

ELECTRICAL SAFETY RULES

October 2024

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1.0 Purpose

To provide minimum safe work practices for persons, when working or testing on, near or in vicinity of the Endeavour Energy network associated with the distribution of electricity.

These Rules form a part of the Endeavour Energy Electricity Network Safety Management System (ENSMS) produced to meet the requirements of the Electricity Supply (Safety and Network Management) Regulation 2014 (or as amended).

The Endeavour Energy network



2.0 Scope

The safety measures prescribed in these Rules are to be observed at all times by Endeavour Energy employees, contractors, and Authorised Persons working for Accredited Service Providers, intending to work* on, near or in vicinity of electrical apparatus.

**Work includes the construction, operation, testing and maintenance of electrical apparatus.*

Work must be carried out in accordance with these Rules and relevant approved procedures and/or approved practices.

Hierarchy of documentation for electrical safety

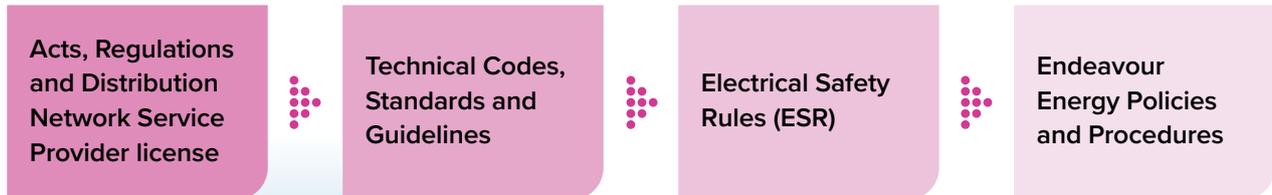
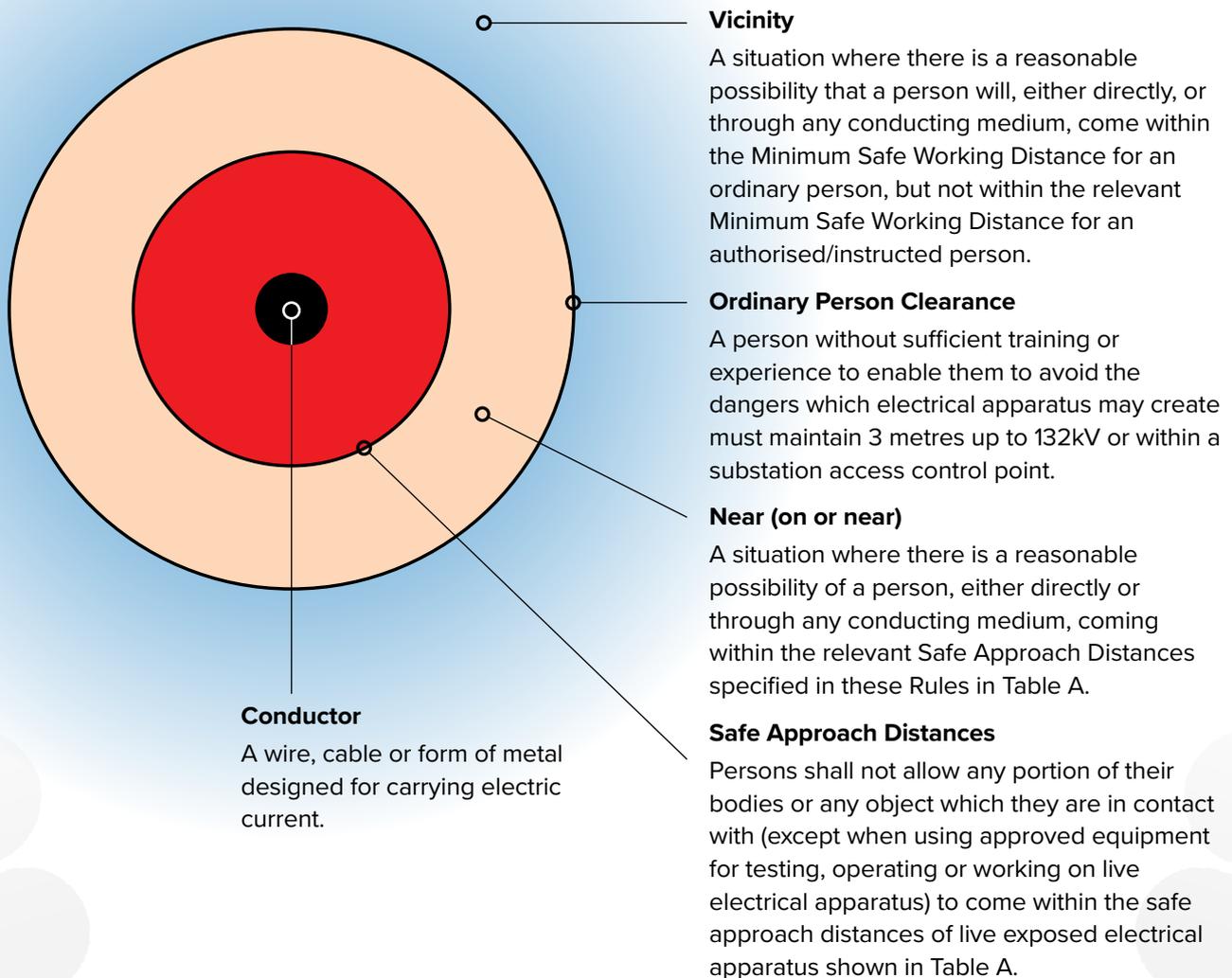


Figure 1 – Application of The Electrical Safety Rules





2.1 Exceptional work

Approval for exceptional work may be given by the **General Manager Safety and Operations** where a change request has been completed, all hazards have been identified, risk assessed, and effective controls measures have been implemented.

For any such approval to be given it must be proved that existing rules and procedures will prevent the work from being done.

An application for approval of exceptional work must be supported by a plan of work, a description of the process to be adopted, a risk analysis, steps to be taken to advise all persons involved of the actions to be implemented and any emergency control measures to be applied.

Applications must be in writing. Approval or refusal of the application will also be in writing.

2.2 Ability to declare rules

The **General Manager Safety and Operations**, upon their approval can declare a rule with immediate effect. Subsequent to the proclamation, a copy of the document must be submitted to the Electricity Network Safety Management System Committee for assessment for permanent changes to the Electrical Safety Rules.

Where amendments occur to the ESR Handbook, the page(s) requiring amendment will be reproduced with the amendment highlighted in 25% grey.

Amendments will take effect following advice of amendments unless specifically otherwise nominated.

Advice of amendments or renewal of the ESR will be provided by the following means:

- in 'The Wire';
- on the Company intranet site;
- on the ASP Portal and through ASP information sessions; and
- during annual electrical safety training.

The Electrical Safety Manager shall be responsible for informing relevant parties of amendments to the ESR to enable this advice.



3.0 References

Endeavour Energy

Board Policy 3.0 – Health & Safety

Company Policy 9.1.10 – Network Electrical Safety

Company Procedure (Health & Safety) GSY 0051 – Health, Safety and Environment Incident Management

Company Procedure (Health & Safety) GSY 1066 – Worksite Hazard and Risk Assessment

Live Low Voltage Work Manual

Live High Voltage Work Manual

Authorisations Manual

Endeavour Energy Electricity Network Safety Management System (ENSMS) (as amended)

MCI0006 – Underground distribution construction standards manual.

Australian Standards

AS 2444: Portable Fire Extinguishers and Fire Blankets

AS/NZS 3012: Electrical installations – construction and demolition sites

AS 4741: Testing of connections to low voltage electricity networks

AS 1418: Cranes, Hoists and Winches

AS 2225: Insulating gloves

International Standards

IEC TS 62073 – Guidance on the Measurement of Wettability of Insulator Surfaces

IEC 60903: Insulating Gloves

Energy Networks Association (ENA)

- ENA DOC 001: National Electricity Network Safety Code

- ENA NENS 03: safe access to electrical and mechanical devices

- ENA NENS 04: safe approach distances to electrical and mechanical devices

- ENA NENS 07: Manual Reclose

- ENA NENS 09: National guidelines for the selection, use and maintenance of personal protective equipment for electrical hazards

- ENA DOC 023: Vegetation management

- ENA DOC 024: Tools and equipment

New South Wales

- Electricity Supply Act

- Electricity Supply (Safety and Network Management) Regulation

- NSW Electricity (Consumer Safety) Regulation 2006

- Service and Installation Rules of New South Wales

- Work Health and Safety Act 2011

- Work Health and Safety Regulation 2011 NSW

Industry Safety Steering Committee (ISSC)

- Guide for height safety within the NSW electricity industry (ISSC 34)

- Guide for Working On, Near or in the Vicinity of the Apparatus of another Network Operator (ISSC 37)

- Guide for Network Operators to Provide Information to the Construction Industry for Working Near Overhead Power Lines (ISSC 32)

- Guide to electrical workers' safety equipment (ISSC 14)

- Guide to Electricity Workers' Escape & Rescue Procedures (ISSC 24)

- Guide to Managing Vegetation near Power Lines (ISSC 3) WorkCover

Codes of practice

- Amenity Tree Industry - Code of Practice

- Work near Overhead Power Lines - Code of Practice

- Work near underground assets – Guide



4.0 Definitions

Shall - indicates a statement is mandatory

Should - indicates a recommendation

May - indicates the existence of an option

For the purpose of these Rules:

Access Authority for work or test

A pre-printed form which, when issued in accordance with a documented procedure adopted by the employer, gives permission to the holder and work party to work on or near, or test, electrical apparatus. It shall:

- define the electrical apparatus on or near which work or test may be carried out;
- describe the scope of the work to be carried out; and
- define the safe area for work.

Accredited service provider (ASP)

An individual or entity accredited in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014 (or as amended). Note: an accredited service provider can be an individual, partnership, or company. (Note: in addition to accreditation issued by the Regulator, an ASP must hold authorisation from Endeavour Energy for work on or near our network.)

Adjacent to energised circuit

Within three (3) meters of bare conductors of an energised circuit.

Anti Islanding Protection

Control system at a source of LV supply, designed to automatically de-energise and remain in that state whilst the network element to which it is connected is de-energised. (Customer installed Low Voltage generation systems with active anti-islanding protection in accordance with Australian Standards are deemed to achieve LV Auto Isolation.)

Apparatus

An item or combination of items of plant or equipment.

Approved

Having appropriate employer endorsement in writing for a specific function.

Authorised person

A person with technical knowledge or sufficient experience who has been approved, or who has the delegated authority to act on behalf of Endeavour Energy, to perform the duty concerned.

Authorised switching officer

A worker, authorised in writing for operation of the network within the limitations specified on their authority card.

Authority to energise

All procedures for the cancellation of Access Authorities, laid down in these Safety Rules, have been carried out and that electrical apparatus may be energised safely.

Barrier

(see **Screens**)

Belly rope

A rope placed midspan over the conductors in a loop to control uplift or sideways movement of the conductors during re-tensioning, raising or lowering.

All pulling and tie down ropes must be a minimum of 16mm diameter polypropylene in good condition and capable of holding the anchor block.

Cable

An insulated conductor or two or more such conductors, laid together, either with or without fillings, reinforcement or protective coverings.

Come along

(See **Wire grip**)

Community Battery

Metered LV network batteries providing network support and energy storage benefits to nearby customers.

Competent person

A person having the skills, knowledge and attributes needed to complete a task.

Conductor

A wire, cable or form of metal designed for carrying electric current.

Crane

A crane or hoist of a mobile or crawler type, or an elevating work platform (EWP) or part thereof and includes the gear ancillary to the use of the crane.

Customer installation

An Electrical Installation owned by a network customer, that may be isolated from the network by removing service fuses, opening main switch(es) or disconnecting service mains.

Danger tag

An approved tag, which when affixed in accordance with approved procedures to a device gives warning against any operation of that device.

De-energised

Not connected to a source of electrical supply but not necessarily isolated.

Disconnected apparatus (completely disconnected)

Electrical apparatus which cannot be energised by operating work because of the absence of electrical connections to any source of electrical supply.

Specifically, to be disconnected apparatus, electrical apparatus must be able to be visually confirmed at any time as being separated from all sources of electrical supply:

- (a) in excess of the specified minimum safe approach distance for authorised persons and be secured to prevent the mains, cables or apparatus coming closer than that distance; or
- (b) by a secured barrier or screen.

Additionally, Network Mains must be earthed and short circuited by approved means at all points of disconnection.

Note that for the purposes of this definition “secured” means by use of permanent line, connection, or other hardware, requiring a tool to install and remove.

Earthed

Electrically connected to the general mass of the earth.

Electrical apparatus (electricity works)

Any electricity power lines or associated equipment or electricity structures that form part of a transmission or distribution system.

Electrical station

Any enclosed substation or switching station, whether of the indoor, outdoor or underground type.

Electrically Qualified

A worker who is trained and competent in an electrical trade of profession such as a linesman, electrical fitter/mechanic, cable jointer, electrical engineer or engineering officer, system electrician distribution powerline worker or other electrically qualified person.

Employee

A worker in the employment of the employer (whether under a contract of employment or apprenticeship) and includes a contractor and a person employed by a contractor, who carries out work for the employer.

Employer

In the case of Endeavour Energy employees and contractors (and their sub-contractors) directly engaged by Endeavour Energy, Endeavour Energy is the employer. For Authorised Persons engaged by an Accredited Service Provider to perform work, the Accredited Service Provider is the employer.

Energised

Connected to a source of electrical supply.

Excavation

Work involving the penetration of the ground or surface of the earth including cutting or caisson, chasing, boring, piercing or the digging of trenches, ditches, shafts, wells, tunnels, drifts and rises below the finished levels of the ground surface or finished ground levels. This also includes works involving the movement or placement of soil or other surface materials by removing, boring or forcing objects into the ground or the surface of the earth.

Exposed conductor

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 and which is in sound condition.

Extra low voltage

Voltage normally not exceeding 50 volts alternating current (a.c) or 120 volts direct current (d.c).

Generating station

Any building or enclosure where electrical energy is able to be generated at high voltage, or at low voltage where the output is transformed to high voltage.

Hazard/risk assessment

The assessment performed by which work processes and locations are assessed to determine the presence of hazards and indicates the appropriate method to safely manage the risk.

Hazardous low voltage or mechanical apparatus

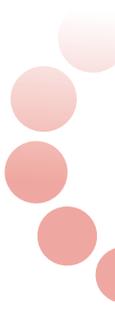
All hazardous low voltage, mechanical, pneumatic, hydraulic or gas filled equipment associated with high voltage electrical apparatus, which may present a danger to persons in certain work situations. It may also refer to low voltage electrical apparatus for the supply of electricity to the public, such as low voltage overhead line or underground cables forming part of the low voltage distribution system and includes alternating current and direct current control and power systems for circuit breakers, transformers, etc. These may be referred to in the Special Conditions section of Access Authorities as ‘local safety precautions’.

High voltage

A voltage normally exceeding 1,000 volts alternating (a.c) or 1,500 volts direct current (d.c).

High voltage cage or room

A fully fenced or walled area, room or compartment identified by a notice, containing exposed high voltage conductors which do not maintain standard safety clearances.



High voltage cages or rooms may be located within high voltage switchyards or elsewhere. Entry to High Voltage Cages or rooms is only permitted under Access Authority. (Note: Entry for operating work by appropriately authorised persons is permitted provided that Safe Approach Distances can be maintained.)

Instructed person

A person adequately advised by an Authorised Person or who has sufficient training and experience in the safety requirements for the work being undertaken to enable them to avoid the dangers which electricity may create.

Insulated

Separated from all other possible conductors by a rated value of non-conductive material, as in a covering or barrier, or by sufficient gap in air to prevent flashover or short circuit.

Isolated (or isolate)

Disconnected from all possible sources of electrical energy by opening switches, withdrawing circuit breakers, removing fuses, opening links, opening connections, tying back bonds and rendering them incapable of being made live unintentionally by the application of danger tags (and locks where possible).

Live

Connected to a source of electrical supply or subject to hazardous induced or capacitive voltages.

Live line indicating devices

Includes any testing equipment, such as live line testers, used for proving high voltage electrical apparatus live or de-energised.

Live line work

The application of approved techniques by trained, qualified and authorised persons on live high voltage electrical apparatus. It includes all work performed on the components of a line energised at, or capable being energised to high voltage due to isolation, earthing and short circuiting and the issuing of an Access Authority not being carried out.

Low voltage

A voltage normally exceeding 50 volts alternating current (a.c) or 120 volts direct current (d.c), but not normally exceeding 1,000 volts alternating (a.c) or 1,500 volts direct current (d.c).

Low Voltage Access Authority (LVAA)

A pre-printed form which, when issued in accordance with a documented procedure adopted by the employer, gives permission to the holder and work party to work on or near, or test, electrical apparatus (usually associated with network LV only isolations) where an Access Authority is not required.

LV Protective Bonds (LVPBs)

Approved bonds which short circuit all phase, neutral and streetlight conductors when required under these Rules.

Mains (Network Mains)

Conductors, including cables and earthing conductors, owned or leased by Endeavour Energy and forming part of the network, but not including control, protection, communications, or other secondary system conductors.

Mid span hold down device

A stringing block securely attached to the conductor being worked on to prevent excessive upward movement at midspan. The device must be securely anchored to the ground such that the upward load of the conductor will not release the anchorage. The conductor must be free to move within the device to allow for pulling and tensioning.

Megger

To carry out an insulation test, or continuity test on electrical apparatus using an insulation tester. (Note: 'Megger' is a commonly used term which is also a commercial brand name.)

Mobile plant

cranes, elevating work platforms, tip trucks or similar plant, any equipment fitted with a jig or boom and any device capable of raising or lowering a load.

Near (on or near)

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 specified in these Rules in Table A.

Network

All of the electrical apparatus used in the supply of electricity. The terminology adopted to describe the various elements of the network includes:

- Transmission Network - All electrical apparatus operating at nominal voltages of 33,000 volts a.c and above.
- High Voltage Distribution Network - All electrical apparatus operating at nominal voltages above 1,000 volts a.c and less than 33,000 volts a.c.
- Low Voltage Distribution Network - All electrical apparatus operating at nominal voltages between extra low voltage and 1,000 volts a.c. (excluding low voltage apparatus downstream of a customer connection point as defined in the Service and Installation Rules of New South Wales)

Network Battery

Unmetered batteries providing network support only (could become community batteries in future)



Network operator

For the purpose of these Rules and the network to which they apply, Endeavour Energy is the network operator. Other Network Operators in New South Wales are:

- Ausgrid
- Essential Energy
- Sydney Trains
- Transgrid

Neutral conductor

The conductor of a low voltage system which is earthed at its origin.

Observer / Safety Observer

Is a worker whose sole duty is to observe the work that is in progress and to ensure that work is carried out in accordance with approved procedures and these Rules. A safety observer may carry out the duties of a nominated rescuer if competent to do so.

Operational earths

Earthing and short circuiting equipment applied to electrical apparatus to satisfy the requirements for the issuing of an Access Authority, as distinct from working earths. Operational earths may only be applied or removed, with the approval of the System Operator.

Operational Protective Bonds (OPB)

Approved bonds which short circuit all phase, neutral and streetlight conductors to satisfy the requirements for the issuing of an Access Authority, as distinct from Working Protective Bonds. Operational Protective Bonds may only be applied or removed, with the approval of the System Operator.

Operating Agreement

A written agreement on which an undertaking is given by an authorised person for a network operator or other organisation, that the electrical apparatus specified will remain isolated and/or earthed until the written agreement has been cancelled. The document is used in cases where the Network Operator or organisation concerned is undertaking switching operations for the other party. (An Operating Agreement is not an Access Authority.)

Operating work

Work involving the following:

- operation of switching devices, links, fuses, or other connections intended for removal or replacement;
- locking and tagging electrical apparatus;
- proving electrical conductors de-energised, earthed, and short-circuited;
- issuing of Access Authorities and Operating Agreements; and

- the application of a procedure endorsed by the Electrical Safety Committee, in the use of approved testing equipment for commissioning activities where Access Authority for Test conditions cannot be met.

Ordinary person

A person without sufficient training or experience to enable them to avoid the dangers which electrical apparatus may create.

Overhead line

An aerial conductor together with insulators, hardware, cross arms or other associated electrical equipment erected or in the course of erection out of doors for the purpose of supplying electricity. It does not include any pole or support located within a fence surrounding an electrical station.

Personal issue

Means the issue of an Access Authority where there must be direct instruction by the Issuer to the Holder during the issuing process.

Phasing/phased

A test to determine whether energised conductors may be satisfactorily connected together.

Qualified

A worker who is trained and competent to use appropriate skills to complete a given task.

Rescuer / Nominated rescuer

A worker, competent to carry out the appropriate rescue and resuscitation in constant communication with the work party and located such that no delay in carrying out a required rescue will occur. Specifically the rescuer must be at the work site where the rescue would be required.

Safety device

A device, interlock or system attached to plant, equipment or apparatus that prevents unintended operation.

Safety document

A safety document is an electronic document which captures the Access Authority or Operating Agreement number and references the switching plan number. Listed on the safety document is the job description, isolation points, earthing points as well as the issue and acceptance details.

Screens (screened)

A barrier of either insulating material or conductive material fitted with an earthing bond suitable for connection to earth medium.



Spiking

Driving a metal spike into a screened cable ensuring that at least one core of the cable is connected to the metal sheath or screen using approved cable spiking equipment.

SWER

The single wire earth return system.

Switching folder

A printed envelope which documents all Access Authorities for Work or Test, Operating Agreements, secondary documents or LVAA forms issued and cancelled and associated conditions for the associated work site including the connection of earthing apparatus. Access Authorities, hazard assessments and all switching instructions shall be stored in the folder. All associated paperwork shall be returned to the folder and the folder returned for filing.

Switching plan

A written sequence of actions to operate equipment on the high voltage and/or the low voltage network.

Switching station/switch yard

Any premises or structure containing or carrying electrical apparatus, but does not include any structure carrying only one switch and/or fuse unit (such as an air break switch).

System Operator

The authorised person responsible for the operation of all or a designated part of the electrical network.

Totally enclosed electrical apparatus

Electrical apparatus in which the conductors are totally enclosed within it and which can only be exposed by unbolting or unlocking covers or shutters which prevent normal access. High voltage insulated cables with metallic earthed screens shall be regarded as totally enclosed apparatus.

Vehicle

A truck (non-tipping), car utility or other general purpose conveyance used for the carriage of persons or goods.

Vicinity

A situation where there is a reasonable possibility that a person will, either directly, or through any conducting medium, come within the Minimum Safe Working Distance for an ordinary person, but not within the relevant Minimum Safe Working Distance for an authorised/instructed person.

Voltage

Potential difference between conductors and between conductors and earth.

Warning tag

A tag affixed to apparatus giving a warning against the operation of the apparatus due to defect, change of normal condition or operation, or unusual situation.

Wire grip

Cable grips, wire grips or come along clamps are used for tensioning, pulling or stringing of wires, overhead conductors and cables.

Work area/site

A location at which work is to be performed. Under Access Authority conditions the Access Authority defines the work site. Where live line work is within a work site, it takes precedent over all other work.

Worker

A person is a worker if the person carries out work in any capacity for a person conducting a business or undertaking, including work as:

- (a) an employee; or
- (b) a contractor or subcontractor; or
- (c) an employee of a contractor or subcontractor; or
- (d) an employee of a labour hire company who has been assigned to work in the person's business or undertaking; or
- (e) an outworker, ie, a person who performs work for an employer at their own home or at another location that is separate from their employer's factory, workshop, office or worksite; or
- (f) an apprentice or trainee; or
- (g) a student gaining work experience; or
- (h) a volunteer.

Working earths

Earthing and short circuiting equipment erected, in addition to operational earths, to fulfil the requirements of these Rules.

Working Protective Bonds (WPB)

Approved bonds which short circuit all phase, neutral and streetlight conductors in addition to Operational Protective Bonds, to fulfil the requirements of these Rules.



5.0 Authorisations, training and competency

5.1 Authorisations Manual

Endeavour Energy publish an Authorisations Manual that is developed for workers and their managers to outline the purpose of authorisation functions, detail the various authorisation functions requirements for work on or near the network, the process of becoming authorised and the requirements to access the network.

This manual exists as a standalone document that shall be read in conjunction with these rules.

5.2 Individual competency

Authorisation functions are developed as part of an overall safety management system. They provide assurance that individuals working on or near the network have the necessary knowledge and skills to perform particular tasks (or functions) safely.

The authorisations framework incorporates various functions that define the competency requirements for performing tasks on or near the network. These are broken into categorised profiles such as switching, permit recipients, substation access requirements and trade-based role outcomes, etc.

The authorisations framework additionally contains specific functions deemed as having a significant impact on network integrity, high risk tasks or requiring a high level of ongoing competency management. The competency requirements are designed to provide assurance for the ability of an individual to adequately identify, assess and control electrical safety hazards. They do not, however, provide assurance of the quality of work outcomes.

The authorisations framework is designed to assist the understanding of the competency requirements required for various tasks. It does not substitute the necessary oversight managers must have over their workers when working on or near Endeavour Energy's network.

5.3 Authorisation application

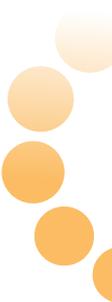
Applications must be accompanied by valid evidence that all competency requirements as defined in the specific authorisation function have been met.

Managers are required to confirm applicants have been sufficiently exposed to a variety of work/tasks of significant complexity on the network (relevant to the specific functions to be held) in order to maintain knowledge and/or skills in order to adequately identify, assess and control electrical safety hazards.

This may be undertaken through a variety of means such as but not limited to: having a comprehensive oversight over work schedules/ programs, regular workplace and onsite interactions, documenting safety toolbox talks, collating workplace forms and other documented evidence, independent third-party references from a previous employer/supervisor, verification of competency assessments, etc.

Figure 2 – Authorisation process steps





Specifically, this is a three-stage process where an individual completes all necessary required training in addition to holding any required qualification(s).

The individual's line manager attests to the competence of the individual, and finally, submits the necessary documentation for the authorisation to be issued.

For company employees, the declaration of competency must be signed by the authorised person's line manager or higher. For employees of ASPs, contractors to the company or employees of other network operators, the declaration of competency must be signed by an appropriately delegated officer of the authorised person's employer.

Application forms, certificates, training transcripts and other forms of valid evidence will be electronically stored in the company authorisation database.

Note: An applicant is not authorised until an Authorisation card or certificate is issued.



6.0 General

Basic Safety Principles

**ALL ELECTRICAL APPARATUS SHALL BE REGARDED AS LIVE
UNTIL PROVED DE-ENERGISED.**

Contact with live electrical apparatus will cause severe injury or death.

In all cases of electric shock or suspected electric shock the victim shall immediately be transported to hospital or medical centre for treatment.

All cases of electric shock or suspected electric shock shall be reported as required by Company Procedure (Health & Safety) GSY 0051 – Health, Safety and Environment Incident Management.

Hazard and risk assessments shall be carried out for all types of work performed under these Rules.

6.1 Training and qualifications

6.1.1 Employer responsibility

The employer shall ensure that appropriate training courses and assessments have been undertaken for the respective workers so that they can carry out the required tasks safely and competently (see Section 5.0).

6.1.2 Worker responsibility

A worker shall not carry out work on or near the network unless the worker has been authorised to carry out the specified function. Authorisation requires that the worker:

- has received training which is appropriate for the type of work concerned; and
- is capable to safely perform the work required to be undertaken; and
- has demonstrated competency of the relevant work procedures and safety instructions; and
- has, during the previous 12 months, received appropriate instruction in the following procedures that are relevant to the nature of the work:
 - resuscitation;
 - releasing a person from live electrical apparatus;
 - rescuing a person from a pole, structure or elevating work platform; and
 - rescuing a person from a confined space.

All persons required to work in construction areas must hold a SafeWork NSW 'General Construction Induction' card. Visitors to construction areas shall be inducted into the site and supervised.

6.2 Reporting of electrical incidents/accidents

All electrical incidents and accidents shall be reported as required by Company Procedure (Health & Safety) GSY 0051 – Health, Safety and Environment Incident Management.

In all instances of incident or accident it is the workers responsibility to make the site safe, notify appropriate personnel, apply first aid where required and secure the site.

6.3 Reporting hazardous electrical situations

All hazardous electrical situations shall be guarded until made safe and shall be reported as soon as possible to the System Operator.

Any person observing someone committing a breach of these Rules shall warn them of the hazard involved and then report the matter to the person's supervisor or their own manager or supervisor. **Safety devices shall not be tampered with or bypassed in any way while the equipment the device is attached to is in service.**



6.4 Safe approach distances (SAD)

6.4.1 Safe approach distances for Authorised Persons and Instructed Persons

Persons shall not allow any portion of their bodies or any object which they are in contact with (except when using approved equipment for testing, operating or working on live electrical apparatus) to come within the safe approach distances of live exposed electrical apparatus shown in Table A.

Table A – Safe Approach Distances for Authorised Persons and Instructed Persons

Nominal Voltage (a.c volts)	Safe Approach Distance (mm)	
	Authorised Person	Instructed Person
Up to and including 1,000	500	1000
Above 1,000 up to and including 22,000	700	1200
Above 22,000 up to and including 66,000	1000	1500
Above 66,000 up to and including 132,000	1500	2000
Above 132,000 up to and including 220,000	2500	3000
Above 220,000 up to and including 330,000	3000	3500
Above 330,000	4000	4500

6.4.2 Safe Approach Distances for ordinary persons

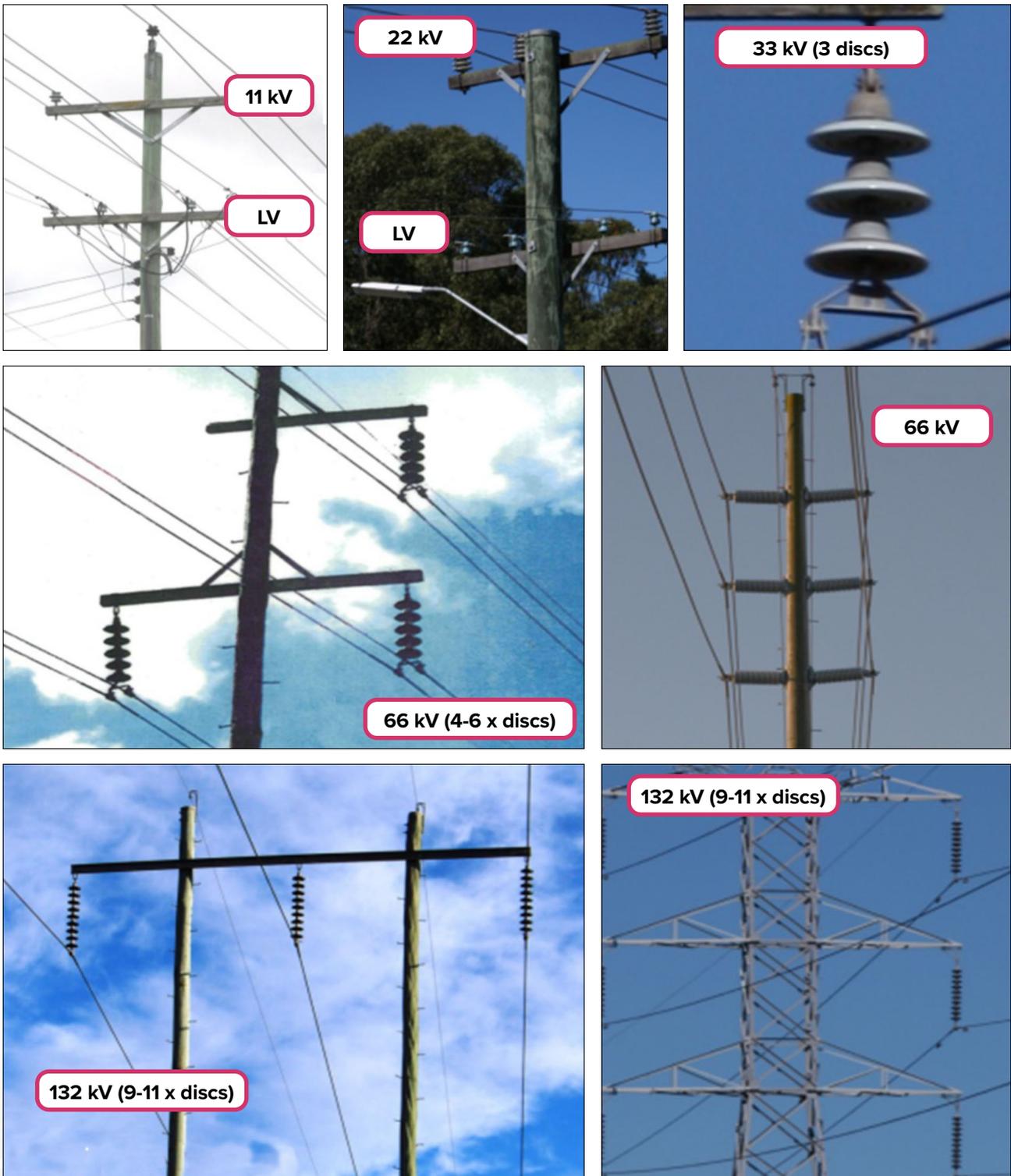
Ordinary persons shall maintain the Safe Approach Distances given below in Table B.

Table B – Safe Approach Distances for Ordinary Persons

Nominal Voltage (a.c volts)	Minimum safe approach distance
Up to and including 132,000	3.0 metres
Above 132,000 up to and including 330,000	6.0 metres
Above 330,000	8.0 metres



Figure 3 – Examples of nominal voltages and apparatus



6.4.3 Safe Approach Distances for operating plant in close proximity to electrical apparatus

The operation of plant in the proximity of live overhead lines (which includes cranes and elevating work platforms) is governed by the WHS Act 2011, the WHS Regulation 2017 and associated Codes of Practice.

A safety observer is required at all times whilst plant is operated *within* the *Safe Approach Distances* given in Table B regardless of whether the apparatus is energised or de-energised.

Note: If there is no safety observer for an authorised or instructed plant operator then the operator shall revert to the Table B clearances.

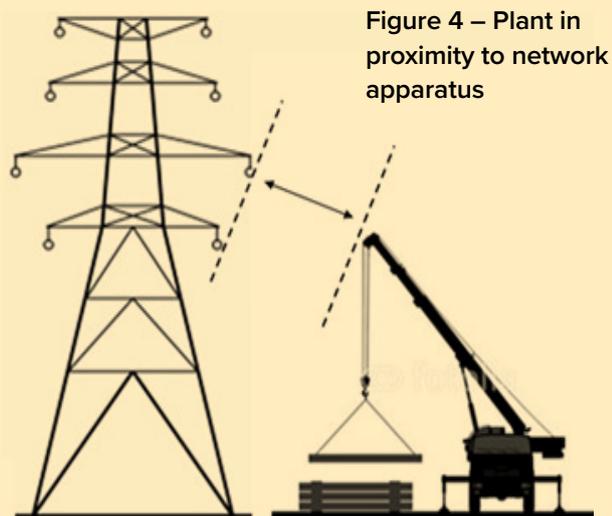


Figure 4 – Plant in proximity to network apparatus

When loading or unloading equipment using plant, great care shall be taken to ensure that no part of it, or its load, comes within the safe approach distance relevant to the voltage concerned.

The safe approach distance for plant operated by workers who have not been authorised is given in Table B above. For plant operated by authorised or instructed persons, Safe Approach Distances given in Table A above can apply.

The authorised operator is responsible for ensuring there is a safety observer in place at all times during plant operation within the approach distance provided in Table B. The safety observer shall:

- be authorised to observe plant operating near overhead electrical apparatus; and
- while the plant is in motion, only have the duty to observe the operation of the plant; and
- only observe one item of plant at any one time.

The safety observer working with an EWP must be competent to carry out the role of nominated rescuer and be familiar with the emergency procedures for the EWP they are observing. Under emergency conditions, the safety observer may operate the plant for the purpose of rescue without another observer being required.

Workers shall not be in contact with any part of the plant and the ground or earthed situation during the period the plant is being operated within the safe approach distance given in Table B above.

The authorised operator may operate the controls of the plant while standing on the ground or while in contact with an earthed situation only if one or more of the following provisions are complied with:

- the controls are effectively insulated for the nominal voltage of the conductors near the plant;
- for plant operating near low voltage apparatus only, the operator wears low voltage insulating gloves and approved outer gloves on each hand;
- the operator stands on an equipotential metallic mat which is electrically connected to all metalwork associated with the controls; or
- radio or similar controls with no physical connection to the plant are being utilised and the operator is located further from the plant than the distances specified in Table A.

Note that any plant, including the controls, or any load carried or moved by the plant, or any tools, may be considered to be insulated only if they comply with the insulation requirements of a relevant Australian Standard, is appropriately labelled, and the test certificate is in date. The insulated portions of the plant shall be clearly identified by appropriate markings and/or labels.

The plant must bear the notices depicted in the WorkCover Code of Practice for Work Near Overhead Power Lines which must be visible to the operator at each set of controls.



6.4.4 Safe Approach Distances for scaffolding in close proximity to electrical apparatus

When metal scaffolding or other portable metal structures are being erected, moved or used in electrical stations or elsewhere, the provisions of the AS 4576, 2020 and the Guide to Scaffolders, shall be observed at all times. This requires a minimum clearance of four (4) metres to be maintained, unless the electrical apparatus being worked on has been isolated, earthed and short-circuited, and an Access Authority has been issued.

Scaffolding that is closer than four (4) metres to any exposed live electrical apparatus in an electrical station shall be earthed by a trailing earth, capable of carrying the maximum prospective fault current, to the electrical station earth grid.

6.4.5 Safe Approach Distances and practices for excavation near underground cables

Prior to commencing any excavation work, a search shall be conducted to identify and locate any underground cables that may be in the vicinity of the excavation. For planned work, this includes contacting the Before You Dig Australia service (www.BYDA.com.au) and reviewing network asset information where available.

When working in emergency or unplanned situations, it is not possible to obtain BYD plans prior to work. In these situations, controls will include, but not limited to:

- Review of area for indications of underground services
- Potholing with care to determine depth and direction of services
- Hand excavation when within 150mm of services or beyond hard cover
- Excavation in small increments using a scraping motion
- When using plant to excavate, the plant operator is to confirm they remain in constant communication with the safety observer and follow all instructions

The location and depth of the bottom ducts/cables must be identified by potholing. This can be carried out by either non-destructive or manual excavation techniques to confirm their position.

Non-destructive excavation must not exceed 2000 PSI. Any method of excavation utilising pressure that exceeds 2000 PSI must be classed and treated as powered excavation.

For an unauthorised excavator operator, powered excavation shall not be carried out closer than 600mm to underground cables. This distance can be reduced to 300mm if it is known that only low voltage cables are in the area, such as underground service cables.

Powered excavation may be used to expose the hard cover or to 150mm above the cable if:

- the machine operator is authorised to excavate near the network; and
- they operate under the constant direction of a person authorised to observe excavation work.

The cable can be exposed for the length of the excavation by manually removing the hardcover and additional soil or sand.

Once exposed, mechanical excavation may then be carried out to 75mm beside the cable by an authorised operator under the constant direction of an authorised observer with a toothless bucket attachment.

Chasing alongside ducts/conduits shall only be done in a scraping manner. The level will be reduced in 50mm intervals using a scraping motion, not a digging or lifting motion. This process is to be repeated to achieve the desired depth and width of excavation, using a toothless bucket attached to a backhoe or excavator.

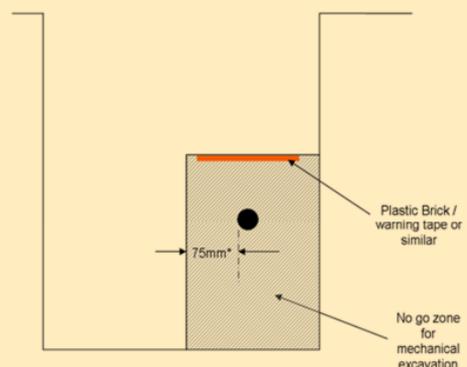


Figure 5 – Cable excavation clearances

If a cable is known or suspected to have been damaged during excavation, it shall be:

- regarded as live;
- guarded from a safe approach distance of eight (8) metres by a responsible person once found; and
- remain guarded (unless extreme circumstances exist) until made safe or repaired in accordance with these Rules.





6.4.6 Absolute limits of approach to live exposed conductors

An authorised switching officer or high voltage test technician using an insulating stick, approved high voltage test equipment, or approved earthing equipment, may reduce the safe approach distance to the absolute limits of approach in table C below.

Under no circumstances may a worker come closer to live exposed conductors than the distances in Table C unless approved high voltage live work techniques are used.

Table C – Absolute Limits of Approach to Live Exposed Conductors

Nominal Voltage (a.c volts)	Absolute Limit of Approach (mm)
Above 1,000 up to and including 22,000	300
Above 22,000 up to and including 33,000	400
Above 33,000 up to and including 66,000	700

6.4.7 Safe Approach Distances for Drones and Remotely Piloted Aircraft Systems

Drones and other remotely piloted aircraft systems must maintain at least 1500mm from powerlines and exposed electrical apparatus. A drone shall not be flown directly below or parallel (at the same altitude of conductors) to overhead conductors because in the event of signal loss, they automatically rise and 'return to base'.

6.4.8 Trenchless excavation approach distances

Cables must be de-energised, isolated and earthed before commencement of the intended works when working within:

- 1 metre of existing distribution cables
- 3 metres of existing transmission cables (measured from any direction)

6.4.9 Excavation adjacent to structures

Trenching adjacent to existing structures presents a stability hazard on the structure when excavation works are carried out and the ground conditions are compromised.

When preparing for excavation in proximity to an existing structure, it is critical that sufficient fill remain around the base of the structure.

A zone of influence ratio of 1:1 shall be applied at all times (eg: if the excavation is 1m deep, 1m of ground fill must remain around the structure).

Where this cannot be achieved, and/or where ground conditions are adversely affected; the excavation void must be stabilised via mechanical support (i.e.: shoring) and/or supporting the structure via mechanical means (i.e.: crane, piling, temporary stays, etc.).

If supporting a structure via mechanical means, the loading and the forces exerted on the structure itself must be assessed (existing and potential changes).

Figure 6 – Excavation adjacent to structure



6.5 Communication

Persons communicating with a System Operator via a radio or telephone shall identify themselves and should state the place from where they are speaking. The person transmitting the message is responsible for ensuring it is received correctly. **Operating messages shall be repeated by the receiver to the sender for confirmation.**

Facilities for emergency communications shall be available at all work sites. All workers normally on site shall be aware of and be instructed in the correct use of these facilities.





6.6 Emergency conditions

During an emergency the System Operator may request any competent person to carry out work that may, in the opinion of the System Operator, be necessary to make the network safe.

Under emergency conditions, to save life or protect property:

- switching may be carried out by any competent person; and
- the System Operator shall be notified as soon as possible after such emergency operations; and
- the switch shall not be operated again without the System Operator's approval.

Note: Where risk to human life exists electrical apparatus shall be isolated, earthed and short circuited as required by these Rules. Rescue may then be carried out without the issue of an Access Authority under the immediate supervision or direction of the isolating officer.

6.7 Fallen conductors

All fallen conductors shall be:

- regarded as live;
- guarded from a safe approach distance of eight (8) metres by a responsible person once found; and
- remain guarded (unless extreme circumstances exist) until made safe or repaired in accordance with these Rules.

There may be high or low voltage conductors down or both and these may be intermixed. Precautions shall be taken to manage any risks from step and touch potentials.

The fallen conductors shall be identified by an authorised person.

If unqualified or unauthorised workers encounter a fallen conductor, they must guard that conductor but remain eight metres away. A call must be made to the Control Room immediately via 131 003.

Workers must not approach the conductor at any time, and they must do whatever is possible to keep other workers in the vicinity of the conductor as far away as possible.

The safe approach distance to fallen overhead conductors is eight metres. This safe approach distance from live fallen conductors prevents the step potential (across the body from foot to foot), from being greater than 32 volts.

Considering the effect of concrete footpaths and variations in ground conditions, the Safe Approach Distances have been worked out using typical soil resistivity readings taken across the company's geographical area.

6.7.1 Making safe fallen low voltage conductors

Fallen low voltage conductors, including streetlight conductors, shall be made safe by:

1. Being isolated in accordance with section 7.1.2 for the purpose of issuing an AA or LVAA; or
2. Operating low voltage switchgear(s) and applying a warning tag(s) to these switching points; or
3. Using live LV work procedures to:
 - a. Un-bond or cut away and apply a warning tag(s) at the point(s) of disconnection; or
 - b. Where the integrity of the insulation has been assessed and it has been confirmed that it is safe to do so, insulated or covered service mains may be rolled up and secured at least 3.5m high so as to be out of reach of the public ensuring all exposed conductors are covered (i.e temporary insulation). If there is any doubt about the insulation integrity, the fallen low voltage conductors shall be isolated or disconnected (unbonded or cut away).

A Warning Tag shall be applied to the adjacent structures advising of the actions taken and the dispatcher or System Operator shall be advised of all actions taken.





Live working techniques shall be used when work is not being carried out under LVAA or AA conditions in accordance with 71.2 of these rules.

Streetlight conductors that cannot be made safe by the above means shall be short-circuited using LVPBs or portable earthing equipment.

Under emergency conditions, to save life or protect property:

- Switching may be carried out by any competent person;
- and The System Operator shall be notified as soon as possible after such emergency operations;
- and The switch shall not be operated again without the System Operator's approval.

Note: Where risk to human life exists electrical apparatus shall be isolated, earthed and short-circuited as required by these Rules. Rescue may then be carried out without the issue of an Access Authority under the immediate supervision or direction of the isolating officer.

Caution: There may be high voltage conductors down as well, and these may be tangled in the Low Voltage conductors.

Before attempting to work on any fallen conductors, it is essential to establish that either no high voltage conductors are involved, or any fallen high voltage conductors have been isolated and proved de-energised (before earthing).

When proving low voltage fallen conductors de-energised using a contact tester, a temporary earth stake shall be used, driven into the ground at least 1.5 m away from any fallen conductors.

6.7.2 Making safe fallen high voltage conductors

Fallen **high voltage** conductors shall be managed as follows:

- treat the fallen conductors as live; and
- under instructions from the System Operator, isolate and Danger Tag the points of isolation; and
- prove de-energised by approved means; and
- earth and short circuit in accordance with approved procedures.

Alternatively, following proving de-energised, the fallen conductors may be made safe using live line cutters by an authorised person in accordance with approved procedures.

An Access Authority shall be issued before any work is carried out on the fallen conductors, including relocation, in accordance with these rules.

The System Operator shall be advised of all action taken.

Note: In cases of extreme emergency, involving danger to life or property, it will not be necessary to issue an Access Authority, providing the conductors are first isolated, proved de-energised, earthed and short circuited in accordance with these Rules.

6.8 Safety equipment

6.8.1 Duty of personnel regarding safety equipment

It is the duty of every person working on or near electrical apparatus:

- to use only safety equipment approved by the employer; and
- to use in a proper manner the safety equipment provided for its intended purpose; and
- to satisfy themselves that safety equipment is in good condition and working order prior to use; and
- to maintain and care for safety equipment.

Before use, all safety equipment shall be examined by the worker. If found to be defective, damaged or beyond the required test dates:

- it shall not be used; and
- it shall be identified as defective with a Warning Tag; and
- the worker's supervisor shall be informed, as soon as practicable, so that a replacement for such equipment can be arranged.





6.8.2 Protective Clothing

This clause is specific to protective clothing requirements for work covered under these rules and is exclusive of any additional general safety PPE requirements.

All workers shall wear protective clothing when undertaking any activity on or near the network within the scope of these rules. Specifically, protective clothing is required to be worn by a worker when:

- Carrying out electrical operating work, unless operating remotely;
- Working or testing on or near live electrical apparatus;
- Working on or testing earthing conductors;
- Operating or observing plant on or near live electrical apparatus;
- Carrying out the role of a nominated rescuer for work on or near the network;
- Signed on to an Access Authority or Low Voltage Access Authority; or
- Identified on the Worksite Hazard and Risk Assessment or Safety Management Plan.

The minimum protective clothing worn within the scope of these rules shall:

- cover the body from neck to wrist to ankle. Shirt, coat or jacket, and/or overalls shall be fastened at both wrist and neck area;
- be arc rated and flame retardant, with a minimum arc rating of 4 cal/cm²;
- be worn such that shirts must be tucked into trousers and sleeves must be rolled down and fastened to protect against entanglement and arc flash injury;
- have non-metallic fasteners or have fasteners protected by a layer of the same material as that of the garment on both the top and undersides; and
- be maintained in accordance with the manufacturer's instruction.

When applied to arc rated flame retardant clothing, retroreflective material shall be flame retardant.

Wet weather clothing and cold weather clothing worn when working on or near the network should comply with the requirements above. Where it does not comply, it shall be worn over at least one layer of protective clothing described above.

Additionally, approved safety footwear shall be in good condition and worn for all work on or near electrical apparatus.

People visiting site performing administrative or observation-type activities where there is no reasonable possibility of coming on or near live electrical apparatus are excluded from this requirement however are required to wear long sleeved shirt, long trousers and flat, enclosed footwear.

All clothing and materials are to be regarded as conductive unless there is definite knowledge to the contrary.

The wearing or carrying of personal metal effects such as keys, metal banded watches, bracelets, metal belts, clothing with metal thread woven into it, metal zips, cigarette cases, ear rings, body piercings, necklaces, rings, mobile phones, etc., constitute a danger when working on or near live electrical apparatus.

Such effects shall be removed from the person to minimise the risk of injury and objects falling from pockets.

Only approved items may be worn provided it is worn over at least one layer of protective clothing as described above.

Long hair must be secured against becoming caught in machinery or equipment.

Clothing and safety footwear shall be in good order and repair. Clothing shall have no holes, missing or broken buttons, fasteners or zips.

6.8.3 Hardhats

Only approved hardhats shall be used.

Before use, hardhats shall be inspected for any signs of deterioration. Hardhats shall not be modified in any way. Approved stickers or labels designed for the purpose are acceptable.

Damaged hardhats shall be discarded and replaced.





Under no circumstances should a hard hat be worn over any headwear such as a sun hat, cap, or beanie, unless specifically approved for this purpose. These items present a fire risk, and reduce the effectiveness of the helmet's internal webbing and protective structure that is designed so that the helmet is a snug fit around the wearer's head.

Hardhats shall only be cleaned with soap and water or mild household detergent.

Hardhats are required to be worn in the following situations:

- In outdoor areas of electrical stations, and within cable basements;
- When working or testing on or near any live electrical apparatus (excluding tunnel boards, control panels or meter boards where the helmet would unduly restrict vision or reduce the wearer's ability to move within a small space);
- When carrying out electrical operating work (unless operating remotely or where the helmet would reduce the wearer's ability to move within a small space);
- When working in an area where cranes or plant, including elevating work platforms are operating;
- When mechanical lifting/cable pulling is taking place within operating reach of the crane or plant; or
- Where there is a risk of being struck by falling objects.

6.8.4 Harnesses

Only approved harnesses shall be used.

- Any person working in an elevated position where a fall is possible, including all work in elevating work platforms shall use an approved harness and lanyard.
- Before trusting their weight to the harness and lanyard, persons shall ensure that all fastenings are properly engaged.
- Before use, harnesses and lanyards shall be inspected for any visible failure, malfunction or deterioration.

6.8.5 Low voltage insulating gloves

Only approved low voltage insulating gloves and approved outer gloves shall be used.

- When working or testing on or near live low voltage electrical apparatus that is not adequately screened or insulated, approved low voltage insulating gloves and approved outer gloves shall be worn on each hand.
- This requirement extends to working or testing distribution substation earthing systems.
- Where there is a risk of exposure to transferred or step and touch potential, approved low voltage insulating gloves and approved outer gloves shall be worn on each hand.
- Approved low voltage insulating gloves and approved outer gloves shall be worn on each hand when operating Air Break Switches and metal clad switchgear on the Distribution Network except where suitably rated operating equipment is used.
- Approved low voltage insulating gloves and approved outer gloves shall be worn on each hand when operating low voltage switchgear and fuses (including on customer's installations).
- Approved low voltage insulating gloves and approved outer gloves shall be worn on each hand before contacting or accessing customers equipment when conducting fault and emergency investigations on customers installations.
- Other types of gloves shall not be used for these purposes.

Low voltage insulating gloves shall comply with one of the following standards:

- AS 2225 (superseded) - '650 Volts Working' voltage rating.
- AS 60903 – Class 00 or Class 0
- IEC 60903 – Class 00 or Class 0
- EN 60903 – Class 00 or Class 0
- ASTM D120 – Class 00 or Class 0

An exemption from these requirements may only be granted for work being undertaken in accordance with a procedure including a risk assessment, as approved by the Electricity Network Safety Management System Committee.

Before use, the insulating gloves shall be inspected for any damage, discolouration or perishing, and air leak tested for a period of not less than 20 seconds. Any glove that is not in optimum condition, eg, cracking, stickiness, discolouration, contact with chemicals or any other form of deterioration or damage shall be discarded.



The recommended best practice is to use a glove inflation tool as shown in figure 7.

Figure 7 – Insulating glove air test



Recommended best practice is to use a glove inflation tool.

Stock Code: 1000010020



Step 1

Hold the glove, insert glove into inflation tool as shown.



Step 2

Roll up glove to trap the air in the palm/finger area of glove.



Step 3

Hold the glove next to ear to listen and feel for air leaks for a minimum of 20 seconds.

If the glove deflates, don't use gloves, dispose pair of gloves and replace.

Rings, watches and other jewellery shall not be worn on hands and wrists when wearing low voltage insulating gloves as they can cause mechanical damage and pose an electrical hazard.

Avoid mechanical damage to insulating gloves caused by abrasion and sharp edges. Replace approved outer gloves if there is any concern, they may compromise the insulating properties when working live.

Insulating gloves shall be stored:

- in their natural shape, removed from outer protective gloves, in a cool, dark and dry place, inside a canvas/ leather bag, or a box specifically designed for that purpose; and
- away from chemicals, direct heat, and out of direct sunlight.

Tools and equipment must not be stored in the same bag as insulating gloves.

If insulating gloves are to be cleaned, they are to be washed with mild soap and water and allowed to dry before storing.





6.8.6 Eye / Face protection

Only approved eye protection shall be used. Eye protection is required to be worn in the following situations:

- In all situations posing a risk of injury to sight;
- When carrying out electrical operating work (unless operating remotely);
- When working or testing on or near live electrical apparatus, including inside tunnel boards and control panels, and during all Live Line Work; and
- Arc rated face shields required for all ground based field switching (except metal clad HV switchgear).

6.8.7 Low voltage detectors

Only approved low voltage detectors shall be used.

- Before every use, each detector must be proved for correct operation using either a source of low voltage supply (another in service conductor) or an approved checking device supplied by the employer.
- The detector must be proved both immediately before and after any no indication result.
- Detectors should also be inspected for any signs of damage, cracks in insulation or other defects before every use.
- Detectors shall not be modified in any way

6.8.8 Low voltage indicating devices (volt sticks)

Only approved low voltage indicating devices shall be used.

Low voltage indicating devices shall not be used for proving de-energised. They provide an indication only.

It is the worker's responsibility to carry out suitable tests and checks prior to working on any low voltage electrical apparatus.

6.8.9 Ladders

Only approved ladders such as timber or fibreglass shall be used for work on or near electrical apparatus.

- Persons shall satisfy themselves that the ladder is in a safe condition before trusting their weight to it.
- The ladder shall always be erected so that the head fitting or metal bucket is properly engaged and the ladder shall be so placed that the distance between the foot of the ladder and the pole or structure measured horizontally is approximately one quarter of the extended length of the ladder (4:1 ratio).

In addition, the following precautions must be complied with:

- the ladder shall, where ever possible, be lashed top and bottom, (the bottom lashing shall have a red or orange flag attached to make it easily seen); or
- if it is not practicable to lash the ladder at the top or bottom it shall be supported by another worker, or alternative safety measures taken such as the use of an EWP or the installation of scaffolding.

When using ladders near exposed live electrical apparatus extra precautions may need to be taken. Ladders shall not be brought within the minimum safe working distances to exposed high voltage electrical apparatus.

6.8.10 Portable pole platforms

Only approved pole platforms shall be used.

- Before a platform is used it shall be examined for any visible damage, distortion or deterioration.
- Defective or damaged pole platforms shall not be used, shall be fitted with a Warning Tag and returned for replacement.
- The platform must be marked with the designed load limits (which shall not be exceeded).

6.8.11 Tool Bags

Only approved tool bags shall be used.

- A person working in an elevated position shall take care to avoid dropping tools and material.
- They shall keep all small tools and small material not in use in the tool bag provided or in an approved pouch. (Small tools and small material shall not be thrown to or from the person elevated, they must be raised or lowered by means of the tool bag attached to a handline or by approved hook attached to a hand line).
- Each time before use, tool bags shall be inspected to ensure they are in good order and repair and the handle(s) are firmly attached to the bag.





6.8.12 Temporary low voltage covers and insulating material

Authorised persons shall use approved covers, tubes, or mats made of insulating material when working near exposed low voltage conductors which are live or could become live.

Covers and/or tubes used for this purpose shall only be used to prevent inadvertent brush contact with electrical apparatus at a different potential.

When covers and/or tubes are used to cover conductors, they shall be securely fixed to prevent displacement.

For the purpose of this Clause the neutral, street light conductor and Broad Band Communication Cable (BBCC) and catenaries, if involved shall be regarded as a conductor and shall be covered.

Covers, tubes, and mats used to prevent inadvertent personal contact with low voltage apparatus shall be electrically tested on acceptance, routinely inspected every six months and visually inspected prior to every use.

Covers, tubes, and mats that are relied upon for low voltage insulation shall be electrically tested in accordance with the relevant Australian Standard every six months and inspected for damage prior to every use.

Covers and/or tubes shall be intact and shall not be modified in any way. Damaged or defective covers and/or tubes shall be removed from service and discarded or Warning tagged until repaired.

When used in general public environment such as crane or plant operation or construction work, covers or tubes shall only be used for visual indication of the location of the electrical apparatus and the external groups shall be advised to maintain minimum Safe Approach Distances for the voltage concerned.

6.8.13 Screens/barriers

Only approved screens/barriers shall be used.

- Temporary insulating screens for use near live high voltage electrical apparatus shall be tested every 6 months, and be inspected, clean, dry and in good condition at time of use.
- Screens and barriers shall only be installed using an approved method.

6.8.14 Rescue kits

Only approved rescue kits shall be used.

An approved rescue kit shall always be available at the worksite. The kit shall be deployed and ready for immediate use when workers are attended by a nominated rescuer. Rescue kits (see Table D) shall also be available when workers enter confined spaces. Table D shows the appropriate rescue kits to be used.

Table D – Rescue Kit Requirements

Work on	Type of rescue kit
A pole using a ladder or platform	Pole rescue kit
Elevated work platform	Controlled descent device (A Ground Operator shall also be present)
Low voltage apparatus	Low voltage/Substation rescue kit
Towers	Tower rescue kit
Power transformer and scaffolding	Power Transformer rescue kit
Confined spaces	Confined space rescue kit - A vertical rescue - B horizontal rescue





Where a person is working on or near overhead electrical apparatus from a ladder or pole platform, the rescue kit shall be located near the foot of the ladder.

The contents of rescue kits shall be examined prior to each days use.

After a kit has been used for a rescue all of its items shall be inspected to ensure it is in good condition. The natural fibre rope life line shall be discarded and replaced by a new one.

**The requirement for a new rope does not apply to simulated or practice rescues.
A practice rope shall not be used for an in service kit.**

Rescue kits should be stored in a dry place, preferably out of direct sunlight.

A rescue kit shall not be used for any other purpose.

6.8.15 First aid kits

Only approved first aid kits shall be used.

- First aid kits shall be readily available for the treatment of minor injuries.
- Any items used out of a first aid kit shall be replaced as soon as possible.
- Kits shall contain a Contents List, allowing the contents to be checked against the list.
- Kits shall be carried in vehicles and shall be stowed in places where they can be easily reached. First aid kits shall be regularly inspected.

6.9 Controlled descent device

Only approved controlled descent devices shall be fitted to elevating work platforms.

- Elevating work platforms used for work shall be fitted with a controlled-descent device for every occupant of the basket or bucket.
- Controlled descent devices (anchor point, lanyard, descender link and rope) shall be inspected prior to each days use. Any defective or suspect controlled descent device must be replaced before the EWP is used.
- Controlled descent devices, ropes and snap hooks for controlled descent systems shall be kept in clean and dry conditions and ready for immediate use.

6.10 Operating equipment and live line working equipment

Only approved operating equipment and live line working equipment shall be used.

- Operating equipment and live line working equipment and indicating devices shall be kept in a dry clean place and stored on the supports where provided.
- Care shall be taken in handling operating equipment and live line working equipment so the surface will not be damaged.
- Before use, operating equipment and live line working equipment should be cleaned and wiped thoroughly with a silicon cleaning cloth.
- Operating equipment and live line working equipment and live line indicating devices shall be marked with the voltage for which they are suitable and shall not be used for higher voltages.
- Operating equipment and live line working equipment and live line indicating devices shall be marked with a current test date and due test date.
- Operating equipment and live line working equipment and live line indicating devices shall only be used for their designed purpose.

6.11 Height measuring rods

Only approved height measuring rods shall be used.

- Height measuring rods shall not be used above their rated voltage as indicated on their test sticker.
- Height measuring rods shall be marked with a current test date and due test date.
- Workers shall be trained in approved procedures prior to use of height measuring rods.
- Before use, height measuring rods should be cleaned and wiped thoroughly with a silicon cleaning cloth.

Note: Height measuring rods shall only be used for their designed purpose.





6.12 Water spray equipment

Only approved water spray equipment shall be used.

- Work utilising specially designed water spray equipment shall not be regarded as work on or near exposed high voltage conductors provided that approved work methods are applied by trained and authorised workers.
- The System Operator shall be advised prior to commencing any such live insulator washing.

6.13 Insulated low voltage tools

Only approved insulated tools shall be used for work on live low voltage electrical apparatus.

- All insulated tools shall be:
 - checked for any signs of damage to or deterioration of the insulation before each use; and
 - tested and marked with a current test date, due test date and maximum voltage application.
- Low voltage insulated tools are intended for use on live low voltage equipment without additional precautions such as the wearing of insulating gloves. However, insulating gloves shall be worn where there is a possibility of any contact with live conductors/terminals.
- In damp conditions the level of the insulation may be reduced and insulating gloves should be worn. Tools which are covered or which are not clearly marked with an insulation voltage level shall not be used for live work unless approved insulating gloves are worn.
- Insulated tools shall be stored and handled carefully so that the insulation is protected from damage.

6.14 Portable electrical equipment

- Portable electrical equipment or tools which have suffered physical damage or which they consider to be unsafe shall not be used. They shall be Warning Tagged and repaired or replaced.
- All portable electrical equipment and tools shall be regularly examined and maintained to ensure that the equipment is in good order and labelled as required by AS/NZS 3012: Electrical installations – construction and demolition sites.

6.15 Warning signs

- Only approved warning signs, barriers, guards, plates, warning lights, etc. shall be used as required where hazards exist to workers or the public.

6.16 Conductive materials

All materials, (not tested and rated with an insulation value for the voltage concerned) including liquids and gases shall be regarded as conducting unless there is definite knowledge to the contrary. In particular, it should be noted that:

- earth, concrete, branches and wet or damp timber are conducting materials;
- flame conducts electricity and care shall be exercised when using flame producing equipment;
- equipment such as metal ladders, wire reinforced ladders, steel tapes, metal reinforced tapes or rulers, shall not be used on or near live exposed conductors. Metal objects, such as radio telephone units with telescopic aerials, torches and the like shall be handled with care when working in the vicinity of live exposed conductors;
- the medium of certain fire extinguishers is conductive. Only fire extinguishers conforming to Class (E), as specified in AS 2444 - Portable Fire Extinguishers Selection and Location, may be used for fire fighting on energised low voltage electrical apparatus. When using a fire extinguisher near high voltage equipment care shall be taken to maintain the minimum safe working distances, until the equipment has been isolated and earthed; and
- vehicle tyres, although made of rubber, contain a high percentage of carbon and other conducting materials, and therefore shall not be regarded as insulators of electricity.





6.17 Working on or accessing poles or structures

Before coming into contact with a pole or structure, every person shall make their own inspection including a test for the presence of a hazardous voltage in accordance with approved procedures. No person shall climb a pole or structure which:

- has visible deterioration due to decay, is visibly cracked or split to a degree which may cause such a pole or structure to collapse; or
- has been identified as a suspect pole by a Pole Inspector, unless it has been effectively secured.

Additionally:

- a pole or structure which has been confirmed to have a voltage difference to the general mass of earth above extra low voltage shall be treated as energised apparatus;
- where poles are fitted with pole steps, workers shall make sure of the firmness of each step before trusting their weight upon it;
- particular care shall be taken with poles or structures where loading conditions are to be significantly changed, e.g. made free-standing, or the tension in one direction decreased or increased, such as where conductors are cut away or newly erected;
- no person shall join two ladders together to climb a pole or structure; and
- except for an emergency involving danger to human life, no person shall remove a ladder from a pole while a person is aloft. Any ladder which is removed shall be replaced as soon as possible.

6.18 Identification of electrical apparatus

Electrical apparatus shall be identified by an approved means.

- No electrical apparatus shall be commissioned unless appropriate labelling for identification is permanently affixed.
- All labels shall be clear and permanent and shall be updated should the identity of the electrical apparatus be changed.
- All records of electrical apparatus shall be amended in accordance with any network change.



6.19 Tags

6.19.1 Danger tags

Figure 8 – Danger Tag (front and back)



A Danger Tag is a label on which the words **DANGER - DO NOT OPERATE** is boldly marked. It provides a warning against inadvertent or unauthorised operation of electrical apparatus.

Danger Tags installed for long periods of time should be checked at least every 7 days and be replaced if deteriorated or faded. Only approved Danger Tags shall be used.

A Danger Tag shall:

- be associated with an AA or an LVAA on isolated electrical apparatus;
- be applied or removed at the direction of the System Operator where associated with the high voltage network (which includes low voltage isolations for the issue of an AA);
- be applied to all isolation points by a person authorised to operate the isolation point prior to the issue of an AA or LVAA;
- be affixed to all points of isolation (including their remote controls), using yellow tape or other approved method, to which the AA or LVAA applies;
- be attached to any electrical apparatus, which by operational work, provides continuity between electrical apparatus and the associated earthing equipment;
- be installed so as to be visible to persons attempting to operate the apparatus; and
- in public places, be installed either out of the reach of the public or to ensure they cannot be inadvertently removed in accordance with approved procedures.

No person shall operate a device to which a Danger Tag is attached for Access Authority purposes, unless directed by the System Operator.

Danger Tags shall be used at all isolation points for high voltage, low voltage, mechanical or pneumatic apparatus.

6.19.1.1 Danger tags for high voltage application:

When applied under the direction of the System Operator the Danger Tag will be noted with:

- the switching plan number, incident number or “verbal” in the instruction number field;
- the ‘Work/Test’ tick box ticked;
- the identification number or description of the isolation point;
- the name of the person attaching the tag;
- their associated work location; and
- the date of application of the tag.

6.19.1.2 Removal of danger tags attached for high voltage applications

A Danger Tag, installed under a switching plan or at the direction of the System Operator, shall only be removed by an authorised person, at the direction of the System Operator.

6.19.1.3 Danger tags for low voltage application

A Danger Tag attached for low voltage applications will be noted with:

- the switching plan number, incident number or “verbal” in the instruction number field;
- the ‘LV AA’ tick box ticked;
- the identification number or description of the isolation point;
- the name of the person attaching the tag;
- their associated work location; and
- the date of application of the tag.

Note: where high voltage apparatus is required to be isolated for work (eg the opening of HV DOFs on a pole sub for work on low voltage apparatus), an Access Authority shall be issued in accordance with the requirements of these Rules;

6.19.1.4 Removal of danger tags attached for low voltage applications

A Danger Tag attached to an isolation point associated with a Low Voltage Access Authority, Access Authority or Operating Agreement shall only be removed by an authorised switching officer once the need for the application of the tag no longer exists (i.e. the LVAA, AA or OA has been cancelled).

There may be multiple Danger Tags at an isolation point. Care must be exercised to remove the correct tag.

6.19.1.5 Application of Personal Danger Tags attached for Non- Network Isolations

Refer to Section 11 – Non-Network Isolations.

6.19.1.6 Removal of Personal Danger Tags attached for Non-Network Isolations

Refer to Section 11 – Non-Network Isolations.

6.19.2 Warning tags

Figure 9 – Warning Tag (front and back)



6.19.2.1 Use of warning tags

A Warning Tag provides a warning that:

- the operation or use of plant, equipment or apparatus would be hazardous to persons; or
- the normal functioning or operation of the plant, equipment, device or electrical apparatus to which it is attached has been changed or is not normal. (Operation of the plant, equipment, device or apparatus may still be possible, but caution or restrictions may apply.)

Warning Tags shall be used on any item of equipment or plant, which is defective, unserviceable or should not be operated.

Warning Tags must have all information provided on the tag to advise the user of the hazards. The details must be clear and obvious to anyone reading the tag. Only approved Warning Tags shall be used.



Warning Tags shall be attached to the operating devices, securing locks or access doors of apparatus in such a manner that is obvious to any person approaching that there are hazards or changes to the apparatus.

A Warning Tag shall be applied to auto-reclosing facilities made non-auto for the purpose of Live Line Work.

6.19.2.2 Removal of warning tags

A Warning Tag shall not be removed from apparatus while the hazardous condition still exists.

A Warning Tag may only be removed by any person only when:

- the hazardous or unusual condition has been repaired; or
- the reason for its attachment no longer exists; or
- the item to which the tag was attached has been completely disconnected.

6.20 Area marking tapes

Yellow tape barriers are to be used to define a controlled area for work in association with the issue of an AA for Work or Test. Yellow tape barriers are used to indicate the dividing line between live electrical apparatus and the apparatus on which it is safe to perform work under an Access Authority for Work or Test.

Only an Authorised Switching Officer will erect, remove or alter the position of yellow tape barriers.

6.20.1 Yellow Tape Barriers

6.20.1.1 Use of yellow tape barriers

Only approved yellow tape barriers shall be used to define an area for work in association with the issue of an AA or LVAA. Yellow tape barriers are used to indicate the dividing line between live electrical apparatus and the electrical apparatus which is under an AA or under a LVAA.

Yellow tape barriers shall only:

- be used in conjunction with an Access Authority; or
- be used in conjunction with a LVAA; and
- be erected or altered by an authorised switching officer.

If covers allowing access to exposed conductors are to be removed, the taping is to be carried out in conjunction with the Access Authority Holder.

When applied for the purpose of HV testing, the yellow taped barrier must be supplemented by the signage indicating “HIGH VOLTAGE TEST IN PROGRESS”. This sign must be placed at the entrance to the work area. While testing is underway the entrance must be closed with yellow tape by the Access Authority Holder.

Structures that support live HV equipment must not be used to support the yellow tape barrier unless inside the Switch Room.

There are many different substation layouts constructed on the network and to produce a guide for each possible scenario for work in these would not be practical. However, before erecting a yellow tape barrier, the Authorised Switching Officer must give consideration to the extent of the area governed by the AA, for example, where it is proposed to form the opening in the yellow tape barrier, what equipment will remain alive adjacent to the work area and if any special equipment or plant will have to enter during the course of the work.

In rare situations the nature of the substation configuration and switchgear arrangements make it extremely difficult to accurately tape the AA area (eg GIS switchgear is one prime example).

Wherever possible these instances are to be alerted during their job planning, and they are to include a diagram illustrating the preferred taping arrangements. Where a diagram is not provided, or arrangement is not practical to implement, the AA issuer and the AA recipient (holder) are to agree on site to the most practical method of taping for that situation.

Once agreement has been reached the AA special conditions are to be noted with the following comment: “Site constraints inhibit yellow tape, limitations discussed and agreed between issuer and recipient”.



6.20.1.2 Entrance to yellow tape area

Where yellow tape barriers are erected, an opening in the yellow tape shall form an entrance to the yellow tape area. The Switching Folder shall be placed at the yellow tape barrier entrance.

Figure 10 – Entries to Access Authority areas in outdoor switchyards

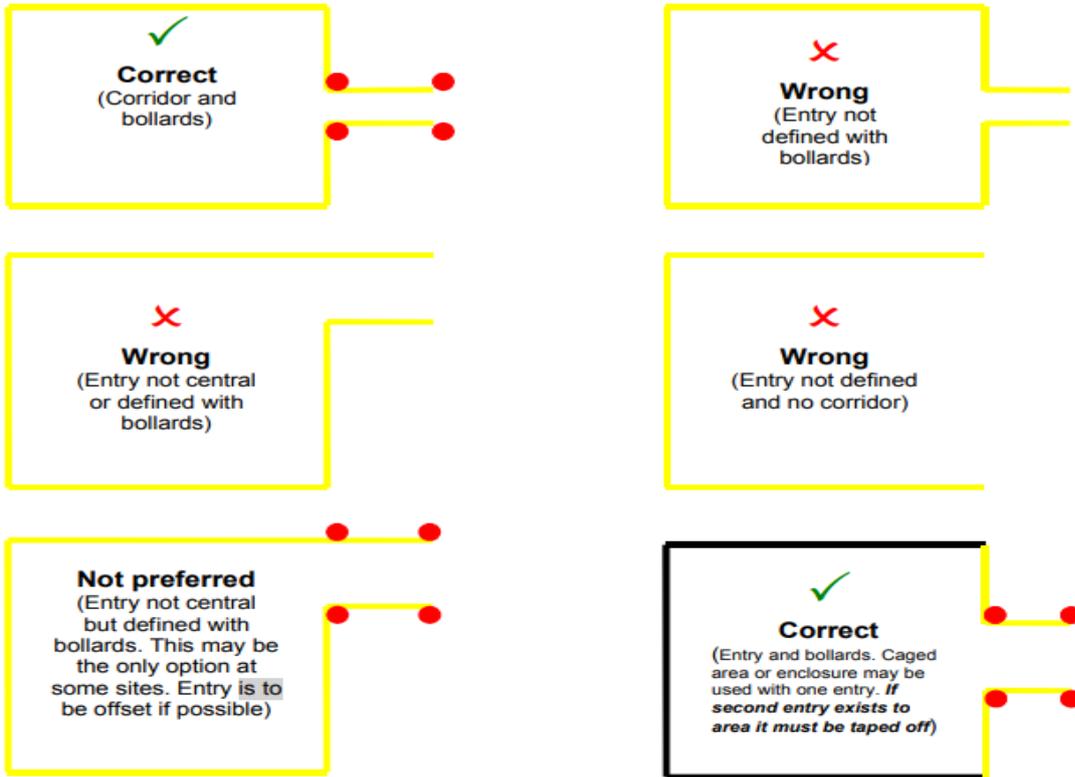


Figure 11 – Example of switchgear under Access Authority with yellow tape defining entry area



6.20.1.3 Crossing or interfering with yellow tape barriers

Persons working or testing in a yellow tape area shall not pass over, under or interfere with such tape.*

*This does not prevent temporarily disturbing the yellow tape barrier to permit the passage of plant or materials under the control of the Access Authority Holder. Precautions shall be taken to ensure that risks are controlled to prevent harm to personnel and or damage to plant or material. Such tape shall be replaced in its original position as soon as the necessary passage of plant or materials has been completed. Extreme care shall be taken to ensure that Safe Approach Distances are maintained at all times during the period that the yellow tape has been disturbed.

6.20.1.4 Removal of yellow tape barriers

Yellow tape barriers shall be removed by an authorised switching officer immediately after the associated Access Authority or LVAA have been cancelled. Yellow tape barriers shall not be left erected following the cancellation of an Access Authority or LVAA.

This does not include work continuing from day to day where Access Authorities are cancelled and reissued on a daily basis. Tape barriers shall be checked prior to the reissue of an Access Authority or LVAA.

6.20.1.5 High Voltage apparatus above Access Authority area

Where an area is to be defined by a yellow tape barrier and there are live high voltage conductors above the area, then the warning sign “DANGER live HV conductors above” shall be displayed in the appropriate position/s within the yellow tape area, as shown below.

This shall also be noted in the special conditions.

Figure 12 – Barrier “in” method for the erection of a barrier in a substation showing “DANGER live HV conductors above”



6.20.1.6 Yellow tape barrier “in”

A yellow tape barrier is erected around the equipment under AA conditions. The area within the yellow tape barrier is the defined area for work, as shown in Figure 1 – Barrier “in” method for the erection of a barrier in a substation.

In open HV switchyards the yellow tape barrier “in” method is commonly used as it is the most practical method of identifying the equipment to be worked on and establishing a defined area for work.

When using the barrier “in” method, an opening must form the entrance to the work area in the yellow tape barrier. This opening can be identified by a two metre by two metre entry, formed by four high visibility bollards. This opening must be clearly marked with the notice “CAUTION – Entry to Access Authority Area”. If the opening encroaches on other equipment or there is insufficient room available, the entrance can be reduced but will be as large as practical up to the standard opening size. With indoor equipment two entry bollards can be used.



Figure 13 – Barrier “in” method for the erection of a barrier in a substation

6.20.1.7 Yellow tape barrier “out”

A yellow tape barrier is erected between the equipment under AA and all other live equipment

within the substation. The equipment outside the yellow taped barrier is the defined area for work, as shown in Figure 14 – Barrier “out” method for the erection of a barrier on totally enclosed switchgear. This method is primarily used when the barrier “in” method is not practical.

The switching folder is to be attached by an Authorised Switching Officer at the location specified by the person requesting the electrical isolation, where the AA can be found.



Figure 14 – “Barrier “out” method for the erection of a barrier on totally enclosed switchgear





6.21 Isolation of low voltage apparatus

A LVAA shall be issued in accordance with clause 7.1.2 to allow work on low voltage network apparatus not subject to Access Authority conditions. A LVAA shall also be issued when carrying out isolation for contractors and ASPs in situations such as low voltage isolation of services for contractors and ASPs to perform work. Specifically, a LVAA:

- gives clearance to access specific electrical apparatus to carry out work;
- records the isolation points operated to isolate the electrical apparatus;
- records the number and location of each set of LV Protective Bonds installed and removed (if applicable);
- is issued by an authorised low voltage switching officer;
- is received by an authorised LVAA holder on behalf of the work party;
- is signed on to by the work party before commencing work; and
- is surrendered by the LVAA holder prior to the restoration of supply to the isolated apparatus.

Operational LV Protective Bonds shall not be removed until the AA or LVAA has been surrendered. Operational LV Protective Bonds may be removed prior (or upon completed work scope as outlined in the AA) if endorsed by the AA issuer.

The isolation of Non-network systems including non-network low voltage apparatus, low voltage apparatus contained within the boundary of an electrical station, and non-electrical sources of energy, may be managed in accordance with Section 11 of these rules.

**The integrity of an isolation point shall not be compromised.
Work shall only proceed on the connections or operating mechanism of a switching device or isolator
if there is no risk of altering the required state of the apparatus.**

6.22 General working procedures in electrical stations

6.22.1 Entry into electrical stations

A person shall not enter areas within an electrical station where there are live exposed conductors unless the person:

- is authorised to enter that area, and has normal duties which require entry to the area; or
- has been specifically instructed by a person authorised to enter the area and is supervised by a person authorised to enter the area; and
- has been clearly instructed, on the site, as to the limits of the areas that may be entered; the dangers existing; and the precautions that shall be observed.

In addition, the person shall:

- comply with any instructions concerning safety given by the accompanying authorised person; and
- be made aware of the dangers existing.

6.22.2 Securing of entrances

Access ways giving entrance into electrical stations shall always be locked when not in use.

At all times precautions shall be taken to ensure that unauthorised persons are not able to gain access.

6.22.3 Checking of entrances and exits

Appropriate entrances and exits shall be checked to ensure that they:

- allow free and unobstructed movement;
- can be opened and closed easily; and
- can provide safe exit for persons should the need arise.





6.22.4 Additional requirements for indoor, basement and underground electrical stations

Inspections should be carried out to ensure that emergency exits are free of obstructions to provide the safe emergency exit intended.

Exit doors, intended for emergency use only, shall have suitable signs affixed on or adjacent such as Emergency Exit or Alarmed Emergency Exit to indicate their usage. The signs shall be fitted to both the inside and outside of the emergency exit.

6.22.5 Duties of persons on entry into electrical stations

Persons entering electrical stations shall:

(a) Advise of their entry directly in the EE visitor app, and provide:

- the name, service number and contact number (mobile phone) of the work site coordinator;
- the number of persons entering;
- the nature, and likely duration, of the work to be carried out;

or if performing operating work, or work that may affect network integrity, notify the relevant System Operator of their access.

(b) Read and understand any warning signs, labels or tags posted at the entrance to the station, as well as warning signs appropriate to the area being entered.

(c) Note the locations of the following items:

- warning signs instructions appropriate to the area being entered;
- telephone, if installed, (the operation of the telephone should be checked to ensure it is working correctly);
- the medical emergency button (where fitted);
- portable and fixed firefighting appliances, (portable firefighting appliances should not be used for any other purposes, such as holding doors open, etc.);
- any rescue kits, fire blankets and deluge showers, if provided;
- live exposed conductors, and any screening;
- Access Authority taped areas; and
- hazard barriers (e.g. trench barriers, pit fences).

6.22.6 Operating work in electrical stations

When entering an electrical station for operating work, in addition to the requirements in Clause 6.23.5 (except for 6.23.5 (a)), the authorised person shall:

- notify the relevant area System Operator of their access;
- advise the area System Operator of any unusual conditions or other anomalies found in the substation;
- provide the area System Operator with the switching instruction number and step/s to be attended to at the electrical station;
- wait on permission from the area System Operator to proceed;
- advise the area System Operator on completion of the switching steps indicated;
- advise the area System Operator when leaving the electrical station; and
- secure all access doors and gates.

Operating work within electrical stations shall only be carried out by authorised persons using approved operating procedures and equipment with the permission of the System Operator.

Particular care is necessary when operating electrical apparatus which is power operated and has remote or automatic control, to ensure that the operating work can be carried out without risk to persons or plant. Circuit breakers, isolators, tap changers and air compressors are examples of such apparatus.



6.22.7 Accidentally tripped circuit breaker

Do Not Reclose the circuit breaker unless instructed by the System Operator.

If a circuit breaker is accidentally tripped for any reason, notify the System Operator immediately.

6.22.8 Hazardous low voltage and mechanical apparatus isolations

Equipment covered by an Access Authority which is capable of storing some form of energy, such as circuit breaker operating mechanisms, shall be fully discharged or otherwise rendered inoperative in an approved manner by the Holder. Alternatively, the Access Authority shall be endorsed in Section 4 Special Conditions noting the presence of hazardous energies and the responsibilities of the Access Authority Holder.

In all cases it is the Access Authority Holders responsibility to manage any hazardous energy within the worksite.

6.22.9 Earthing of electrical apparatus in electrical stations

When working on apparatus in electrical stations, earthing shall be so arranged that a minimum of one set of earths is connected at all times to the apparatus on which work is being carried out. Where practicable, earthing and short circuiting shall be applied between all sources of supply and the worksite.

When applying earths within substations, care shall be taken to avoid earth loops through protection current transformers as this may cause unintended tripping. If earths must be placed in such a way as to cause earth loops around current transformers, protection isolation must take place.

When working on CVTs (Capacitive Voltage Transformers) the secondary terminals (four of) are to be short circuited and earthed.

In the case of frequency injection cells, capacitors or inductors, the star point earth is to be applied first.

When using circuit breakers for indirect earthing the tripping mechanism shall be secured by a danger tag and electrical controls shall be checked to ensure that electrical tripping circuits are inoperative.

In the case of HV switchgear maintenance with all remote points earthed and short circuited, permanent earths need not be applied at the work site. The equipment however shall be proved de-energised and momentarily earthed in view of the Access Authority holder.

6.22.10 Work in electrical stations

When working within electrical stations, sound workshop practices shall be adopted. In particular, the following aspects should be noted:

- doors, panels or covers enclosing live equipment shall be kept closed except when work is being performed inside that enclosure;
- protective devices or interlocks shall not be interfered with, bypassed or made inoperative. However, with the approval of the System Operator secondary protective devices may be made inoperative where alternative protective schemes allow;
- electrical stations shall not be used for the storage of material or equipment or parking of vehicles, except as approved by the General Manager Operations or their delegate;
- materials shall not be allowed to obstruct doorways, or passageways, hinder normal operations, work, or access to fire extinguishers, deluge showers, first aid kits where fitted, telephones, control switches or any operating equipment;
- long objects such as ladders, conduits and the like, shall be handled with great care near live exposed electrical apparatus. Whenever possible, long objects should be carried by two people, holding the objects below shoulder height in a horizontal position and as close as practical to the ends of the object, so as to maintain maximum control;
- extreme care shall be taken when using portable radio and telephone apparatus with protruding whip aerials in areas containing exposed live electrical apparatus. At all times, persons shall ensure that no parts of this apparatus come closer than the Safe Approach Distances to live exposed electrical apparatus.





6.22.11 Operation of plant in electrical stations

When operating plant or vehicles capable of exceeding 1.9 metres in height within electrical stations, the following requirements shall be applied:

- for vehicles that are driven off the defined station driveway, an observer is required to ensure that the vehicle does not approach within 3m of live electrical equipment;
- whenever mobile plant is driven within an electrical station, care shall be taken that all crane jibs, stabilisers etc are stowed in the travel position before driving; and
- when mobile plant is in use and is capable of coming within 6m of electrical apparatus in the confines of an electrical station, the mobile plant shall be fitted with an approved 70mm² copper or equivalent trailing earth cable connected to the earth grid of the electrical station. The trailing earth cable must be capable of carrying the maximum prospective earth fault current in that station. For transmission substations or other locations where the fault level warrants it, 2 x 70mm² copper or equivalent conductors are required.

Additionally, an observer shall be appointed to observe the movement of the mobile plant and to give warning to the operator where the mobile plant may encroach within 6 metres of electrical apparatus.

When mobile plant is in use and the use involves the plant moving continuously between locations in the station (for example a Bobcat) an observer shall be appointed to observe the movement of the mobile plant and a means of active communications established between the observer and the operator to give warning to the operator where the mobile plant may encroach within 6 metres of electrical apparatus.

In this situation the requirement to use a trailing earth cable may be waived.

Excavation work within an electrical station shall not be commenced until the location of all underground cables, earthing conductors, ducts, etc in the vicinity of the proposed excavation have been positively identified.

6.22.12 Rescue and resuscitation notices and emergency response information

Within every electrical station, except for padmount and kiosk substations, instructions shall be displayed conspicuously for the:

- release of persons from live (low voltage) electrical apparatus;
- treatment of persons who have received injury from electric shock. These instructions shall include cardio-pulmonary resuscitation (CPR); and
- appropriate emergency response information.

6.22.13 Fire protection systems

When carrying out work within electrical stations equipped with fire protection systems, suitable safety precautions shall be taken to ensure the safety of personnel and equipment. Precautions may include isolation and tagging and/or making non-auto fire detection and extinguishing systems.

A check for the existence of remote fire control gas injection systems, such as bulk injection or self-contained carbon dioxide systems shall be made. To ensure that operation cannot occur during occupancy, Danger Tags should be attached at the bulk gas injection point and/or initiation panel controls.

When leaving electrical stations, fire detection and extinguishing systems made non-auto prior to work commencing, shall be reset for auto operation. See approved procedures for specific locations.

6.22.14 Access to high voltage cages or rooms

An Access Authority is required for entry to a high voltage cage or room. Entry for operating work is permitted provided that Safe Approach Distances can be maintained.

All doors, gates or readily removable panels for ease of access shall be fitted with an approved label identifying the area as a cage or room and a warning against unauthorised entry.

6.22.15 Work in battery rooms

Persons working in battery rooms shall ensure that the rooms are adequately ventilated by means of the natural or forced ventilation.





Because of the risk of explosion, the use of naked flames is prohibited in battery rooms and battery repair depots. Where it is necessary to use naked flames or attached jumper leads in a battery room, the room shall first be thoroughly ventilated and the batteries shall not be on charge. Similarly, caution shall be exercised to ensure that arcing caused by connecting jumper leads, or sparking caused by power tools or steel objects such as tools, watchbands, etc does not occur.

SMOKING IS STRICTLY PROHIBITED IN ALL BATTERY ROOMS.

The spray above gassing cells is strongly corrosive. Persons should take precautions to avoid getting this spray on the skin or clothes. Affected areas should be washed thoroughly with water or other approved washing solutions.

6.22.16 Duties of persons prior to leaving the station

When cleaning up after work and before leaving an electrical station:

- all tools and materials shall be accounted for. (This is especially important in stations where frame leakage busbar protection is installed. The frame leakage earthing path could inadvertently be short-circuited by tools or other equipment left in contact with the switchgear panels.);
- all chequer plates, covers, barriers and the like removed during the course of work shall be replaced to their correct locations. Otherwise, suitable barriers or warning signs shall be erected to guard against injury to persons;
- normal and emergency lighting shall be checked as turned off;
- entrances and exits shall be checked as secured; and
- advise that they are leaving the station directly in the EE visitor app.

6.23 Earthing systems

Earthing systems shall remain intact while ever the associated electrical apparatus is energised.

If part of an earthing system is damaged or disconnected, dangerous voltages may appear. Making or breaking a connection to an earthing system or between earthing systems shall be carried out in accordance with 6.34 of these rules.

Apparatus which can produce dangerous voltages if an earthing system connection is disconnected include power and voltage transformers, potential taps fitted to high voltage bushings and high voltage current transformers, insulated sheaths of high voltage cables, and surge diverters.

6.23.1 Temporary connections between earthing systems

All connections between earthing systems, including from cable screens and overhead earth wires, should be made using a suitable permanent or bolted connection. Where this is not practicable, a clamped connection may be used as a temporary bond provided the mechanism is locked with a network HV switch or earthing padlock. If a temporary bond is to be left in place, a Warning Tag shall also be applied to the bond indicating the purpose of the bond and what works are required to enable removal of the bond.

Figure 15 – Example locking mechanisms



Note that operational and working earths, and temporary equipotential bonds used by workers to address earthing hazards during work are exempt from this requirement.

6.24 Neutral systems

All parts of neutral systems shall be regarded as live while ever associated phase conductors are energised, and the procedures contained in these Rules adopted for work on this equipment.

Neutral systems shall remain intact while ever the associated electrical apparatus is energised.

Dangerous voltages may appear, during earth fault conditions, on neutral systems including neutral busbars, neutral resistors, neutral reactors and the connections between the neutrals of transformers or generators and the earthing systems.





6.25 Work on new (yet-to-be connected) or disconnected apparatus

An Access Authority or LVAA is not required for work on apparatus which is confirmed to be disconnected apparatus.

A risk assessment shall be completed and suitable measures shall be put in place to enable the work to be carried out safely, such as issuing an Access Authority on adjacent apparatus.

Before work is carried out on, or near, disconnected apparatus, a formal declaration of 'Disconnected Apparatus' shall be made, unless working in accordance with approved live working techniques.

Disconnected Apparatus scenarios may vary considerably and at a minimum, a declaration of Disconnected Apparatus must:

- be issued by an **Electrically Qualified and** authorised Access Authority Holder; and
- be available at the worksite; and
- record the disconnection points and method of disconnection (i.e.: bond physically removed, or span of mains removed, etc.) for the disconnected apparatus; and
- record the location of earthing and short circuiting equipment; and
- advise the work party of the disconnected status of the apparatus; and
- be cancelled prior to the issue of an Access Authority or LVAA enabling connection of apparatus to the network.

A schematic mark-up of the worksite and network configuration, in addition to photos and/or drawings should be included with the declaration of Disconnected Apparatus.

When cancelling a declaration of Disconnected Apparatus, all relevant work parties must be advised and acknowledge that the apparatus shall no longer be considered to be disconnected.

A Warning Tag shall be attached to all points of disconnection. The condition of Warning tags on disconnection points shall be checked at least weekly while work on disconnected apparatus is being carried out, and replaced where necessary.

The requirements of 6.35 of these rules must be adhered to with regard to the hazards of induced voltages; transferred earth potentials; earth fault currents; and lightning.

Testing and commissioning activities may be carried out on disconnected apparatus, including the temporary removing of earth and short circuit connections if:

- the person responsible for the test takes all necessary precautions and actions to ensure the safety of workers, contractors, the public and the electrical apparatus under test; and
- at the conclusion of the testing or commissioning, the disconnected apparatus is fully discharged and left in a safe condition, including the reinstatement of any earth and short circuit connections.

Illustration of where Endeavour Energy Electrical Safety Rules apply

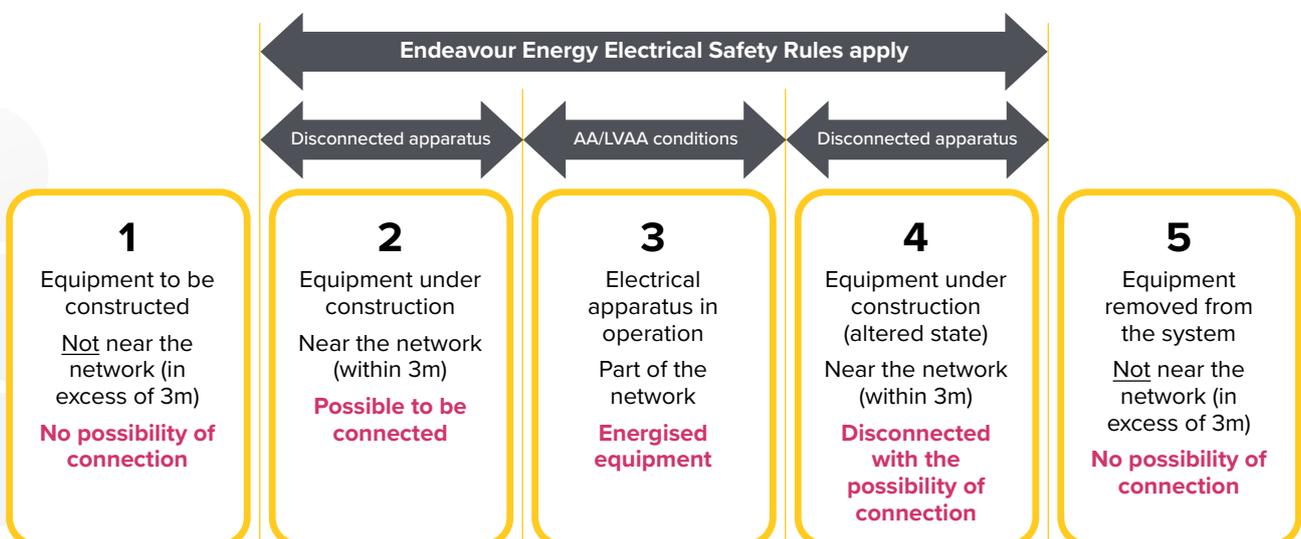


Figure 16 – Declaration of New or Disconnected Apparatus (FSY 0261)



Declaration of New or Disconnected Apparatus

Issued in accordance with Project / Defect No.:

1. Purpose. This form is a formal declaration determining whether electrical equipment, conductors or associated electrical apparatus can be regarded as disconnected apparatus as per Endeavour Energy's Electrical Safety Rules (location and apparatus to be considered disconnected):

.....

.....

.....

.....

.....

.....

.....

.....

2. Disconnection points & actions taken:

.....

.....

.....

.....

.....

.....

.....

3. Earthing and short-circuiting equipment are connected at:

a. d. g.

b. e. h.

c. f. i.

4. Special conditions/requirements for testing:

.....

.....

5. Issue of Declaration of New or Disconnected Apparatus. *(Tick all appropriate boxes, rule out and initial items not done)*

- The electrical apparatus has been disconnected and the disconnection has been secured by Warning Tags.
- The disconnection requires a tool, or installation of a span to reconnect to network infrastructure
- The electrical apparatus has been proved de-energised, earthed and short circuited.
- Hazards from induced voltages, transferred potentials, fault currents or lightning are controlled.
- Under/Over crossings are identified and managed/controlled with the worksite hazard risk assessment.
- Are there restrictions due to live adjacent circuits (i.e. height or below ground) and are they controlled? Yes No
- The New or Disconnected Apparatus shall remain disconnected until this declaration is cancelled.

Subject to the control measures listed above the electrical equipment, electrical conductors and associated electrical apparatus complies with Endeavour Energy's Electrical Safety Rules and is now deemed Disconnected Apparatus.

Issued by: Name (Print) Authorisation No:

Signed Time Date / /

Phone.....

Completed Declaration of New or Disconnected Apparatus shall be available at the worksite and left in a waterproof cover adjacent to the Disconnected Apparatus.

6. Cancellation of Declaration of New or Disconnected Apparatus.

- No members of the work party are working on the equipment described in Item 1
- All earthing and short-circuiting equipment listed in Item 3 have been removed from the electrical apparatus.
- I have ceased work and will consider the apparatus as 'live'. This Declaration of New or Disconnected Apparatus is now cancelled.

Signed Time Date / /

Comments:.....

.....

FSY0261 November 2022





6.26 Work on de-energised lines in proximity to in-service lines

Work in proximity to in-service lines (such as above, below or beside) can only proceed in accordance with Appendix 1 – Work on Overhead Mains and Apparatus Under or Adjacent to Energised Circuits.

6.27 Cable penetrations including in cable ducts

Positive cable identification must be undertaken before cutting existing cable ducts or conduits, or making a penetration in a wall, floor, or other barrier, where live cables may be contacted. All conduits must be considered to contain a live cable until the contents have been proven and identified.

Valid Before You Dig Australia (BYDA) plans shall be onsite to assist in positively identifying the location of all underground assets. Project drawings such as As builts, Bore logs or any other Engineering schematics/diagrams relating to location of underground assets should be in place to assist in the identification of underground assets.



Where the end of a conduit is not exposed and unable to be continuously traced to the work site, an inspection window needs to be made to determine whether the conduit contains any cable. The inspection window must be made in a controlled manner in accordance with an approved procedure to avoid impacting or penetrating live cables in the work area.

Once the conduit has been windowed and proved empty or the identity of all cables has been confirmed, the conduit may be cut.

When cutting a cable, conduit, or making a penetration, a minimum of 300mm clearance must be maintained between the cutting tool and all assets adjacent to the work location. Where this is not possible, suitable mechanical protection must be used to prevent damage to adjacent assets.

6.28 Testing

Only approved test equipment shall be used by trained and authorised persons.

The person in charge of the test is responsible for ensuring that all required precautions are taken and ensuring the safety of all members of the work party.

6.29 Responsibility for authorisation to energise

A Responsible Officer must be appointed to manage each network project. The Responsible Officer has ultimate responsibility for delivering the intended business outcomes of the project, and in particular, for certifying that all electrical apparatus to be commissioned as part of the project is certified as available for service prior to commissioning.

The responsibility and authorisation to energise electrical apparatus being placed into service for the first time, or following major maintenance work shall be completed in accordance with approved commissioning procedures.

6.30 Phasing

All new electrical apparatus capable of being paralleled with existing electrical apparatus shall be phased prior to commissioning or recommissioning.

All electrical apparatus, the connections of which have been broken other than by switches provided for the purpose, should be phased before being returned to service, except when there is no possibility of crossing phases.

Phasing shall be checked from all possible sources of supply using approved indicating devices or voltmeters following any installation of new electrical apparatus or re-arrangement of construction involving more than one phase.

6.31 Indirect phasing

Where a high voltage source produces a low voltage potential via a permanently connected transformer, or capacitive coupling, and the low voltage potential derived from each high voltage source consistently phases with an existing reference source of supply, the high voltage sources can be considered to phase.





6.32 Current transformer circuits

The secondary circuits of a current transformer shall not be open circuited while the primary circuit is energised.

6.33 Working on poles carrying live electrical apparatus

Extreme care shall be exercised when it is necessary to work on electrical apparatus on poles in joint use with other electrical apparatus which is live. Special attention is to be paid to the possibilities of uplift occurring on the conductors being replaced or erected.

Where this possibility exists, care shall be taken to prevent the conductors being worked on coming within the Safe Approach Distance of live electrical apparatus as required by 6.4.1 of these rules.

The installation or removal of multiple continuous spans of open wire (uninsulated) conductors under or adjacent to energised circuits is not permitted (where adjacent is defined as being within 3 metres of bare conductors of an energised circuit).

6.34 Hazards from induced voltages and transferred earth potentials

There are several potentially hazardous conditions routinely found on equipment connected to the electrical network including earthing conductors and interconnected apparatus. While these conditions are more likely to be found during a fault on the network or during storm conditions, they can also occur during normal working conditions. These hazards exist even though the fault can be at an entirely different (even remote) location.

Hazards from induced voltages and transferred earth potentials shall be considered in the worksite hazard and risk assessment process.

Basic principles that should be applied when managing the risk of forming part of an earthing circuit:

- All connections bonded prior to making and breaking connections; or
- Completely insulated (live working procedures); or
- Completely separated (dedicated areas of electrical separation).

Figure 17 – Pictorial of bonding, insulation and separation



6.34.1 Lightning

Workers working outdoors or on or near any part of the network (overhead, underground and indoor assets) may be at risk of injury from lightning strike if working during thunder storm activity

A lightning strike on an overhead line results in a very short duration pulse or pulses of very high voltage which travels along the line overhead earth wire or conductor until it is diverted to earth via earth electrodes at a structure or surge diverters on the phase conductors.

Workers working outdoors or on the network must remain alert to changing weather conditions. Work on or near the network during lightning activity shall cease when the time between lightning and corresponding thunder is 30 seconds or less, until 30 minutes after the last thunder is heard (known as the 30/30 rule) unless working on long transmission lines, in which case work should cease whenever lightning activity is identified in an area that may affect the line.

During this period workers are to remain inside a building or vehicle cabin until the lightning threat has safely passed. Work may resume within this period if the work party believes the lightning threat to have safely passed, however the work party must continue to monitor the storm movement.





6.34.2 Induced voltages

Wherever a line is adjacent to or connected to lines or cables which run near energised apparatus, induced voltages can develop. Induced voltages most often occur between an energised line and a non-energised line, but can occur where conductors are parallel anywhere along their length. Electrical induction transfers energy by using either of the following:

- magnetic field (where there is current in a live line it may induce a current or voltage on other nearby lines or earth conductors even if they are earthed);
- electric field or capacitance (nearby energised lines can induce charges on equipment, out of service lines, or even people).

The hazard of induced voltages can be managed by:

- Bonding together and earthing all conductors including the overhead earth wire, pilot cables and metallic catenary cables, as well as conductive poles or structures, as close as possible to the worksite;
- When making or breaking bonds; using temporary bridging conductors to create an equipotential bond before making or breaking the main circuit;
- Using temporary bridging conductors to bond between plant, the structure, equipment and conductors if working close by;
- Earthing metallic fencing that is under overhead lines, and is isolated from the ground; and
- Using bonded earth mats for all ground work and ensuring that all approach and departure paths are via these mats.

Any non-insulated plant being operated for work on or near the network within 15 metres of the centre line of an overhead transmission line and raised off the ground on outriggers must have the chassis connected to earth, either at:

- The earth down lead on the structure carrying the circuit being worked on or near; or
- The structure carrying the circuit being worked on or near if the structure is conductive; or
- A temporary driven earth stake; or
- Following a risk assessment, alternate metallic objects in the work area that provide connection to the general mass of earth.

6.34.3 Voltage gradients

Voltage gradients arise from currents passing through conducting materials such as structures, earthing connections, or fallen conductors, to the natural ground. Two particular gradient situations which can be hazardous to people are referred to as touch voltage and step voltage.

Hazardous step or touch voltages may rise at a structure where earthing has been applied, as a result of line energising, lightning strike, transferred voltages or high levels of induction.

The step voltage reduces substantially at short distances from the base of the structure or the earth stake.

The touch voltage can arise when workers stand near the structure or the portable earth stake where working earths are in place and touch the structure earthing system or the down lead to the portable earth stake.

For this reason, when a portable earth stake is used, it should be installed away from the immediate work area where practical, and workers should generally avoid this location.





6.34.4 Transferred voltages on neutral and earthing systems

During fault conditions, the earth potential rise can be transferred along any conductor to a remote location. A person may receive a shock by touching the conductor and the local soil. Conversely a conductor may transfer a remote low potential into a high soil potential area also creating a touch voltage hazard.

Some sources of transferred earth potential rise include:

- copper or other metallic conductors, such as cable screens or armouring;
- metal pipes (water or gas pipes) especially if the pipes are earthed;
- fencing, especially if a neighbouring fence connects to a substation fence;
- underground cables; and
- concrete (such as a steel reinforced concrete driveway next to a substation).

The hazard of transferred voltages can be managed by:

- using temporary bridging conductors to create an equipotential bond before making or breaking neutral or earth connections;
- using bonded earth mats for all ground work, bonding equipment to the earth mats, and ensure that all approach and departure paths are via these mats; or
- applying suitably designed and constructed earthing and insulation arrangements.

6.35 Work on or near pilot cables

When working on pilot cables, the requirements of 6.35 of these rules must be adhered to with regard to the hazards of:

- induced voltages;
- transferred earth potentials;
- earth fault currents; and
- lightning.

No additional action is required when working on terminal ends of pilot cables within stations where the work area is provided with isolation from the local earth.

Figure 18 – Example of pilot cable



For work on pilot cables where the conductors are to remain unbroken and the cable will not be placed under mechanical stress, then the work may be carried out using live low voltage working procedures without the need to isolate the feeder or individual services within the cable.

Where the conductor is required to be broken or mechanical stress placed on the cable then all services carried by the pilot cable shall be isolated. The associated feeder must also be de-energised where there is a risk of the pilot cable coming within the Safe Approach Distance of live electrical apparatus as required by 6.4.1 of these rules.

Protection work at the terminal ends of the pilot cable may be carried out with the high voltage equipment in service provided satisfactory equipment isolation is taken to ensure system security.

In all cases work shall proceed on pilot cables treating them as 'live' low voltage until all cores being worked on are proved de-energised at the work site.

Where duplicate protection is available and where the System Operator determines that the network will not be placed at unreasonable risk, pilots may be worked on with the feeder live once adequate precautions have been taken.

Precautions shall be taken in accordance with approved procedures to avoid dangers from optic fibre cables where these are used as protection/communication pilots.

Workers within 1.0m of exposed metallic catenary of an overhead pilot cable could be exposed to induced voltage and transferred earth potential hazards, and these shall be managed in accordance with Clause 6.35. Use of temporary insulating material shall be in accordance with Clause 6.9.12.





6.36 Work on live high voltage overhead lines

Work on live high voltage lines shall be carried out in accordance with the requirements of Section 9 of these Rules using approved techniques, procedures and equipment.

Certain work which is not regarded as live high voltage line work may be done in accordance with approved procedures on live high voltage lines as listed below. This work may include:

- operating work; and
- attaching or removing testing equipment which is specially designed for the purpose.

Only appropriately tested and rated equipment shall be used for these purposes.

6.37 Distractions when working on live electrical apparatus or in high risk situations

Mobile phones and other possible distractions shall not be taken into high risk situations. High risk situations include any live electrical work, work at height, work in or near confined spaces, and work with machinery or for operation of plant or crane near live electrical apparatus. Hazard and risk assessments shall record these situations and the control measures taken.

When working as designated observer for live work, the observer may carry a mobile phone (or other communication device) for emergency communication purposes. If the designated observer is required to use a mobile phone, or is in any other way distracted from the role of observer, all work requiring the observers presence shall cease and the work crew shall move away from the hazardous situation.

6.38 Communications antenna on towers, poles or columns

Communications facilities such as Broad Band Communication Cables (BBCC), telephone cables and telecommunications antennas and radio facilities are the responsibility of the communications organisation owning the communications system.

Figure 19 – Antenna safety signage

Isolation processes are provided (where necessary) at the installation sites for the isolation of the energy supplying these installations. It is essential to identify such installations during the worksite hazard and risk assessment and to note the control measures adopted to manage the site if persons are to be working within the hazardous field of the antenna (this will be shown in the instructions provided at each site).

These control measures will include the isolation procedure for the energy source to the antenna/transmitter.



Radio emissions pose a potential danger. Care must be taken to avoid approach to these installations until isolated in accordance with approved procedures.



6.38.1 Exclusion zones for communication transmitters

Figure 20 – Communication transmitters and exclusion zones



Whip or Omni type antennas

Exclusion zone: 0.5m in any direction



Panel type antenna and 5G aerial

Exclusion zone: 10m in front, 3m to the side and 1.5m above and/or below



Parabolic Dish type antenna

Exclusion zone: 600mm around and 1m in front of the dish

7.0 Work on low voltage electrical apparatus

This section applies to all electrical apparatus operating at low voltage.

7.1 Low voltage safety principles

7.1.1 Basic safety principle

ALL LOW VOLTAGE EXPOSED CONDUCTORS AND ELECTRICAL APPARATUS SHALL BE REGARDED AS LIVE UNTIL ISOLATED AND PROVED DE-ENERGISED BY APPROVED MEANS.

Contact with live electrical apparatus will cause severe injury or death.

In all cases of electric shock or suspected electric shock the victim shall immediately be transported to hospital or medical centre for treatment.

All cases of electric shock or suspected electric shock shall be reported as required by Company Procedure (Health & Safety) GSY 0051 – Health, Safety and Environment Incident Management.

Hazard and risk assessments shall be carried out for all types of work performed under these Rules.

7.1.2 Work on or near de-energised low voltage electrical apparatus

When work is to be carried out on or near de-energised low voltage electrical apparatus (except for disconnected apparatus, or where approved live low voltage working techniques are applied), an authorised person shall, in accordance with approved procedures and in the following sequence:

- **ISOLATE** the associated electrical apparatus from all possible sources of network supply;
- **SECURE THE ISOLATION** by tying back bonds, withdrawing fuses or links (where practical), applying **DANGER TAGS** and where possible approved **LOCKING DEVICES** to all points of isolation;
- **PROVE DE-ENERGISED** by approved procedures;
- **APPLY LV PROTECTIVE BONDS** immediately after proving de-energised - requirements for these bonds are outlined in section 7.1.11;
- **CLEARLY IDENTIFY THE ELECTRICAL SAFE AREA FOR WORK;**
- **ISSUE A LVAA** or **ACCESS AUTHORITY** in accordance with these Rules.

The LVAA **HOLDER** SHALL:

- **SATISFY THEMSELVES** that the LVAA will allow the work to be carried out safely;
- **SIGN ON** to the LVAA as the LVAA Holder; and
- **ENSURE** all members of the work party understand and sign onto the LVAA prior to commencing work.

Where the work party considers that hazardous induced or transferred voltages are likely to occur, either live working procedures shall be adopted or the conductors shall be short-circuited by approved means with Working Protective Bonds.

7.1.3 Proving low voltage electrical apparatus de-energised

Low voltage electrical apparatus shall be proved de-energised by means of approved testing devices. This test equipment shall be proved to be in good working order immediately before and after use, otherwise two independent means of proving de-energised shall be used. Care shall be taken to ensure correct identification of all individual LV isolation points and circuits. Proof of isolation shall be confirmed by a second qualified worker (if available).





7.1.4 Energising and de-energising low voltage electrical apparatus

When connecting de-energised electrical apparatus, including connection to customers services, to a live low voltage source of supply, the final connections to be made shall be to the source of supply. When disconnections are being made, the connections at the source of supply shall be disconnected first. The neutral conductor shall be connected first and disconnected last.

7.1.5 Street lighting conductors and control circuits

Working on or near street lighting conductors poses a unique hazard due to the risk of inadvertent energisation and difficulties in identifying all sources of supply.

Street lighting conductors and other control circuits shall be treated as live unless they have been:

- a) Isolated at all sources of supply, danger tagged, and LV Protective Bonds applied from the isolated Street Light mains to the neutral of the isolated Low Voltage mains; or
- b) Isolated from all sources of supply via a physical break in the street light conductor on both sides of the work site, and danger tagged.

Street lighting conductors are effectively earthed via connected lamp fittings, even if isolated, and therefore present a hazard. They shall be temporarily insulated when approaching within 500mm. Metal street light brackets and support fittings shall be regarded as earthed.

Note: Fallen street lighting conductors must be treated live any low voltage conductor and either be:

- appropriately isolated, proven de-energised and have LV Protective Bonds applied; or
- cut away / unbonded using live LV techniques

7.1.6 Low Voltage Access Authority/Access Authority for LV equipment/network

This document lists the actions to be followed for issuing, receiving and signing on to a LVAA or AA for work associated with Low Voltage (LV) isolation only.

This applies to situations where workers are required to carry out work on or near the company's LV network electrical apparatus that is not subject to High Voltage (HV) Access Authority (AA) conditions. This includes Accredited Service Providers (ASPs). Whenever AA's, LVAA's or Operating Agreements are on issue, a Switching Folder shall be used.



Figure 21 – Low Voltage Access Authority (Front) (FSY 0215)



LOW VOLTAGE ACCESS AUTHORITY No.:

1. Purpose of Low Voltage Access Authority (LVAA) This LVAA is for work on
 (the equipment to be work)
 at (the location of work)
 to
 (the purpose of work)

2a. Isolation The following actions have been taken: (list all points of isolation and other steps taken to confirm the site is ready for work).....

2b. Details of customer installation isolation points (list all points of isolation and other steps taken to confirm the site is ready for work)

3. Low Voltage Protective Bonds (LVPBs) have been connected at:

Location	Placed by:	Removed by:	Location	Placed by:	Removed by:
A)			F)		
B)			G)		
C)			H)		
D)			I)		
E)			J)		

4. Special conditions

5. Issue of LVAA (Tick all appropriate boxes, cross out non-applicable boxes and initial, rule out and initial items not done)

- The electrical apparatus has been isolated and (except for Low Voltage (LV) auto isolation points) the isolation has been secured by danger tags.
- The electrical apparatus has been proved de-energised and LVPBs applied to all conductors in contact with customer installations as required by the Electrical Safety Rules (ESR).
- The isolation of the electrical apparatus will remain in this condition until this LVAA is cancelled.
- There are no other LVAA's or High Voltage (HV) Access Authorities (AA) for Work or Test currently issued on the electrical apparatus listed in Item 1.
- Work party is on site has been given advice on the isolations, location of LVPBs and nearest live electrical apparatus.

This Low Voltage Access Authority is issued to:

Issued by: Name (Print) Authorisation No:

Signed Time Date / /

6. Acceptance by LVAA Holder (Local safety precautions must be taken by LVAA Holder and work party)

- I understand the contents of this LVAA.
- I am satisfied that Items 1 to 5 above will permit me to carry out the described work.
- I am an authorised LVAA Holder.
- I will make all members of the work party aware of the conditions of this LVAA.
- This LVAA will remain at the worksite until cancelled by an authorised switching officer.

Name (Print) Authorisation No.: Phone No:

Signed Time Date / /

(The Low Voltage Access Authority Holder must comply with the requirements for LVPBs and all other relevant policies and procedures)

7. Transfer of Low Voltage Access Authority

- As the new LVAA Holder, I have read and understand this AA.
- I am receiving this LVAA in the presence of the current LVAA Holder and Issuer.
- I am an authorised LVAA Holder.
- I accept responsibility as the LVAA Holder from the time of transfer shown below.

Received by (print)	Signature	Auth. No.	Time	Date	Received from (signature)



7.1.7 Responsibilities of the AA or LVAA issuer

Refer to 8.2.2.4 for the requirements.

7.1.8 Responsibilities of persons signing onto an AA or LVAA

Refer to 8.2.2.5 for the requirements

7.1.9 Access Authority for Test on the Low Voltage network

Refer to 8.2.3.2 for the requirements

7.1.10 Switching Folder requirements on the Low Voltage network

Refer to 8.2.1 for the requirements

7.1.11 Operational Protective Bond Requirements

Operational Protective Bonds (OPBs) shall be applied to at least two different sides of the worksite, unless specified otherwise in the scenarios outlined below. The first set of OPBs shall cover the worksite from the “normal network source of supply for that circuit.” The second set should be applied on any other side of the work site, preferably the side that poses the greater risk of LV back feed (e.g. furthest from the normal supply point, most customers connected).

These OPBs should be installed as close as practical to the worksite without hindering the work to be performed. If any network apparatus or mains are disconnected from a circuit with an OPB, additional bonds shall be placed on those circuits prior to the disconnection to ensure that every circuit being worked on, with a potential back-feed (e.g. services attached or network isolation point), has an OPB applied.

Depending on the scope of work and network configuration, defining a clear worksite can be complex. In cases of uncertainty, a set of OPBs should be applied from all sources of network supply.

Circuits containing Community/Network batteries

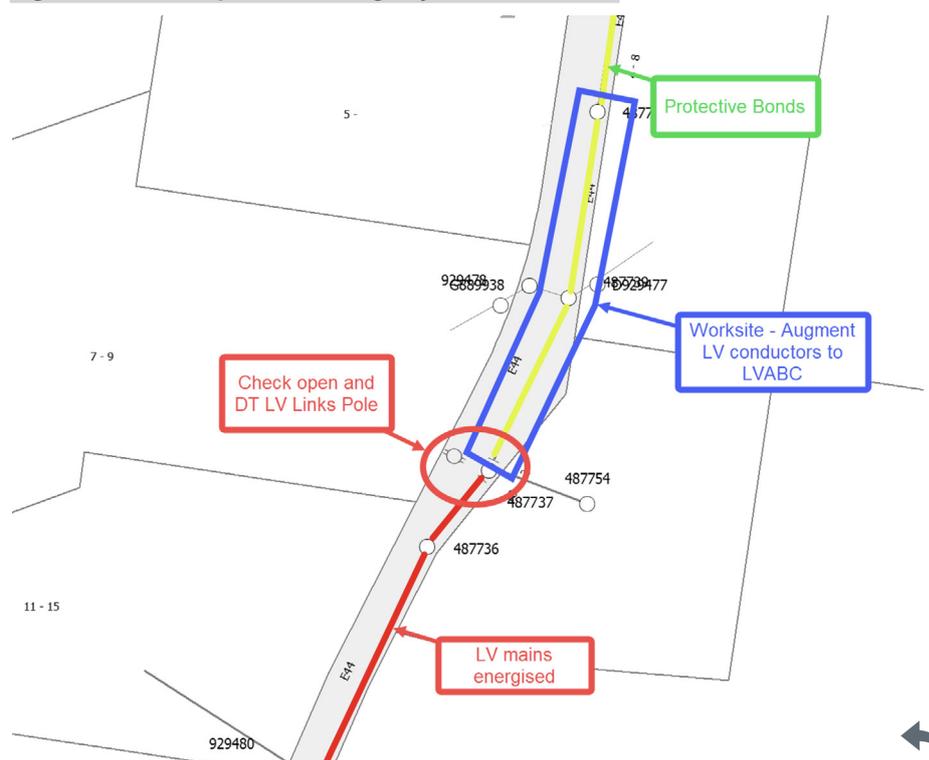
Where community or network batteries form part of the isolation, an additional set of OPBs shall be installed on network mains as close to the community battery as possible with the battery network isolation point isolated.

7.1.11.1 Exceptions from Operational Protective Bond Requirements

Working Adjacent Live LV Mains

If the worksite extends to an isolation point, the isolation should be extended so that the worksite does not come within the clearances of live LV mains. Where the worksite must come within clearance of live LV mains, appropriate live low-voltage work procedures shall be followed. If any network apparatus or mains are disconnected from a circuit with an OPB for the purposes of augmenting a section of mains up to the live isolation point, no additional OPBs are required to be applied to this circuit provided that all connected services have been isolated, or are connected to a circuit with an OPB applied.

Figure 23 – Example of working adjacent live mains



PB requirements when there are no Network Mains beyond the worksite.

In some cases, a second set of OPBs cannot be installed on the other side of the worksite because there are no network mains beyond the worksite. In these scenarios, it is acceptable to have only one set of OPBs applied as close to the worksite as possible.

If any network apparatus or mains are disconnected from a circuit with an OPB for the purposes of augmenting a section of mains, no additional OPBs are required to be applied to this circuit, provided that all connected services have been isolated.

Figure 24 – Example of worksite with no network mains beyond

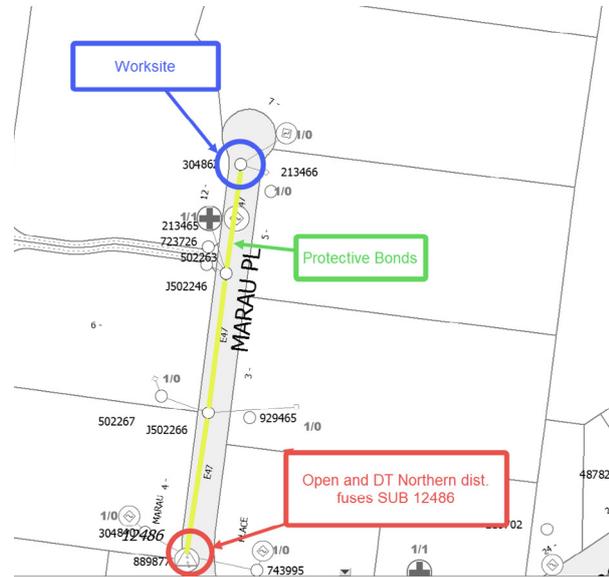
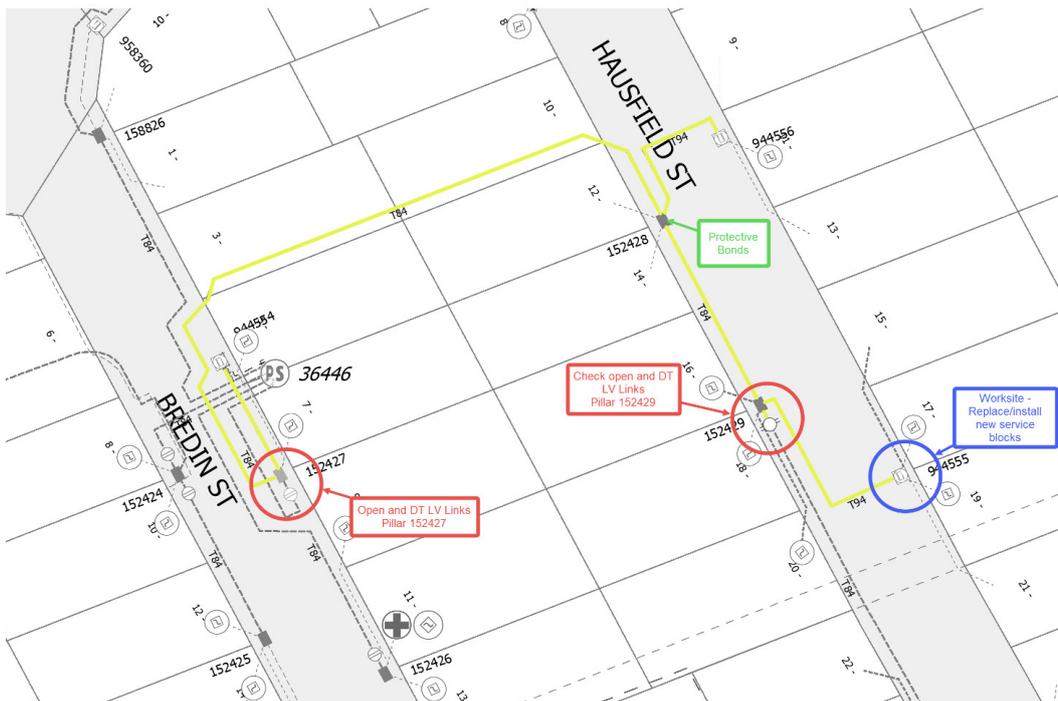


Figure 25 – Example of worksite with no network mains beyond



7.1.11.2 PB Requirements for Customer Isolations

PB requirements for work within SAD of the Network (including service mains)

Where work is to be performed within SAD of the network, only one set of OPB is required on the Network provided that the following conditions are met:

Single Customer Substation

- The customer installation shall be isolated; and
- OPB shall be applied to the LV (i.e. Tx links, Fuse strips, LVCB etc).

OR

- The customer installation shall be isolated; and
- The network isolation extended to the HV, and HV Earthing applied, which will satisfy the requirements, negating the need for PBs in this scenario.



Multiple Customer Substation

The customer (where work is to be performed) shall be isolated; and

- a. Isolate and apply an OPB at LVCB or fuse strip; or
- b. If unable to achieve a), and other sources of LV supply exists, extend the isolation to bar outage and place an OPB in a suitable location (i.e. Tx links or fuse strips); or
- c. If unable to achieve b), de-energise the circuit, and use live LV techniques to break connections at the bottom of the LVCB, and apply an OPB to the disconnected tails and apply temporary insulation or secure the disconnected tails so that they cannot come within clearances of live exposed parts.

7.1.11.3 PB Installation Requirements

Before installing the OPBs, ensure the conductors are clear of any contamination or oxide.

All PBs must be approved for use and at least 50mm² copper.

On the underground network, PBs may be applied to columns, pillars or substations containing live equipment if an HSE quick guide or procedure has been approved and on-site risk assessment deems it safe to do so. Refer to HSE Quick Guide – Installations of Low Voltage Protective Bonds on LV Switchgear.

The information contained within the HSE Quick Guide – *Installations of Low Voltage Protective Bonds on LV switchgear* will be merged into a PB manual at a later date.

Note: At the time of writing, there are no approved methods for installing PBs into a column containing live components.

7.1.11.4 Requirements for Streetlight circuits

Working on or near street lighting conductors poses a unique hazard due to the risk of inadvertent energisation as well as difficulties in identifying all sources of supply.

Street lighting conductors and other control circuits shall be treated as live unless they have been:

- a) Isolated at all sources of supply, danger tagged, and an OPB applied from the isolated Street Light mains to the neutral of the isolated Low Voltage mains; or
- b) Isolated from all sources of supply via a physical break in the street light conductor on both sides of the work site, and danger tagged. This method negates the need for an OPB to be applied.

7.1.11.5 Works Within a Zone Substation

Where isolation points are contained within a zone substation, no OPBs are required.

If an isolation includes a network isolation point from a set of distribution mains (such as street supply), then at least one set of OPBs must be applied to the switch or incoming mains.

Continuity of a circuit through closed fuses must not be relied upon. Low voltage switching devices relied upon for protective bonding continuity, must be checked closed and danger tagged with the purpose clearly written and associated switching plan

OPBs must be applied by an authorised person immediately after the conductors have been proved de-energised. All three phases or all available phases and neutral shall have LVPBs applied.

OPBs may be removed where the LV mains or apparatus they are connected to are being replaced, removed, repaired or re-configured. The endorsement for the removal must be specifically noted in the special conditions on the LVAA or the endorsed for removal box ticked on the Access Authority, and appropriate precautions taken upon removal (i.e.: adopting Live Low Voltage working procedures).

The location of each set of PBs (OPBs and WPBs) must be clearly identified on the AA or LVAA and switching folder.

7.1.12 Application of Low Voltage Protective Bonds to overhead mains

Apply OPBs between the distribution neutral and each distribution phase on the distribution mains. Preferable location (where possible/practical) of LVPBs applied on overhead open mains is within view of the worksite.





Figure 26 – Example application to overhead ABC mains

To provide a suitable bonding point on the LV ABC, the IPCs must be installed with the inclusion of a 100mm x 12mm stainless steel bolt. On completion of work, the stainless steel bolt must be removed, and the insulated covers secured onto the IPCs.

7.1.13 Application of Low Voltage Protective Bonds to underground apparatus

Select a pillar or suitable accessible point of apparatus that is connected to the isolated mains cable on which the intended work is to be carried out. Prove that the electrical apparatus has been de-energised by means of an approved testing.

Connection of OPBs to UG apparatus can be made by locating a spare terminal hole in each service block that is electrically connected to each phase and neutral of the mains cable on which the intended work will be carried out. If a spare terminal hole is not available, temporary connection can be made using approved accessories in the protective bond kits.

Apparatus must be secured to prevent unauthorised access from the public by suitable means such as but not limited to temporary insulating material, temporary fencing, temporary enclosures, etc. Where this is not achievable, the apparatus must remain guarded by an authorised worker.

Figure 27 – Example application to underground apparatus (clamp attachments left / bolted right)





7.1.14 Application of Low Voltage Protective Bonds to Service Mains

Where work is to be carried out on apparatus that is connected to low voltage service mains, the potential for an alternate source of supply exists. Whilst service mains remain connected to network apparatus with LVPBs installed (OPBs and/or WPBs), no further isolation or protective bonding requirements exist.

Where service mains are disconnected from network apparatus that has protective bonding applied, the service mains shall be regarded as energised.

Where the bonding of service mains is not practical and isolation is required, service fuses at each premise shall be removed, Personal Danger Tag applied (non-network isolation) and listed on the back of the Switching Folder (in the 'additional control measures taken by the Access Authority holder' section).

It is the Access Authority Holders responsibility to ensure that all Personal Danger Tags at service fuses are removed prior to cancellation of the Access Authority or LVAA.

Work that requires service mains to be connected/disconnected from network apparatus (such as augments, pole changes, pillar changes, etc.) may be completed using live LV procedures.

Note: Exposed tails of service mains must be regarded as live with suitable temporary insulating material applied to any exposed conductor.

7.2 Work on live low voltage electrical apparatus

Work on or near live low voltage electrical apparatus shall only be carried out by trained and authorised personnel in accordance with approved live low voltage procedures.

7.2.1 Working with a safety observer

A person working on or within 500mm of an uninsulated live low voltage conductor shall wear a low voltage insulating glove and approved outer glove on each hand and be attended by a safety observer who:

- has had training in emergency procedures; and
- demonstrated competency to carry out those procedures during the last 12 months; and
- holds authorisation to carry out the work being undertaken; and
- been instructed in the hazards of the work and the necessary precautions.

Emergency procedures include resuscitation and releasing a person from live apparatus, and, as appropriate to the work being done, rescuing a person from a pole, structure, or elevating work platform.

The primary responsibility of the safety observer is to remain on the ground and observe LV live work activities across the full scope of the LV live work task.

The Safety Observer must alert the work team to any potentially unsafe actions that may inadvertently occur including infringement of safe working distances, movement of temporary insulating material, or any other lack of compliance with approved procedures.

The Safety Observer has the authority to temporarily stop the work at any time.

The Safety Observer must not perform any other task whilst LV live work is in progress and must maintain effective and immediate communication with the work team at all times. This may include the use of electronic communication due to noisy environments.

A low voltage rescue kit suitable for the work being performed, a burns kit and defibrillator must be available at the worksite and deployed ready for immediate use by the safety observer.

7.2.2 Effectiveness of insulation on low voltage electrical apparatus

Low voltage electrical apparatus covered with material such as tape, rubber, plastic or fabric including cables and service wires exposed to ultraviolet (UV) deterioration shall not be regarded as insulated for handling when live, unless it is known that the insulation is suitable for the purpose and is in good condition.

7.2.3 Deleted (content moved to 7.1.5)





7.2.4 Paralleling of low voltage distributors via bonding, switching or fuse insertion

All paralleling of low voltage distributors shall be carried out in conjunction with Despatch, Low Voltage Control or the System Operator. Only approved switching plans and network alterations are to be undertaken. The application of OPB's, issue and cancellation of LVAA's shall be coordinated through Despatch, Low Voltage Control or the System Operator.

Correct phasing and compatible voltages from all possible sources of supply shall be confirmed at low voltage bond, switch and fuse points prior to making connection following any installation of new electrical apparatus or re-arrangement of construction.

7.2.5 Low voltage customers' service connection and identification of service neutral

Incorrect connections, reverse polarities and incorrect phase rotations can create life threatening situations and equipment damage. It is the connecting person's responsibility to ensure that all connections are correct prior to leaving the work site.

All connections to the low voltage network must only be made after undertaking a documented testing process in accordance with AS4741 – Testing of connections to low voltage electricity networks, and the results must be recorded.

In particular, the identity of the neutral conductor(s) must be confirmed by electrical testing, and the polarity of connections must be confirmed as being correct.

If there is any doubt about the identification of a service neutral, the service shall be left disconnected until the neutral has been identified.

All connections and required testing must be complete before leaving site, including confirming that metal parts are not energised.

7.2.6 Work on low voltage control panels or switchboards

Work on low voltage control panels or switchboards (including work in tunnel boards) shall be performed in accordance with approved procedures. Care shall be taken to ensure inadvertent contact is not made with live exposed conductors and precautions taken to prevent the worker from forming a part of a conductive circuit.

7.2.7 LV tasks not permitted when working with live low voltage

The following tasks shall only be carried out on LV network apparatus under isolated conditions under an LVAA or AA:

- Work on the top circuit(s) of three-way or four-way, twin circuit, or triple circuit, open wire, multi-phase overhead constructions (other than the installation or removal of bonding conductors or service connections);
- Cable jointing involving straight-through or branch joints;

The following tasks shall only be carried out on LV network apparatus under de-energised conditions, using approved Live LV working procedures or isolated under LVAA or AA conditions:

- Any work that disturbs CONSAC (concentric neutral solid aluminium conductor) cable, including making or breaking connections;
- Making or breaking connections of paper/lead cables;
- Replacement of columns or metal pillar covers where the incoming mains are larger than 50mm² in size;
- Making or breaking ground-mounted transformer connections, either at the bushing or line side of the main isolator;
- Working on maximum demand indicator (MDI) or metering current transformers on ground-mounted transformers, mounted between the transformer bushings or line side of the main isolator (excluding the use of testing and measuring equipment to insulated or non-exposed conductors);
- Remove or replace Weber LV switchgear current transformers (other than with the transformer, LV fuse strips, and distributor connections all isolated).





Note: The connection and disconnection of generators may be carried out on LV network apparatus under de-energised conditions subject to the workers WHRA.

The final decision whether to work live or not will be made by the work party on site after completion of the pre-task hazard and risk assessment.

Work on apparatus upstream of the line side of the LV fuses to the transformer secondary bushings is considered to be high risk as the only protection is on the primary side of the transformer.

Due to close proximity and clearance constraints with other phases and secondary points of contact, and higher fault current levels, work in this area is prohibited on ground mounted transformers (as listed above). Work on pole mounted transformers in this area should be carried out under isolated conditions where possible/practical and is subject to the outcome on an on site risk assessment.

Note: Testing and application of load monitoring equipment (including DSUB monitors), with no exposed conductive parts may be carried out in this area using approved testing and connection procedures.

7.3 Work on low voltage overhead lines

7.3.1 General principles

The basic safety principle of regarding all conductors as live until proved de energised always applies. Earthed apparatus is known to present a hazard, but the hazard is often not obvious.

Protection from electric shock can be achieved by insulation or body separation or both. Where you can't achieve one, you shall have the other.

Insulation can be obtained by having:

- permanently insulated conductors; or
- temporarily insulating bare conductors; or
- by wearing low voltage insulating gloves and approved outer gloves on each hand.

Making a connection between a live conductor and any other conductor can also create a hazard.

The following precautions are required:

- ensure your body does not become the path between the conductors; and
- always check between the conductors before making the connection, using an approved low voltage detector to ensure the connection will not be made between unlike phases.

For the purpose of this Clause the neutral, street light conductor and Broad Band Communication Cable (BBCC) and catenaries, if involved shall be regarded as a conductor and shall be covered.

7.3.2 Work on or near live low voltage overhead conductors

Where work is to be done within 500mm of any uninsulated live low voltage conductor every other uninsulated conductor within reach shall be covered with temporary insulating material in all directions, and an insulating glove and approved outer glove shall be worn on each hand.

This means that work may be done on an uninsulated live conductor provided that an insulating glove and approved outer glove shall be worn on each hand, and every other conductor within reach is covered in accordance with these Rules.

The temporary insulating material shall be applied from a position below the mains so that no part of the worker's body other than their forearms are at or above any exposed conductor.

Once all conductors are covered, the insulating material can be removed from the conductor on which work is to be carried out. On completion of the work, the temporary insulating material on the bare conductor shall be reinstated before progressing to the next conductor.





7.3.3 Persons working together

Where two or more persons are working together on a live low voltage line, in addition to Clause 7.3.6 below, special care shall be taken to ensure that they either:

- confine their work to the same phase; or
- maintain at least 500mm body separation from each other; and
- do not pass tools (or anything conductive) direct from one to the other.

7.3.4 Deleted (content moved to 7.2.1)

7.3.5 Working without a safety observer

A safety observer is not required for work on live low voltage overhead conductors where the work is limited to operating, testing, or disconnection / reconnection of service conductors only.

A person working without a safety observer on or within 500mm of an uninsulated live low voltage conductor shall:

- keep below the level of every uninsulated conductor within 500mm of any part of their body except for the forearms; and
- wear an insulating glove and approved outer glove on each hand.

An example is connecting or disconnecting a service line at a point of attachment, working from below the service mains but with insulated services at or below head level, or with a bare service conductor below head level temporarily insulated wherever it is within reach.

7.3.6 Working in Earthed Situations

An earthed situation is a work location where an earthed conductor is within 500mm of any part of the person's body. An earthed conductor may include metal brackets, earthing down leads or cable sheaths which may not be obvious hazards. An earth situation presents a risk of electric shock from contact between the live conductor being worked on and earth.

Earth situations include working on steel or concrete poles. De energised street lighting conductors should also be treated as earthed.

An insulating glove and approved outer glove shall be worn on each hand when working on or near live low voltage conductors in an earth situation.

7.3.7 Passing Between Live Low Voltage Conductors

When workers need to pass between live low voltage conductors within 500mm of any part of the worker's body, they shall wear a low voltage insulating glove and approved outer glove on each hand, and be attended by a safety observer in accordance with Clause 7.2.1. The conductors nearest their body shall be insulated (either temporarily or permanently) wherever they are within reach. Permanent insulation must be thoroughly visually inspected for integrity before passing through.

7.3.8 Deleted (content moved to 6.36)

7.4 Work on low voltage underground cables

7.4.1 Identification of low voltage underground cables

When low voltage cables exist in areas where high voltage cables could exist, identification of the cable will be necessary as detailed in Section 8 of these Rules. When working on underground pilot cables they shall be identified in the same way as low voltage cables. All cables shall be regarded as live and all necessary precautions taken until proved de-energised.

7.4.2 Work on de-energised low voltage cables

A person shall not work on or near de-energised low voltage cables unless they are identified, isolated, danger tagged and proved de-energised in accordance with approved procedures.





7.4.3 Work on energised low voltage cables

All work on energised low voltage cables shall be performed in accordance with approved procedures. Consideration shall be given to the option of isolation in every case.

When working on pillars and columns containing energised apparatus, a worker shall:

- wear an insulating glove and approved outer glove on each hand; and
- apply temporary low voltage insulating material to all live parts not being worked on and earthed metal within reach; and
- work from an insulating mat to minimise the hazard of their body being at earth potential.

7.4.4 Persons working together

Where two or more persons are working together on live low voltage apparatus, special care shall be taken to ensure that they either:

- confine their work to the same phase; or
- maintain at least 500mm body separation from each other; and
- do not pass tools (or anything conductive) direct from one to the other, including to a person not positioned on an insulating mat.

7.4.5 Working without a safety observer

A safety observer is not required for work on live low voltage cables and apparatus where the work is limited to operating, testing, or disconnection / reconnection of conductors only.

An example is connecting or disconnecting a customer's service at a point of attachment above ground level, working from an insulating mat, with all bare conductors and apparatus temporarily insulated, other than the phase being worked on.



8.0 Work on or near high voltage electrical apparatus

This section applies to electrical apparatus operating at high voltages.

8.1 High voltage safety principles

8.1.1 Basic safety principle

ALL HIGH VOLTAGE ELECTRICAL APPARATUS SHALL BE REGARDED AS LIVE UNTIL ISOLATED AND PROVED DE-ENERGISED, EARTHED AND SHORT CIRCUITED AND AN ACCESS AUTHORITY IS ISSUED IN ACCORDANCE WITH THESE RULES.

Contact with live electrical apparatus will cause severe injury or death.

In all cases of electric shock or suspected electric shock the victim shall immediately be transported to hospital or medical centre for treatment.

All cases of electric shock or suspected electric shock shall be reported as required by Company Procedure (Health & Safety) GSY 0051 – Health, Safety and Environment Incident Management.

Hazard and risk assessments shall be carried out for all types of work performed under these Rules.

8.1.2 Work on, or near, de-energised high voltage electrical apparatus

Before carrying out work on or near exposed high voltage electrical apparatus (except for disconnected apparatus, or where approved live line working techniques are applied), an authorised person shall, in accordance with approved procedures:

- **ISOLATE** the associated electrical apparatus from all possible sources of electrical supply; and
- **SECURE THE ISOLATION** to prevent unauthorised operation of the isolation point by applying **DANGER TAGS** to all points of isolation; and
- apply approved **LOCKING DEVICES or CONTROL SYSTEMS** as applicable; and
- **PROVE DE-ENERGISED** the associated electrical apparatus; and
- **EARTH AND SHORT CIRCUIT** the associated electrical apparatus, immediately after proving de-energised by connecting operational earths; and
- as required, **CLEARLY IDENTIFY THE SAFE AREA FOR WORK**; and
- **ISSUE AN ACCESS AUTHORITY** in accordance with these Rules.

Also, THE ACCESS AUTHORITY HOLDER shall:

- **SATISFY THEMSELVES** that the Access Authority will allow the work to be carried out safely;
- **SIGN ON** to the Access Authority as Access Authority Holder;
- **ENSURE** all members of the working party understand and sign onto the Access Authority prior to commencing work; and
- **ENSURE** all unwanted mechanical energies or secondary supplies are isolated prior to commencing work.

8.1.3 Isolation of high voltage electrical apparatus for work or test

Isolation of electrical apparatus shall be carried out by an authorised switching officer for the apparatus being operated, and in accordance with these Electrical Safety Rules. Due regard shall be given to the capability of the isolating devices to break any suspected load. Isolation shall provide sufficient break in the circuit to prevent a flashover or bridging of the isolation gap and precautions shall be taken to ensure the safety of the operator of the device.

High voltage electrical apparatus shall be isolated by making a break in the electrical circuit appropriate to the voltage and type of insulation being used, by:

- operating an identified switching device or isolator; or
- removed or separated connections; or
- mid span isolation points (installed using approved live line working techniques).

The effectiveness of the isolation shall be demonstrated by a visible break. Where it is not practicable to demonstrate a visible break approved testing or earthing procedures shall be used.

The integrity of an isolation point shall not be compromised.

Work shall only proceed on the connections or operating mechanism of a switching device or isolator if there is no risk of altering the required state of the apparatus.

When operating overhead switchgear on the transmission network, the authorised switching officer shall stand on an equipotential mat electrically connected directly to the handle of the switch, except where suitably rated operating equipment is used.

When operating non-metal clad high voltage switch gear (eg MD4), the authorised switching officer shall wear the following additional PPE for protection against arc flash injury:

- (i) approved arc rated clothing; and
- (ii) an approved arc rated face shield; and
- (iii) approved arc rated gloves.

Any person who approaches in-service SWER apparatus, to carry out work on or near the pole, shall visually determine from a distance of 3m that the HV earthing system is effective.

8.1.4 Securing of isolations

Precautions shall be taken to prevent unauthorised operation of every isolation device that has been operated to create the isolation.

This is achieved by applying Danger tags on all isolation points and locking devices at all times possible (only approved locking devices shall be used).

8.1.5 Proving high voltage electrical apparatus de-energised

**HV conductors must be proved de-energised prior to the application of earthing equipment.
Testing for de-energised mains shall only be completed by an authorised person using approved equipment.**

To prove HV electrical apparatus de-energised the following actions shall be carried out:

- the HV detector shall be inspected for a compliant test date and for signs of any visual damage;
- ensure that the HV detector is set to the correct voltage range;
- test the HV detector against a known live HV source or approved proving unit;
- apply the HV detector to the apparatus on all phases at the proposed isolation point where earths and short circuits are to be applied and observe for any voltage indication;
- retest the HV detector against a known live HV source or approved proving unit without any alteration to the selection switch; and
- repeat procedure at each and every proposed isolation point where earths and short circuits are to be applied.

When direct contact testing is utilised, testing shall be carried out with appropriately insulated testing equipment. The equipment shall be within a valid test date.

Direct contact testing should be completed on bare sections of HV apparatus. Testing should not be conducted on covered conductors or bus bars.

Testing instruments should be tested/proved in the same plane relative to conductors where possible. The authorised switcher should be aware of stray fields/induction in HV switchyards in relation to the plane (angle) of the detecting device.





Where induction is suspected due to adjacent live apparatus, alternate switching arrangements may alleviate the presence of induction, eg, bleeding induction through the HV winding of a transformer within the isolation.

Note: Any indication on a detector shall be regarded as indicating potential. No assumption shall be made as to the possibility of induction being the cause.

Where it is not practicable to prove conductors de-energised at the point of application of operational earths, approved procedures shall be used to ensure the conductors are de-energised prior to the application of operational earths (eg via neon indicators or transformer secondary potentials).

Visual detectors such as neons or lights may be used provided that there is a facility to test the visual detectors once the HV apparatus is de-energised via approved testing procedures.

Test points and approved test devices for use with test points shall be verified with another source or approved testing unit after testing.

Where no testing facility is available, switching may be arranged to include an accessible section of apparatus to carry out the test, ie, low voltage on a transformer within the isolation, or proving the oil switch open on an external apparatus, eg, overhead mains.

When testing is completed through fuse elements, a method of test must be followed that ensures that the fuse has not blown during the test. The use of fuse test dummies is recommended. The location of fuse dummies that have been installed must be recorded on the switching folder.

Proving de-energised aerial covered high voltage cables shall be carried out at termination or transition points on high voltage covered cable where exposed conductors are available. The covered cable shall then be traced visually to the work site.

Note: The visual trace shall be independently verified by a second person.

The application of an interlocked, fault rated earthing switch may be used to prove apparatus de-energised where the electrical apparatus is fully enclosed and non-withdrawable. Interlocks shall only allow the earthing switch to be closed if bus bar and feeder disconnectors have been opened.

8.1.6 Earthing and short-circuiting

Earthing is an integral step in providing safe access to de-energised HV apparatus under an Access Authority. Operational earths shall be applied between all points of the isolation and the work site. Care should be taken to ensure that earths are between the work site and all possible sources of supply including low voltage (LV) backfeeds.

Earthing and short-circuiting equipment shall be applied by an authorised person immediately after the conductors have been proved de-energised. Earths shall be connected to the general mass of the earth or to a substation earth grid before application to HV apparatus. All three phases or all available phases shall be earthed.

Working earths and equipotential bonds may need to be connected to the electrical apparatus in addition to operational earths prior to work commencing.

Earths shall not be connected through a fuse element and therefore fuse dummies must replace fuses when fuses form part of the earthing circuit to ensure earthing connectivity during a fault. The location of fuse dummies that have been installed must be recorded on the Switching Folder.

High voltage switching devices relied upon for earthing continuity, must be checked closed and danger tagged with the purpose clearly written and associated switching plan.





8.1.6.1 Earthing and short-circuiting of an overhead line

Earthing and short circuiting of a high voltage line shall be carried out as follows:

- where a number of transformers are tee connected to a spur line (a line with only one possible source of network supply), the high voltage transformer terminals need not be isolated and earthed individually, provided that the line is earthed between the nearest transformer(s) and the work site;
- at least one set of earths shall be visible to the work site except for earthing high voltage covered conductor (Note: a working earth may be applied to satisfy this requirement);
- where the conductors are to be broken, wherever possible, an earth shall be connected within sight of the work, on both sides of the proposed break or approved temporary bonds connected across the break until the conductors have been reconnected;
- working earths may be placed on the line under Access Authority conditions as needed, provided that the line is proved deenergised before installing the extra earths;
- where possible, excess earthing lead must be secured to the structure for safety;
- where permanent earthing facilities such as substation earth electrodes, down leads, transmission towers, or pole buttplates exist, they shall be used for earthing overhead lines;
- earthing equipment used for earthing and shortcircuiting a line, whenever connected at a substation, shall be connected to the high voltage earthing system; and
- where no permanent earthing facilities exist, an approved earth stake shall be used, driven at least 600 mm into the ground.

Note: where a temporary driven earth is used for an operational earth on a high voltage distribution network feeder without Sensitive Earth Fault (SEF) protection enabled, the associated high voltage isolation points shall be a three-phase switch or ganged switch (ie cannot be operated one phase at a time). This does not prevent SEF protection being temporarily disabled for network operation if required.

8.1.6.2 Earthing of transmission earth wire and overhead pilot cables

Where operational or working earths are applied to transmission feeders having overhead earth wire/s and/or pilot cable/s with uninsulated earthed screens, each earth will be bonded to the aerial earth wire or pilot cable to maintain the same potential at the worksite.

8.1.6.3 Earthing of single wire earth return (SWER) lines

When earthing a SWER line, the first earth connected shall be to a known permanent (solid) earth on the supply side of the work site. If two (or more) possible sources of supply exist then the first two (or more) earths connected shall be to a known permanent earth, one on each supply side of the work site.

A permanent earth point can be found at distribution substations, isolating transformers, reclosing facilities and at some established points as noted on system diagrams. In addition to the solid earth bond connection/s the SWER line shall be earthed on each side of the proposed work. This includes below DOF where the work involves work on a distribution transformer pole.

8.1.6.4 High voltage overhead covered conductors

High voltage overhead covered conductors including:

- metallic screened aerial bundled cable (ABC);
- Non-Metallic Screened Aerial Bundled Cable (NMSABC); and
- unscreened insulated conductor (Covered Conductor Thick - CCT);

shall be earthed and short-circuited in accordance with approved procedures. High voltage aerial cable systems need not be earthed and short circuited at the work site, provided that the conductors are earthed and short circuited between all isolation points and the work site.

Earthing and short circuiting at the points of isolation satisfies this requirement.

High voltage overhead covered conductors shall be traced visually from an earth location to the work site, with the trace independently verified by a second person prior to the commencement of work.

Alternatively, insulated unscreened conductors may be earthed and short circuited where required, using earthing tags or connectors specially installed for the purpose.





8.1.6.5 Earthing equipment

Only approved equipment shall be used to earth and short-circuit high voltage conductors. Earthing equipment shall have an appropriate rating for the maximum prospective fault current and backup clearing time so that earths are capable of operating the protection. Earthing equipment must be within current test date and in good condition.

Improvised earthing and short circuiting equipment shall not be used.

8.1.6.6 Work on unearthed electrical apparatus

The only exemptions to the requirement for earthing and short-circuiting of high voltage electrical apparatus are:

- draw-out type equipment which has been withdrawn clear of live conductors and has the housing door locked closed; or housing area taped off to prevent entry into the housing; or shutters closed, locked and danger tagged preventing access to high voltage spouts or terminations; or
- apparatus which is separated from all possible sources of high voltage supply by apparatus which is earthed and short-circuited such as screens or barriers; or
- dismantled high voltage equipment on which it is impracticable to use fixed earths, and which cannot be energised by operational work; or
- where approved live line working techniques are applied; or
- involved with the application of test voltages; or
- for work on secondary systems in accordance with these Electrical Safety Rules; or
- special circumstances as approved by the Manager System Operations.

8.2 Access Authorities

Before work is carried out on, or near, electrical apparatus, an Access Authority shall have been issued and the safe area of work defined as required by these Rules, unless working in accordance with approved live line working techniques. An Access Authority:

- is issued by an authorised person; and
- is received by an authorised Access Authority Holder; and
- gives clearance to carry out specified work or test on specific electrical apparatus on the network; and
- records the isolation points operated to isolate the electrical apparatus; and
- records the number and location of Operational Earths, Operational Protective Bonds Working Earths (managed on Switching Folder), Working Protective Bonds (managed on Switching Folder), equipotential bonds (managed on Switching Folder), and LV Protective Bonds installed.

8.2.1 Switching folder

A switching folder (Company Form (Health & Safety) FSY 0054 – Switching Folder), is an envelope, attached by an authorised person at the location specified by the person requesting an electrical isolation, where Access Authorities shall be found.

The switching folder shall also be used for retention of other paperwork associated with LVAAs, live line work, and operating agreements. Every switching folder shall be returned and stored for auditing purposes.





The switching folder provides important information for an authorised person prior to removal of operational earths and the re-connection of isolated electrical apparatus. For example, the following information shall be included on the switching folder:

- AA's, OA's or LVAA's issued;
- Location of Operational Earths applied;
- Location of Operational Protective Bonds applied;
- Location of Working Earths applied;
- Location of Working Protective Bonds applied;
- Location of Fuse Dummies applied;
- Location of Phase rotation taken;
- Location of Equipotential bonds and or short circuits applied;
- Any Cross-referenced Switching Folders;
- Location where Switching folder is to be left at;
- Details of any equipment that cannot be placed into or returned to service;
- Type of Safety Document issued or received i.e., OA, Work, Test, LVAA's, Secondary and;
- Any unusual condition that the authorised person making the re-connection is to be aware of.

The switching folder also provides a receptacle for all associated paperwork including AA for work, AA for test, LVAA's, Operating Agreements, danger tags, warning tags, switching documentation and other relevant worksite safety documentation.

It is critical that upon carrying out any action associated with this folder the action is first verified to be complete and correct and the folder filled in or signed immediately after this verification. If there is any delay or distraction after verification then the action is to be verified again and the folder filled in or signed immediately.

All information entered on the switching folder must be investigated and checked. Any anomalies must be resolved by the authorised person before any attempt is made to remove operational earths and re-energise the isolated electrical apparatus.



Figure 28 - Switching Folder (front) (FSY 0054)

Switching Folder



Date: ___/___/___ Area of Responsibility/Desk: _____

SP No's _____

Location of Work: _____

Access Authority Issuer to Document

Documents Issued Details	Cancel Details
Type: Work (W) Test (T) Operating Agreement (OA) Secondary (S)	
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____
No: _____ Time: : _____ Date / / _____ By: _____	Time: : _____ Date / / _____ By: _____

Operational Earthing and/or Operational Protective Bonds

Location of Operational Earthing (OE) and/or Operational Protective Bonds (OPB) applied:	Removed by:	Location of Operational Earthing (OE) and/or Operational Protective Bonds (OPB) applied:	Removed by:
___a)		___j)	
___b)		___k)	
___c)		___l)	
___d)		___m)	
___e)		___n)	
___f)		___o)	
___g)		___p)	
___h)		___q)	
___i)		___r)	
Fuse Dummies Applied:	Removed by:	Fuse Dummies Applied:	Removed by:
a)		d)	
b)		e)	
c)		f)	

Phase Rotation Taken

a)	d)
b)	e)
c)	f)

Cross Referenced Switching Folders

a)	d)
b)	e)
c)	f)

Unusual Condition (for the information of the restoring officer):

Switching folder to be left at: _____

On completion return this folder with all associated paperwork and tags to your Supervisor
FSY0054

Figure 29 - Switching Folder (back) (FSY 0054)

Switching Folder



Date: ___/___/___

Access Authority Holder to Document

Additional control measures taken by Access Authority Holder:

Working Earths and/or Working Protective Bonds SHALL be recorded below and removed prior to surrender of Access Authority

Location of Working Earths (WE) and/or Working Protective Bonds (WPB) applied:	Removed by:	Location of Working Earths (WE) and/or Working Protective Bonds (WPB) applied:	Removed by:
___a)		___k)	
___b)		___l)	
___c)		___m)	
___d)		___n)	
___e)		___o)	
___f)		___p)	
___g)		___q)	
___h)		___r)	
___i)		___s)	
___j)		___t)	

All Equipotential bonds and/or short circuits SHALL be removed prior to surrender of Access Authority

Equipotential bonds and/or short circuits applied:	Removed by:	Equipotential bonds and/or short circuits applied:	Removed by:
a)		e)	
b)		f)	
c)		g)	
d)		h)	

Equipment that cannot be placed into or returned to service has been left disconnected at:

On completion return this folder with all associated paperwork and tags to your Supervisor
FSY0054



8.2.1.1 Cross referenced switching folders

All other switching folders involved with a common isolation must be listed. An accurate description of the location is essential. If there are no other switching folder locations strike this section out or write NIL.

Where other switching folders are involved under a common isolation a reference to these must also be made on the rear of the switching folder. The notation in the “UNUSUAL CONDITIONS” section must be “X-REF Folders” or “Cross Reference Folders”, and the location of all other cross referenced switching folders involved under the same isolation.

Careful consideration is needed for earthing at multiple work locations. In particular the Authorised Switching Officers must take particular note of whether there is:

- independent earthing for each worksite; and
- earthing common to multiple worksites.

The two situations are illustrated in the diagrams below, and in particular it should be noted that:

- for worksites controlled by separate AA with independent earthing, the AA at any worksite can be cancelled and operational earths relating to that AA removed whilst other AA are current (refer to Figure 30 – Independent earthing for each worksite);
- common earthing situations for multiple worksites require switching folders to be cross referenced (where practicable) and all AA's must be cancelled before any operational earthing is removed (refer to Figure 31 – Both earths common to each worksite). Recording of common earthing and cross reference situations must be made in the unusual conditions section of the respective switching folders; and
- working earths may also be an option to provide visual earths for respective work parties.

It must always be remembered that when working earths are used, operational earths must first be erected to satisfy the requirements of these Rules then an AA issued before proving de-energised and erecting working earths as required.

Note: All switching operations and earthing, issuing and cancellation of AA's will be coordinated through the System Operator.

Figure 30 – Cross referenced AAs with independent earthing for each worksite

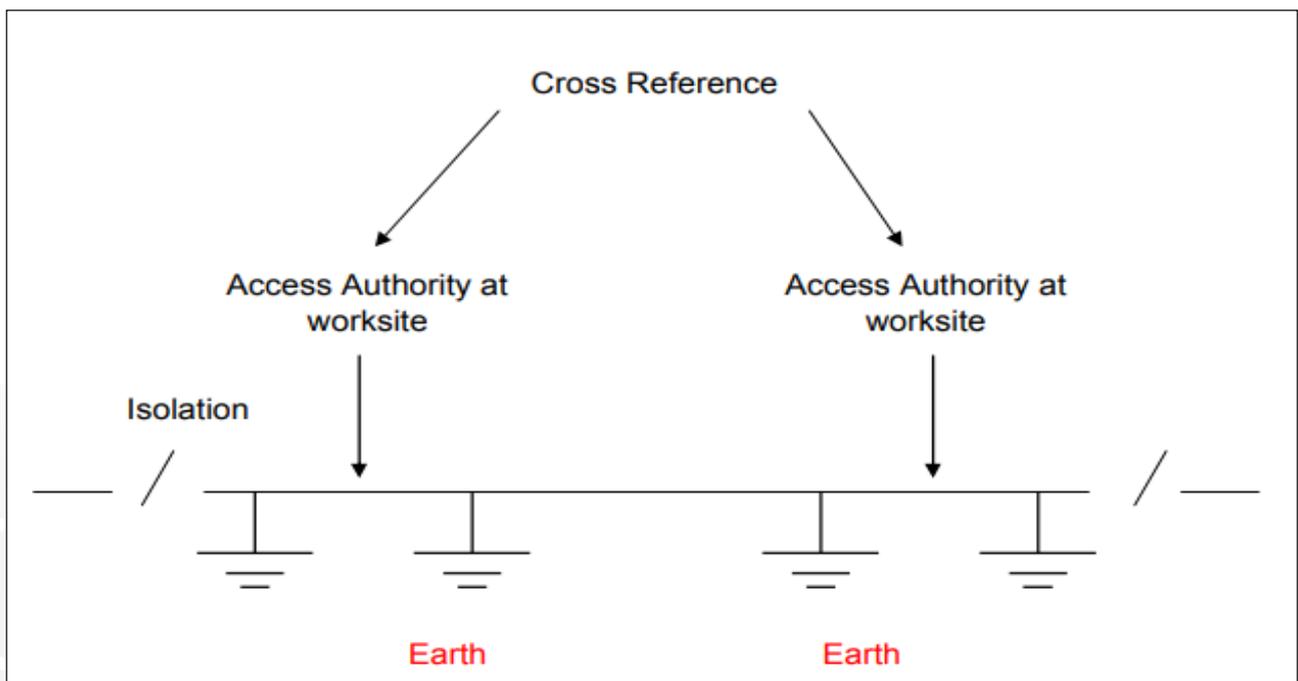
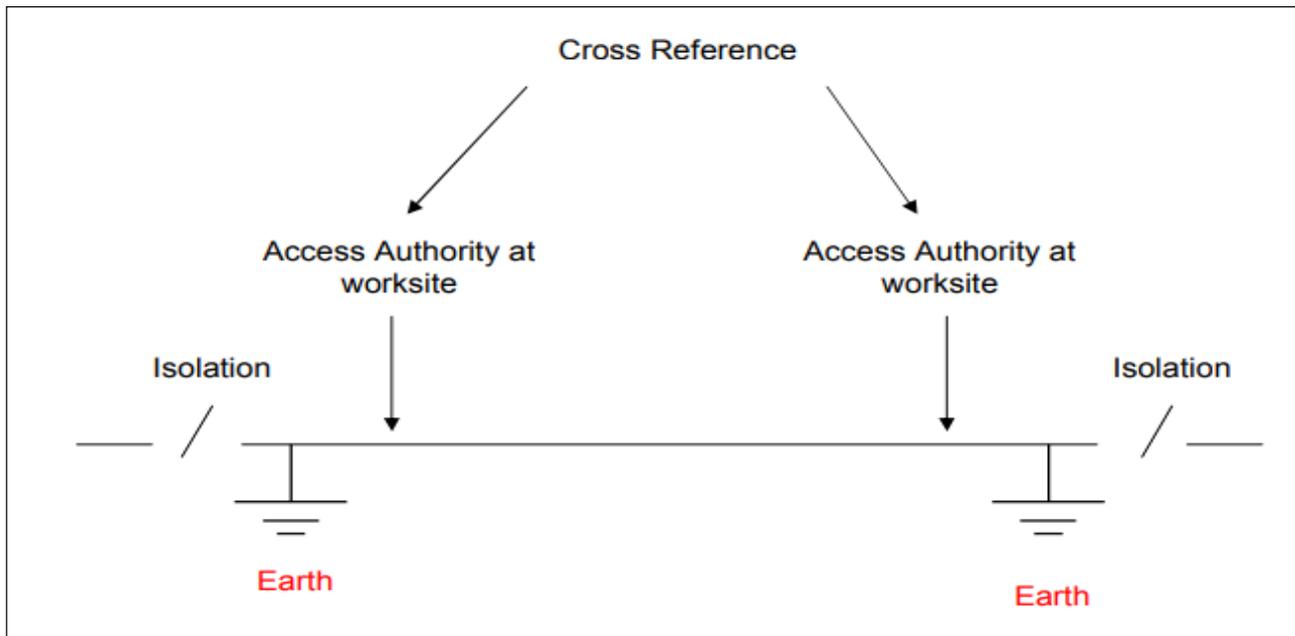


Figure 31 – Cross referenced AAs with common earthing for each worksite



8.2.1.2 Operational earthing and/or operational protective bonding applied and/or removed

The number of operational earths and protective bonds applied to the electrical apparatus must be recorded and their locations recorded accurately.

Additional earths (i.e. Working Earths, WPB's) required for managing induction risk or required as a visual on site must also be recorded on the back of the switching folder.

Upon installation of any earth to the network their location must be immediately recorded on the switching folder. There must be no distraction between application of the earth, verification of its location and recording that earth on the switching folder.

Upon checking the cancellation of the AA and signing it off, any earths that are removed must be signed off by the authorised person. Upon removal of an earth the authorised person must verify the earth is removed then immediately sign that earth off on the folder.

8.2.1.3 Fuse dummies applied

The location of fuse dummies that have been installed must be recorded. The signature of the authorised person removing the fuse dummies must be recorded. If there are no fuse dummies installed, strike this section out or write NIL. The folder must be signed immediately after it is verified that the fuse dummies are removed.

8.2.1.4 Phase rotation taken

When phase rotation has been taken the location and rotational direction must be noted. If there is no phase rotation taken, strike this section out or write NIL.

8.2.1.5 Unusual conditions (for the information of the Restoring Officer)

Any unusual conditions or information that would assist the reconnecting authorised person must be listed in this section:

- cross reference folders;
- common earthing points;
- difficult locations, a description of how to find switching points that were hard to find, etc;
- common isolation points; and
- any other information that will be useful for the authorised person restoring the switching.



8.2.1.6 Switching Folder protocols

After isolation and earthing is complete, an AA can be prepared, issued by the authorised person and left in the switching folder at a designated location.

In the AA areas defined by yellow tape, the switching folder must be left at the entry to the yellow tape area.

On completion of the work or test the cancelled AA must be left in the switching folder at the designated location. If the switching folder is to be placed out in the weather, it will be left in a weatherproof plastic bag for the purpose (or some other noted location).

It is the duty of the authorised person responsible for removing earths and the reconnection of the electrical apparatus to confirm that all relevant documentation is accounted for, correctly cancelled and all operational, switching and working earths and equipotential bonds relevant to this switching folder are removed before energising part or all of the isolated electrical apparatus.

The authorised person can accept specific information from another authorised person or the System Operator concerning earths that have been removed, but which have not been signed off the switching folder as removed. In such cases, the authorised person reconnecting the electrical apparatus must initial the removed earths and must add "As per (The name of the authorised person who gave the information)". Such information must only be accepted when the authorised person cannot readily see the earths concerned, due to remote location and, upon receiving clear details of the number and location of the earths concerned.

Blanket statements such as "all earths removed" must not be accepted or acted upon by any authorised person. On completion of the reconnection all paperwork pertaining to the job must be placed in the switching folder and forwarded to the manager/supervisor of the authorised person carrying out the restoration.

8.2.2 Access Authority for Work

8.2.2.1 Description

It is an authority issued for work to be carried out on, or near, de-energised, isolated and short circuit and earthed electrical apparatus.

8.2.2.2 Requirements before commencing work

With the exception of live line work, persons may not commence work on or near isolated and short circuit and earthed electrical apparatus until:

- an Access Authority has been issued by an authorised person; and
- it has been received by the authorised person delegated to be the Access Authority Holder, on behalf of the single or multiple crews; and the Access Authority Holder has ensured that all persons at the worksite:
 - are aware of the existence and conditions of the Access Authority; and
 - are aware of the locations of the nearest energised network apparatus;
 - sign onto the Access Authority before commencing work.

8.2.2.3 Approval for additional work after disconnection

All works on de-energised apparatus is to be listed on the scope of works on the AA. Any additional works not outlined in the initial work scope and purpose of the AA will require System Operators approval along with the following:

- the additional work has been included on the original Access Authority prior to its acceptance; or
- a new Access Authority has been issued to cover all work; or
- an additional Access Authority has been issued for the additional work.





8.2.2.4 Responsibilities of Access Authority issuer

The authorised person issuing an Access Authority shall:

- ensure that all necessary safety precautions have been taken in accordance with these Rules;
- ensure the Access Authority is completed in ink in a clear and legible manner;
- not issue an Access Authority when there is concern that the isolation is incorrect for the work to be carried out;
- not issue an Access Authority to a Holder who is not authorised, considered incompetent, insufficiently interested or inattentive when the authorised switching person is issuing the warnings;
- not issue a personal issue Access Authority until the Holder has been given personal instruction on the conditions of the Access Authority;
- advise the Holder and all persons present who are to sign on the Access Authority of the hazards involved and the precautions taken for the issue of the Access Authority (Note: this shall be carried out by the Holder where the authorised switching person is not on site);
- Where Operational Earths/Protective Bonds are endorsed for removal upon surrender of the Access Authority, the Access Authority issuer shall ensure that a member of the work party has the appropriate authorisation to do so. and;
- draw a line under the names of persons signed on to the Access Authority and advised of the hazards and initial the line (Note: this shall be carried out by the Holder where the authorised switching person is not on site).

In the event where Isolation points, Operational Earthing or Protective Bonds exceed the amount of space available on the Access Authority, another Access Authority will be issued as an extension of the initial Access Authority and numbered accordingly (i.e. 1 of 2 and 2 of 2). Both Access Authorities must be accepted by the same Access Authority holder. All members of the work party shall sign onto both the Access Authorities.

In the event the work party exceeds the amount of space available on the Access Authority, a duplicate Access Authority may be issued to allow for more sign on space for the work party. The duplicate Access Authority number shall be crossed out and labelled accordingly (i.e. 1 of 2, 2 of 2).

An authorised person may cancel an Access Authority already issued if it is considered that the requirements of these Rules are not being met. The System Operator and appropriate field supervisor shall be notified of the cancellation.

8.2.2.5 Persons authorised to be Access Authority holders

Only persons authorised in accordance with Endeavour Energy policies and procedures shall hold an Access Authority.

Responsibilities of Access Authority holders:

- confirm that the Access Authority clearly states:
 - the apparatus to be worked on; and
 - the work to be carried out; and
 - the location of the work; and
 - the operational earths or operational protective bonds provide a safe work area for the described works; and
 - any special conditions; and
- refuse to work on or test electrical apparatus specified on the Access Authority when the requirements of these Rules have not been met; and
- understand that adjacent electrical apparatus shall be regarded as live; and
- confirm that all persons who are to work on the electrical apparatus covered by the Access Authority, understand the conditions of the Access Authority and any hazards involved; and
- confirm that all persons required to carry out work on the isolated electrical apparatus or enter the yellow tape area/worksite, including any visitor/s, sign onto the Access Authority under 'Sign on' column; and



- once all members of the work party have signed on the Holder underlines and initials to signify the appropriate warnings were given; and
- for persons who were not present when the warnings were issued, the Holder repeats the warnings, underlines and initials as they sign on the Access Authority to signify the appropriate warnings were given; and
- safeguard the Access Authority until it is surrendered, the Access Authority shall be left in the switching folder; and
- where Working Earths and/or Working Protective Bonds are required to carry out work, the Access Authority Holder shall document their location on the Switching Folder and sign them off the Switching Folder upon removal.
- before the Access Authority is surrendered, all persons who have signed on the Access Authority under 'Sign on' column have signed off the Access Authority under 'Sign off' column; and
- as soon as work is completed, advise the System Operator that the Access Authority is surrendered, and that the apparatus is available for service or alternatively the limitations and conditions which apply; and
- where personal danger tags are installed in conjunction with an Access Authority or LVAA, they shall be listed on the Switching Folder in the additional control measures taken by the Access Authority Holder, and removed prior to cancellation of the Access Authority or LVAA.

8.2.2.6 Additional responsibilities of persons taking up an Access Authority (in the absence of an authorised switching person)

Where the Access Authority is left to be picked up, the Holder shall be authorised to take up an Access Authority. Also, the Holder shall receive clearance from the System Operator to take up the Access Authority, before he allows persons to sign on the Access Authority or commence work. The Holder shall verify that the electrical apparatus is isolated, danger tagged, earthed and short-circuited, and low voltage bonds applied, as defined on the Access Authority, and issue the warnings required.

8.2.2.7 Responsibilities of persons signing on to an Access Authority

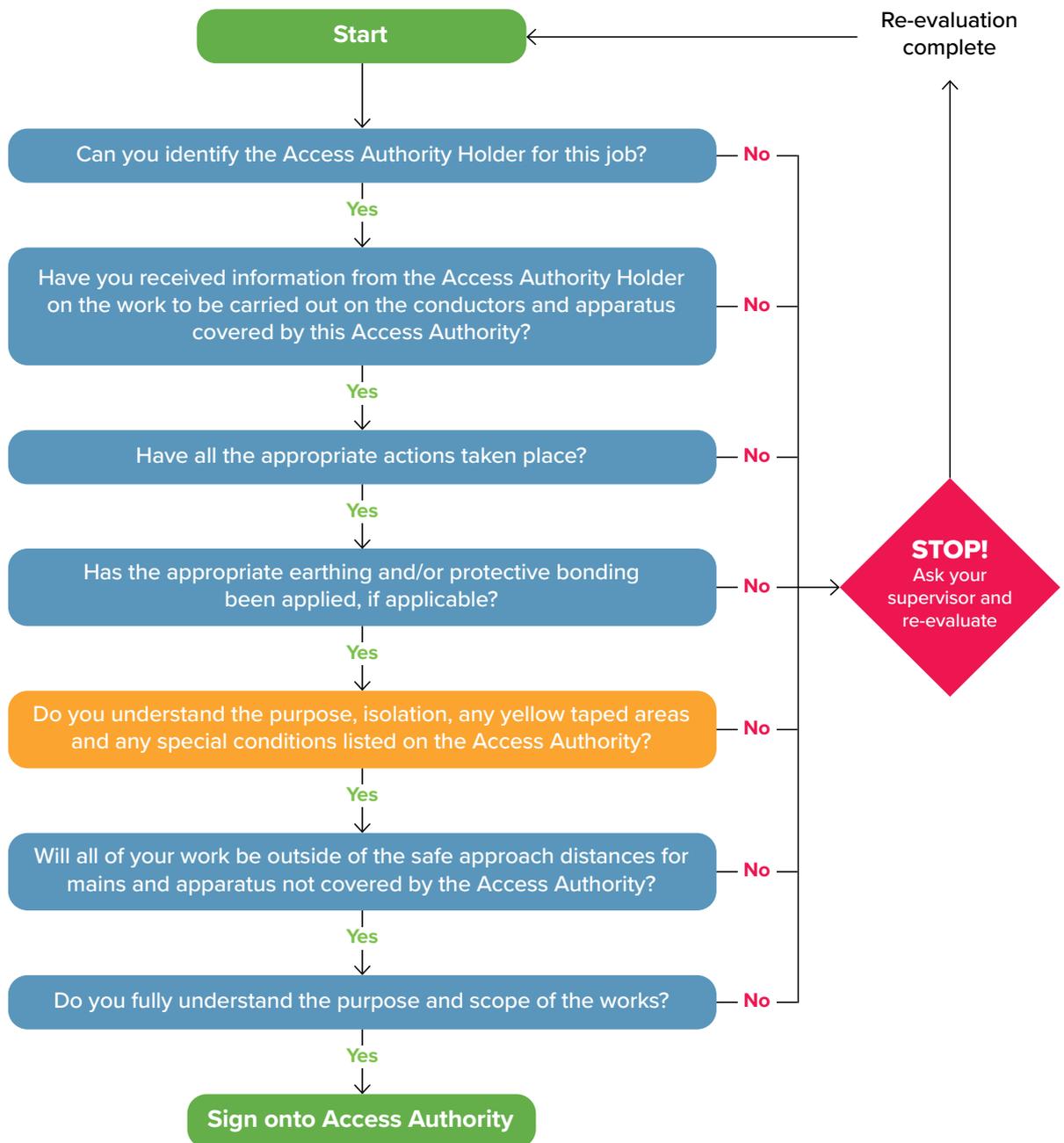
All persons at a work site governed by an Access Authority shall sign on the Access Authority in 'Sign on' column following acceptance by the Authorised Holder.

Persons signing on an Access Authority shall ensure that they, relevant to their work:

- understand the instructions given on the work to be undertaken;
- understand the limits of the Access Authority and are aware of any relevant warnings;
- sign on to the Access Authority to indicate their understanding of the requirements of above points;
- follow any safety directions given by the authorised person in charge;
- always leave or return to the barriered area via the barrier entrance;
- on completion of their work, sign off the Access Authority in 'Sign off' column; and
- there after consider the electrical apparatus they have been working on as live.

Access Authorities issued 'in person' to electrically qualified authorised persons can be transferred.

Checklist prior to signing onto an Access Authority



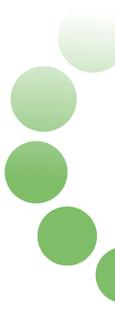
8.2.2.8 Procedure on leaving or returning to a worksite controlled by an Access Authority

Persons leaving a worksite shall sign off the Access Authority in 'Sign off' column.

Persons returning to a worksite shall satisfy themselves of the Access Authority conditions and sign onto the Access Authority in the 'Sign on' column prior to recommencing work. The Holder shall give all current warnings, underline and initial the signature.

8.2.2.9 Transfer of Access Authorities

Where, in unforeseen circumstances, the original Access Authority Holder is unable to continue work or must leave the worksite, the Access Authority may be transferred to a new Authorised Access Authority Holder or work shall cease and the Access Authority be surrendered.



The transfer may only be carried out if:

- **BOTH PERSONS ARE PRESENT ON SITE;**
- the new Access Authority Holder is authorised to accept an Access Authority; and
- the original Holder of the Access Authority ensures that the person to whom the Access Authority is to be transferred is fully aware of all safety aspects of the Access Authority or work prior to the transfer.

If the intended new Holder was already signed on the Access Authority under 'Sign on' column, that person shall sign under 'Sign off' column before becoming the new Access Authority Holder.

Access Authorities issued to non-electrically qualified persons as Personal Issue **CANNOT BE TRANSFERRED.** (Personal Issue - see Definitions)

8.2.2.10 Work on electrical apparatus continuing from day to day

An Access Authority is generally limited to one day's duration. For major work and with the approval of the Manager, System Operations an extended Access Authority may be issued for a maximum of seven days in accordance with approved procedures.

On the completion of work each day (when work is ongoing from one day to the next);

- the Access Authority Holder shall ensure all members of the working party have signed off under 'Sign off' column daily; and
- temporarily surrender the Access Authority; and
- notify the System Operator of the temporary surrender; and
- the Access Authority on issue shall be returned to the switching folder and the switching folder left in a secure location.

Prior to re-instatement the following day the System Operator shall be notified of the intent to re-instate the Access Authority.

8.2.2.11 Alterations to Access Authority conditions

If it becomes necessary to alter in any way the conditions of the Access Authority on issue, e.g. the isolation, earthing or special conditions, the Access Authority shall be surrendered and cancelled.

Before the work can recommence a new Access Authority shall be issued setting out the changed conditions which then apply.

8.2.2.12 Proxy cancellation of an Access Authority

Failure to surrender or sign off an Access Authority is a serious matter. Where persons leave the site without doing so all practical steps should be taken to obtain their signatures. Where this is not possible, the following procedure applies.

Where a person is unable to sign 'Sign off' column or surrender the Access Authority due to accident, sickness or any other legitimate reason, the System Operator may obtain authority from the appropriate Manager for the surrender on behalf of the absent person.

If this authority is obtained, the following endorsement shall be handwritten across the back of the Access Authority by the Holder to complete the surrender prior to cancellation:

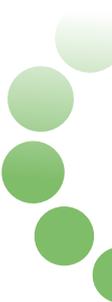
I hereby state that _____, whose signature appears under 'Sign on' column, (or as Access Authority Holder), is incapable of signing under 'Sign off' column, (or as Access Authority Holder), and has ceased work on the electrical apparatus referred to in this Access Authority.

Advised by: _____ (Branch Manager)

Signed: _____ Time: _____ am/pm.

Witness: _____ Date: _____





The Manager who authorised the endorsement of a person's signature shall be responsible for ensuring that the absent person is advised of the actions taken immediately on, or before, their return to duty.

If this clearance is received as verbal instruction from the System Operator, the authorised person on site will complete the abovementioned endorsement, including the statement via System Operator (include Name).

8.2.2.13 Loss or destruction of an Access Authority

Where an original Access Authority has become lost or is destroyed, work shall cease. The original Holder and the work group coordinator, after being satisfied that such is the case, shall request the issue of a replacement Access Authority. All persons signed on the original Access Authority shall sign on the duplicate Access Authority.

The new Access Authority shall be marked duplicate across the top. The System Operator shall create a new safety document to record the details of the duplicate Access Authority.

The precautions taken to make the work safe by isolation, earthing and tagging shall be confirmed before issue of the duplicate Access Authority.

The loss of an Access Authority is a serious matter; a duplicate may only be issued after exhaustive checks and enquires are made to locate the original.

8.2.2.14 Returning of electrical apparatus to service following the cancellation of an Access Authority

Electrical apparatus under Access Authority shall not be re-energised until the following steps are done in the following order:

- all work on the electrical apparatus is completed;
- all equipment, plant, tools and materials (other than those referred below) are removed;
- all persons (other than those who are to remove working earths/protective bonds and equipotential bonds) are clear of the electrical apparatus;
- all working earths/protective bonds, short-circuits and equipotential bonds are removed;
- all relevant Access Authorities have been surrendered;
- the Access Authority is cancelled by the authorised person;
- the System Operator gives permission to proceed;
- any means, such as yellow tapes, used to distinguish the electrical apparatus from in-service or live equipment has been removed;
- all LV Protective Bonds have been removed;
- all operational earthing and short-circuiting equipment associated with work carried out on the electrical apparatus has been removed;
- all remaining persons are clear of the electrical apparatus;
- all electrical apparatus associated with the work is ready for service; and
- the System Operator gives permission for reconnection to proceed.

The Authorised Switching Officer responsible for completing the network restoration must check that the Access Authority has been cancelled prior to commencing or continuing with network restoration, and verify switching status with the System Operator.

The switching folder, containing the surrendered or cancelled Access Authority, updated switching plan, and any removed danger tags, shall be handed to the Authorised Switching Officer responsible for completing network restoration, or left at a location designated by the System Operator (preferably the work site).

Where this is not practical (e.g. a Transmission line job), the restoring Authorised Switching Officer shall gain the following information from the System Operator prior to commencing or completing the network restoration:

- Confirm switching plan number; and
- Access Authority number(s); and
- Access Authority cancellation date and time; and
- Name of the authorised person who surrendered or cancelled the Access Authority.





8.2.3 Access Authority for Test

8.2.3.1 Description

It is an authority issued to authorised persons to allow them to perform high voltage testing or the removal of operational earths for testing electrical apparatus.

An Access Authority for Test shall be issued in accordance with the following requirements:

- any Access Authority for Work, covering the electrical apparatus to be tested, has been cancelled;
- only one Access Authority for Test shall be issued on the apparatus to be tested at any one time;
- an Access Authority for Test shall not have any common isolation points with an Access Authority for Work;
- the issuer shall enter particulars of the testing, and details of the electrical apparatus on which test voltages are to be applied;
- particulars of any earths which may be removed during the currency of the Access Authority for Test shall be entered on the Access Authority;
- the Access Authority for Test Holder may remove and/or replace operational earths and/or protective bonds associated with the equipment being tested;
- testing work shall not commence until suitable precautions, including the erection of yellow tape barriers and/or warning signs have been taken; and
- when a single work party is testing a single piece of electrical apparatus at one location only, limited work directly associated with the test may be carried out to allow repetitive testing, including the disconnection and reconnection of conductors as required by the testing process.

8.2.3.2 Situations requiring Access Authority for test

An Access Authority for Test shall be used when the electrical testing has the potential to produce currents hazardous to the human body. (Refer to Joint Australian/New Zealand Standard AS/NZS 60479 – Effects of current on human beings and livestock, for further information).

Access Authority for Test is required in the following situations:

- the application of tests which produce high voltages on electrical apparatus;
- the use of testing devices, rated at higher than 1,000 volts a.c or 1,500 volts d.c, on electrical apparatus;
- the use of electronic insulation testing devices on cables and capacitors which can create voltages greater than 1,000 volts a.c or 1,500 volts d.c, (except when used on switchgear to which there are no cables or capacitors connected and which can be considered as disconnected apparatus); and
- the removal of operational earths to carry out any electrical tests.

An Access Authority for Test is not required when testing equipment that is not electrically connected to network apparatus (in excess of the relevant safe approach distances for the apparatus concerned and the test voltage being applied), however, such testing shall be in accordance with approved procedures to ensure the safety of persons and adjacent electrical apparatus or equipment.

8.2.3.3 High voltage test

High voltage testing is subject to the application of approved procedures and the following requirements:

- the points of isolation provide separation distances appropriate for the test voltages and the insulating medium;
- control measures are taken to ensure persons are prevented from coming on or near the conductors while under test;
- control measures are taken to ensure adjacent electrical apparatus and equipment do not become unintentionally energised during the test;
- at the conclusion of the test, ensure any electrical apparatus under test that has become electrically charged during test is fully discharged and left in a safe condition;
- all operational earths that were temporarily removed to allow the electrical testing to be carried out are reapplied immediately; and
- where testing requires operational earths be temporarily removed, the electrical apparatus shall be regarded as being live, irrespective of whether or not the testing voltages have been applied.





8.2.3.4 Persons assisting with testing

Any person assisting in the testing of electrical apparatus shall be competent and trained in rescue and resuscitation in accordance with Clause 6.1.2, and shall sign on to an Access Authority for Test prior to the commencement of the testing process. It is necessary that a person assisting in testing be competent in isolating the testing apparatus.

8.2.3.5 Precautions prior to high voltage testing

Where any exposed part of the electrical apparatus being tested may become live, the worker in charge of the test shall take precautions to prevent persons from coming in contact with the live conductors.

These arrangements shall include:

- the installation of yellow tape barriers and the affixing of Danger - High Voltage Testing notices;
- arranging for workers to stand by at these exposed points during the tests; and may include:
 - where a high voltage injection test set is used as the voltage source a flashing amber light is also to be displayed at the test location; and
 - ensure that at the conclusion of the work any apparatus which has become electrically charged during the course of the work is fully discharged and left in a safe condition.

8.2.3.6 Application of testing devices on high voltage electrical apparatus

Testing of high voltage electrical apparatus shall be in accordance with approved procedures. In all cases it shall be the responsibility of the person in charge of the test to take all necessary precautions and actions to ensure the safety of workers, contractors, the public and the electrical apparatus under test.





8.3 Work on control and protection equipment

Persons working on control and protection equipment associated with in-service electrical apparatus, including its secondary wiring shall work in accordance with approved procedures; and

- shall take adequate precautions to ensure that inadvertent tripping of the in-service electrical apparatus does not occur;
- shall notify the System Operator prior to such work commencing, having regard to any operational limitations that the work may impose on the electrical apparatus for the duration of the work; and
- shall not interfere with, bypass or make inoperative protection devices or interlock systems unless they are authorised by the System Operator.

8.4 Replacement of high voltage fuses in switchgear and operation of fuse switch units

Where it is necessary to replace, access, or inspect high voltage fuses in switchgear, the fuse switch unit shall first be isolated from all possible sources of supply.

Oil insulated high voltage fuse switch units shall not be operated in an energised state.

11kV and 22kV plugboard fuses shall be isolated and earthed prior to exposing and making contact with high voltage electrical apparatus in accordance with approved switchgear operating instructions. Special care shall be taken to prevent personal effects from falling into the switchgear.

8.5 Work on high voltage overhead lines

Before any work is carried out on, or near, high voltage overhead lines, the provisions of these Rules shall apply, including the application of approved procedures for:

- live line work using approved live line working techniques;
- work on completely disconnected overhead lines; and
- operating work.

8.6 Work on high voltage underground cables

8.6.1 Precautions for working on high voltage underground cables

Before any work is carried out on, or near, high voltage underground cables or cable terminations they are to be isolated, proved de-energised, earthed and short circuited and an Access Authority issued in accordance with these Rules.

Note: The assistance of Before You Dig (BYDA.com.au) and all other necessary searches shall be sought prior to commencing any excavation (service searches must be no older than 30 days old at the time of powered excavation).

8.6.2 Work which may be carried out with high voltage cables in service

Work in gas or oil pressure supervision cubicles, including work on the gas or oil pipes within the cubicles may be carried out with high voltage cables in service. Other functions may only be carried out in accordance with approved procedures.

8.6.3 Work which may not be carried out with high voltage cables in service

A person shall not physically handle a high voltage cable while it is live unless it is completely surrounded by an earthed sheath or screen, or both, and precautions are taken, where necessary to avoid danger from induced voltages and transferred earth potentials.

A person shall not physically handle a high voltage cable, whether sheathed or screened or not, if its condition is suspect or doubtful unless:

- (a) the cable is proved to be de-energised and made safe for work in accordance with these Rules; or
- (b) working in accordance with approved cable identification procedures.





8.6.4 Isolation of high voltage underground cables

Isolation of high voltage underground cables shall be carried out in accordance with Clause 8.1.3.

8.6.5 Earthing and short circuiting of high voltage underground cables

8.6.5.1 Basic earthing principle

Earthing and short circuiting of a high voltage cable shall be carried out as close as practicable to the work site between all points of isolation and the work site.

Operational earths and working earths on cables shall be established by:

- (a) closing a fault rated earth switch;
- (b) applying approved portable earthing apparatus; or
- (c) connecting all phases to earth using conductor not less than 70mm² Copper or its equivalent.

8.6.5.2 Earthing for a high voltage cable to be cut

When a high voltage cable is to be cut, where practicable, earthing and short circuiting shall be carried out on each side of any proposed break in the cable.

8.6.5.3 Precautions when continuity of high voltage cable sheath is broken

Where it is necessary to break the metallic sheath on high voltage cables (which are connected to the system) during jointing processes:

- a bond shall be used to ensure continuity of the cable sheath/s;
- an earth mat shall be installed to provide a work platform for the joiner to work on. This earthed mat shall be bonded to the sheath of the cable; and
- all short circuiting and earthing shall be carried out using conductor not less than 70mm² Copper or its equivalent.

8.6.5.4 Temporary removal of earthing equipment

Earthing and short circuiting equipment may be temporarily removed only to:

- carry out testing of cables or equipment under an Access Authority for Test; or
- allow the rearrangement of equipotential bonding when working under induced voltage conditions; or
- changing from bonded earth mat conditions to fully insulated conditions in accordance with approved procedures; or
- allow equipment to be dismantled or replaced as permitted by Access Authority conditions.

8.6.6 Identification of high voltage underground cables

Before working on high voltage cables remote from their exposed terminals it is essential that they be positively identified. Cables are deemed to be positively identified if the cable has been visually and/or physically traced throughout its entire length from one point of isolation where an earth can be applied, or for newly installed unearthed cables, physically traced by means of the installation process and pulling eyes.

For cables which cannot be positively identified visually, then the following approved methods and requirements must be met for positive identification.

For HV Cables (rated less than 33kV), LV cables and pilot cables, at least one of the following methods in Table 8.6.6A are required for positive identification. The identification must also be verified by a second person.



Table 8.6.6A – HV Cables (rated less than 33kV), LV Cables and Pilot Cables Methods

Method	Description
a) Signal Generation and Detection	<p>Using an approved signal generator, inject a signal into the cores that have been shorted at the remote end.</p> <p>Detect the signal by using an electro-magnetically coupled search coil and amplifier (or approved signal detector) at the worksite.</p> <p>The signal generator must not be connected between one core and earth or one sheath and earth for this test.</p> <p>For two or more cables laid together, uncover all the cables and apply the detector to them all before the identification is accepted.</p> <p>For multi-core cables, the identification must also be confirmed by tracing the lay or roll of the cores for maximum signal strength.</p> <p>Access Authority for Test is required.</p>
b) Fault Location Tests (Faulted Cables)	<p>Using surge generator (thumper) injections on the suspected cable and obtaining visual confirmation at the fault work site of the resulting arcing effect, such as smoke, flames, sparks, or other clear evidence of a breakdown at the fault work site.</p> <p>Access Authority for Test is required.</p>
c) LV (Alternating or Direct Current) Injections	<p>Using a direct current tong ammeter or equivalent to detect a pulse, direction or ramp of direct current injected at a point of isolation, or;</p> <p>Using an alternating current tong ammeter or equivalent to detect a pulse or direction of alternating current injected at a point of isolation.</p> <p>Access Authority for Test is required.</p>

For HV cables rated greater to and including 33kV, at least two of the following methods in Table 8.6.6B are required for positive identification. The identification shall also be verified by a second person.

Table 8.6.6B – HV Cables (rated greater to and including 33kV) Methods

Method	Description
a) Signal Generation and Detection	<p>Using an approved signal generator, inject a signal into the cores that have been shorted at the remote end.</p> <p>Detect the signal by using an electro-magnetically coupled search coil and amplifier (or approved signal detector) at the worksite.</p> <p>The signal generator must not be connected between one core and earth or one sheath and earth for this test.</p> <p>For two or more cables laid together, uncover all the cables and apply the detector to them all before the identification is accepted.</p> <p>For multi-core cables, the identification must also be confirmed by tracing the lay or roll of the cores for maximum signal strength.</p> <p>Access Authority for Test is required.</p>
b) Fault Location Tests (Faulted Cables)	<p>Using surge generator (thumper) injections on the suspected cable and obtaining visual confirmation at the fault work site of the resulting arcing effect, such as smoke, flames, sparks, or other clear evidence of a breakdown at the fault work site.</p> <p>Access Authority for Test is required.</p>
c) LV (Alternating or Direct Current) Injections	<p>Using a direct current tong ammeter or equivalent to detect a pulse, direction or ramp of direct current injected at a point of isolation, or;</p> <p>Using an alternating current tong ammeter or equivalent to detect a pulse or direction of alternating current injected at a point of isolation.</p> <p>Access Authority for Test is required.</p>

Table 8.6.6B – HV Cables (rated greater to and including 33kV) Methods (continued)

Method	Description
d) DC Simulated Sheath Faults	Using a low voltage impedance measurement device applied to an insulated sheath or screen of a cable at a point of isolation to detect an applied interrupted sheath fault connected at the fault work site. Access Authority for Test is required.
e) Detection of Oil Leaks	Where pressure loss from an oil filled cable is monitored at a point of isolation, and other cables in the vicinity are checked for pressure loss.
Two Methods – Preferred	Use a combination of any two methods a) – e).
Two Methods – Alternate	Repeat method a) or b) from a different location, or from the same location but with the tasks performed by different personnel.

When the cable has been identified, it shall be suitably labelled by the identifying officer by attaching a metal tag with sealing wire and seal. The tag shall be inscribed with the voltage of the cable, substation and switch numbers or geographic location of other ends, date of identification and identity of the identifying officer.

Alternatively, unterminated cables left above ground in substations or other enclosures which provide protection from the elements may be clearly identified by information written on the cable serving with a permanent marker pen.

A cable that has been identified greater than four weeks previously, or if the label is missing or illegible, must be identified again in accordance with these rules.

A cable which is terminated to labelled apparatus at both ends is identified in accordance with these rules.

Where a cable is connected at one end only, a Warning Tag shall be attached to the apparatus at the connection point to indicate the cable is not able to be energised and identify the location of the remote end.

All unterminated cable ends shall be short-circuited and labelled in accordance with MCI0006 Underground distribution construction standards manual.

8.6.7 Other cables laid adjacent to power cables

Where other cables and power cables are laid together, additional precautions are necessary to identify the correct cable.

Except where it is possible to positively identify the cable in accordance with Clause 8.6.6, both the communications cable and power cable shall be identified as a double check (this may require both to be isolated).

8.6.8 Proving high voltage cables de-energised by spiking

Following identification of the cable at the work site, the cable shall be spiked (by approved means) at the work site to prove it is de energised. The spiking equipment used shall be remotely operated.

Where for some reason it is impossible to identify a cable using electrical or physical methods, or to prove it de energised by testing, it shall be spiked, and the spiking equipment used shall be remotely operated.

8.6.9 Work on high voltage de-energised cables without spiking

Work may proceed on a high voltage cable without spiking provided that at least one of the following conditions has been fulfilled:

- the identification process has involved tracing a clearly visible cable, where the view of the cable is not hidden by any form of coverage, throughout its entire length or from a point of isolation where an earth can be applied; or
- the cable concerned has a metallic sheath or screen, has been identified in accordance with Clause 8.6.6 and the work does not involve the penetration of the metallic sheath or screen, therefore not interfering with the primary cable insulation.



8.7 Work on electrical apparatus not owned by Endeavour Energy

All work on electrical apparatus not owned by Endeavour Energy is to be carried out in accordance with the electricity safety rules and procedures of that authority, unless they afford an inferior safety outcome to these Rules.

8.8 AA and LVAA used in conjunction on the same worksite

Ideally a single AA will be issued on the one worksite to adequately cover the HV apparatus required to be isolated and extended to allow any LV apparatus that may form part of the scope of works to be included.

Examples of AA extended scope (LV and HV combined) activities include but are not limited to:

- extended LV extremity isolations to allow Pole Substation retrofit/replacement activities involving both HV and LV apparatus; and
- extended LV extremity isolations to allow Padmount Substation and associated switchgear maintenance/replacement activities.

In particular cases it may be required that both an AA and LVAA exist simultaneously on the one worksite. This application may allow LV work to begin ahead of the HV work and enable restoration of LV supply whilst HV activities are still being undertaken.

Examples of separate AA and LVAA activities used in conjunction simultaneously include but are not limited to:

- combined HV and LV overhead augmentation activities where separately sequenced isolations are required; and
- pole replacement activities where multiple circuits are present.

It is expected that in these circumstances both the AA and LVAA be acknowledged on the switching folder to identify the existence of both documents. In these cases the LVAA must be stored and submitted with the AA documentation.

Furthermore, the Worksite Hazard and Risk Assessment (WHRA) refer to Company Form FSY 0118 – Worksite Hazard and Risk Assessment, must include any cases where AAs and LVAAs exist simultaneously and also reflect any changes in scope of activities.

8.8.1 Workers on both the AA and LVAA

Any worker required to carry out work within the scope of work of both an AA and LVAA must be required to sign on and off each document accordingly.

Where either the AA or LVAA is to be cancelled and supply restored whilst work is still being carried out, all workers must cease work immediately and maintain three metres from any network apparatus. All workers must have the re-defined scope of work explained and be made aware of any newly introduced risks on Company Form FSY 0118 – Worksite Hazard and Risk Assessment by the AA or LVAA Holder.

Prior to recommencing work, all isolation points must be visually inspected and confirmed as being open with apparatus proven to have no hazardous voltages present. This can be achieved by either an electrical test to prove de-energised for LV apparatus, or the visual trace of operational earthing on the HV apparatus.

8.8.2 LV isolation as a source of supply to HV apparatus

Wherever a LV isolation is identified as a source of supply to HV apparatus subject to the AA, the LV isolation must be danger tagged and listed as one of the isolation points under the AA. A separate LVAA for the LV isolation will not be issued because it has already been documented and controlled under the AA.

8.8.3 Common isolation for work on LV and HV apparatus

A LVAA must be issued for work on LV apparatus that needs to be isolated from HV apparatus, for example where the apparatus is a pole, which has already been subject to a AA. Any LV isolation common to both the AA and LVAA must be double danger tagged under the respective AA and LVAA documentation.





8.8.4 Work under converged (intersecting) AA and LVAA conditions

If the LV isolation required for work on HV apparatus is not covered under sub section 8.8.3 because it is not a source of supply to that HV apparatus, a LVAA must be issued to cover the LV isolation. This scenario usually arises where LV and HV apparatus converge at a support structure or crossover area. Whenever the work program or outage schedule prohibits simultaneous issuance or cancellation of an AA or LVAA, work must be suspended before signing on or signing off on either the AA or LVAA.

For example, a LVAA may be cancelled earlier than the AA to restore customers connected on the LV apparatus. After the cancellation of the LVAA, employees can continue to work on the HV apparatus as covered by the ongoing AA alone but they must observe the precautions for work above live LV apparatus.

Alternatively, the AA may be cancelled earlier than the LVAA to restore the HV apparatus for securing load on the HV distribution feeder. After cancellation of the AA, employees can continue to work on the LV apparatus as covered by the ongoing LVAA alone but they must observe the safety approach distance from the live HV apparatus above.



9.0 High voltage live work

9.1 Scope

This section of the Electrical Safety Rules relates to High Voltage Live Work (HVLW) on the Company's high voltage transmission and distributions system and includes work in live HV switchyards. It does not cover work on live low voltage systems which is covered in section 7 of these rules.

All HVLW work shall be conducted in accordance with Division Procedure (Network) GNV 1072.00 – High Voltage Live Work Safety and approved supporting procedures.

9.2 Safety – General

9.2.1 Identification of the worksite

Before HVLW commences the worksite **shall** be clearly identified by all members of the work party.

9.2.2 Communication

The Worksite coordinator **shall** ensure that there is at least one form of secure communication method to the System Operator. If communication with the System Operator is not possible work shall not proceed.

Effective communication must be established and maintained between all members of the work party and shall be limited to the work being performed.

9.2.3 HVLW Permit

Before any live work commences, an authorised person shall receive clearance from the System Operator and **shall** issue a live work permit to the work party, which shall be read and understood by all members of the work party.

9.2.4 Live Line Manual

A Live Line manual **shall** always be available at the worksite and shall be referenced when discussing the work procedures or techniques to be employed to perform the work method.

The manual shall be kept up to date with all amendments that have been issued.

9.2.5 Training and Authorisation

All HVLW staff **shall** be appropriately trained and suitably authorised to perform the live work procedures or techniques associated with the work method to be performed.

9.2.6 Minimum Approach Distance (MAD)

Minimum Approach Distances to exposed HV live conductors in accordance with Table E below, **shall** be maintained at all times. Where these distances cannot be maintained the work shall not proceed until either the distance can be maintained via other arrangements or suitable HV insulation is established.

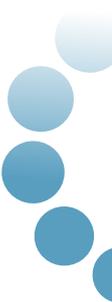


Table E – Minimum Approach Distances for High Voltage Live Work

Nominal Voltage (a.c volts)				
Situation	Stick Method			Glove and Barrier Method
	11kV –22kV	33kV	66kV	11kV – 33kV
H.V. Live worker working on energised conductors and apparatus	500mm	600mm	700mm	Contact wearing approved insulated gloves and sleeves
HV Live worker working on energised conductors and apparatus in relation to the insulated phase behind	500mm	600mm	700mm	
HV Live Work EWP insulated section to uninsulated conductors and apparatus	11kV-100mm 22kV-200mm Refer Note 1	300mm Refer Note 1	1000mm Refer Note 1	300mm Refer Note 1
HV Live work EWP insulated section to insulated conductors and apparatus	11kV-50mm 22kV-100mm	150mm	1000mm	Brush Contact
HV Live work EWP, mobile plant and borer non-insulated section to (uninsulated conductors)	700mm	1000mm	1000mm	11kV-700mm 22kV-700mm 33kV-1000mm
HV Live Work EWP, Mobile Plant and borer Erector, non insulated section (to single insulated conductors)	11kV-350mm 22kV-400mm	450mm	1000mm	11kV-350mm 22kV-400mm 33kV-450mm
Mobile Plant load (e.g. pole) double insulated, where the load is insulated and the conductors are insulated	Brush Contact	Brush Contact	1000mm	Brush Contact
Phase to phase distance (the distance to be maintained between phases when moving the conductors)	11kV-350mm 22kV-425mm	550mm	900mm	11kV-350mm 22kV-425mm 33kV-550mm

Note 1: In relation to insulated sections of the EWP Booms to uninsulated apparatus/conductors.

Note 2: In relation to the circuit below the EWP basket when work between circuits.



9.2.7 Suspension of work

Work may be suspended by the System Operator or the work crew due to network or work site contingencies.

Work **shall** be suspended if it is necessary for the System Operator to carry out any switching involving the circuit being worked on.

When it is necessary for the work crew to suspend work, the System Operator **shall** be notified.

When work is suspended the worksite and associated circuitry **shall** be left in a safe condition.

Work **shall** not recommence until clearance has been obtained from the System Operator.

9.2.8 Safety Observers

A dedicated Safety Observer **shall** be appointed and shall not perform any other task whilst HVLW is in progress.

The Safety Observer **shall** maintain effective and immediate communication with other members of the work party at all times.

9.3 Live Work Permit

Work on live high voltage electrical apparatus shall be carried out under a LIVE WORK PERMIT, where an authorised person shall, in accordance with approved procedures:

- **IDENTIFY** the approved high voltage live work method to be used; and
- **CONFIRM** that the worksite is at the required electrical and geographical location; and
- **CONFIRM** that all necessary temporary protection alterations are made on circuits impacting the work site; and
- **IDENTIFY** all site risks and ensure that risk management controls are in place; and
- **SELECT** the correct temporary insulation to be used and comply with all Minimum Approach Distances; and
- **ADOPT** all Safe Working Principles for the work method selected; and
- **COMPLY** with all the requirements of the approved techniques and/or procedures selected for the work; and
- **ISSUE** the live work permit.

Also **THE LIVE WORK PERMIT HOLDER** shall:

- **SATISFY THEMSELVES** that the Live Work Permit will allow the work to be carried out safely; and
- **SIGN ON** to the Pre Job/Post Job Live Line Working Check Sheet;
- **CONFIRM** all members of the working party understand and initial the Pre Job/Post Job Live Line Working Check Sheet prior to commencing work.



Figure 36 – High Voltage Live Work Permit (page 1)



No: **XXXXXX**

High Voltage Live Work Permit

Issued in accordance with “Work Request for HV Live Line Work” Request No. / Verbal:

1. Purpose: This HV Live Work Permit is for work on

 at
 to

2. Network Location: Work to be completed between switches No’s:

3. Network Condition: Check condition of work site pole, adjacent poles, conductor, hardware and ties.
Record Pole numbers:

4. Network Access: Confirm access, protection status and clearance to work.
Confirm Protection Status.
 Voltage(s): Zone(s): Feeder Name(s):
 Circuit Breaker/Recloser No(s): Reclose set to Non-Auto
Approval obtained from System Operator for work to proceed.
 System Operators Full Name: Time: Date:
 Control Desk:

5. Special conditions:

6. Issue of HV Live Work Permit *(Tick all appropriate boxes, cross out non-applicable boxes and initial, rule out and initial items not done)*
 Confirm that the worksite is at the correct electrical and geographical location
 Confirm that all necessary temporary protection alterations have been made
 Confirm that a communication link with the System Operator has been established and crew communication is operational (if required)
 Confirm all equipment and plant on site is appropriately rated and in suitable and serviceable condition and within test date

This HV Live Work Permit is issued to:
Issued by: Full Name (Print) **Authorisation No:**
Signed: **Time:** **Date:**

7. Acceptance by HV Live Work Permit Holder
 I understand the contents of this HV Live Work Permit. I am satisfied that the HV Live Work Permit will allow the described work to be carried out.
 I am an authorised to perform this work. I will confirm all members of the work party are aware of and will maintain the conditions of this HV Live Work Permit.
 This HV Live Work Permit shall remain at the worksite until cancelled.
Full Name (Print) **Authorisation No:** **Phone No:**
Signed: **Time:** **Date:**

(The HV Live Work Permit Holder shall confirm compliance with the requirements of Safe Working Principles, Techniques, Procedures and all other relevant policies)

8. Transfer of HV Live Work Permit
 As the new HV Live Work Permit Holder, I have read and understand this HV Live Work Permit.
 I am receiving this HV Live Work Permit in the presence of the current HV Live Work Permit Holder.
 I am an authorised HV Live Worker.
 I accept responsibility as the HV Live Work Permit Holder from the time of transfer shown below.

Received by (print)	Signature	Auth. No.	Time	Date	Received from (signature)

9.4 Coordination of HV Live Work and Access Authority Work on the same worksite

Live work and work under an access authority shall only be conducted on the same work site providing that:

- (i) A single task coordinator is appointed for the work site, who is an authorised HV live worker, who remains on the ground, and whose sole responsibility is to directly supervise whenever any work is being carried out;
- (ii) In situations where HV live work and access authority work methods are to be used separately, clear transition points shall exist between the HV live work and the work undertaken under the access authority. The transition process must include the work party obtaining clearance from the task coordinator to transition from HV live work to work under AA or LVAA conditions, or from work under AA or LVAA conditions to HV live work before proceeding. Additionally, HV live work PPE shall be left on the ground when HV live work methods are not in use;
- (iii) In situations requiring HV live work and access authority work methods to be used simultaneously, HV live work personnel must be signed on to the HV live work permit and the access authority before ascending to perform the HV live work, and must wear HV live work PPE for all work aloft;
- (iv) All conductors that have been moved or repositioned are secured using the appropriate techniques and equipment; and
- (v) Safe Approach Distances as required by the Company's Electrical Safety Rules are established and maintained by either using HV live work methods or using appropriate equipment between the live circuit and access authority clearance area.

9.5 De-energised work

If a live line trained crew are to perform work on a feeder that is de-energised due to fault and emergency reasons (i.e. in response to an unplanned event, and not at the request of the live line staff), and approved live line procedures can be safely employed such that if the line were to become re-energised there would be no impact to the safety of the work, then this work may proceed under direction of the System Operator.

High voltage live line work is not able to proceed if the network is requested to be de-energised for any reason.

9.6 HVLW Equipment

HVLW equipment includes the following:

- **PPE** - hardhats, arc rated clothing, boots, protective eyewear, insulated sleeves and gloves;
- **Tools** – insulated sticks, rods, supports, clamps, etc used to perform HVLW;
- **Insulation** – insulated rigid covers, mats; and
- **Scaffolding** – rated and approved HVLW scaffolding and platforms

All HVLW equipment **shall** be designed, tested and approved specifically for high voltage live work.

All HVLW equipment **shall** be inspected for damage, dust and dirt prior to work commencing. Equipment that has a test label shall be checked to ensure that the equipment is within test date.

Any defective HVLW equipment shall be tagged, returned for assessment and/or repair/tested or disposed immediately if required.

9.7 Temporary Insulation

Temporary insulation shall be used to ensure that the worksite is safe to prevent inadvertent **brush** contact with electrical apparatus a different potential.

It is not intended to use HVLW covers to provide long term insulation.

9.8 Switching and Protection Requirements

Prior to live work commencing the network and associated protection systems shall be configured to ensure the safety of the work crew and the integrity of the network.



9.9 Mobile Plant

For all work, all EWP's to be used for the work method **shall** be inspected and rated to ensure it is suitable for the work to be performed.

For all Glove and Barrier Live Line work, EWP's **shall** have an appropriate electrical test certificate.

It is a requirement for HV live work EWPs to be tested with an insulation resistance tester once a week, after cleaning or exposure to moisture and if for any other reason the insulation becomes suspect.

The mobile plant **shall** be treated as alive and all persons at ground level shall keep clear and avoid contact when in use for HVLW.

The chassis of the plant **shall** be electrically connected to an effective earth point before any HVLW procedures are carried out.

9.10 HVLW Mechanical Tension and Loading Calculations

All tensions and loads to be contained shall be assessed to ensure that they can be safely controlled.

The assessment shall be checked by another authorised HVLW worker.



10.0 Operating agreements

10.1 General

This chapter describes the controls required to work on, near, or in the vicinity of mains and apparatus owned or operated by another organisation.

The requirements in this section apply to NSW Network Operators (i.e. TransGrid, Ausgrid, Essential Energy, Sydney Trains) and are based on the Industry Safety Steering Committee Guide ISSC37 – “Guide for working on, near, or in the vicinity of the mains and apparatus of another network operator”.

There are generally two types of Operating Agreements:

- An Operating Agreement issued by the company to another organisation is to confirm that the isolation and access will remain in that state while ever the Operating Agreement is in force; and
- An Operating Agreement received by the company which is issued by another organisation is to confirm that their equipment will remain in the same state while ever the isolation and access for the company remains in force.

An Operating Agreement will be used to allow a system to be established for maintaining the conditions of an isolation for a range of applications including:

- NSW Distribution or Transmission Network Operators;
- HV customers; and
- Third parties requiring access to LV customer installations (non-network).

Prior to the establishment of an Operating Agreement, communication must be made with the external party to confirm the level of competence of the nominated representative and to identify any site specific requirements.

The working organisation shall request the isolation, earthing, and short-circuiting as appropriate, of the mains and apparatus to be worked on or near, by the asset owner.

The request is to include:

- Location of work.
- Nature of work.
- Proposed time and date of work.

This isolation and earthing are to be secured via an Operating Agreement issued by the asset owner to the working organisation. Once the Operating Agreement is issued, the working organisation’s safe systems of work shall apply.

An Operating Agreement procedure must be incorporated within each Network Operator’s network isolation and access procedures.

Operating Agreements must be established and issued by an authorised representative of the asset owner responsible to operate and provide access to the network apparatus involved.

To issue an Operating Agreement over an asset, the mains and apparatus must be:

- Isolated from all network sources of electrical energy by the opening of switches, removal of fuses or links, or other disconnection from the energy source;
- Secured in an isolated state by the attaching of Danger/Do Not Operate tags at each isolation point, as well as through the use of locks where available;
- Proved de-energised using appropriate test equipment;
- HV mains and apparatus are to be short circuited and connected to earth by suitably rated bonding conductors and equipment;
- LV mains and apparatus are to be short circuited or isolated from all customer sources of supply; and
- 1500V d.c. mains and apparatus are to be rail connected.

The Operating Agreement must be received by an authorised representative for the working organisation so that it can be incorporated into the Working Organisation’s safe systems of work.



This exchange of Operating Agreements can be carried out between System Operators of the Asset Owner and the Working Organisation in strict accordance with documented communication protocols in place between those Network Operators.

Work practices and equipment used by the Working Organisation are to be as per the documented practice of the Working Organisation.

Prior to any associated isolations or earthing being removed by the asset owner, the Operating Agreement must be surrendered by the working organisation either by the return of appropriately endorsed Operating Agreement forms in the field, or verbally by the System Operator acting on the advice of the work party.

10.2 Issue of an Operating Agreement

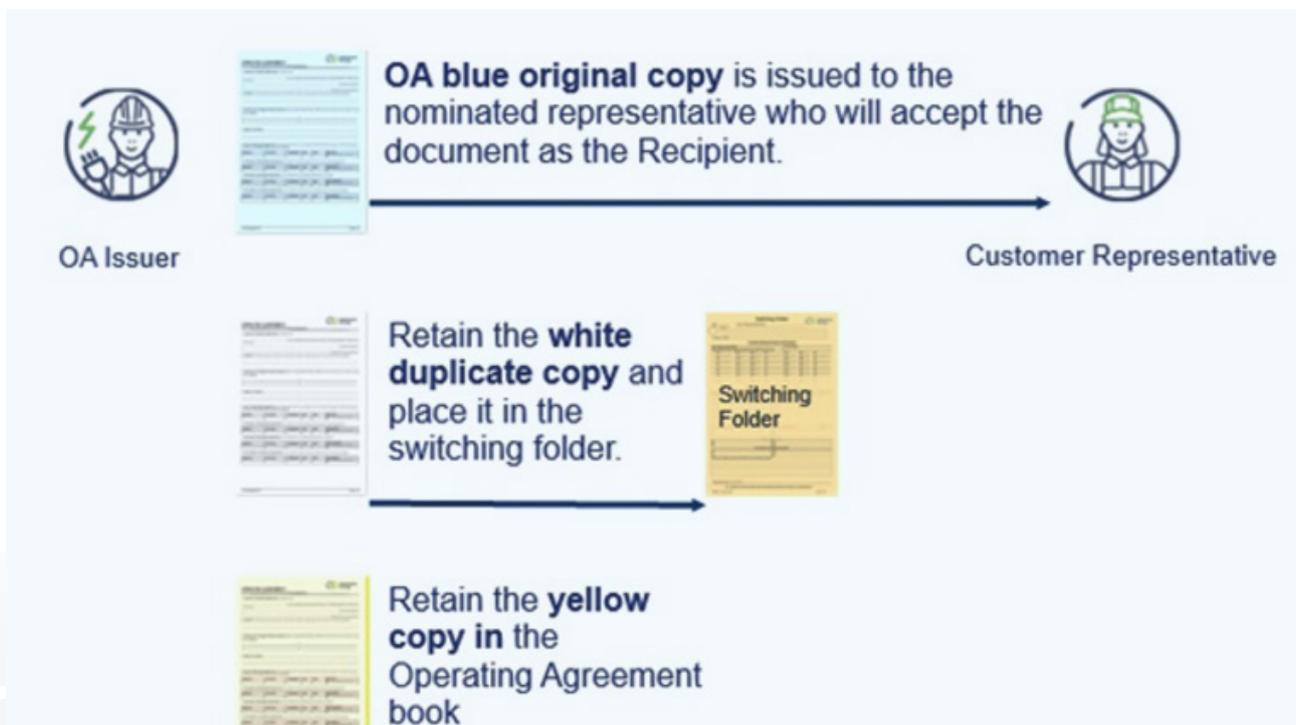
The authorised switching officer is to contact the nominated representative from the other organisation named on the disconnection and reconnection instruction or correspondence required isolation has been secured, applicable earthing or LVPBs have been applied and the system of maintaining the isolation has been carried out as requested.

Note: Authorised switching officers required to issue an Operating Agreement must be authorised to switch at the particular voltage level required for the agreement.

10.2.1 Responsibilities of the Authorised Switching Officer

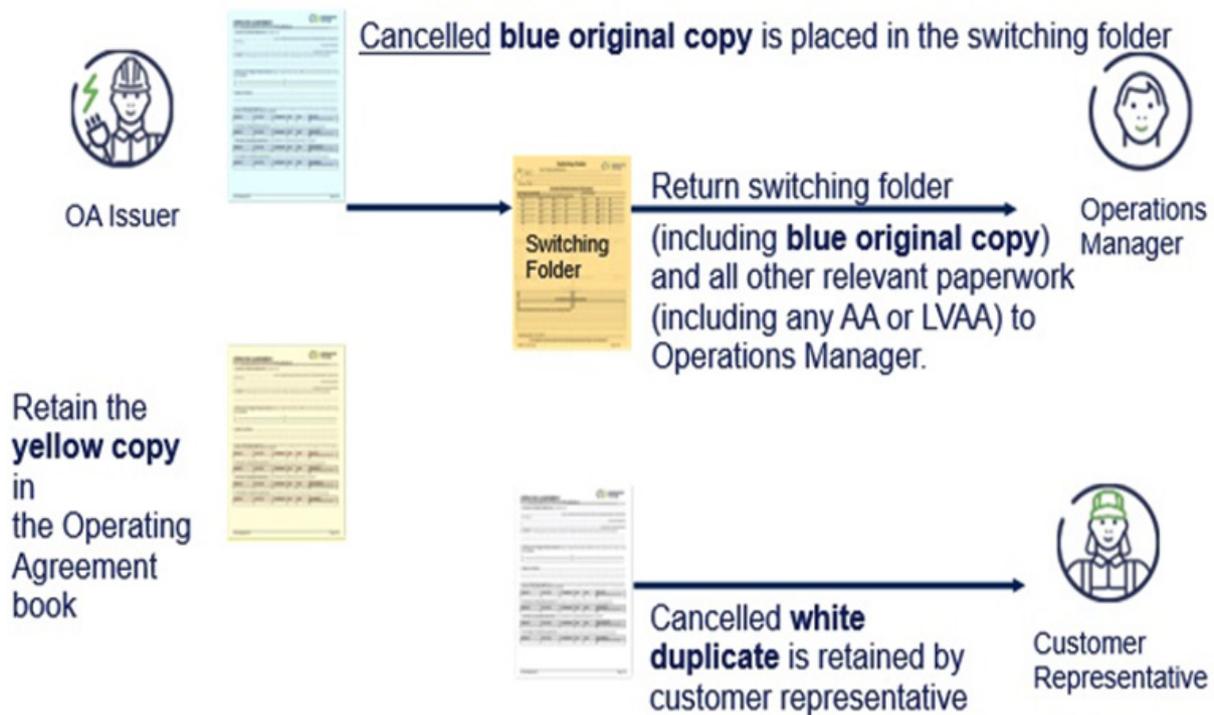
- Complete the Operating Agreement.
- Sign the Operating Agreement as the Issuer and hand the blue original copy to the nominated representative who will accept the document as the Recipient.
- Retain the white duplicate copy and place it in the switching folder.

Retain the yellow copy the Operating Agreement book (held by the Authorised Switching Officer).



10.2.2 On completion of work

- The nominated representative from the other organisation must hand the blue original copy of the Operating Agreement to the Authorised Switching Officer in exchange for the white duplicate copy.
- The nominated representative must also surrender the white duplicate copy in the presence of the Authorised Switching Officer and will retain this for their own organisation's records.
- Both the blue copy and white copy are cancelled once surrendered.
- The Authorised Switching Officer retains the blue original copy and returns it with the switching folder and all relevant paperwork to the relevant Operations Manager.



10.3 Receipt of an Operating Agreement

The Authorised Switching Officer must check if practicable, in the presence of the nominated representative from the other organisation, that the required isolation has been secured, applicable earthing or LVPBs (as appropriate) have been applied and the system of maintaining the isolation has been carried out as specified.

Note: Authorised Switching Officers required to receive an Operating Agreement must be authorised to switch at the particular voltage level required for the agreement.

10.3.1 On Receipt of an Operating Agreement

- The Authorised Switching Officer is to accept the signed original copy of the Operating Agreement from the nominated representative from the other organisation.
- If the other organisation cannot provide an Operating Agreement, the Authorised Switching Officer must prepare the Operating Agreement on behalf of the other organisation utilising Endeavour Energy's Operating Agreement document.
- The nominated representative is to sign the Operating Agreement and the issuer retains the white duplicate copy.
- The Authorised Switching Officer is to receive the blue original copy of the Operating Agreement and issue a company AA or LVAA as necessary.
- The blue original copy must be placed in the switching folder.



10.3.2 On completion of work

- The Authorised Switching Officer is to surrender the blue original copy of the Operating Agreement and hand it to the nominated representative from the other organisation in exchange for the white duplicate copy, which is then surrendered in the presence of the nominated representative.
- Once both copies are surrendered, the nominated representative is to cancel the agreement signing both copies.
- The Authorised Switching Officer is to return the switching folder, together with the cancelled AA or LVAA, the white duplicate copy of the Operating Agreement and all other relevant papers to the relevant Operations Manager.

10.4 Restoration of mains and apparatus

The restoration of mains and apparatus covered by the issue or receipt of an Operating Agreement cannot take place until both the original and duplicate copies have been cancelled.

10.5 Missing Operating Agreement

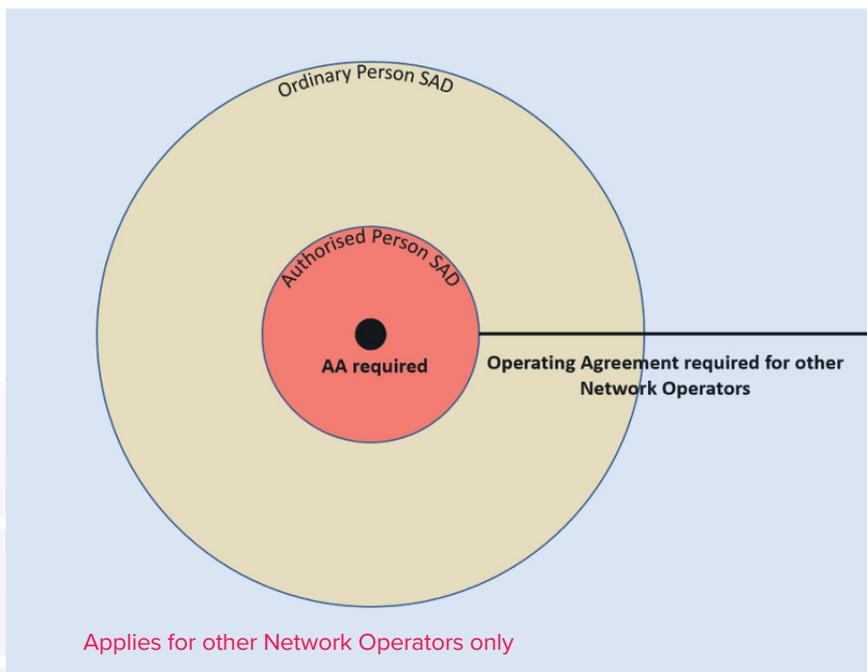
When it is reported that an Operating Agreement has gone missing (either the original or copy or both), it is the responsibility of the authorised switching officer to:

- notify relevant manager;
- patrol the section of isolated electrical apparatus confirming the condition of the isolation remains unaffected; and
- re-write and issue a new Operating Agreement in the presence of the nominated representative from the other organisation.

10.6 Operating Agreements with other Network Operators

When another Network Operator has requested Endeavour Energy's network to be isolated and earthed/short-circuited for work outside Safe Approach Distances (SAD) for authorised persons, an Operating Agreement shall be issued to the requesting Network Operator.

If the other Network Operator is to come within SAD for authorised persons, an Access Authority shall be issued.



The Operating Agreement does not allow the working Network Operator to come within Endeavour Energy's Safe Approach Distances for authorised persons nor does it allow the working Network Operator to perform any operating activities (including earthing/short circuiting) on Endeavour Energy's network.



Figure 37 – Operating Agreement (FSY 0216)



Safety Document Area of Responsibility Desk:

Operating Agreement No:

Issued in accordance with Switching Plan / Incident No:

1. Purpose of Operating Agreement An agreement with
 (name of authority/customer/contractor with whom this Operating Agreement is being issued)
 on the following (the electrical apparatus)
 at (the location of electrical apparatus)

2. Isolation points and actions taken:

Voltage	Isolation points

3. Earthing / Protective Bonds have been connected to the conductors at: (cross out if not applicable)

a. f.
 b. g.
 c. h.
 d. i.
 e. j.

4. Special conditions

5. Issue of Operating Agreement (to be signed by the worker who has operational control of the electrical apparatus).
 The electrical apparatus must remain in this condition until this agreement is cancelled.

Print name	Signed by	Classification	Time	Date	Issued for <small>(name of authority/customer/contractor)</small>

6. Acceptance of Operating Agreement (to be signed by the worker agreeing to the above issue of Operating Agreement).
 The acceptance of this Operating Agreement transfers the responsibility of the safe systems of work to the working organisation.

Print name	Signed by	Classification	Time	Date	Accepted for <small>(name of authority/customer/contractor)</small>

7. Surrender of Operating Agreement (to be surrendered by the accepting authority/customer or contractor).

Print name	Signed by	Classification	Time	Date	Surrendered for <small>(name of authority/customer/contractor)</small>

8. Cancellation of Operating Agreement (to be cancelled by the worker who has operational control of the electrical apparatus).

Print name	Signed by	Classification	Time	Date	Cancelled for <small>(name of authority/customer/contractor)</small>

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11.0 Non-network isolations

11.1 General

Non-network isolations only apply where work on or near the company's electrical apparatus is not associated with a switching plan, AA, LVAA or OA. Where isolation points are listed on a Switching plan, this section is not applicable.

- Non-network isolations may be used in conjunction with an AA and/or LVAA.
- Non-network isolations shall be secured with a personal danger tag.

Endeavour Energy employees shall only use approved personal danger tags and/or devices.

Where the entire isolation (including all extremities) is within the boundary of an electrical station, non-network isolation process will apply. If any part of the isolation extends to the Low Voltage or High Voltage network (external street supply), a LVAA or AA must be utilised.

Non-network electrical systems associated with substations typically include but are not limited to the following:

- LV supply to Substation Voltage Transformers not associated with a Switching Plan;
- Auxiliary 230/400 Volt station systems (fans, pumps, motor supplies, etc);
- 230/400 Volt station supply (lights, power, etc); and
- Audio Frequency Injection Cell (AFIC) 230/400 Volt supply systems.

Non-network electrical systems relating to customer installations such as:

- LV service and metering work beyond the connection point of a consumer's installation (Refer Service and Installation Rules of New South Wales); and
- Alternate sources of generation where the isolation point is downstream of a connection point of a consumer's installation (i.e., community batteries, solar photovoltaic systems, emergency generators, etc.).

11.2 Non-Network System Isolations

All sources of supply must be identified utilising the station circuit diagrams (where applicable) and visually traced if applicable/required.

Any worker who will come within 500mm of exposed LV electrical equipment considered as being isolated will either carry out a test to prove de-energised or witness a test to prove de-energised.

Where a non-electrically qualified worker is required to come within 500mm of LV electrical equipment, they must witness a test to prove de-energised and have the isolation identification process explained so that they are satisfied their work can be carried out safely.

All workers who will come within 500mm of exposed LV electrical equipment considered as being de-energised must apply a personal danger tag to all points of isolation with their name and contact details clearly marked.

All personal danger tags applied to electrical apparatus (and who applied them) must be recorded in a central location readily available on the worksite in order to track and identify apparatus activity. Company Form FSY 0217 – Isolation Sheet can be used to record this information, or alternatively, the isolation points can be noted on the Switching Folder, in section 2b of the LVAA, or on the Worksite Hazard and Risk Assessment (WHRA) form.

Personal danger tags must be removed upon completion of work only by the individual who applied it (whose name is clearly identified on the tag). In the event that the worker is unable to remove the personal danger tag, the supervisor must be contacted and a delegate appointed to remove the personal danger tag on their behalf after all reasonably practicable attempts are made to contact the worker.

Restoration of supply to the non-network system isolation can only be carried out after all members of the work party have removed their personal danger tags associated with the equipment being worked on.

No personal danger tags are permitted to be left on overnight.





In the event that equipment will be left unserviceable, or members of the work party have to leave site, all members of the work party must remove their personal danger tags and the worksite coordinator, as appointed on the WHRA form, must apply a warning tag detailing the condition of the apparatus.

Where multiple workgroups are on the same worksite, contact must be made between the groups to cross reference WHRA forms and to verify work can be carried out safely.

Where possible overlaps in isolation points exist, both parties will be subject to combine activities so that no inadvertent or unauthorised operation of electrical apparatus is carried out.

11.3 Minimum safe working distances within a substation for work on or near control, protection, low voltage and metering equipment

Due to the physical constraints of housings and associated equipment on or near control, protection, LV power and metering equipment and/or circuits within Transmission and Zone Substations (i.e., tunnel boards), it is impractical to comply with Table A of these rules.

As such, persons must not allow any portion of their bodies or any object, which they are in contact with (other than insulated tools or equipment issued for testing, operating or working on live exposed conductors) to come within the minimum safe working distances of live exposed electrical apparatus, as shown in Table F.

This table lists the minimum safe working distances for approach to live electrical apparatus on or near control, protection, LV power and metering equipment and/or circuits within Transmission and Zone Substations only, for both employees and any non-insulated tools they are using.

Table F – Minimum safe working distances of live exposed electrical apparatus

Nominal voltage (volts)	Minimum safe working distances (mm)	
	Electrically qualified person	Unqualified person
Protection and control circuits not exceeding extra LV	Avoid contact	100
Protection and control circuits above extra LV but not exceeding 400 volts	50	200

Where the minimum safe working distances listed in Table F cannot be maintained, the following precautions must be undertaken:

- insulating mats, barriers or screens must be used as appropriate to prevent inadvertent contact with live exposed conductors and electrical apparatus and earth, or between live exposed conductors and electrical apparatus;
- where the above measures are not adequate to ensure that risks to employees are controlled to prevent inadvertent contact with live exposed conductors and electrical apparatus and earth or between live exposed conductors and electrical apparatus, then additional measures must be implemented to make the work safe; and
- current transformers must not have open circuit secondaries while primary circuit is alive.



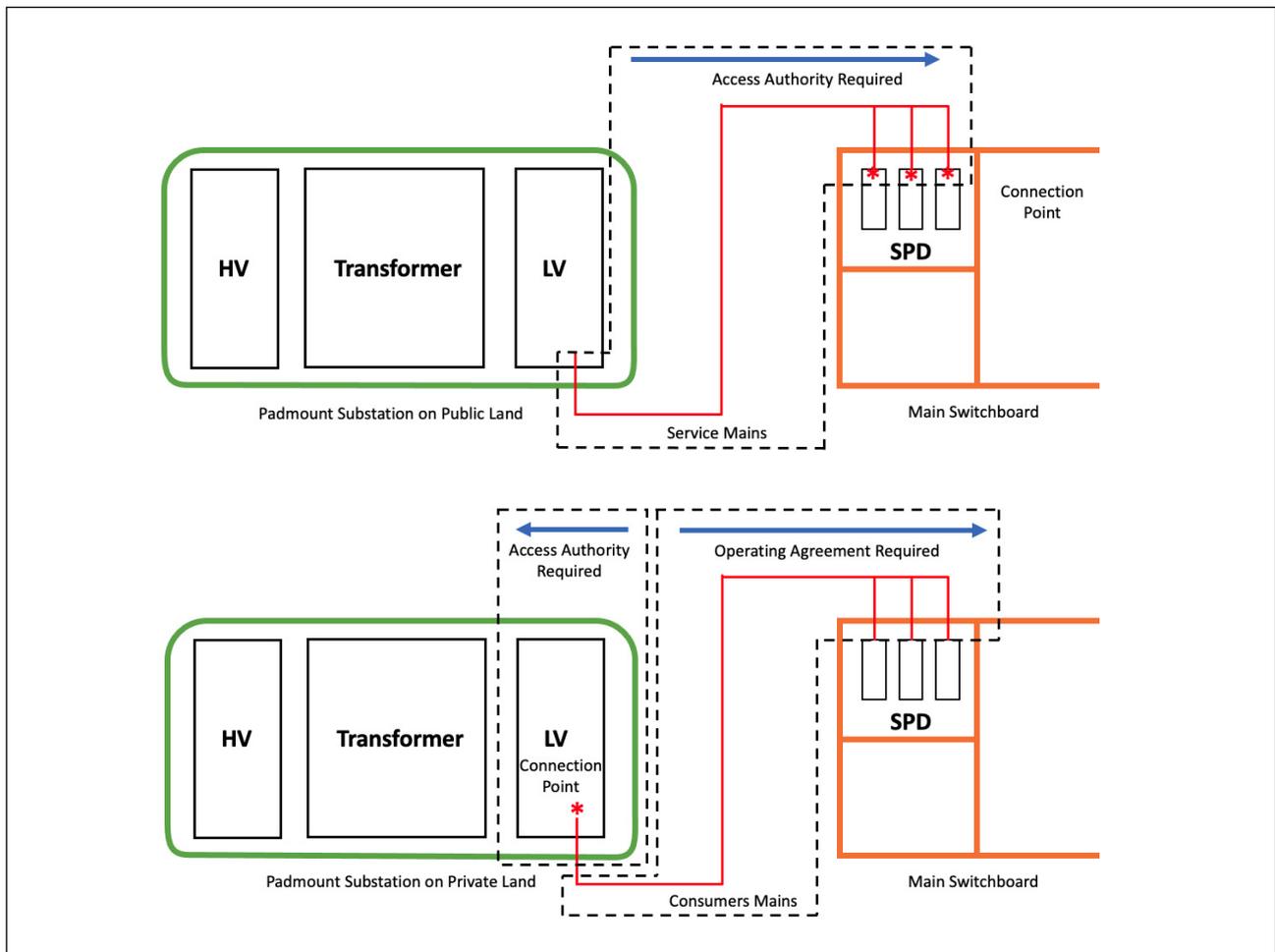


11.4 Isolation of Low Voltage Customer Assets Connected to Endeavour Energy Substation Equipment

The diagram below specifies the method of isolation according to the relevant scenario.

- If work is to be performed on the service mains including replacement of the SPD, and requires isolation at the Endeavour Energy substation, an LVAA or AAW shall be applicable.
- If work is to be performed on the consumers mains within the Endeavour Energy substation or within Safe Approach Distances, an LVAA or AAW shall be applicable.
- If work is to be performed on the consumers mains and requires isolation at the Endeavour Energy substation (with no work to be performed within the substation and not come within relevant Safe Approach Distances), an Operating Agreement shall be applicable.

Figure 38 Isolation of Low Voltage Customer Assets Connected to Endeavour Energy Substation Equipment



11.5 Isolation of Low Voltage service mains

Unless part of a works request and associated switching plan, where service mains are isolated to protect against inadvertent energisation from alternate sources of supply (i.e., solar back-feed, portable generation supplies, etc.), each service isolation point shall have a personal danger tag applied and be listed on the back of the switching folder as an additional control measure taken by the AA holder.

For example:

- Each house may be separately listed with the house number;
- Grouped together and listed as “services between poles #43 and #51 are isolated and personal danger tags applied”; or
- Listed as being fed from an asset such as “services fed from pillar #3455 isolated and personal danger tags applied”.



12.0 Vegetation management

12.1 General

12.1.1 Safety Observer

A safety observer must be in place for all work where a worker or plant will come within three metres of the network.

The safety observer must:

- only have the duty to observe the operation of the plant and vegetation control work near the network; and
- only observe one work activity at any one time.

12.1.2 Safe Approach Distances

The Safe Approach Distances, as stated in Table G – Safe Approach Distances for Vegetation Control, for workers, tools, plant and vegetation must be maintained while carrying out vegetation control in accordance with this procedure.

12.1.3 Weather Conditions

Vegetation control work on or near energised overhead lines must not proceed in the event of the following weather conditions:

- an electrical storm is observed in the vicinity of the worksite;
- any significant rain (beyond intermittent spotting), mist, fog, snow or sleet;
- wind velocities that will result in unexpected movement of conductor, EWP or vegetation
- sufficient to breach Safe Approach Distances;
- excessive wind velocities such that work cannot be carried out safely; and
- lighting is not adequate.

In all cases, a WHRA must assess for possible variations in the weather whilst the work is being carried out.

12.1.4 Personal Protective Equipment

When undertaking vegetation control work on or near energised overhead lines, workers must wear PPE in accordance with clause 6.8.2 of these rules as a minimum.

12.2 Close Approach Vegetation Control (CAVC)

Close approach vegetation control is the term used to describe vegetation control works being undertaken on vegetation that is within the vegetation clearance distances specified in Table H – Safe Approach Distances for Close Approach Vegetation Control.

The maximum nominal circuit voltage where close approach vegetation control can be undertaken is 66kV.

There are up to five levels of protection used during close approach vegetation control:

- worker uses appropriately insulated tools;
- there is sufficient air gap between the vegetation and energised overhead lines;
- worker maintains sufficient air gap between their body, the plant and tools being used and energised overhead lines;
- a safety observer monitors the work to confirm the required air gaps and work practices are being maintained by the worker; and
- for work carried out aloft, the worker works from an appropriately insulated EWP.





12.2.1 Plant used for close approach vegetation control

Where close approach vegetation control is undertaken from an EWP, the EWP must be insulated for the highest nominal voltage of any circuit in the work area.

- Insulated EWPs must comply with AS/NZS 1418.10 – Cranes, hoists and winches – Mobile elevating work platforms.
- Insulated EWPs must be visually inspected and electrically tested before going into initial service in accordance with AS/NZS 1418.10 – Cranes, hoists and winches – Mobile elevating work platforms.
- Insulated EWPs must be wiped clean and inspected for defects before each use.
- Insulated EWPs must undergo visual inspection and electrical retesting, in accordance with AS/NZS 1418.10 – Cranes, hoists and winches – Mobile elevating work platforms, every six months after going into initial service.
- An insulated EWP that fails a visual inspection or electrical test must not be used for close approach vegetation control.

12.2.2 Insulated tools used for close approach vegetation control

Close approach vegetation control must only be carried out using tools insulated for the highest nominal voltage of any circuit in the work area.

All insulating fibreglass tube sections must comply with IEC 60855 – Insulating foam-filled tubes and solid rods for energised working. Materials used in the handle must have the same mechanical properties as those required by IEC 60855 – Insulating foam-filled tubes and solid rods and must be made of the same material as the insulating section.

All insulating fibreglass tube sections must be marked with all the following information:

- manufacturer's name or trademark;
- relevant voltage rating (phase to phase highest system voltage); and
- an identifying number, either engraved or indelibly written, on a securely attached label.

The minimum length of the insulating section must be based on the Safe Approach Distances for workers and relevant system voltage, as prescribed in Table G – Safe Approach Distances for Vegetation Control and Table H – Safe Approach Distances for Close Approach Vegetation Control.

Uninsulated sections of handles must be clearly indicated by placement of a hand guard and by unambiguous labelling.

The surface of all insulating sections must be clean and dry, free of cracks, scratches, surface damage or mechanical defects that could impair the insulating qualities. Minor surface damage, such as light scratches, is acceptable. Any foam filled sections must be sealed at the end to prevent water ingress.

All hydraulic hose sections must comply with IEC 62237 – Energised working – Insulating hoses with fittings for use with hydraulic tools and equipment.

All insulating hydraulic hose sections must be marked:

- non-conductive; and
- with an identifying number, either engraved or indelibly written, on a securely attached label.

If the high voltage insulated tool has been tested previously it will have a test sticker or label indicating the date of last test and date next due. This sticker or label must not be removed.

The surface of all insulating hydraulic hose sections must be clean and dry and free of surface damage or mechanical defects that will impair the insulating qualities.

Insulated tools must be visually inspected and electrically tested before going into initial service.

Insulated fibreglass tube sections and insulated hydraulic hose sections must be subjected to a power-frequency voltage of 45kV for each 300 millimetres, for a period of one minute. The leakage current must not exceed 100 micro amps for any section.

Insulated tools must be wiped clean and inspected for defects before each use.





Insulated tools must be visually inspected and electrically retested every six months after going into initial service. Insulated fibreglass tube sections and insulated hydraulic hose sections must be subjected to a power-frequency voltage of 45kV for each 300 millimetres, for a period of one minute. The leakage current must not exceed 100 micro amps for any section.

An insulated tool that fails a visual inspection or electrical test must not be used for vegetation control work.

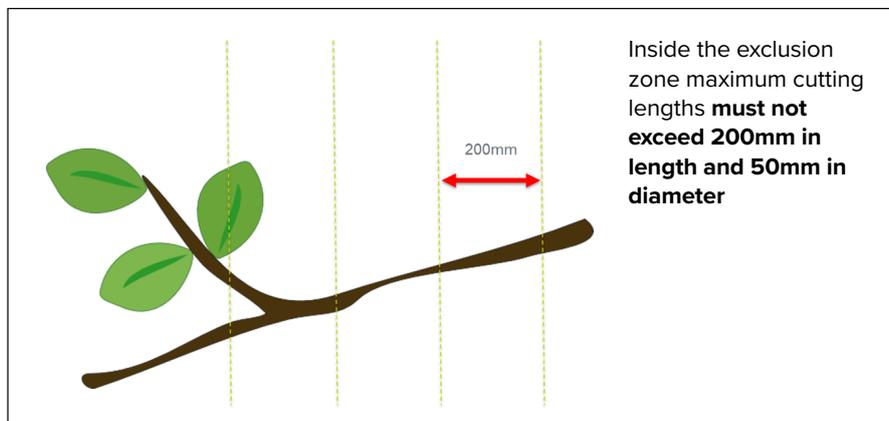
12.2.3 Vegetation clearance

Whilst undertaking any vegetation control in accordance with this procedure, the vegetation must not be within the clearances stated in Table G – Safe Approach Distances for Vegetation Control and Table H – Safe Approach Distances for Close Approach Vegetation Control for close approach vegetation control.

Vegetation to be trimmed above energised overhead lines:

- must have a maximum diameter of 50mm; and
- must be cut into small pieces no greater than 200mm in length.

Figure 39 – Vegetation cutting size



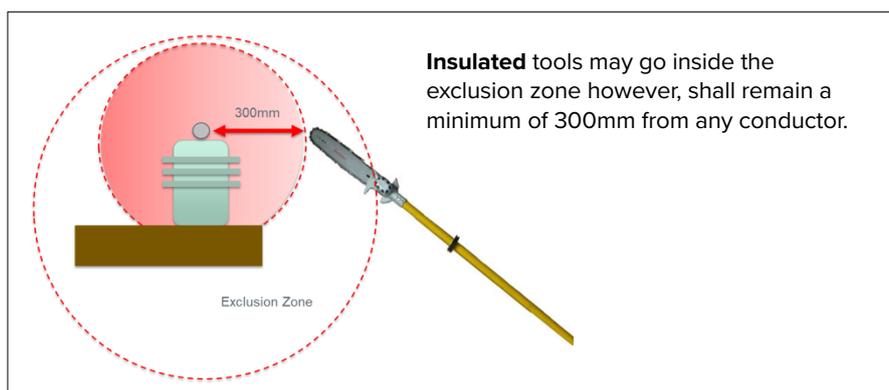
The cut and hold technique may only be used if there is no possibility to make contact with the network i.e. a clear line of site directly below. Any vegetation trimming directly above the mains shall be no more than 50mm in diameter or 200mm in length. A drop zone shall be nominated, established and noted prior to using the cut and hold technique, the established drop zones shall have a clear line of site and free of mains at all times.

12.2.4 Insulated tool clearance

Insulated tools must not be in contact with energised low voltage overhead lines when undertaking vegetation control.

Insulated tools must have an air gap of at least 300mm to energised high voltage overhead lines when undertaking vegetation control.

Figure 40 – Tool clearance example





12.2.5 Safety observers and workers on the ground

A safety observer must be appointed for the work in accordance with Section 12.1.1

To avoid exposure to hazardous step or touch voltages, safety observers and any other workers on the ground at a vegetation control work site must remain at least two metres from:

- the EWP;
- vegetation within the required Safe Approach Distances; and
- poles or structures with adjacent vegetation within the required Safe Approach Distances.

In the event of potentially energised conductors falling to the ground, all workers must:

- treat the fallen conductors as being energised;
- remain at least eight metres from the fallen conductors; and
- guard the fallen conductors from a distance of at least eight metres until made safe or repaired.

12.2.6 High voltage feeder reclose setting to be made non-auto

Before commencing close approach vegetation control on a high voltage overhead line, the vegetation control work party must make contact with the System Operator and have the feeder set up for non-auto reclose (“one shot”). At the completion of the task, the System Operator must be contacted to advise workers are clear of the overhead line and that protection can be returned to normal operation.

12.2.7 Position of plant

Position of plant and personnel is critical to maintain required clearances and enable safe felling of sections of vegetation.

Figure 37 – Plant position above overhead powerlines

For 11kV bare conductors personnel shall remain 1200mm from the network.

For 11kV bare conductors insulated plant and equipment shall maintain 700mm from the network.

EWP may be positioned over one phase only.

Person(s) may extend over two phases while maintaining SAD's.

Insulated tools may be positioned over multiple phases.

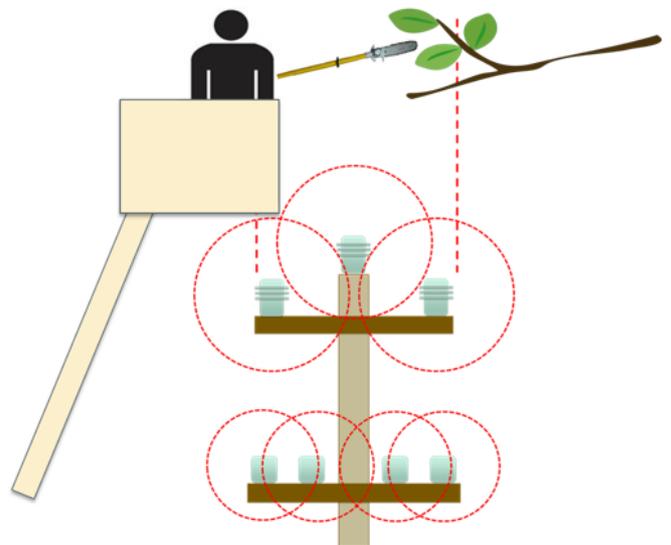




Table G – Safe Approach Distances for Vegetation Control

Climber and Ground line Clearance Table		Using Insulating Tools/equipment			Using Non-insulating Tools/equipment		
Voltage	Personnel clearance	Insulated tool clearance	Vegetation clearance below/beside	Vegetation clearance above	Non-insulated tool clearance	Vegetation clearance below/beside	Vegetation clearance above
LV – Insulated/covered	500mm	300mm	No clearance required		500mm	No clearance required	
LV – Exposed/bare	1000mm	300mm	No clearance required	Not permitted	1000mm	1000mm	Not permitted
11kV - 22kV	1200mm	700mm	700mm* 1200mm#		1200mm	1200mm	
33kV - 66kV	1500mm	1000mm	1000mm* 1500mm#		1500mm	1500mm	
132kV	2000mm	2000mm			2000mm		
220kV	3000mm	3000mm			3000mm		
330kV	3500mm	3500mm			3500mm		
Above 330kV	4500mm	4500mm			4500mm		

*Applicable for Ground Line only.

#Applicable for Climbers.

Insulated EWP Clearance Table		Insulated Mobile Plant Clearance	Using Insulating Tools/equipment			Using Non-insulating Tools/equipment		
Voltage	Personnel clearance		Insulated tool clearance	Vegetation clearance below/beside	Vegetation clearance above	Non-insulated tool clearance	Vegetation clearance below/beside	Vegetation clearance above
LV – Insulated/covered	500mm	Physical clearance (no contact)	300mm	No clearance required		500mm	No clearance required	
LV – Exposed/bare	1000mm		300mm	No clearance required		1000mm	1000mm	Not permitted
11kV - 22kV	1200mm	700mm	700mm	700mm	Not permitted	1200mm	1200mm	
33kV - 66kV	1500mm	1000mm	1000mm	1000mm		1500mm	1500mm	
132kV	2000mm	2000mm	2000mm			2000mm		
220kV	3000mm	3000mm	3000mm			3000mm		
330kV	3500mm	3500mm	3500mm			3500mm		
Above 330kV	4500mm	4500mm	4500mm			4500mm		





Table H – Safe Approach Distances for Close Approach Vegetation Control

Insulated EWP and Ground line Clearance Table		Insulated Mobile Plant Clearance	Using Insulating Tools/equipment	
Voltage	Personnel clearance		Insulated tool clearance	Vegetation clearance below/beside/above [#]
LV – Insulated/covered	500mm	Physical clearance (no contact)	300mm	No clearance required*
LV – Exposed/bare	1000mm			
11kV	1200mm	700mm	300mm	100mm*
22k	1200mm	700mm	300mm	150mm*
33kV	1500mm	1000mm	300mm	200mm*
66kV	1500mm	1000mm	300mm	400mm*

[#]Cutting vegetation above live mains and apparatus only permissible when working from an insulated EWP.

*200mm maximum permissible cutting lengths on vegetation no thicker in diameter than 50mm limited to working over one phase at a time.

Note: CAVC techniques **not permitted** near energised conductors above 66kV.



13.0 Safe operation and care for plant used on or near the network

13.1 General

Operation of any mobile elevated work platform (EWP) shall be in accordance with the manufacturer's instructions. This includes operator knowledge of the full range of limitations for that machine e.g. wind loading, terrain and slope.

Any uninsulated EWP shall only be operated according to the Safe Approach Distances specified in Table A unless working under an Access Authority.

EWPs that are electrically rated and tested may come within the Safe Approach Distances specified in Table A provided the EWP is rated at or higher than the voltage concerned and within its electrical test period.

According to Australian Standard AS 1418 – Cranes, Hoists and Winches an EWP may be classed as High Voltage if it incorporates High Voltage insulation within the upper boom and Low Voltage insulation covering.

EWPs working in normal conditions near live electrical apparatus should be effectively insulated for inadvertent contact with live electrical apparatus. Where it is not possible to effectively insulate the EWPs for the identified hazard, other engineering and/or administrative controls must be implemented. Operators and ground staff shall be aware of step and touch potential where a lower boom insulator is not in use.

The fundamental stability of an EWP in use on or near the network shall always be considered when preparing for work. Ensuring the stability of the EWP will reduce uncontrolled encroachment of safe approach distances.

13.2 Pre-use inspection

Safe and effective operation of EWPs requires that they be checked and maintained on a regular basis. All EWPs must be checked and maintained in accordance with the manufacturer's instructions and maintenance schedules.

The structural and dielectric strength of the fibreglass boom inserts, chassis insulators, baskets, liners and covers can suffer significant deterioration as the result of a number of factors such as:

Table I

Overloading	<p><i>Do not exceed the Safe Working Load (SWL) of the EWP. Care should be particularly taken when lifting or handling unknown loads at the basket, eg. lifting conductors.</i></p> <p>Fibreglass booms have a set SWL. Exceeding this can weaken the boom. Too much load can cause fibreglass strands to break or the resin to fail. Repeated overloading can lower the boom's strength and insulation, risking failure.</p>
Extreme Heat	<p><i>If the EWP has been subject to extreme heat, such as a fire, its structural and electrical properties might be compromised. Before further use, the EWP should undergo both mechanical and electrical testing based on the original specifications to ensure its safety and functionality.</i></p> <p>If the EWP is subjected to other heat sources, damage to the fibreglass can also occur. The resins in fibreglass equipment can be damaged if they are exposed to temperatures of 80 degrees C or higher.</p>
Weathering	<p>The insulating properties might be influenced by the weather, specifically through prolonged exposure to ultraviolet radiation. Any damages to the exterior surface need to be immediately fixed to maintain its efficiency.</p> <p>A protective layer, such as a gel coat, is applied to fibreglass booms, baskets, and covers. If this coat is damaged, for example by dragging conductors, falling tools, tree branches, or contact with other objects, water could seep in through the damaged surface. Over time, this could potentially deteriorate the bond between the fibreglass threads and resin, resulting in the fibreglass losing its structural and electrical integrity.</p>
Accidents	<p><i>If the fibreglass components have been subject to sudden significant loads or severe shock as the result of an accident, their integrity cannot be relied upon.</i></p> <p><i>The fibreglass should be subject to a full range of inspection and tests to prove its mechanical and electrical characteristics prior to further use.</i></p>





Chemicals	<i>Use only products specified for the purpose of cleaning and polishing the fibreglass. Some detergents, cleaning agents, and chemicals can negatively impact the fibreglass. Always follow the manufacturer’s recommendations to ensure the longevity and effectiveness of the fibreglass.</i>
Steam or pressure cleaning	High-pressure and high heat shall not be used to clean the fibreglass components and/or hoses and electrical components of an EWP. Water, under pressure, may enter the fibreglass through any cuts or scratches in the gel coat finish. All cleaning of the fibreglass must be in accordance with the manufacturer’s specifications.
Abrasives	<i>Insulated sections should not be cleaned with abrasive materials like sandpaper, wire brushes, steel wool, or abrasive cleaners, as these can damage the surface gloss.</i>
Surface contamination – external and internal	<i>Surface contaminants must be removed, and a continuous film of water must be broken up by regular cleaning and the application of a water-repellent treatment that causes water to bead up. All insulation surfaces, both internal and external, must be maintained in a clean and water-repelling (hydrophobic) condition.</i> Surface contamination from sources like industrial fallout, coastal salt spray, vehicle exhaust emissions, and dust can lead to the formation of a continuous water film on the insulation’s surface. Many of these contaminants are conductive, especially when water is present. This significantly increases the electrical surface conductivity, which can drastically diminish the insulating properties of the fibreglass.
Electrical damage	<i>If the insulation has been exposed to over-voltage or flashover, it needs to be removed from service for inspection. Any necessary repairs must be made to restore the insulation to its designed condition. The insulation should not be put back into service until its electrical properties have been verified through electrical testing.</i>

13.3 Safety Observer and Safe Approach Requirements

A Safety observer shall be required at all times while plant is in motion within 3m of the network in accordance with 6.4.3 Safe Approach Distances for operating plant in close proximity to electrical apparatus.

The safety observer working with an EWP must be familiar with the emergency procedures for the EWP they are observing. Under emergency conditions, the safety observer may operate the plant for the purpose of rescue without another observer being required.

Workers shall not be in contact with any part of the plant and the ground or earthed situation during the period the plant is being operated within the safe approach distance.

The authorised operator may operate the controls of the plant while standing on the ground or while in contact with an earthed situation only if one or more of the following provisions are complied with:

- the controls are effectively insulated for the nominal voltage of the conductors near the plant;
- for plant operating near low voltage apparatus only, the operator wears low voltage insulating gloves and approved outer gloves on each hand;
- the operator stands on an equipotential metallic mat which is electrically connected to all metalwork associated with the controls; or
- radio or similar controls with no physical connection to the plant are being utilised and the operator is located further from the plant than the distances specified in Table A above.

Note that any plant, including the controls, or any load carried or moved by the plant, or any tools, may be considered to be insulated only if they comply with the insulation requirements of a relevant Australian Standard, is appropriately labelled, and the test certificate is in date. The insulated portions of the plant shall be clearly identified by appropriate markings and/or labels.



13.4 Rescue from an EWP including self-rescue

All EWP's in use on or near the network shall have a form of rescue in the event of emergency. Means of rescue could be a secondary remote control, base controls, accumulator pressure, DC pump, bleed down valves or a hand pump.

The safety observer or nominated rescuer shall be competent in the use of the rescue controls for the EWP they are observing.

There is a requirement for a controlled descent device (CDD) to be fitted to the EWP for self-rescue if the primary rescue method fails. There shall be one CDD per worker in the EWP. Workers working in the EWP shall demonstrate their competence annually to deploy the CDD, attach the CDD to their person and abseil to a safe location.

 [Click to view CDD self-rescue video.](#)

13.5 Electrical test requirements

An insulated EWP shall be electrically tested before being placed into service for the first time, after any insulation repair, and routinely every six months. A copy of the test results shall be kept with the EWP for record purposes.

It is the operator's responsibility to confirm that the EWPs insulation is maintained in an operational condition by cleaning and treating the insulation to ensure its effectiveness and confirming its electrical test certificate is current.

When using the EWP for High Voltage Live Work the requirement for insulation resistance testing of the EWP shall be conducted in accordance with clause 9.9 of these rules.

EWPs operated by authorised live workers must have their tested insulation rated for the voltage being worked on. It is preferred that the upper boom insulation be rated at 132kV and that a chassis insulator be fitted and rated at 33kV.

Operators shall be aware that an EWP may have different wet and dry insulation ratings.

13.6 Insulation and EWP markings

All EWPs used for work on or near the network shall have insulation markings in accordance with Australian Standard AS 1418.10 – Cranes, Hoists and Winches Part 10: Elevating Work Platforms as displayed in figure 38 and table J.

Any additional safety signage must be clearly visible, the intention must be obvious and they must provide unambiguous advice to the operator.

Figure 41

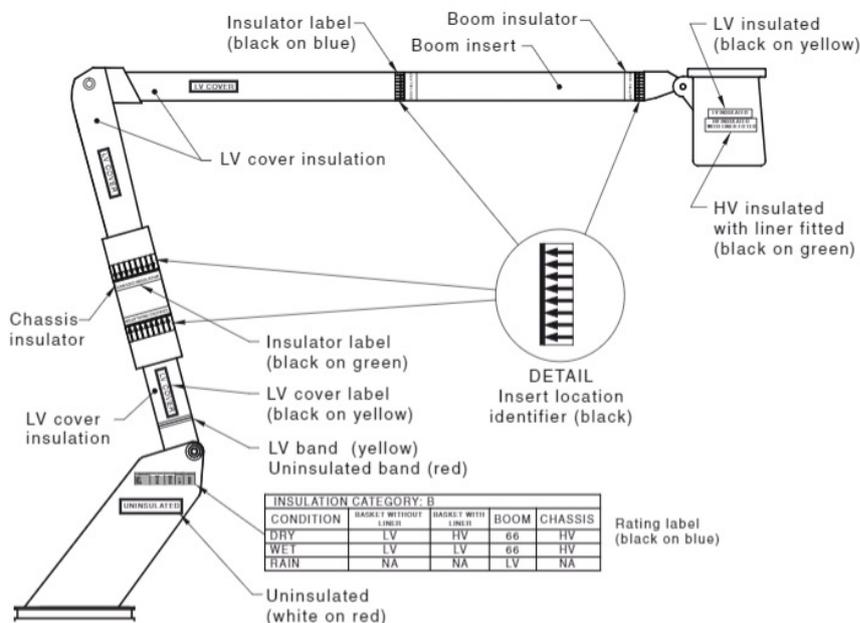


Table J

Label Location	Label Colour	Label Lettering Colour	Rating Plate/Label Example																									
Certification Notices EWP Rating Labels	Sky Blue	Black	<table border="1"> <thead> <tr> <th colspan="5">INSULATION CATEGORY: B</th> </tr> <tr> <th>Condition</th> <th>Basket Without Liner</th> <th>Basket With Liner</th> <th>Boom</th> <th>Chassis</th> </tr> </thead> <tbody> <tr> <td>Dry</td> <td>LV</td> <td>HV</td> <td>66kV</td> <td>33kV</td> </tr> <tr> <td>Wet</td> <td>LV</td> <td>LV</td> <td>66kV</td> <td>33kV</td> </tr> <tr> <td>Rain</td> <td>LV</td> <td>NA</td> <td>LV</td> <td>NA</td> </tr> </tbody> </table>	INSULATION CATEGORY: B					Condition	Basket Without Liner	Basket With Liner	Boom	Chassis	Dry	LV	HV	66kV	33kV	Wet	LV	LV	66kV	33kV	Rain	LV	NA	LV	NA
INSULATION CATEGORY: B																												
Condition	Basket Without Liner	Basket With Liner	Boom	Chassis																								
Dry	LV	HV	66kV	33kV																								
Wet	LV	LV	66kV	33kV																								
Rain	LV	NA	LV	NA																								
EWP Insulator component location identifier Labels	Sky Blue	Black																										
Chassis insulator HV Basket with liner	Bright Green	Black																										
LV cover insulation LV Basket/Basket without HV liner	Safety Yellow	Black																										
Uninsulated	Spectrum Red	White																										

Figure 42





13.7 Cleaning of insulated EWP

Cleaning should be undertaken at a minimum of once a month, or more often as required. This will depend on the degree of use, the operating environment and the condition of boom/chassis/basket insulation.

Appropriate PPE should be used as indicated on the relevant Safety Data Sheets (SDS). They must be used in accordance with the manufacturer's instructions.

13.7.1 Areas to be cleaned

EWP baskets, basket liners and covers, must be thoroughly cleaned and serviceable. While boom and chassis insulators provide phase to earth insulation, the basket and liner is the only phase to phase insulation.

Areas to be cleaned must include the following:

- the upper boom insulator. Cleaning must include both the external and internal surfaces of the insulator. The surface conductivity is the critical factor for this insulation;
- all levelling rods, hydraulic hoses and any equipment which traverse the upper boom insulated section. Where necessary, this equipment will have to be separated and individually cleaned. Dirt and water are retained in clumps of hydraulic hoses;
- the lower boom/chassis insulator (if fitted). The insulator should be cleaned both internally and externally. See upper boom insulator above for details;
- any equipment which traverses the lower boom insulation (see above);
- all fibreglass covering of the boom surfaces (external surface only);
- the operator's basket, both internal and external. The internal floor surface of the basket must be kept free of excessive dirt and tools which may damage the insulation surface;
- the basket liner (if fitted), both internal and external (see basket above for internal floor insulation). The basket liner must be removed regularly from the basket for cleaning, detailed inspection of all surfaces, polishing of the external surfaces and electrical testing; and
- any stand-off insulators supporting equipment (if fitted).

13.7.2 Insulator surfaces – hydrophobicity

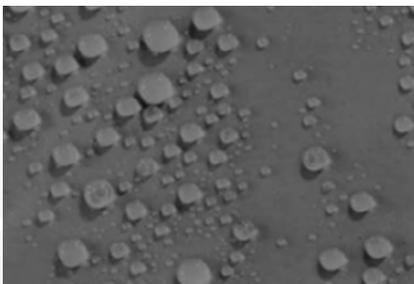
Hydrophobicity is defined by a low level of wettability by water on a surface.

Surface conductivity can vary because of a combination of loss of gloss, damage, moisture and contamination. The condition of an insulator surface can be determined by studying the surface when it is wet.

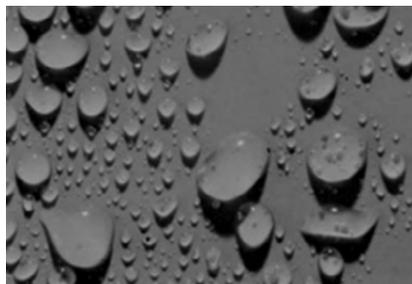
The insulator condition is determined by Wettability Class (WC) 1 to 6, based on IEC TS 62073 – Guidance on the Measurement of Wettability of Insulator Surfaces, as shown below.

Insulation in good hydrophobic condition is illustrated by condition WC 1 or WC 2. The water droplets in these classes are well-beaded with dry surfaces between them.

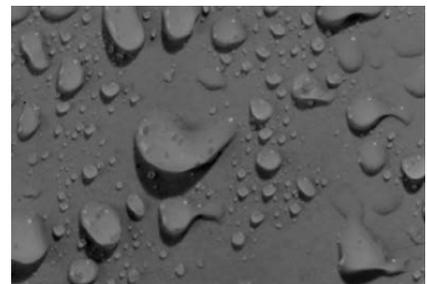
Figure 43



WC 1 - very good hydrophobic condition (clean & gloss surface)

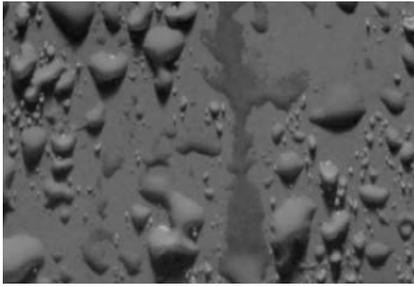


WC 2 - good hydrophobic condition (clean & gloss surface)

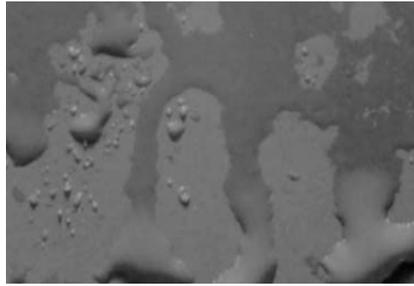


WC 3 is showing signs of the water tending to run across the surface.

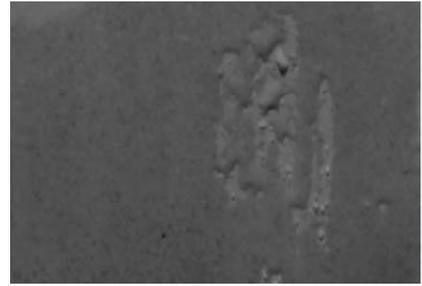




WC 4 - water commencing to run across the surface.



WC 5 - water running across the surface.



WC 6 – surface completely covered by water.

External fibreglass surfaces can have their external surface restored to hydrophobic condition by the application of polish.

Internal fibreglass surfaces are difficult to access and almost impossible to polish. The only way to restore a hydrophobic surface on internal surfaces is to spray a hydrophobic substance onto the surface and allow it to dry.

Before a hydrophobic spray can be applied, the insulation surface must be completely clean and rinsed of any conductive residues. Conductive residues under the hydrophobic spray will still render the surface conductive.

The fibreglass boom inserts, chassis insulators, baskets and basket liners must be cleaned externally and internally. The following methods should be adopted:

<p>External surfaces (boom inserts, chassis insulators, baskets, basket liners and covers)</p>	<p>Clean all dirt, mud and other loose material from the fibreglass using low-pressure water and a soft bristle nylon or polypropylene broom. Wipe the outer fibreglass clean and dry.</p>
<p>Internal surfaces</p>	<p>Internal surfaces of a boom insulator and the insulated equipment that traverse the boom insert shall be cleaned and maintained to ensure dielectric strength. Only the specified cleaning detergents on the internal insulation surfaces as per the manufacturer’s cleaning instructions shall be used. Note:</p> <ul style="list-style-type: none"> • ensure that all internal fibreglass surfaces have been cleaned; • hydraulic hoses, levelling rods, etc must also be cleaned in this process; and • care must be taken not to damage the internal boom or the installed equipment while cleaning.
<p>Boom drying</p>	<p>Once cleaning is done, the exterior of the EWP booms should be wiped and then lifted to let all water drain out, especially from inside the booms. This will allow the unit to dry completely. The cleaning of boom insulators should be scheduled to allow adequate drying time before the EWP is required for normal duties or periodic testing. It is a requirement for HV Live Work EWPs to be tested with an insulation resistance tester once a week, after cleaning or exposure to moisture and if for any other reason the insulation becomes suspect.</p>



Appendix 1 - Work on overhead mains and apparatus under or adjacent to energised circuits

AP1.1 Purpose and Actions

The purpose of this appendix is to outline the actions for work on overhead mains and apparatus under or adjacent to energised circuits. It describes the method of construction and maintenance of overhead mains and apparatus under or adjacent to energised circuits so as to minimise any risk to workers, the public or the network assets as a result of this work.

Before undertaking work in accordance with this appendix, consideration should always be given to isolating any or all circuits in the work area where practicable.

This appendix applies to planned and unplanned tasks involving:

- replacing in-service apparatus (cross arms, insulators, low voltage links, etc) without changing conductor tension under or adjacent to energised circuits, requiring the assessment and control of conductor movements due to the existing or applied mechanical forces;
- pulling/tensioning conductors under or adjacent to energised circuits connected to the span being worked on;
- the removal of a single span of lower voltage open wire (uninsulated) conductors under or adjacent to live mains;
- the removal and/or installation of open wire (uninsulated) conductors at a tee-off pole.

This appendix does not apply to:

- minor pole dressing which will not alter existing open wire (uninsulated) conductor tensions (installing new apparatus, street light control points, pig tail bolts, etc);
- running and removal of low voltage Aerial Bundled Cable (ABC) conductor and insulated streetlight wires, as well as All-Dielectric Self-Supporting (ADSS) cable;
- work above energised circuits; and
- High Voltage Live Work.

The following work methods are not permitted to be used for spans strung continuously under or adjacent to an energised circuit:

- running multiple spans of new or additional open wire (uninsulated) conductors under or adjacent to energised circuits by using the old conductor to pull in the new conductor or manually lifting the new conductor into position; and
- removal of multiple continuous spans of open wire (uninsulated) conductors under or adjacent to energised circuits, other than the removal of one span at a time as detailed in this appendix.

AP 1.2 Safety principles that apply to this work

Any bare conductors within the worksite should be isolated where practical.

This appendix is based on the principle that conductors are controlled at all times, at the pole top. This can be achieved by fitting come alongs and ratchet pullers or slings, or alternatively deadends or other line hardware, to prevent unintended movement. The work party may decide to use additional controls such as belly ropes or mid-span hold down devices in some circumstances.





Outlined below are the risk factors for this type of work that may result in the loss of control of conductors, and injury to the work party. These factors should be considered when preparing a task involving work under or adjacent to energised circuits.

Appendix Table 1

Equipment or hardware conditions	Work Environment	Human Factors
<ul style="list-style-type: none"> • Hardware failure/slip • Pole/cross arm/pin movement/failure • Conductor or joint break 	<ul style="list-style-type: none"> • Uneven spans/tension • Inter-circuit clearance • Conductor size and condition • Hardware age and condition • Third party involvement (eg, car into pole) 	<ul style="list-style-type: none"> • Inadequate risk assessment • Taking short cut • Inadequate procedure • Loss of control of conductor • Over tension • Inexperience • Poor planning • Poor communication • Poor coordination • Poor sequencing • Loss of control of plant • Inadequate staff • Too many personnel • Inadequate equipment

In addition to the risk factors above, the circumstances below can also result in the loss of control of conductors, and injury to the work party.

Appendix Table 2

<ul style="list-style-type: none"> • Pole movement • Insulation breakdown • Isolation point failure • Failure of third party assets • Not following procedure 	<ul style="list-style-type: none"> • Weather – rush job • Time pressure – rush job • Wrong skills of staff • Inadequate supervision • Poor situational awareness
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AP 1.3 Pre work inspection and planning

In order to conduct this work safely a thorough inspection of the worksite by a suitably qualified person must be completed prior to the commencement of work. For planned work, the results of this inspection must be recorded and included in the scoping notes in the job packet for the information of the workers undertaking the task, for example on a Worksite Hazard and Risk Assessment (WHRA). For unplanned work, the results of this inspection must be recorded and addressed on a Worksite Hazard and Risk Assessment (WHRA) for the task.

The pre-work inspection is required to identify the condition of the network conductors and apparatus, as well as the work environment for the task, including:

- the condition of the conductors, fittings, structures and cross arms;
- check conductors for annealing, broken strands or sleeves;
- if structures or cross arms are bent or leaning;
- the terrain: is it flat, uneven, hilly, in a paddock, near a main road;
- other assets: Telstra, Optus, cable TV, low-level earth wire and any low-level communication cables;
- line to be worked on: uplift possibilities, angles, design, clearances, tensions, span lengths, mid-span joints;



- clearances to other circuits (Company assets and assets owned by others, for example Optus, etc);
- the particular requirements of this procedure that apply to the work method for the task;
- any pre-existing defects or damage;
- any nearby structures or trees, that may be affected; and
- any known changes that will occur prior to and during the conduct of the work.

AP 1.4 Preparation and precautions required on the day

A suitably qualified person must be appointed as Worksite Coordinator for the whole job and conduct a thorough pre-work inspection of the worksite in accordance with section AP 1.3 above prior to the commencement of work. The job pack and any other available documentation for the work must also be reviewed by the Worksite Coordinator prior to the commencement of work. The Worksite Coordinator must also confirm there are sufficient suitably qualified employees to complete the work safely.

Prior to commencing work the Worksite Coordinator or suitably qualified person will meet with all of the work team at one time, at one location, to:

- review the documents that were completed prior to the commencement of work, including the requirement for an Access Authority (AA);
- discuss the results of the pre-work inspection;
- discuss the proposed work method and sequence for the task;
- review relevant Safe Work Method Statements (SWMS); and
- complete the details of the Worksite Hazard and Risk Assessment (WHRA).

The work team must fully understand their roles and responsibilities for the day's work and be satisfied that the work can be undertaken safely.

Each member of the team must be aware of the following:

- the work to be carried out;
- the sequence in which the work will be carried out;
- the task that they are to perform;
- the order in which they are to perform the task;
- all agreed safety controls, including the location of rescue and first aid equipment at the worksite;
- who the nominated Worksite Coordinator is; and
- how to communicate with the nominated Worksite Coordinator if and when any situation needing clarification occurs.

All safety rules must be observed and all agreed controls implemented. The work team must conduct the work as instructed by the Worksite Coordinator.

If there are multiple worksites then the appointment of Worksite Coordinators or Worksite Facilitator are to be reviewed and applied.

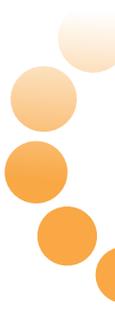
AP 1.5 Replace or install apparatus without changing conductor tension under or adjacent to energised circuits

This method applies to the replacement of apparatus including, but not limited to, cross arms, insulators, ties, and links where conductor tension is not intended to be changed, but assessment and control of conductor movement is required due to existing or temporarily applied mechanical forces.

1.5.1 Hazards associated with this work method:

- Loss of control of conductor (in horizontal or vertical directions), due to poor hardware / conductor condition
- Conductor/tie/hardware failure
- Conductor slips through ties
- Mechanical load changed on adjacent structures
- Reduction of inter-circuit clearances
- Conductor/tie/hardware failure
- Conductor slips through ties



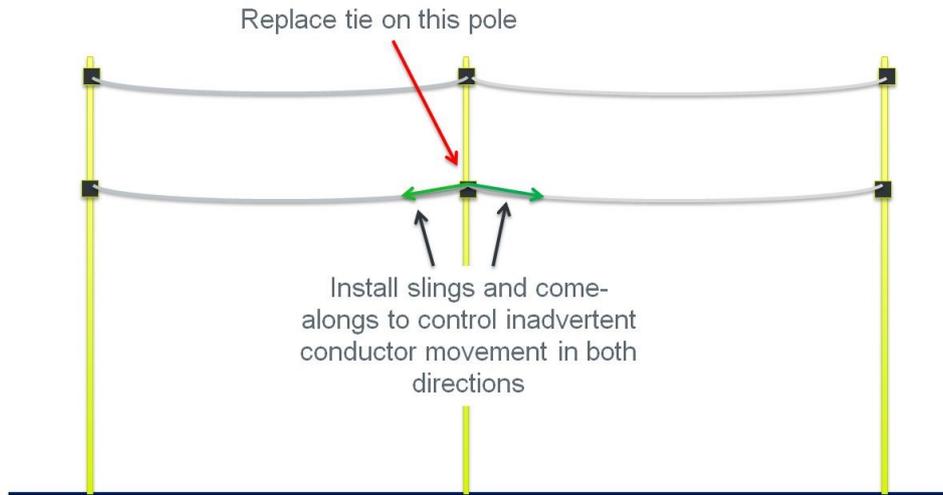


1.5.2 Additional risk controls and work sequence for this work method

Isolate any bare conductors within the worksite where practical.

Where there is no need to take up tension in a conductor being worked on to complete the task (for example, replacement of a tie), prevent loss of control of the conductor by fitting a come-along to the conductor, secured to the cross arm with a non-conductive sling, in both directions (that is, on both sides of the structure) as shown in Figure A, **before commencing the task.**

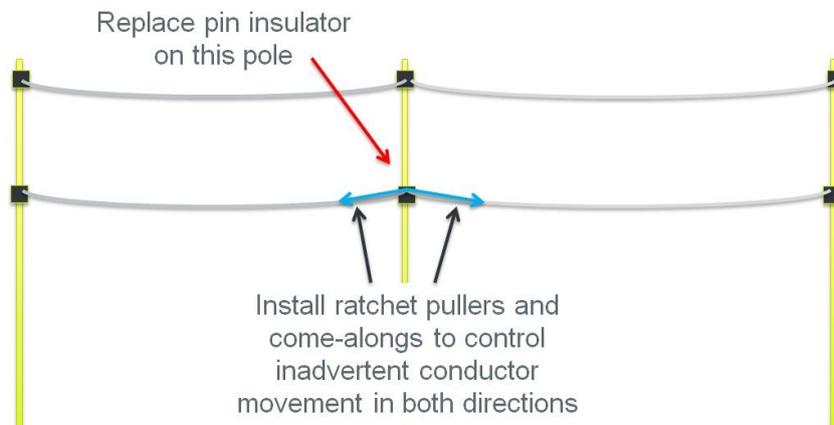
Appendix Figure A – Conductor control for task not requiring conductor tension to be taken up



Where a small amount of tension is required to be taken up in a conductor to complete the task (for example, replacement of a cross arm or an insulator) secure the conductor being worked on in both directions (that is, on both sides of the structure) with come-alongs and ratchet pullers to restrain conductors, as shown in Figure B, **before commencing the task.**

Once the conductor tension is held by the come-alongs and ratchet pullers, the conductor can be untied from the pin insulator. If it has been confirmed there is no tension across the pin insulator, the hazard of horizontal force on the conductor has been removed. The come-along and ratchet puller can then be removed from one side of the structure, or if a temporary cross arm is used, the conductor can sit in the clamp as the remaining hazard is 'dropping' (a loss of conductor control in the vertical direction).

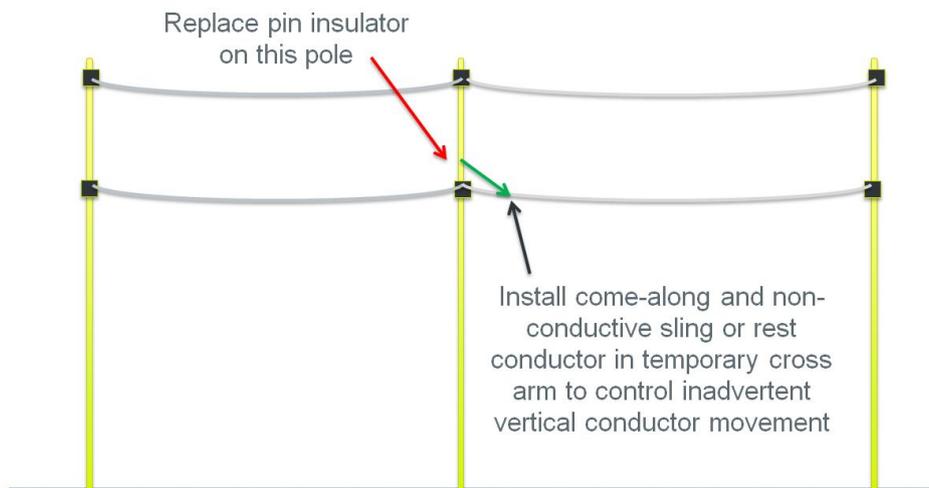
Appendix Figure B – Initial conductor control for task requiring minimal conductor tension to be taken up





When transferring a conductor from one hardware item to another (for example, moving from pin insulator on the old cross arm to pin insulator on the new cross arm), protection from dropping the conductor must be in place at all times. This can be achieved by fitting a come-along to the conductor and securing it to the structure using a non-conductive sling, as shown in Figure C. Alternatively the conductor can be tied into the new cross arm or holding the conductor in a temporary cross arm before being released from the old cross arm.

Appendix Figure C – Conductor control after tension is removed



Note: Confirm all come-alongs/ratchet pullers/service strainers/slings and stockings are of the correct type and size to allow the job to be completed safely.

Once the appropriate conductor control equipment is in place, carry out the replacement of the apparatus.

AP 1.6 Pulling/tensioning conductors under or adjacent to energised circuits connected to the bay being worked on:

This method applies to tasks requiring the pulling or tensioning of conductors including, but not limited to, reinstating a fallen main, or converting a pin structure to a termination structure, where conductor tension is being changed, and the effect on surrounding spans must be controlled.

1.6.1 Hazards associated with this work method:

- Loss of control of conductor due to incorrect work method (conductor dropped)
- Loss of control of conductor (in horizontal or vertical directions), due to poor hardware/conductor condition
- Conductor/tie/hardware failure
- Conductor slips through ties
- Mechanical load changed on adjacent structures
- Reduction of inter-circuit clearances
- Conductor/tie/hardware failure
- Conductor slips through ties

1.6.2 Additional risk controls and work sequence for this work method

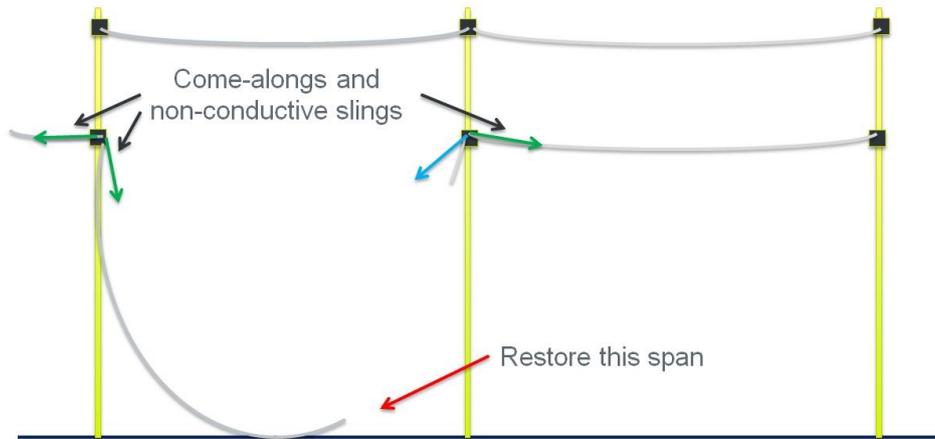
Isolate any bare conductors within the worksite where practical.

When recovering a fallen conductor, prevent loss of control of the conductor by fitting a come-along to the conductor, secured to the cross arm with a non-conductive sling, at the far end of the span being recovered as well as the end of the adjacent span at the structure being worked from as shown in Figure D, before commencing the task.





Appendix Figure D – Conductor control for replacement of a fallen span



At the structure where the work is occurring, secure the conductor being reinstated with a come-along and ratchet puller to restrain and control the tension in the conductor.

Note: Confirm all come-alongs/ratchet pullers/service strainers/slings and stockings are of the correct type and size to allow the job to be completed safely.

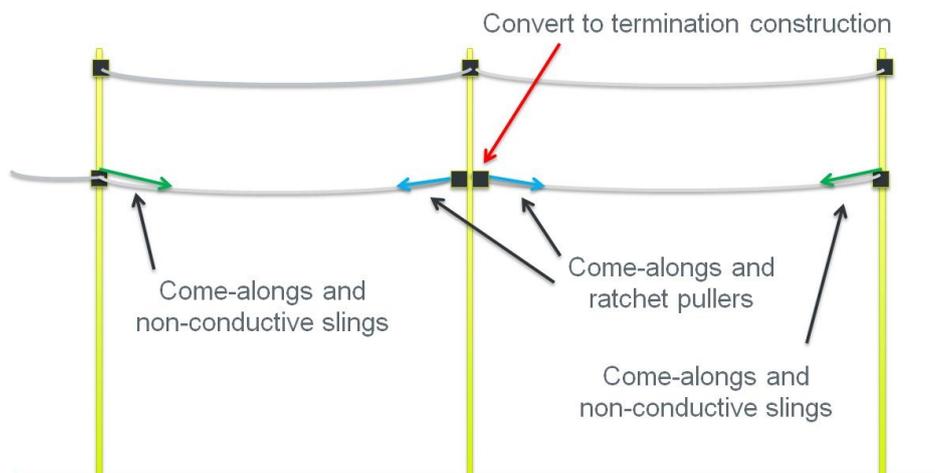
Once the appropriate conductor control equipment is in place, use the ratchet pullers at the work position to adjust the conductor tension and complete the task as required.

NOTE: A strain or termination construction does not require come-alongs to be fitted as the dead-end tie prevents movement of the conductor, if the conductor, insulator, and cross arm are all in sound condition.

When converting a pin structure to a termination structure, prevent loss of control of the conductor by fitting a come-along to the conductor, secured to the cross arm with a non-conductive sling, at the far end of the spans being worked on as shown in Figure E, **before commencing the task.**

At the structure being converted to a termination construction, secure the conductors being worked on in both directions (that is, on both sides of the structure or work position) with come-alongs and ratchet pullers to restrain conductors, **before commencing the task.**

Appendix Figure E – Conductor control to convert pin to termination construction





AP 1.7 Removal of a single span of lower voltage open wire (uninsulated) conductors under or adjacent to live higher voltage mains

This method involves disconnecting and lowering a single span of uninsulated conductors from one end.

1.7.1 Hazards associated with this work method:

- Loss of control of conductor due to incorrect work method (conductor dropped)
- Loss of control of conductor (in horizontal or vertical directions), due to poor hardware/conductor condition
 - Conductor/tie/hardware failure
 - Conductor slips through ties
- Mechanical load changed on adjacent structures
 - Reduction of inter-circuit clearances
 - Conductor/tie/hardware failure
 - Conductor slips through ties

1.7.2 Additional risk controls and work sequence for this work method

Isolate any bare conductors within the worksite where practical.

Note: The outer conductors are to be removed first to minimise uneven loading on the cross arms during the conductor removal procedure.

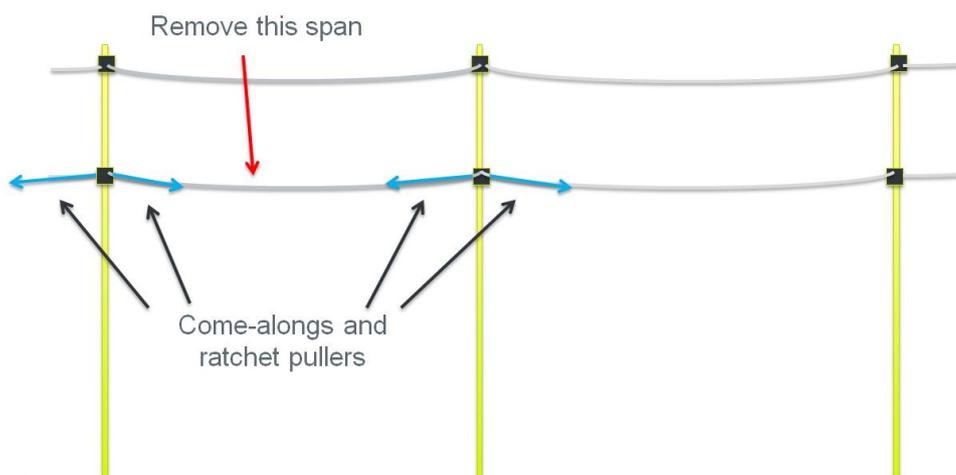
Remove low voltage spreaders, if fitted.

At the structure at one end of the span being removed, secure the conductors being worked on in both directions (that is, on both sides of the structure) with come-alongs and ratchet pullers to restrain conductors.

At the structure at the far end of the span being removed secure the conductors in both directions (that is, on both sides of the structure) with come-alongs and ratchet pullers to restrain conductors, as shown in figure F. The tension in the conductor being worked on must be taken up using the ratchet puller so that conductor tension is held by the control apparatus, not the ties.

Note: Control of the LV conductor movement at the pin must be achieved via the use of ratchet pullers and come-alongs attached by a non-conductive sling.

Appendix Figure F – Conductor control to remove mains from a pin construction





Attach 16mm polypropylene rope or equivalent to the conductor with a suitable device. When ropes are attached to conductors for lowering purposes, confirm that the rope is in good condition and that the attachment of the rope to the conductor cannot slip off in any way.

Note: Care must be taken if come-alongs are to be used for this purpose.

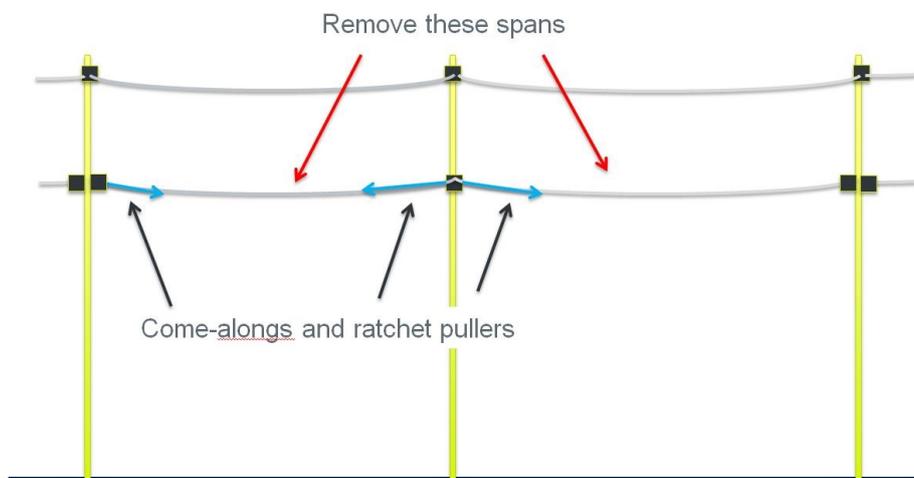
Take up the tension in the span to be removed using the ratchet pullers.

Untie the conductor at the insulator, allow the span to slacken by releasing the tension in the ratchet pullers and lower the conductor to the ground.

Disconnect the conductor from the remaining termination point and complete the removal of the conductor.

NOTE: A strain or termination construction does not require come-alongs to be fitted as the dead-end tie prevents movement of the conductor, if the conductor, insulator, and cross arm are all in sound condition.

Appendix Figure G – Conductor control to remove mains from termination construction



AP 1.8 Removal and/or installation of open wire (uninsulated) conductors at a tee-off pole under or adjacent to live higher voltage mains

This method involves disconnecting and lowering the conductors from a tee off pole end, or pulling conductors up to a tee-off pole, where there is a higher voltage circuit above the conductors at the tee-off structure.

1.8.1 Hazards associated with this work method:

- Loss of control of conductor due to incorrect work method (conductor dropped)
- Mechanical load changed on adjacent structures
 - Reduction of inter-circuit clearances
 - Conductor/tie/hardware failure
 - Conductor slips through ties

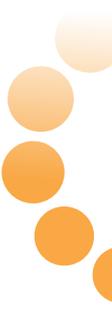
1.8.2 Additional risk controls and work sequence for this work method

Isolate any bare conductors within the worksite where practical.

At the tee-off structure, secure the conductors being removed with come-alongs and ratchet pullers to restrain conductors.

At the structure at the far end of the span being removed, secure the conductors in both directions (that is, on both sides of the structure) with come-alongs and ratchet pullers to restrain conductors from moving in either direction. The tension in the conductor being worked on must be taken up using the ratchet puller so that conductor tension is held by the control apparatus, not the ties.





Attach 16mm polypropylene rope or equivalent to the conductor(s) at the tee-off pole with a suitable device. When ropes are attached to conductors for lowering purposes, confirm that the rope is in good condition and that the attachment of the rope to the conductor cannot slip off in any way.

Note: Care must be taken if come-alongs are to be used for this purpose.

Take up the tension in the conductor(s) at the tee-off pole using the ratchet pullers.

Untie the conductor at the insulator, allow the span to slacken by releasing the tension in the ratchet pullers and lower the conductor to the ground **away from the tee-off structure**.

If re-installing the conductors back to the tee-off pole, attach 16mm polypropylene rope or equivalent to the conductor(s) to be reinstalled to the tee-off pole with a suitable device. Pull the conductors into position on the tee-off pole and hold in position.

At the tee-off structure, secure the conductors being installed with come-alongs and ratchet pullers to restrain conductors. Take up the tension in the conductor(s) at the tee-off pole using the ratchet pullers.

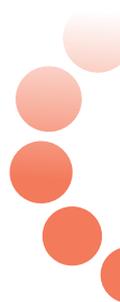
Re-tie the conductor at the insulator, allow the span to slacken by releasing the tension in the ratchet pullers.



Appendix 2 - Abbreviations and acronyms

//	Parallel	ESW	Earth Switch
AAT	Access Authority for Test	EWP	elevating work platform
AAW	Access Authority for Work	FDR	Feeder
ABC	Aerial Bundled Conductor	F/L	Frame Leakage
ABS	Air Break Switch	FLISR	Fault Location Isolation and Supply Restoration
ACB	Air Circuit Breaker	FSw	Fuse Switch
ADMS	Advanced Distribution Management System	GDO or DDO	Ganged tripping drop-out fuse
ADSS	All Dielectric Self-Supporting (fibre optic cables)	GCB	Gas Circuit Breaker
AEMO	Australian Energy Market Operator	GIS	Geographic Information System
AF	As Found	GRP	Group
AL	As Left	GRN	Government Radio Network
AS/by	Auto Standby	HAZ	Hazemeyer
ASP	Accredited Service Provider	HRS	Hours
AUX	Auxiliary	HV	High Voltage
BESS	Battery Energy Storage System	HVC	High Voltage Customer
BBP	Busbar Protection	HVL-WP	High Voltage Live Work Permit
BI	Bus Isolator	IOC	Instantaneous Over Current
BSP	Bulk Supply Point	IDMT	Inverse Definite Minimum Time
Bus	Busbar	INC	Incident
CAVC	Close Approach Vegetation Control	IN-DEP	Independent
CAP	Capacitor	ISOL	Isolator
Col	Column	I/Trip	Inter trip
CO	Changeover	JU	Joint Use
CB	Circuit Breaker	LA	Lightning Arrestor
CCT	Covered Conductor - Thick	LBS	Load Break Switch
CT	Current Transformer	LBU	Local Backup
CVT	Capacitive Voltage Transformer	LDC	Line Drop Compensation
Diff	Differential Protection	LDT	Locked and Danger Tagged
Dist	Distributor	LHS	Left Hand Side
Dirn	Directional	LI	Line Isolator
DOF or EDO	HV drop-out fuse	LLC	Live Line Clamp
DT	Danger Tag	LV	Low Voltage
E/F	Earth Fault	LVAA	Low Voltage Access Authority
EI	Extremely Inverse (Inverse curve characteristic)	LVCB	Low Voltage Circuit Breaker
ESR	Electrical Safety Rules	LVF	Low Voltage Fuse
		LVL	Low Voltage Link





MAINT	Maintenance	RecCB/AR	Reclosing Circuit Breaker
MDI	Maximum Demand Indicator	RHS	Right Hand Side
MINS	Minutes	Rly	Relay
NA	Non-auto	RMI	Ring Main Isolator
N/C	Normally Closed	RMU	Ring Main Unit
NI	Normal Inverse (see SI)	RTU	Remote Terminal Unit
NIS	Not In Service	SAD	Safe Approach Distance
N/O	Normally Open	SAPS	Stand-Alone Power Systems
No	Number	S/BY	Standby
Nos	Numbers	SC	Short Circuit
NV	No-volt	SCADA	Supervisory Control and Data Acquisition
N/V CO	No-Volt Change Over	SD	Safety Document
OA	Operating Agreement	Sec	Secondary
O/C	Over Current Protection	SECS	Seconds
OCB	Oil Circuit Breaker	SECT	Section
ODT	Open and Danger Tagged	SEC	Sectionaliser
OFS	Oil Fuse Switch	SW/AS	
OG Box	Overground Box	SEF	Sensitive Earth Fault
OH	Overhead	SF6	Sulphur Hexafluoride Gas
OLDT	Open Locked and Danger Tagged	SI	Standard Inverse (3 second time curve)
O/S	Out of Service	SL	Street Light
OPGW	Optical Ground Wire	SLCP	Street Light Control Point
ORDT	Open Removed and Danger Tagged	SOP/SSOP	System Operator/Senior System Operator
O/V	Over Voltage	SP	Switching Plan
PE Cell	Photo Electric Cell	SPD	Service Protection Device
PERM	Permanent	SP SW	Single Pole Switch
PF	Power Factor	STAT-COM	Static Compensator
PI	Pole	Sub	Substation
PRI or PRIM	Primary	SW	Switch
PSM	Plug Setting Multiplier	SWER	Single Wire Earth Return
PTN, PROT or PROTN	Protection	SWGR	Switchgear
PPE	Personal Protective Equipment	TC	Tap Changer
PV	Photovoltaic Cell	TEMP	Temporary
recl	Recloser	TL	Timer Lever
		TMS	Time Multiplier Setting





Trans mains	Transmission Mains
TX or TRF or TRANSF	Transformer
U/F	Under Frequency
UG	Underground
UGOH	Underground to Overhead termination
U/S	Unserviceable
USL	Underslung Link
U/V	Under Voltage
V	Volt
VI	Very Inverse (1.55 second inverse characteristic)
VR	Voltage Regulator or Voltage regulation
VT	Voltage Transformer
WGL	Work Group Leader
WHRA	Worksite Hazard and Risk Assessment
WR	Works Request
WT	Warning Tag
XLPE	Cross-Linked Polyethylene
Zn	Zone





