Electrical Safety Rules

Document No. ESR2025/1

November 2025©

Emergency Phone Numbers

Emergency Services	Number
Ambulance, Fire, Police	(0) 000 (or 112 from a mobile phone)

Ausgrid emergency contacts	Number
Ausgrid – hazard or emergency reporting	13 13 88
Environmental emergencies	02 9394 6659 or 0412 070 574 (after hours)

Preface

Ausgrid's Electrical Safety Rules set out the minimum controls required to manage the electrical risks involved in working on, near, or in the vicinity of the Ausgrid electricity supply network.

They apply to all persons carrying out work on, near, or in the vicinity of Ausgrid's electricity supply network, under the Electricity Supply (Safety and Network Management) Regulation.

All workers must comply with these Rules and have the latest version readily available at the work site.

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Group Executive – Network & Digital

Version history

Version	Release date	Effective date	Changes
2025/0	20 August 2025	1 September 2025	Minor update. See ESR Amendment Advice 2025/0 for a detailed list of all changes.
2025/1	26 November 2025	15 December 2025	Major update. See ESR Amendment Advice 2025/1 for a detailed list of all changes.

Contents

1 Introduction

1.1 Purpose and scope

1.1.1 Purpose

These Rules form part of the Ausgrid Electricity Network Safety Management System, which is designed to fulfil Ausgrid's obligations under the Electricity Supply (Safety and Network Management) Regulation 2014.

These Rules provide the minimum controls that must be applied to manage the electrical risks involved in working on, near, or in the vicinity of, the Ausgrid electricity network.

intended purpose disclaimer

This document is produced by Ausgrid for work on or near Ausgrid's network and specific adjacent or interconnected systems and other work as indicated in the document. Ausgrid accepts no responsibility or liability resulting from any usage of these Rules other than for their intended purpose.

1.1.2 Scope

These Rules apply to:

- work which is carried out for the purpose of the construction, commissioning, operation, or decommissioning of the Ausgrid electricity supply network:
  - on, near, or in the vicinity of, mains and apparatus forming Ausgrid's electricity supply network, regardless of whether the network is in a normal, abnormal, or emergency state:
    - including mains and apparatus that are in-service, out-of-service, or under construction; but
    - excluding Network Distributed Energy Resources as set out in Clause 16.2.1;
  - on, near, or in the vicinity of, mains and apparatus owned and/or operated by other electricity network operators;
  - on, near, or in the vicinity of, network customer installations; and
- the facilitation of work near the Ausgrid electricity network, by external parties who are working under a SafeWork Code of Practice, for purposes other than the construction, commissioning, operation, or decommissioning, of the Ausgrid electricity supply network.

In some areas of these Rules, specific requirements apply to specific persons or roles. Where these specific persons or roles are not stated, these Rules apply to all workers.

1.1.3 Work Health and Safety Requirements

In addition to compliance with these Rules, employers and workers involved with work on, near, or in the vicinity of the Ausgrid electricity network must manage the risks associated with such work:

- in accordance with their organisation's applicable safe system of work; and
- in compliance with NSW Work Health and Safety Laws.

1.1.4 Precedence

Employers of persons working under these Rules may provide those workers with specific instructions relating to work practices.

If compliance with specific instructions issued by an employer will conflict with, void, or diminish any requirement of these Rules, the current Rules shall prevail over any conflicting information in any other document.

1.2 Important notes

1.2.1 Availability and accessibility of the Rules

The current version of these Rules must be readily available at each worksite.

These Rules may be amended at various times. Therefore, users of these Rules must confirm that the version they are using is the current version with the latest amendments.

Note: The current version of these Rules is always available in electronic form on Ausgrid's website or intranet.

1.2.2 Governance of the Electrical Safety Rules

The Governance of these Rules is described in the Company Procedure HS000 – P0038 - Amendment, Publication, and Communication of the Electrical Safety Rules.

The Electrical Safety Rules Committee (comprising management and employee representatives of Ausgrid) meets periodically to review the content of these Rules. The Electrical Safety Rules Committee Charter describes the purpose and function of this Committee.

Persons requesting an amendment to these Rules should email electricalsafetyrules@ausgrid.com.au.

1.2.3 Clarification of the Electrical Safety Rules

Persons who are seeking clarification of how these Rules apply in specific circumstances should email electricalsafetyrules@ausgrid.com.au.

1.2.4 Exemption to the Electrical Safety Rules

An exemption to these Rules may be granted in specific circumstances where these Rules cannot be applied, and alternate controls are proposed to manage the electrical risk so far as reasonably practicable.

The following processes apply for persons requesting an exemption to these Rules:

- Ausgrid employees should submit a request via Electrical Safety Rules page on the Ausgrid intranet;
- Persons other than Ausgrid employees should email electricalsafetyrules@ausgrid.com.au.

2 Emergencies

2.1 Emergency response and reporting

This section identifies whom to call and what to do in emergency situations (i.e. situations that present an immediate threat to life or property). Providing assistance and basic life support procedures are also described, as well as how to deal with operating switches and fallen conductors during an emergency.

2.1.1 Electrical hazards in a public space

If you find conditions where there is an electrical hazard associated with mains and apparatus which may present a life-threatening risk to people in a public place (such as damaged live mains and apparatus, fallen mains, hazardous voltages on poles, etc), you must initially remain:

- well clear of the mains and apparatus (at least 8m for fallen High Voltage (HV) or unidentified overhead conductors, as required by Clause 2.1.10), and
- in a position to warn people until, the electrical risk has been controlled, so far as reasonably practicable. If you cannot do this, you must arrange for another responsible person to do so.

You must then do one of the following:

- contact the relevant Control Room Operator; or
- report the matter to Ausgrid's Emergency telephone number (See Page 2 of this document); or
- arrange for someone to make the telephone call for you.

An authorised person attending such a situation may leave the site:

- for the purpose of controlling the hazard by de-energising or isolating the mains and apparatus, if:
  - the hazard is not able to be effectively controlled at the site, and
  - the person has the ability and equipment required to de-energise or isolate the mains and apparatus from a network point of isolation; or
- during a Network Incident where multiple electrical hazards are required to be managed through the Ausgrid Incident Management System (Red Folder) where:
  - the electrical risk at the initial site has been controlled so far as reasonably practicable; and
  - the person is directed by the relevant Control Room Operator, or Ausgrid management, to attend the site of an uncontrolled electrical hazard.

2.1.2 Reporting network incidents

You must report the following types of incidents to the Control Room:

- any emergency situation involving the network;
- any incident that affects network supply;
- any injury or near-miss involving the network;
- any unusual conditions in a substation, as required by Clause 2.1.13.

Ausgrid employees must also refer to the reporting requirements of the Ausgrid Health and Safety Management System.

Numbers to call in an emergency

Use the emergency numbers on page 2 of this document for an immediate response from Ausgrid.

Depending on the situation, you may need to call emergency services such as Fire, Ambulance or Police on 000.

2.1.3 Assisting in a network emergency

During a network emergency, a Control Room Operator may call on any appropriately authorised worker to do any repair or other work necessary to restore or maintain supply (see Clause 2.1.10 for more details).

2.1.4 Operating switches during an emergency

During an emergency, persons who do not have an operating authority may operate switches to de-energise mains and apparatus, for the purpose of saving life or property, if it is safe to do so.

Where mains and apparatus have been de-energised during an emergency, the relevant Control Room Operator must be notified as soon as possible.

The relevant Control Room Operator must give approval for an appropriately authorised operator to re-energise mains and apparatus that have been de-energised in an emergency.

2.1.5 Access permit exemption

As required by these Rules, workers must sign on to a relevant access permit before carrying out work (other than by live work methods) on or near exposed mains and apparatus. However, workers are not required to sign onto a relevant access permit when there is an immediate risk to life or property and the emergency work is carried out under the direct supervision of an appropriately authorised operator (who makes sure that the necessary procedures for identifying, isolating, proving de-energised, earthing and short-circuiting the mains and apparatus are carried out according to these Rules).

2.1.6 Prioritising repairs

If repair work is necessary at more than one point (or on more than one item of mains and apparatus), the relevant Control Room Operator has the authority to determine the order in which the work must be done.

2.1.7 Basic life support emergency procedure

In all emergency situations you must:

- assess the situation quickly;
- look for hazards;
- put controls in place for the hazards;
- ensure safety of rescuer(s), bystander(s), and victim(s);
- call for help (Phone 000); and
- commence appropriate treatment (e.g. rescue, resuscitation, first aid).

2.1.8 Electric shock

Any worker who receives an electric shock from a source with a nominal voltage greater than 50V ac or 120V dc must be immediately transported to a hospital or medical centre for assessment and/or treatment.

2.1.9 Talking to the Control Room Operator

When speaking with a Control Room Operator via a radio or telephone, you must:

- identify yourself (e.g. “I am Lineworker Smith from Oatley depot”)
- identify your reason for calling (e.g. “I need an operator to return and modify the AP area”)
- provide the suburb, the street name and the nearest crossroad (where appropriate, give the name and number of the substation or load control point— e.g. Michaels St Oatley near David Road and/or Substation 12660 Michaels College)

2.1.10 Working on or near fallen conductors

General

Persons must remain at least 8m away from fallen HV or unidentified overhead conductors, until they are identified, isolated, and earthed and short-circuited, as required by these Rules.

Access permit

Work on or near fallen overhead conductors must be carried out under:

- a relevant access permit; or
- the conditions of Clause 2.1.5 in emergency situations.

Live work

Workers who are working at ground level, are not permitted to work on or near fallen overhead conductors while they are live.

Exemption: Fallen LV insulated service conductors that have not been isolated may be cut away by authorised persons who have completed the Ausgrid Storm Responder training course, provided the live LV controls detailed in Clause 9.5.4 are applied.

Proving LV de-energised

Where dual probe contact detectors (e.g. test lamps or voltmeter) are to be used to prove fallen LV mains are de-energised at ground level, workers must use a temporary earth stake, which is at least 1.5m from any fallen wires, as an earth reference. (This ensures there is a sufficient voltage gradient to be detected).

Refer to Clause 9.2.2 for the general requirements for proving LV mains and apparatus are de-energised.

Fallen conductors that cross other live exposed conductors

If the fallen conductors remain electrically connected to overhead spans that are not lowered to the ground, and those spans cross or share a common span with other live exposed conductors, the controls of Clause 10.2.4 must also be implemented.

2.1.11 Communicating unplanned operating work

The following requirements apply where unplanned operating work is communicated verbally between a Control Room Operator and an operator who is working in the field.

Information from the Control Room Operator

The operator in the field must record, as a minimum, the following information provided to them by the Control Room Operator and repeat what they have recorded back to the Control Room operator:

- specific switch identification numbers that are to be operated; and
- the required final state of that switch (open/closed).

The Control Room Operator providing the verbal information must confirm whether the information recalled by the operator in the field is correct.

Following completion of the operating work, the operator in the field must notify the relevant Control Room Operator as soon as is reasonably practicable.

Information to the Control Room Operator

As soon as reasonably practicable after carrying out the operating work, the operator in the field must provide the relevant Control Room Operator with the following information as a minimum:

- specific switch identification numbers that have been operated; and
- the final state of that switch (open/closed).

The Control Room Operator must repeat back the information provided by the operator in the field, and the operator in the field must confirm that the recalled information is correct.

2.1.12 Substation emergencies

Before entering a substation, ensure you know how to call for help in an emergency.

If an emergency occurs:

- Call the appropriate emergency service immediately. Dial (0)000 (or 112 from mobile phones) and ask for the service you need (police, fire, ambulance). Make sure you have the following information:
  - exact address with suburb, street and nearest crossroad
  - type of substation (e.g. underground, chamber, switching station)
  - type of emergency (e.g. fire, explosion, electric shock)
  - number of casualties and types of injuries.
- For emergencies affecting the network, call the relevant Control Room Operator or the Ausgrid emergency telephone number (refer to the emergency telephone phone numbers on page 2).

- For emergencies in a confined space, refer to the emergency procedure developed as part of the confined space entry permit.

Emergency switches

Distribution substations in the Sydney CBD are fitted with emergency switches to summon help. These switches are coloured red, and are mounted at waist height, just inside the substation door. To use the emergency switch, you must press it firmly. You will hear a two-tone alarm cycling on and off. The tone changes to a continuous two-tone alarm when the relevant Control Room Operator acknowledges the call.

The acknowledgment tone is automatically silenced after 30 seconds.

Note: As required by Control Room procedures, when an alarm is activated, the relevant Control Room Operator will ring the substation to check whether the alarm is genuine. If there is no answer, the operator will assume the alarm is genuine and call emergency services.

Cancelling a false alarm

To cancel a false alarm, reset the switch knob by turning it clockwise (the spring-loaded button will pop out) and immediately contact the relevant Control Room Operator and confirm the false alarm.

Note: If you reset the alarm within 10 seconds, no alarm will be raised in the System Control room.

Figure 1 – An emergency switch in a Sydney CBD distribution substation

2.1.13 Unusual conditions in a substation

If you observe any of the following conditions in a substation, immediately report them to the relevant Control Room Operator:

- a circuit breaker is tripped as a result of an emergency or any other cause (leave switch open);
- any audible or visual alarms, and the operation of any protection relays;
- unusually high air temperature which may indicate an electrical overload or a ventilation problem;
- any other dangerous conditions (e.g. unusual noises, a burning smell, abnormal electrical discharges, oil spills, or unguarded open trenches); or
- any limitations on the operation of mains and apparatus, either during the work, or on completion of the work.

Report any significant substation damage to the relevant Control Room Operator. This includes damage caused by fire, flood, storm, lightning strike, accident or vandalism. Depending on the circumstances, the Control Room Operator may instruct you to remain at a substation until assistance arrives.

3 Authorisation

3.1 Persons who may work on, near, or in the vicinity of, Ausgrid mains and apparatus

Work on, near, or in the vicinity of, Ausgrid mains and apparatus may only be undertaken by:

- the following persons who are working under the NSW Electricity Supply Act and Regulations:
  - authorised persons (see Section 3.2); or
  - instructed persons (see definition in Chapter 16) who are under the direct supervision of an authorised person; or
  - persons who are appropriately authorised by, and working for, another electricity network operator for the following work:
    - carrying out work on their mains and apparatus which requires them to work on, near, or in the vicinity of Ausgrid mains and apparatus; or
    - assisting Ausgrid with the restoration of the Ausgrid network, following major storms or other events which cause significant damage to the network; or
- external parties working near, or in the vicinity of, Ausgrid mains and apparatus, under the SafeWork NSW Code of Practice – Work Near Overhead Power Lines (currently published as, and referred to hereafter as, the WorkCover NSW Code of Practice – Work Near Overhead Power Lines) or the SafeWork NSW Guide – Work Near Underground Assets. (Note: External parties are not permitted to carry out work on Ausgrid mains and apparatus); or
- persons who are qualified under, and working in accordance with, Network Standard NS183 for the installation of approved attachments to Ausgrid structures (e.g. street signs); or
- persons who are qualified under, and working in accordance with, Network Standard NS284 for the installation of approved artwork to Ausgrid structures (e.g. painting, or attaching vinyl wrap to, LV pillars or kiosk substations).

See Chapter 18 for the definitions of, and Figure 2 below for an explanation of, the terms “on”, “near”, or “vicinity”.

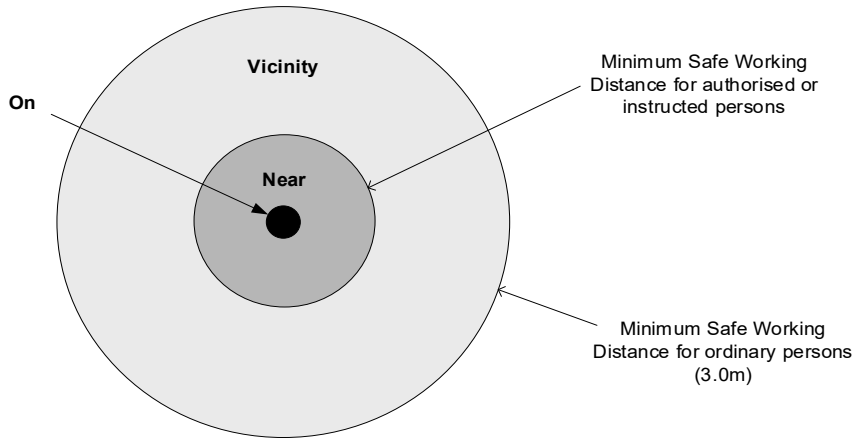

Figure 2 – Diagram explaining the terms on, near, or vicinity.

3.2 Authorised persons

This section describes the requirements for persons to be authorised for work under the scope of these Rules.

3.2.1 Eligibility

The following persons are eligible to be authorised persons:

- Ausgrid employees; or
- Ausgrid contractors/partners; or

- Accredited Service Providers (see Clause 3.3.2).

3.2.2 Authorisations relevant to the work

Authorised persons must hold the authorisation(s) that are relevant to the scope of the work they are undertaking. (See section 3.3 for the various authorisations).

3.2.3 Authorisation criteria

To be authorised to work under the scope of these Rules, workers must achieve the training, competency, and other criteria required for the relevant authorisation, as set out in the Ausgrid training matrix and/or authorisation system.

3.2.4 Authorisation records

Authorisations, training, and skills, must be recorded in one of the following:

- a network passport (personal training records); or
- a national skills passport; or
- a training or authorisation card; or
- an authorisation letter (for persons who are specially authorised to receive access permits); or
- an Ausgrid authorisation system.

The documents listed above must be shown if requested by an authorised officer of Ausgrid.

Figure 3 - National skills passport

3.3 Authorisations required by these Rules

This section describes the requirements for the following authorisations required for work on the Ausgrid network:

- Work on, near, or in the vicinity, of mains and apparatus
- ASP authorisation
- Enter substations
- Carry out operating work
- Issue access permits
- Receive access permits
- Submit network access requests
- Work on or near live exposed HV
- Work on or near live exposed LV
- Operate mobile plant
- Identify cables
- Carry out vegetation control
- Enter cable pits
- Apply hazardous voltages for test

3.3.1 Authorisation to work on, near, or in the vicinity of mains and apparatus

This authorisation allows persons to carry out work:

- in the vicinity of exposed mains and apparatus; or
- in the vicinity of overhead mains and apparatus; or

- on or near isolated exposed mains and apparatus, under an access permit; or
- on mains and apparatus that are insulated (as defined by these Rules); or
- on any structure that contains or supports mains and apparatus.

Note: The authorisation to work on, near, or in the vicinity of Ausgrid mains and apparatus, is a prerequisite for the authorisations in the following clauses within this section (except for the special authorisation to receive access permits).

3.3.2 Accredited Service Provider (ASP) authorisation

ASPs must be authorised by Ausgrid to work on, near, or in the vicinity of Ausgrid mains and apparatus.

Refer to the Ausgrid Customer Supply Standard ES4 - Accredited Service Provider Authorisation, for information on the scope and application of ASP authorisation for the Ausgrid network.

ASPs may only carry out work within the limits of their authorisation as defined in ES4.

3.3.3 Authorisation to enter substations

Persons must not gain access to, or enter, substations unless they are:

- Authorised by Ausgrid to enter substations, or
- Accompanied by an Ausgrid stand-by person (see the definition of “stand-by-person” in Chapter 17) who has specifically and clearly instructed the person about the following:
  - the limits of the area they can access or enter; and
  - electrical hazards and any other possible hazards associated with substation entry; and
  - the controls required to manage the risks arising from those hazards.

As per the definition of ‘substation’ in Chapter 18, this requirement applies to all types of electrical stations - substations, switching stations, and any other areas where live exposed conductors are present.

Substation keys

Refer to the Ausgrid Technical Guide T0037 ‘Network Access and Security – Locks and Keys’ for the requirements for the issue of substation access keys to workers.

3.3.4 Authorisation to carry out operating work

See Chapter 18 Glossary – General, for the definition of operating work.

Only the following workers (who must be authorised to work on, near, or in the vicinity of mains and apparatus) may carry out operating work on the Ausgrid network:

- Workers with an appropriate operating authority (see Clause 3.4.4); or
- Workers who are undertaking training for the purpose of obtaining an operating authority and who are under the direct supervision of a worker with the appropriate operating authority; or
- Electrically qualified workers (or electrical apprentices) who are carrying out operating work on behalf of, and under the direct supervision of, an operator who holds an operating authority which is appropriate for the operating work being carried out.

  Note: Workers carrying out operating work in this situation are not authorised to:
  - issue access permits; or
  - work under the reduced minimum safe work distances from live exposed HV mains and apparatus of Clause 7.2 (unless assessed as competent in, and working to, an approved procedure);
- Electrically qualified workers (or electrical apprentices under their supervision) who are required to operate LV switches (including fuses) that control:
  - substation auxiliary circuits; or
  - services; or
  - individual street lighting luminaires; or
  - multiple street lighting luminaires - where all the luminaires are located on a single pole or structure.

- A recipient of an access permit, or a person who is under the direct supervision of the recipient, may remove access permit earths and/or permit LV shorts with the approval of the relevant Control Room Operator, as permitted by Clause 9.2.4 or Clause 9.8.6.
- A worker who is trained and assessed as competent to install earthing and short-circuiting equipment may remove access permit earths and/or permit LV shorts under the broad supervision of the appropriately authorised operator who will be re-energising the mains and apparatus;
- Where the emergency situation presents an immediate risk to life or property, workers who do not hold an operating authority may de-energise mains and apparatus, if they are able to do so safely (see Clause 2.1.4).

3.3.5 Authorisation to issue access permits

An access permit may only be issued by a person who holds an appropriate operating authority.

See Clause 3.4.4 for information on the scope of operating authorities.

3.3.6 Authorisation to receive access permits

Access permits must only be issued to persons who are authorised by Ausgrid to receive access permits.

Refer to Section 5.3 for information on access permit recipient authorisation.

3.3.7 Authorisation to submit Network Access Requests

Network Access Request (**NAR**) authorisation is required for the following activities:

- submit requests for the isolation and re-energisation of mains and apparatus;
- submit High Voltage Live Work requests;
- submit Close Approach Vegetation Control (**CAVC**) requests;
- submit System Alteration Orders (**SAO**); and
- issue Equipping Permits.

There are three levels of NAR authorisation as set out below in Table 1:

Table 1 - Authorisation levels and conditions for NAR authorisation

Authorisation Level	Conditions
Network Access Request Level 1 (NAR1)	Can prepare NARs but they must be checked and countersigned by a person holding current NAR2 authority and who has a thorough understanding of the work concerned.
Network Access Request Level 2 Restricted (NAR2-R)	Can prepare, sign and submit NARs for work they thoroughly understand. They are not authorised to countersign NARs prepared by other persons.
Network Access Request Level 2 (NAR2)	Can prepare, sign and submit NARs for work they thoroughly understand. They can also check, and countersign NARs prepared by NAR1 authority holders if they have a thorough understanding of the work concerned.

NAR authorised persons advance from Level 1 to Level 2 after satisfying predetermined criteria and submitting an application to the Head of System Control.

The minimum timeframe to progress from Level 1 to Level 2—Restricted is 12 months. The minimum timeframe to progress from Level 2—Restricted to Level 2 is 6 months.

NAR authorised persons are required to undertake an annual knowledge assessment in submitting NARs.

3.3.8 Authorisation to work on or near live exposed HV

Work on or near live exposed HV conductors may only be carried out by persons who are authorised by Ausgrid in accordance with the Ausgrid HV Live Work Manual.

3.3.9 Authorisation to work on or near live exposed LV

Work on or near live exposed low voltage mains and apparatus may only be carried out by persons who are authorised in accordance with Clause 9.5.2 - Authorisation to work on or near live exposed LV .

3.3.10 Authorisation to operate mobile plant

Workers must be authorised to operate mobile plant near, or in the vicinity of, exposed mains and apparatus as required by Section 7.5.

3.3.11 Authorisation to identify cables

Workers must be authorised to identify, and verify the identification of, underground cables using signal generation and detection methods, or fault location tests.

3.3.12 Authorisation for vegetation control

Ausgrid contractors carrying out vegetation control must be authorised in accordance with Section 10.5 - Vegetation management.

3.3.13 Authorisation to enter cable pits

Workers must be authorised to enter an Ausgrid underground cable pit.

3.3.14 Authorisation to apply hazardous voltages for test

Workers must be authorised to apply hazardous voltages to Ausgrid mains and apparatus for testing purposes.

3.4 Operating authorities

This section describes the various classes of operating authority, the scope of each authority, and the requirements for maintaining an operating authority.

3.4.1 Manager responsibilities

Managers of workers involved in operating work must make sure the workers are appropriately trained and authorised to carry out the operating work assigned to them.

3.4.2 Operator responsibilities

An operator must be appropriately trained, assessed as competent, and currently authorised, before carrying out operating work.

An operator must only carry out operating work within the scope of their operating authority.

An operator must stop and seek further information if they are uncertain how to correctly, and safely, carry out operating work they are called upon to conduct.

3.4.3 System Control approval

Workers must not carry out operating work without the knowledge and approval of the relevant Control Room operator.

Exceptions:

- De-energising mains and apparatus in an emergency, as per Clause 2.1.4; and
- Operating work on street lighting circuits.

3.4.4 Operating authorities

Details of the scope of the different operating authorities are provided in the tables within this clause.

Notes: In this Section:

- ‘Hunter’ refers to Upper Hunter and Lower Hunter areas; and
- Authorisation to commission mains and apparatus includes the authorisation to decommission mains and apparatus (within the scope of the mains and apparatus that may be commissioned).

Table 2 - Class 1 operating authorities

Class 1 Operators		
Class	**Area**	**Authorised to carry out the following operating work:**
1	All areas	**Mains and apparatus** Carry out operating work on HV and LV mains and apparatus. The following subscripts are required for the operation of specific apparatus: • (CBD) – Sydney CBD triplex network • (inter) – Sydney distribution intertrip systems • (op) – Sydney Olympic Park precinct • (SWER) – Single Wire Earth Return (SWER) systems • (T'lay) – Sydney translay systems • (tri) – Newcastle CBD triplex network **Permits** Issue/cancel - Access Permit(s) for Work, Access Permit(s) for Test, Clearance to Work(s), Operating Agreement(s), Permit Folder(s), Permit Receptacle(s), Isolation Folder(s). Cross-reference access permits and Permit Folders. **Commissioning** Commission HV & LV mains and apparatus.
1hl	Hunter only	(Limited Operators) **Mains and apparatus** Carry out operating work on HV and LV distribution mains and apparatus in the Hunter Area. The following subscripts are required for the operation of specific apparatus: • (fdr) – operate feeder switches only, in zone substations • (reg) – Pole-mounted regulators • (SWER) – Single Wire Earth Return (SWER) systems • (ug) – apparatus on underground networks **Permits** Issue/cancel - Access Permit(s) for Work, Access Permit(s) for Test, Clearance to Work(s), Operating Agreement(s), Permit Folder(s), Permit Receptacle(s), Isolation Folder(s). Cross-reference access permits and Permit Folders. **Commissioning** Commission HV & LV distribution mains and apparatus in the Hunter Area.
1hs	Hunter only	(Limited Operators) **Mains and apparatus** Carry out operating work on HV and LV mains and apparatus in zone and sub-transmission substations in the Hunter Area. The following subscripts are required for the operation of specific apparatus: • (tri) – Newcastle CBD triplex network • (132) – 132kV apparatus

Class 1 Operators		
Class	**Area**	**Authorised to carry out the following operating work:**
		Permits Issue/cancel - Access Permit(s) for Work, Access Permit(s) for Test, Clearance to Work(s), Operating Agreement(s), Permit Folder(s), Permit Receptacle(s), Isolation Folder(s). Cross-reference access permits and Permit Folders. **Commissioning** Commission HV & LV mains and apparatus in zone and sub-transmission substations in the Hunter Area.

Table 3 - Class 2 operating authorities

Class 2 Operators		Restricted HV operating authorities
Class	**Apparatus**	**Authorised to carry out the following operating work:**
2A	HV overhead lines	**Mains and apparatus** On overhead HV mains and apparatus that are isolated under an Isolation Folder, and in accordance with the Isolation Folder process in Clause 5.11.5: • Prove de-energised; and • apply earthing and short-circuiting equipment; and • issue (and cancel) an Access Permit for Work, to another member of the same workgroup. **Permits** Issue/cancel an Access Permit for Work - to another member of the same workgroup (see Clause 3.5.1). **Commissioning -** Nil.
2B	LV & HV circuit breakers	**Mains and apparatus** Close circuit breakers that have been intentionally tripped as part of protection trip checks. **Permits –** Nil **Commissioning –** Nil.
2Cc	Distribution substations – Sydney CBD triplex substations only	**Mains and apparatus** Operate distribution substation transformer switches (HV & LV). Operate LV circuit breakers supplying direct distributors. Operate LV bus section circuit breakers. **Permits** Issue/cancel an Access Permit for Work, or an Access Permit for Test - to another member of the same workgroup (see Clause 3.5.1). Complete a Permit Folder **Commissioning** Commission like for like replacements.

Class 2 Operators		Restricted HV operating authorities
Class	**Apparatus**	**Authorised to carry out the following operating work:**
2Cs	Distribution substations - Suburban areas only	**Mains and apparatus** Operate distribution substation transformer circuit breakers (HV & LV). Operate LV circuit breakers supplying direct distributors. Operate LV bus section circuit breakers. Excludes: • switches in single circuit breaker type substations; and • HV feeder switches **Permits** Issue/cancel an Access Permit for Work, or an Access Permit for Test - to another member of the same workgroup (see Clause 3.5.1). Complete a Permit Folder **Commissioning** Commission like for like replacements.
2D	Overhead networks	**Mains and apparatus** Operate the following overhead mains and apparatus: • air break switches, up to and including 33kV • links on radial or radialised lines, up to and including 33kV • drop-out fuses, up to and including 33kV • LV fuses, links, and inter-distributor tees (**IDTs**). This authorisation includes: • providing approval for making/breaking bonds by HV Live Work methods; and • confirming points of isolation at open bonds; and • maintaining LV supply with LV parallels, or motor generators (if running isolated from the network). The following subscripts are required for the operation of specific apparatus: • (elbs) – enclosed load break switches • (recl.) - reclosers • (cap.) - 11kV pole-mounted capacitors **Permits** Issue/cancel an Access Permit for Work - to another member of the same workgroup (see Clause 3.5.1). Class 2D operators with the subscript (a) are authorised to: • issue a Clearance to Work to external parties working near isolated LV mains and apparatus under the WorkCover NSW Code of Practice - Work Near Overhead Power Lines; and/or • issue an Operating Agreement to other NSW Network Operators who are working near isolated Ausgrid LV mains and apparatus in accordance with Clause 15.1.2. Complete a Permit Folder. **Commissioning** Includes - new and replacement overhead mains and apparatus, with the apparatus being limited to:

Class 2 Operators		Restricted HV operating authorities
Class	**Apparatus**	**Authorised to carry out the following operating work:**
		• the apparatus the operator is authorised to operate; or • pole mounted substation upgrade and relocation. Excludes - commissioning any apparatus where HV phasing is required.
2Dh	Overhead networks - Hunter only	In addition to the scope of the 2D authority, carry out the following: • operate 66kV air break switches • operate links to sectionalise a feeder prior to restoring supply • replace 33kV drop-out fuse elements • make zone substation feeder circuit breaker reclose functions non-auto where that function cannot be achieved by a Supervisory Control and Data Acquisition (**SCADA**) system. • change open points to radialise HV feeders • maintain LV supply with motor generators in conjunction with the operation of the network.
2Eh	Underground networks - Hunter only	**Mains and apparatus** Operate HV ring main units (RMUs) and fuse switches in suburban distribution substations. This includes the isolation and earthing of HV cables and distribution transformers. **Permits** Issue/cancel an Access Permit for Work – to another member of the same workgroup (see Clause 3.5.1). Complete a Permit Folder **Commissioning** Commission new distribution substations and LV distributors.
2Fh	Overhead networks - Hunter only	**Mains and apparatus** Carry out the following: • Replace 11kV drop-out fuse elements. • Switch to isolate, prove de-energised and earth at pole-mounted substations. **Permits** Issue/cancel an Access Permit for Work - to another member of the same workgroup (see Clause 3.5.1). Complete a Permit Folder **Commissioning –** Nil.
2Fr	HV Overhead fuse replacement	**Mains and apparatus** Replace 11kV drop-out fuse elements. **Permits –** Nil. **Commissioning** – Nil.
2Gh	Substations (zone and STS) Hunter only	**Mains and apparatus** Carry out operating work on HV and LV mains and apparatus in zone and sub-transmission substations in the Hunter Area, up to and including 132kV. **Notes**

Class 2 Operators		Restricted HV operating authorities
Class	**Apparatus**	**Authorised to carry out the following operating work:**
		This authority includes: • feeder switches and isolators, transformer circuit breakers and isolators, bus section switches and bus isolators. • racking of withdrawable voltage transformers (VTs). • removing audio frequency plant from service for maintenance, repairs and like-for-like replacement. **Permits** Issue/cancel an Access Permit for Work, or an Access Permit for Test) – to another member of the same workgroup (see Clause 3.5.1). Complete a Permit Folder **Commissioning** Commission like for like replacements.

Table 4 – Class 3 operating authorities

Class 3 Operators		Secondary Systems
Class	**Activity**	**Authorised to:**
3S	Secondary Systems	**Mains and apparatus** Carry out work on network protection, automation, control, and substation metering systems. **Permits** Issue/cancel Secondary Systems Clearance(s). **Commissioning** Network protection, automation, control, and substation metering systems.

Table 5 – Class 4 operating authorities

Class 4 Operators		Special Authorities.
Class	**Activity**	**Authorised to:**
4A	Emergency conditions	The Group Executive – Field Delivery, may authorise a person for a specific period to carry out specific operating work.
4B	Training	Carry out operating work and supervise others carrying out operating work, for the purpose of training. The scope of the operating work that may be carried out by or under the supervision of the 4B operator is defined within the specific authority of each operator.

Table 6 – Class 5 operating authorities

Class 5 Operators		LV operating authorities
Class	**Activity**	**Authorised to:**
5B	Low voltage (LV) fuse replacement	**Mains and Apparatus** Replace LV fuses on LV network distributors and street lighting circuits. Open/close LV parallels. **Permits –** Nil. **Commissioning –** Nil.
5E	Emergency response	**Mains and Apparatus** Replace LV fuses on LV network distributors and street lighting circuits. Isolate LV mains and apparatus to facilitate the management of hazardous situations on the network and re-energise the LV mains once the hazardous situation has been rectified. Open/close LV parallels. **Permits –** Nil. **Commissioning –** Nil.
5F	Operation of the LV network	**Mains and apparatus** Carry out operating work on street lighting circuits and LV network distributors – where the work involves the isolation of no more than three (3) LV network distributors. **Notes** This authorisation includes: • the operation of switches in substations controlling LV network distributors; and • the replacement of LV distributor fuses under fault conditions. This authorisation excludes any operating work that creates a parallel between any substations connected to the Sydney CBD triplex network. The following subscripts are required for the operation of specific apparatus: • (cbd) authorised to operate LV apparatus in the Sydney CBD triplex network; • (cp) authorised to operate switches in commercial pillars; • (lb) authorised to operate switches in underground link boxes; • (op) authorised to operate LV apparatus in the Sydney Olympic Park precinct; • (d) authorised to carry out operating work on direct distributors **Permits** Issue/cancel Access Permit(s) for Work. Complete Permit Folder(s). Operators with the subscript (a) are authorised to: • issue a Clearance to Work to external parties working near isolated LV mains and apparatus under the WorkCover NSW Code of Practice - Work Near Overhead Power Lines; and/or • issue an Operating Agreement to other NSW Network Operators who are working near isolated Ausgrid LV mains and apparatus in accordance with Clause 15.1.2.

Class 5 Operators		LV operating authorities
Class	**Activity**	**Authorised to:**
		Operators with the subscript (d) are authorised to: • issue and/or receive an Operating Agreement to/from a direct distributor customer; and/or • issue an access permit to themselves for the purpose of inspection and/or application of non-hazardous test volts to direct distributors - as per Clause 5.3.1. Operators with the subscript (test) are authorised to issue and/or cancel an Access Permit for Test (see Clause 3.5.1). **Commissioning** Commission new or replacement LV mains and apparatus. For operators with a (d) subscript, this includes: • overhead direct distributors; and • underground direct distributors connected to withdrawable fuse strips up to and including a maximum capacity of 800A.
5P	Operation of the LV network – workgroup operators	**Mains and apparatus** Carry out operating work on street lighting circuits and low voltage network distributors - where the work involves the isolation of no more than three (3) LV network distributors. **Notes** This authorisation includes: • the operation of switches in substations controlling LV network distributors; and • the replacement of LV distributor fuses under fault conditions. This authorisation excludes any operating work that creates a parallel between any substations connected to the Sydney CBD triplex network. The following subscripts are required for the operation of specific apparatus: • (cbd) authorised to operate LV apparatus in the Sydney CBD triplex network; • (cp) authorised to operate switches in commercial pillars; • (lb) authorised to operate switches in underground link boxes; • (op) authorised to operate LV apparatus in the Sydney Olympic Park precinct. • (d) authorised to carry out operating work on direct distributors. **Permits** Issue/cancel an Access Permit for Work – to another member of the same workgroup (see Clause 3.5.1). Complete Permit Folder(s) Operators with the subscript (a) are authorised to: • issue a Clearance to Work to external parties working near isolated LV mains and apparatus under the WorkCover NSW Code of Practice - Work Near Overhead Power Lines; and/or • issue an Operating Agreement to other NSW Network Operators who are working near isolated Ausgrid LV mains and apparatus in accordance with Clause 15.1.2.Operators with the subscript (d) are

Class 5 Operators		LV operating authorities
Class	**Activity**	**Authorised to:**
		authorised to issue and/or receive an Operating Agreement to/from a direct distributor customer. Operators with the subscript (test) are authorised to issue and/or cancel an Access Permit for Test – to another member of the same workgroup (see Clause 3.5.1). Operators with the subscript (m) may issue additional Access Permits for Work to other Ausgrid workgroups, as set out in Clause 3.5.1. **Commissioning** Commission new or replacement LV mains and apparatus (excluding direct distributors).

Table 7 - Class 6 operating authorities

Class 6 Operators		Control Room authorities
Class	**Activity**	**Description**
6A	System Operator	**Mains and apparatus** Authorised to operate the Ausgrid network from the Sydney or Wallsend control room.
6B	Area Operator	**Permits** Verbal/electronic operating agreements between control rooms of other electricity network operators. **Notes:** Area Operators who are trained to act as System Operators are deemed to also hold a Class 6A operating authority during the time they are acting as System Operators. Class 1 Operators who are trained to act as Area Operators are deemed to also hold a Class 6B operating authority during the time they are acting as Area Operators.
6C	LVCR Operator	Co-ordinate operation of the LV network by field operators.
6D	SCADA Operations	Configure and maintain network control and monitoring functionality used by System Control.

3.5 Limited and restricted operating authorities

Class 1hl and 1hs operating authorities are referred to as limited operating authorities, and operators with these authorities are referred to as ‘limited operators’.

Class 2 and Class 5 operating authorities are referred to as restricted operating authorities, and operators with these authorities are referred to as ‘restricted operators’

This section provides specific requirements relating to limited and restricted operating authorities.

3.5.1 Signing onto an access permit

When issuing an access permit, Class 2 and/or Class 5P operators must issue the access permit to another member of the same workgroup. They must then sign onto the access permit under ‘Sign On’ and remain at the worksite until the access permit is surrendered by the recipient and cancelled by the operator.

Subscript (m)

In addition to the Access Permit for Work that a Class 5P operator issues and signs onto as a member of the workgroup, Class 5P operators with the subscript (m) may issue additional Access Permit(s) for Work to other Ausgrid workgroups who intend to work on the same isolated LV mains and apparatus, without the operator being required to sign onto the additional Access Permit(s) for Work that they issue.

In this situation, the Class 5P (m) operator must complete a Permit Folder at the time they issue any additional Access Permit(s) for Work (see Section 5.11 for Permit Folder requirements).

If the Class 5P (m) operator is required to leave the worksite, all Access Permit(s) for Work issued by the Class 5P (m) operator, under that Permit Folder, must be surrendered and cancelled and returned to the Permit Folder.

Subscript (a)

Class 2D and 5P operators with an (a) subscript are not required to sign on to:

- a Clearance to Work which they issue to external parties for work near Ausgrid mains and apparatus under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines; or
- an Operating Agreement which they issue to another NSW Network Operator for work near isolated Ausgrid LV mains and apparatus in accordance with Clause 15.1.2.

3.5.2 Permit Folders

See Clause 5.11.2 for specific requirements for restricted operators relating to Permit Folders.

3.5.3 Common points of isolation

Except when an Isolation Folder is used, or for the isolation of street lighting circuits – the points of isolation for an access permit which is issued by a restricted operator must not form a common point of isolation with other isolated mains and apparatus.

3.5.4 Use of multiple authorities

Where a limited or restricted operator holds multiple operating authorities, that operator may use those multiple authorities to carry out operating work which is not covered by the scope of any single authority the operator holds (e.g. a restricted operator with both 2Dh and 2Eh may carry out a switching which requires the operation of both air break switches on overhead mains and ring main isolators in kiosk substations).

3.5.5 Maintaining competency

Limited and restricted operating authorities are issued for a period of twelve (12) months and renewal is subject to continuing demonstrated competency of the operator.

Limited and restricted operators must maintain competency by regular use of their operating authority, as follows:

- Restricted operators (except for Class 5B, 5E, and 2B operators) must use their skills at least four (4) times a year to maintain competency.
- Class 1 limited operators, and Class 5F restricted operators, must use their skills at least ten (10) times a year to maintain competency.

Prior to being re-authorised, limited and restricted operators must provide evidence of all operating work they have completed, within the previous 12 months, to Operating Assurance and Training.

4 Network access, and alterations

4.1 Network Access Request procedures

This section describes the requirements for completing a NAR.

4.1.1 Authorisation

You must be trained and authorised before submitting a NAR (see Clause 3.3.7).

4.1.2 When a Network Access Request is required

A NAR must be submitted prior to:

- Work on or near exposed mains and apparatus under an access permit, Clearance to Work, or Operating Agreement; or
- Work on or near live exposed HV mains and apparatus, in accordance with the Ausgrid HV Live Work Manual; or
- Carrying out CAVC; or
- Work on the secondary systems of mains and apparatus - as required by the System Control document NSEC 007 “Submitting Network Access Requests”.

Note:

A NAR must also be submitted in conjunction with a SAO, as required by System Control document NSEC 007 “Submitting Network Access Requests”.

Exemptions

A NAR is not required to be submitted for the following:

- Emergency situations (i.e. situations that present an immediate threat to life or property); or
- The isolation and re-energisation of street lighting circuits only (where no other circuits are involved).

4.1.3 Completing a NAR

NARs must be submitted using the appropriate online system in accordance with the System Control document NSEC 007 “Submitting Network Access Requests”.

4.1.4 Cancelling a NAR

On the day of work, the relevant Control Room Operator may cancel the work planned. The Control Room Operator must then notify everyone named on the NAR of the cancellation.

When another person (apart from the Control Room Operator) is going to cancel an order, they must discuss the proposed cancellation with all the contact officers nominated on the NAR before advising the Control Room Operator.

4.1.5 Additional work after isolation

If additional work must be done by another workgroup on the mains and apparatus after they have been isolated, then the person responsible for the additional work must ask for another access permit to be issued.

The second workgroup must wait until another access permit is issued before starting the work.

An extension of the isolation beyond the mains and apparatus specified in the original NAR is only allowed if required to complete the work covered by the original request. In this case, the initial access permit must be cancelled, and a new access permit issued for each workgroup for the changed conditions.

The work must be clearly defined, and all workgroups identified on the NAR and access permits. If this is not done, the work must not be carried out unless the documents are formally amended with System Control.

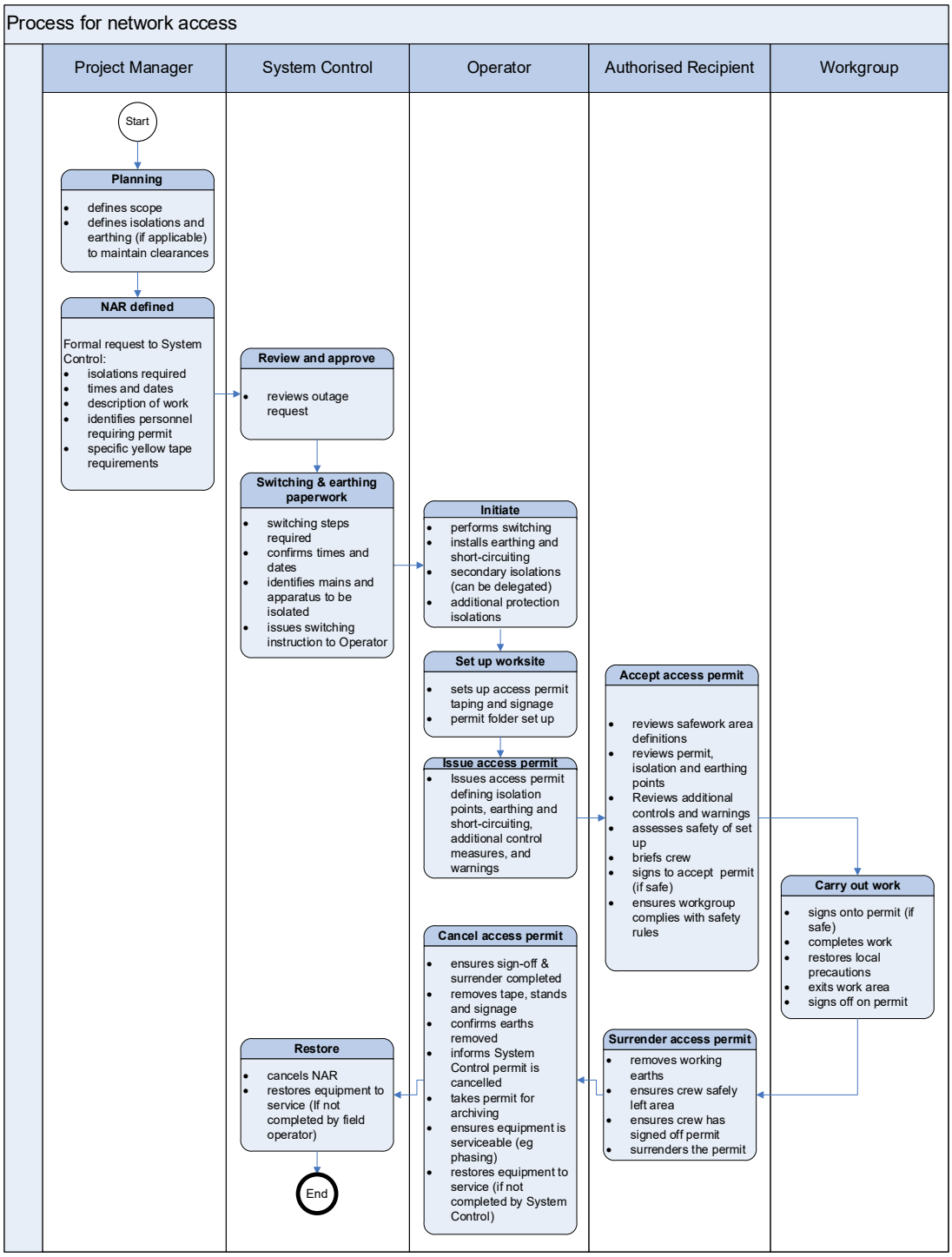

Figure 4 – Process for Network Access

4.2 System alterations

This section describes the requirements for the recording of, and restrictions to, system alterations.

4.2.1 Recording system alterations

A person who is authorised in accordance with Clause 3.3.7 must submit a System Alteration Order (SAO) to notify System Control of the following alterations to the network, as required by the Ausgrid System Control document NSEC 007 “Submitting Network Access Requests”:

- connection of new or altered mains and apparatus; or
- alterations to the labelling or rating of mains and apparatus; or

- alterations to protection and SCADA systems.

4.2.2 Completing a SAO

All SAOs must comply with the requirements specified in the Ausgrid System Control document NSEC 007 “Submitting Network Access Requests”.

4.2.3 Restriction on system alterations

System alterations to faulted sections of mains and apparatus must comply with the requirements of the System Control Document NSEC 007 “Submitting Network Access Requests”.

System alterations which require phasing as per Section 4.4 must not be made connectable to faulted sections of the network, where the new mains and apparatus cannot be phased due to the network fault.

4.3 Commissioning

This section outlines requirements for commissioning.

4.3.1 Commissioning

Before being placed into service, new and replacement mains and apparatus must be subject to a commissioning process that complies with the requirements of Ausgrid Rules, Standards and Technical Documentation.

(See Chapter 18 for the definitions of ‘commissioning’ and ‘commissioned’).

Commissioning controls, which include Equipping Permits, system alteration orders, and network access requests, must be followed to ensure that all persons working on the new mains and apparatus are clear of the mains and apparatus before the application of test voltages or network voltages.

4.4 Phasing

This section sets out the requirements for phasing of interconnectable mains and apparatus.

4.4.1 New mains and apparatus

All new mains and apparatus that will be capable of interconnecting with another source (other than grid-following inverter-based LV distributed energy resources) must be phased when they are first energised, to ensure there is no difference of potential at the point(s) of interconnection. (Except where the absence of phasing is approved by System Control and noted on the relevant System Diagrams).

4.4.2 Existing mains and apparatus

Existing mains and apparatus that:

- are capable of interconnecting with another source (other than grid-following inverter-based LV distributed energy resources); and
- have been isolated for work; and
- have conductors/connections, which have been cut/disconnected, and reconnected while the mains and apparatus are de-energised;

must be phased when re-energised, to ensure there is no difference of potential at the point(s) of interconnection. (Except where the absence of phasing is approved by System Control and noted on the relevant System Diagrams).

Exemption: Phasing is not required if there is no possibility of crossing phases as part of the reconnection of conductor connections. Examples include, but are not limited to:

- busbars associated with outdoor circuit breakers, transformers, etc.
- restoring connections between sealing ends and bushings
- repairs on a multi-core cable that do not involve new joints
- repairs on a single core cable
- mid-span overhead breaks
- air break switch replacement

Key Points

Phasing must be checked from all possible sources of supply (other than grid-following inverter-based LV distributed energy resources).

Wherever reasonably practicable, phasing should be carried out using wireless HV phasing equipment, or on LV connections (using approved test lamps, indicating devices, or voltmeters) in preference to using wired HV phasing equipment.

Where a HV source produces a LV potential via a permanently connected transformer, and the LV consistently phases with an existing reference source of LV supply, the corresponding HV sources are considered to be in phase.

Phasing of HV connections on HV mains and apparatus must only be carried out by, or under the direct supervision of, a Class 1 Operator, using an approved device and method.

5 Access permits, folders, and forms

This chapter describes the application and use of the following documents:

- Access Permit for Work
- Access Permit for Test
- Clearance to Work
- Operating Agreement
- Equipping Permit
- Secondary Systems Clearance
- Permit Folder
- Isolation Folder
- Additional Worker Sign On/Off Form
- Working Earths and/or LV Shorts Form

5.1 Access permits

This section describes the application and use of access permits.

5.1.1 When an access permit is required

Except for the situations described in Clause 5.1.2, workers must sign onto a valid access permit before carrying out any work:

- on or near the exposed conductors of connectable or commissioned mains and apparatus; and/or
- on the earth connections to mains and apparatus, as required by Clause 9.12.1; and/or
- on sub-transmission cable sheath link boxes (see Clause 9.9.8); and/or
- on, near, or in the vicinity of, mains and apparatus where there is a reasonable possibility of the work causing damage to the mains and apparatus or compromising the electrical integrity of the insulation of the mains and apparatus.

5.1.2 Exemptions to the need for an access permit

An access permit is not required for work on or near exposed mains and apparatus in the situations set out in Table 8 below.

Table 8 - When an access permit is not required

Access permit not required
If authorised workers are using approved live work methods.
If an authorised operator is performing operating work within the scope of their operating authority.
If authorised persons are carrying out operating work on behalf of, and under the direct supervision of, an operator. **Note:** This operating work must be carried out under the direct supervision of an operator who makes sure that the necessary procedures for isolating, proving de-energised, earthing and short-circuiting the mains and apparatus are carried out in accordance with these Rules. For ancillary operating work on underground street lighting circuits – i.e. the making and breaking of de-energised LV conductor connections before the issue, or after the cancellation, of an access permit or Clearance to Work.
In an emergency when there is an immediate risk to life or property and the work is carried out under the direct supervision of an appropriately authorised operator, as required by Clause 2.1.5.
For work on individually isolated LV service conductors and/or locally isolated road crossing conductors.
For work on isolated street lighting luminaires where:

Access permit not required
• the luminaires are individually controlled by a local fuse, which forms the point of isolation; or • there are multiple luminaires that are located on a single pole or structure and all the luminaires are controlled by a local fuse, which forms the point of isolation.
Where authorised persons are working on sub-circuits and auxiliary supplies within substations. For example, substation light and power circuits, tap changer control circuits and customer load control equipment circuits.
Where authorised persons are working on secondary systems within substations, under a Secondary Systems Clearance (see Clause 5.10.1).
Where other NSW Electricity Network Operators are working on or near Ausgrid mains and apparatus under their own access authority, as required by Clause 15.1.2.
Where external parties are working near LV mains and apparatus under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines, and they have been issued a Clearance to Work as required by Section 5.7.

5.1.3 Types of access permits

There are two types of access permit used by Ausgrid for work on or near the Ausgrid network:

- Access Permit for Work; and
- Access Permit for Test.

The application of each type of each access permit type is given below in Clause 5.1.4, and Clause 5.1.5.

5.1.4 Access Permit for Work

An Access Permit for Work must be used when the proposed work excludes the application or creation of hazardous voltages on exposed mains and apparatus.

5.1.5 Access Permit for Test

An Access Permit for Test must be used where the work includes the application or creation of hazardous voltages on exposed mains and apparatus, for the purpose of testing.

No other access permit, Clearance to Work, or Operating Agreement (which is issued to another NSW network operator to facilitate the issue of their access authority for work on or near Ausgrid mains and apparatus), may be issued on mains and apparatus that are covered by an Access Permit for Test.

Exceptions:

- An Access Permit for Test is not required for the application of hazardous test voltages to secondary systems, where the secondary systems conductors to which the voltage is applied do not extend beyond the area under the control of the person applying the test voltages.
- As set out in Operating Protocols between Ausgrid and another organisation, an Access Permit for Test may be issued by each organisation on either end of interconnected mains and apparatus to facilitate testing. Controls must be in place to co-ordinate the testing between the organisations.

At the time the hazardous test voltages are applied, the person who is responsible for the application of the test voltages must be the recipient of the Access Permit for Test.

If the person who is responsible for the application of test voltages is not already the recipient of the Access Permit for Test, the permit must be transferred to them prior to the application of test voltages. See Clause 5.6.4 for the requirements for transferring an access permit to another recipient.

5.2 Persons issuing access permits

5.2.1 Authorisation

Access permits must only be issued by persons who hold an appropriate operating authority (see Clause 3.4.4).

5.2.2 Issuer - responsibilities

The operator who issues the access permit must do the following:

- take all the necessary control measures to comply with the Rules before issuing an access permit; and
- check that the details of the isolation, earthing and short-circuiting, LV shorting, other control measures, and warnings of any live mains and apparatus, have been printed clearly (in blue or black ink) on the access permit; and
- personally hand the access permit to, non-electrically qualified recipients, and specially authorised persons explaining:
  - all the control measures that have been taken, such as points of isolation and the location of earthing and short-circuiting, and/or LV shorting equipment; and
  - if there are any live exposed conductors in the vicinity of the mains and apparatus to be worked on or tested.

5.2.3 Issuer – rights to refuse

An operator has specific rights related to safety when issuing an access permit. An operator can refuse to do the following:

- leave an access permit at a specified worksite if they think the details of the isolation, earthing or shorting of the mains and apparatus specified in the NAR are inappropriate for the work; or
- hand an access permit to a recipient whom they believe is incompetent, uninterested, or inattentive; or
- hand an access permit to a person who cannot produce documentary evidence that they are authorised to receive Ausgrid's access permits.

5.3 Persons receiving access permits

5.3.1 Authorisation

As required by Clause 3.3.6, only persons who are authorised by Ausgrid may receive an access permit.

The person who receives the access permit is called the recipient.

Apprentices are not eligible to be authorised to receive an access permit.

A person who is authorised to issue an access permit is also authorised to receive an access permit, however they may not issue an access permit to themselves.

Exception: An Ausgrid Network Connections Inspector with an appropriate operating authority may issue an access permit to themselves, for the purpose of carrying out inspection and electrical testing of direct distributors.

5.3.2 Maintaining authorisation

To maintain authority to receive access permits, authorised recipients must complete annual refresher training.

5.3.3 Recipient authorisation levels

There are 2 levels of recipient authorisation:

- Level 1 – restricted
- Level 2 – unrestricted.

Level 1 (restricted) recipients are not permitted to receive an access permit where the work requires the mains and apparatus to be defined at the worksite by a yellow tape barrier.

5.3.4 Recipient types

Recipient types include the following:

- Type 1 - electrically qualified Ausgrid employee;
- Type 2 - electrically qualified ASP or contractor to Ausgrid;
- Type 3 - non-electrically qualified Ausgrid employee;

- Type 4 - non-electrically qualified ASP or contractor to Ausgrid;
- Type 5 - a specially authorised person (see Clause 5.3.5).

There are different processes required for the issue/receipt of an access permit depending on the recipient type (see Clause 5.5.1 for details).

There are different access permit requirements for work extending beyond one day for various recipient types (see Clause 5.5.4 for details).

Note: Access permits may be issued to employees, or contractors, of other Electricity Supply Network Operators, who are authorised by the other Network Operator to receive access authorities. For the purpose of access permit recipient authorisation, such workers are to be regarded as contractors to Ausgrid (i.e. either Type 2 or Type 4 recipients, depending on their qualification).

5.3.5 Special authorisation to receive access permits

A special authorisation to receive access permits may be given to external party individuals who intend to work near Ausgrid HV mains and apparatus, under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines.

This special authorisation may only be applied in suitable circumstances (i.e. where the need for an Ausgrid stand-by person to receive the access permit is not necessary to ensure the safety of the persons involved in the work).

This authorisation (by the Group Executive – Field Delivery) requires the person seeking special authorisation to successfully complete the relevant Ausgrid special authorisation training and assessment.

A special authorisation to receive access permits is limited to a particular job at a specific location, for a limited time period.

5.3.6 Responsibilities prior to accepting an access permit

Prior to accepting an access permit, the recipient must confirm that:

- the mains and apparatus to be worked on are clearly specified in the access permit, and that the isolations, earthing and other control measures taken are appropriate for the work to be carried out; and
- in a switchyard, any live HV mains and apparatus that pass over a taped safe work area must have 'Danger High Voltage Overhead' warning signs erected. Additional signs may be placed to indicate adjacent live equipment at the discretion of the recipient; and
- tape barriers (when required) clearly define the safe work area and/or clearly identify other adjacent equipment, which must be treated as live. The tape must enable clear access to allow safe completion of the work.

5.3.7 Responsibilities after accepting an access permit

Proving de-energised

- for work on or near isolated LV mains and apparatus where LV shorts are not installed at the worksite– the recipient must ensure the mains and apparatus are proved de-energised at the worksite before commencing work;

  Note: This is not required for the excavation of faulted underground cables, as the cable cannot be proved de-energised at the worksite until the cable is uncovered.

Controlling the sign-on and sign-off of workers

- the recipient must ensure that every person signing on to the access permit is aware of the mains and apparatus which are covered by the access permit, the work to be done, the control measures in place, and any warnings that are included on the access permit; and
- the recipient must instruct and give face-to-face demonstration to all people who will sign on the access permit of the safety requirements of the access permit; and
- the recipient must ensure that all those required to sign on the access permit do so before they start work; and
- the recipient must ensure that every person signing on the access permit is aware of their obligations to notify the recipient when leaving and returning to the worksite (see Clause 5.4.1); and

- Access permit recipients can only be responsible for their own workgroup and must not allow any other person to sign on to the access permit. Individual workgroups must sign on to separate access permits. See Chapter 16 for the definition of workgroup; and
- the recipient can only allow people carrying out work that directly relates to the purpose of the access permit to sign on to the access permit as members of the workgroup; and
- before allowing workers with other work classifications to sign on to the access permit, the recipient must know these tasks are covered by the access permit and the workers will work in accordance with the access permit conditions. If in any doubt, these workers are not allowed to sign on to the Access Permit;

Safeguarding the permit

- the recipient is responsible for safeguarding the access permit. The recipient must return the access permit to the Permit Folder at the end of each day and at the completion of work;

Remaining at the worksite

- the recipient must remain at the worksite or be travelling between locations within the worksite during the course of work, except when following the procedure for leaving the worksite detailed Clause 5.3.9 below (see Chapter 18 Glossary – General for the definition of worksite);

Working earths/shorts

- the recipient must record the connection and disconnection of working earths/shorts; and
- all of the working earths/shorts must be removed before the recipient surrenders the permit;

Controlling the sign-off of workers

- the recipient must ensure that everyone who signed onto the access permit has signed off before the access permit is surrendered.

5.3.8 Rights to refuse

The recipient has the right to refuse to accept the access permit if they consider the control measures detailed on the access permit are inadequate to ensure safety, or do not comply with these Rules.

The recipient has the right to refuse to allow a person to sign on to the access permit if they think the person is incompetent, uninterested, or inattentive.

5.3.9 Recipient leaving the worksite

If a recipient must leave the worksite, they must:

- transfer the access permit to another authorised recipient (see restrictions on permit transfer in Clause 5.5.2 and requirements for permit transfer in Clause 5.6.4) ; or
- Advise all members of the workgroup that they must cease work on or near the mains and apparatus until the recipient returns.

The above requirements do not apply when the recipient is travelling between locations within the worksite.

5.3.10 Surrender of an access permit

When the work is finished, the recipient must surrender the access permit as required by Clause 5.6.11.

The recipient must then:

- leave the surrendered access permit in the Permit Folder or Permit Receptacle at the place of issue; or
- give the surrendered access permit to the operator.

For Isolation Folder procedures, the recipient must hand the surrendered access permit to the restricted operator who issued the permit.

5.4 Persons signing onto an access permit

5.4.1 Responsibilities before signing on

Before signing onto an access permit, workers must complete the steps set out in the checklist in Figure 5 below.

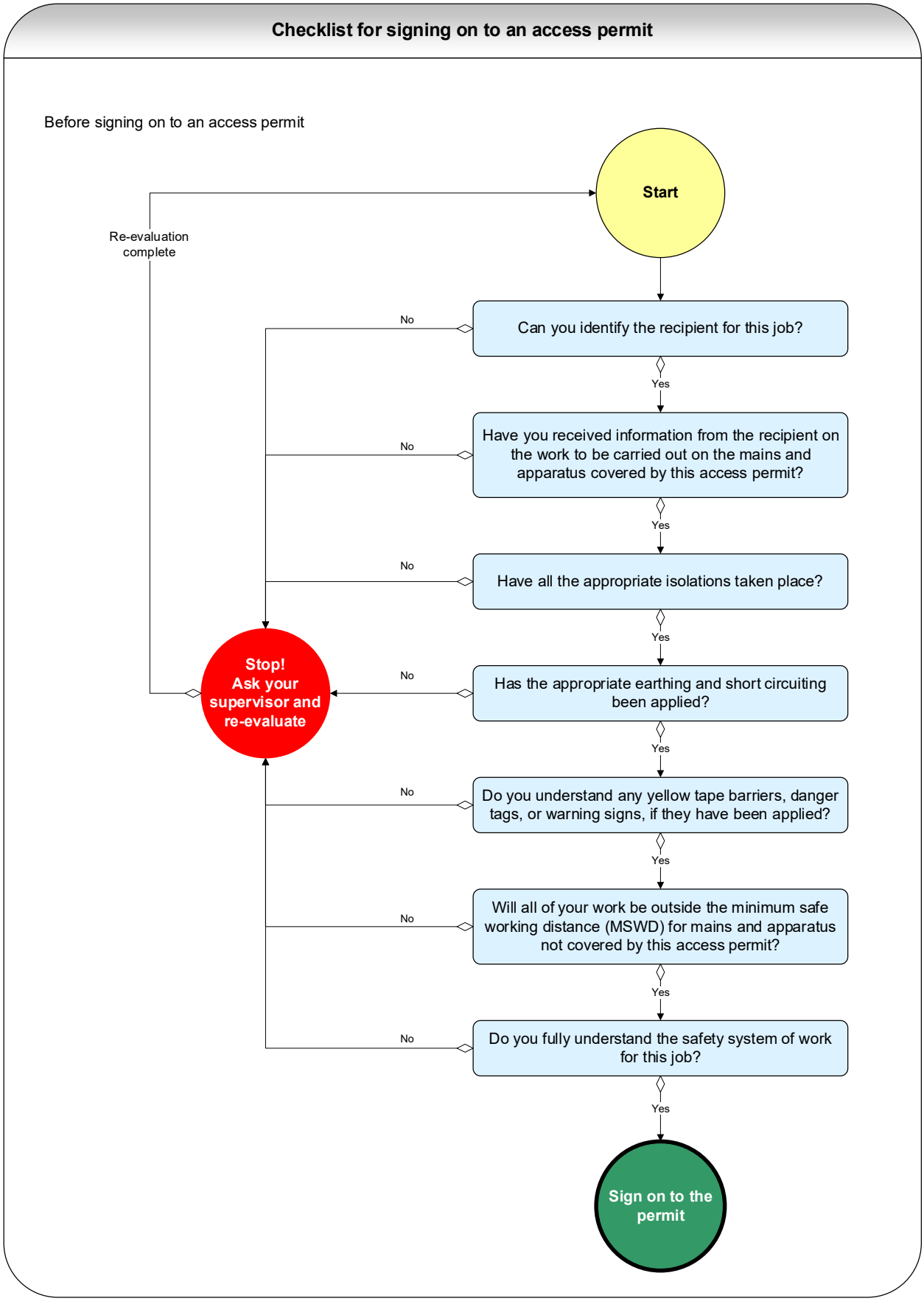

Figure 5 - Checklist prior to signing on to an access permit

5.4.2 Working while the recipient is present

Persons who have signed onto an access permit may only carry out work on or near mains and apparatus under the access permit while the permit recipient is physically at the worksite. (Note: There may be multiple work locations within the one worksite (permit area), and workers may continue to work on or near the mains and apparatus if the recipient is at another location within the worksite).

5.4.3 Responsibility for signing off

Before leaving the worksite, all persons who have signed onto an access permit must notify the recipient and sign off the access permit.

Exemption: A worker may temporarily leave the worksite without signing off the access permit if they comply with the requirements of Clause 5.4.4 below.

5.4.4 Temporarily leaving the worksite

If a person, who has signed onto an access permit, needs to temporarily leave the worksite while covered by an access permit and then return, the worker must:

- Notify the recipient before leaving; and
- Notify the recipient on return; and
- Identify the mains and apparatus being worked on before leaving; and
- Check with the recipient before re-commencing this work, that the access permit covering the identified mains and apparatus is still valid; and
- When taping is required, comply with the requirements of taping procedures used to designate safe work areas.

Figure 6 - Workgroup member actions before leaving the worksite and then returning

5.5 Requirements for access permits

This section describes requirements for access permits including cross referencing, examining, altering, duplicating, continuing work and withdrawing. It also describes the procedure for mains and apparatus left ready for emergency service and returning mains and apparatus to service.

5.5.1 Issue to recipients

There are different processes required for the issue of an access permit depending on the recipient type (see Clause 5.3.4).

The processes for the issue of an access permit to the various recipient types is set out in Table 9 below.

Table 9 – Process for receiving an Access Permit

Recipient Type	Details
Type 1 - Electrically qualified Ausgrid employee	These recipients can independently read, check, observe, and comply with the requirements of these Rules covering access permits. Access permits may be left for these recipients in a permit folder or Permit Receptacle. In this situation, only the recipient may retrieve the permit from the folder or receptacle. See Clause 5.5.4 for the requirements for work extending over more than one day.
Type 2 - Electrically qualified ASP or contractor to Ausgrid	These recipients can independently read, check, observe, and comply with the requirements of these Rules covering access permits. Access permits issued by Class 1 Operators may be left for these recipients in a permit folder or permit receptacle - under the following provisions. Any Access permit left for an ASP or contractor must be left at a nominated isolation point that is not normally accessible by the ASP or contractor (e.g. inside a kiosk substation.) An Ausgrid network connections officer, or contract officer, (any of whom must be authorised as an access permit recipient or be authorised to submit NARs) must attend the site to: • retrieve all required access permits and hand them to the recipient; and • provide the recipient with access to the current system diagrams; and • explain the purpose of the access permit(s). For work on underground cables, the Operator is to note “subject to cable identification by Ausgrid” on the access permit. See Clause 5.5.4 for the requirements for work extending over more than one day.
Type 3 – Non-electrically qualified Ausgrid employee	These recipients must have the access permit handed to them by an operator who will explain the control measures detailed on the access permit. See Clause 5.5.4 for the requirements for work extending over more than one day
Type 4 – Non-electrically qualified ASP or contractor to Ausgrid	These recipients must have the access permit handed to them by an operator who will explain the control measures detailed on the access permit. See Clause 5.5.4 for the requirements for work extending over more than one day.
Type 5 - Specially authorised person	This special authorisation is given by the Group Executive – Field Delivery, for a person to receive Ausgrid access permits for a particular job at a specific location and for a limited time period. A specially authorised person must successfully complete training in Ausgrid access permit procedures and be issued with a letter of authorisation. This authorisation letter must be shown to the operator to prove that they are authorised to receive Ausgrid access permits. The access permit must be handed directly to the specially authorised person by the Class 1 Operator who will explain the control measures detailed on the access permit. See Clause 5.5.4 for the requirements for work extending over more than one day.

5.5.2 Restrictions on transfer of access permits

An access permit must not be transferred between Type 3, 4, or 5 recipients. See Clause 5.6.4 for operator requirements when completing an access permit that is to be issued to a Type 3, 4, or 5 recipient.

If an access permit must be transferred between Type 2 recipients, the network connections officer or contract officer must be present at the time of transfer, to provide the new recipient access to the current system diagrams and explain the purpose of the access permit(s) to the new recipient.

5.5.3 Cross-referencing access permits

An appropriately authorised operator must cross reference all access permits issued where:

- the work requires access to different sections of mains and apparatus (i.e. mains and apparatus forming separate parts of the network e.g. mains and apparatus at different voltages or different feeders at the same voltage); and
- separate access permits are issued for each section of mains and apparatus.

Exception:

Where the work on street lighting circuits also requires access to other HV or LV circuits – different operators may issue separate access permits on the street lighting circuit and the other HV/LV circuits. In this situation, the access permits (and Permit Folders) need not be cross referenced. However, the exclusion of the street lighting circuit must be noted on the access permit for the other HV/LV circuits, and the exclusion of the other HV or LV circuits must be noted on the access permit for the street lighting circuit. These exclusions must be noted in the “warnings” section of the access permits.

Permit Folders

See Clause 5.11.5 for the requirements for cross-referencing Permit Folders.

5.5.4 Work Involving an access permit extending over more than one day

Figure 7 - Permit folder at a worksite

When work is continuing on mains and apparatus over a number of days, with no change to the conditions of the access permit, the following requirements apply for the various types of permit recipients.

Type 1 recipients (electrically qualified Ausgrid employees)

For recipients who are electrically qualified Ausgrid employees:

- it is not mandatory for Ausgrid employees to sign off the access permit, or for the recipient to place the permit on transfer, at the end of work each day;
- the recipient must leave the access permit in the Permit Folder or Receptacle at the place of issue at the end of work each day; and
- before re-commencing work each day, the recipient must:
  - identify the mains and apparatus that were being worked on and check that the access permit covering those mains and apparatus is still valid; and
  - ensure that all members of the workgroup notify the recipient before resuming work; and

- ensure that members of the workgroup who have previously signed off the access permit have signed back on to the access permit before re-commencing work.

See also Sections 5.3 and 5.4 for further requirements.

Type 2 recipients (electrically qualified ASPs and contractors to Ausgrid)

For recipients who are electrically qualified ASPs or contractors to Ausgrid:

- All workers must sign off the access permit and the recipient must surrender it at the end of work each day.
- The recipient must return the surrendered access permit to an operator or the network connections /contract officer.
- Multiple daily access permits (up to a maximum of five) may be left in a Permit Folder or Receptacle. (Noting the requirement for the network connections/contract officer to hand the access permit to the recipient).

Type 3 recipients (non-electrically qualified Ausgrid employees)

For recipients who are non-electrically qualified Ausgrid employees, if the work is continuing for a number of days in identical circumstances:

- All workers must sign off the access permit and the recipient must surrender it at the end of work each day.
- The recipient must leave the surrendered access permit in the folder or receptacle at the place of issue.
- Multiple daily access permits (up to a maximum of five) may be left, in a Permit Folder or Receptacle, for the same recipient after the initial issue.
- If the recipient is unavailable to accept the access permit on any following day, then an appropriately authorised Operator must hand it to another authorised recipient for that day.

Type 4 recipients (non-electrically qualified ASPs and contractors to Ausgrid)

For recipients who are non-electrically qualified ASPs or contractors to Ausgrid, if the work is continuing for a number of days in identical circumstances:

- All workers must sign off the access permit and the recipient must surrender it at the end of work each day.
- The recipient must return the surrendered access permit to an operator, or the network connections/contract officer.
- Multiple daily access permits (up to a maximum of five) may be left in a Permit Folder or Receptacle for the same recipient after the initial issue. (Noting the requirement for the network connections/contract officer to hand the permit to the recipient).
- If the recipient is unavailable to accept the access permit the following day, then an appropriately authorised Operator must hand it to another authorised recipient for that day.

Type 5 recipients (specially authorised recipients)

for specially authorised persons – if the work is continuing for a number of days, the access permit must be surrendered and cancelled at the end of each day and a new access permit must again be handed directly to the specially authorised person by a Class 1 Operator on each subsequent day.

External parties working near LV under a Clearance to Work

External parties working near LV mains and apparatus under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines, or the SafeWork NSW Guide – Work Near Underground Assets, may be issued a Clearance to Work for multiple days. There is no requirement to issue these workers a Clearance to Work each day.

5.5.5 Examining access permits

The following people may examine an issued access permit, to ensure compliance with the Rules:

- inspectors or auditors of regulatory bodies;
- supervisors and managers of the recipient and/or persons who have signed onto the access permit;
- the following Ausgrid employees:

- Ausgrid management;
- safety advisers or specialists;
- auditors;
- operating standards and training employees;
- network connection officers;
- contract officers;
- project officers/managers; and/or
- operators

5.5.6 Access permits on issue needing alteration

An access permit must not be altered after being accepted by a recipient.

An access permit must be cancelled if the control measures recorded on the permit must be changed to meet work requirements. A new access permit must be issued for the new control measures (which must comply with these Rules).

Exception: It is not necessary to cancel an access permit where earthing and short-circuiting equipment is temporarily removed, in accordance with Clause 9.8.6, so that certain stages of the work or testing can proceed.

An access permit must be cancelled and a new access permit issued if a new NAR overlaps into the isolation of an existing access permit.

5.5.7 Issuing a duplicate access permit

A duplicate access permit can be requested by the original access permit (or supervisor of the recipient) if:

- The original access permit is lost, destroyed or vandalised; or
- A surrendered access permit is lost, destroyed or vandalised. This ensures that a complete tracking of the process is maintained. The original recipient or supervisor must only accept and surrender the access permit when satisfied the work is completed, and all workers from the workgroup have either signed on and off the document or have been notified that the mains and apparatus are being returned to service.

5.5.8 Mains and apparatus left ready for emergency service

To leave mains and apparatus ‘ready for service in an emergency’ at the end of each workday, the recipient must:

- ensure workers listed under ‘Sign On’ have signed off on the access permit; and
- Indicate the mains and apparatus are ready to return to service in the surrender section of the Access Permit and add any other special conditions or instructions in “Comments”; and
- surrender the access permit; and
- return the surrendered access permit to the place of issue.

If mains and apparatus left ready for service in an emergency are required to be restored to service, a Class 1 Operator must recover all surrendered access permits and the associated folders. If mains and apparatus are not required to be restored to service, a Class 1 Operator must cancel all surrendered access permits and re-issue new access permits to allow work to continue the next day.

5.5.9 Mains and apparatus left unready for emergency service

If it is necessary during an emergency to place into service mains and apparatus (which are under an access permit), a Control Room Operator must contact the supervisor to arrange for the following:

- completion of any work so the mains and apparatus can be safely placed in service; and
- surrender of the access permit.

5.5.10 Withdrawing an access permit

Under the following situations, an access permit must be withdrawn:

- If the recipient is unauthorised; or

- if the recipient and/or the persons who are signed onto the access permit are not complying with these Rules; or
- If the access permit is invalid (i.e. the isolations, earthing and short-circuiting, and other controls do not align with those recorded on the access permit.

Process

The process for withdrawing an access permit is as follows:

- All workers who signed onto the access permit must sign off; and
- The recipient must then surrender the access permit.

An appropriately authorised operator must then:

- Cancel the access permit then write 'Withdrawn' across the cancelled document; and
- Notify the relevant Control Room Operator that the access permit has been withdrawn; and
- Notify the recipient's supervisor and arrange to issue a new access permit to an authorised recipient; and
- Return the withdrawn access permit to the Permit Folder; and
- Report the incident as per Ausgrid's incident reporting policy and requirements.

5.5.11 Access permits that are not accepted

When an access permit has not been accepted (e.g. the job is cancelled), it may be withdrawn after consulting the supervisor of the workgroup.

The Operator must write *'Withdrawn'* across the access permit and send it to the relevant Regional Field Operating Manager.

5.6 Completing an access permit

This section describes the requirements for completing and using an access permit.

Ausgrid

ACCESS PERMIT FOR WORK 12345

Issued in accordance with Network Access Request N^{0} ..... Due for cancellation: Time .....hrs Date .....

1. PURPOSE: This Access Permit allows access to: .....

.....

.....

.....

.....

to carry out the following: .....

2. ISOLATION POINTS: .....

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.....

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3. ACCESS PERMIT EARTHS and/or PERMIT LV SHORTS:

No	Location of Access Permit Earths/Permit LV Shorts	Re-moved	No	Location of Access Permit Earths/Permit LV Shorts	Re-moved
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

4. ADDITIONAL CONTROL MEASURES: .....

.....

5. WARNINGS: .....

.....

.....

.....

6. ISSUE: I hereby certify that the above controls have been carried out in line with Ausgrid's Electrical Safety Rules and are within the scope of my operating authority:

This Access Permit is issued to ..... Permit Folder affixed at .....

Permit Receptacle/s affixed at..... Time.....Date.....

Issued by (Signature) .....(Print name) ..... Operating Authority .....

7. ACCEPTANCE BY RECIPIENT: By signing below, I accept this Access Permit and state that I: (print name) .....

(1) fully understand my responsibilities as an access permit recipient; (2) will treat all mains and apparatus other than those covered by this Access Permit as alive; (3) am satisfied that the controls listed in Sections 1-4 of this Access Permit will allow me, and those who sign onto this Access Permit, to complete the work in compliance with the Electrical Safety Rules; (4) acknowledge any warnings listed in Section 5 of this Access Permit; and (5) am responsible for applying, removing, and recording, working earths and/or working LV Shorts.

Recipient Signature ..... Classification ..... Contact Phone Number .....Time..... hrs. Date.....

Issue Date: 2024 A55

Figure 8 – Access Permit for Work – front page

Attach Additional Worker Sign On/Off Form here - Do not print

8. TRANSFER OF ACCESS PERMIT: (By signing "TRANSFERRED TO" each new recipient accepts the terms of Section 7 of this Access Permit).

TRANSFERRED FROM	TRANSFERRED TO - New Recipient
1. Signed.....Time.....Date.....Comments	1. Signed.....Phone.....Classification..... Name.....Time.....Date.....
2. Signed.....Time.....Date.....Comments	2. Signed.....Phone.....Classification..... Name.....Time.....Date.....
3. Signed.....Time.....Date.....Comments	3. Signed.....Phone.....Classification..... Name.....Time.....Date.....
4. Signed.....Time.....Date.....Comments	4. Signed.....Phone.....Classification..... Name.....Time.....Date.....
5. Signed.....Time.....Date.....Comments	5. Signed.....Phone.....Classification..... Name.....Time.....Date.....

9. WORKER SIGN ON/OFF:

SIGNING ON - I confirm that: (1) I have received information from the recipient on the work to be carried out on the mains and apparatus covered by this Access Permit; (2) I am satisfied I can carry out the work in compliance with the Electrical Safety Rules; and (3) I will treat all other mains and apparatus as alive.				SIGNING OFF - I confirm I have ceased work under this Access Permit and now regard the mains and apparatus covered by this Access Permit as alive.		
Print name	Signed	Time	Date	Signed	Time	Date

I hereby state that..... who is SIGNED ON is unavailable to SIGN OFF and has ceased work on the mains and apparatus referred to in this Access Permit. Signed ..... Print name .....

Time ..... Date .....Witness (sqd) ..... Print name .....

10. ADDITIONAL WORKER SIGN ON/OFF: Additional Worker Sign On/Off Form number..... was completed and is attached to this permit . (Write "NIL" if an Additional Worker Sign On/Off form was not required).

11. WORKING EARTHS AND/OR LV SHORTS: were applied and removed as recorded on the Working Earths/LV Shorts Form No. ..... which is returned with this Permit. (Write "NIL" if there were no Working Earths or Working LV Shorts applied).

12. SURRENDER OF ACCESS PERMIT : I hereby state that all workers authorised by me to work under this Permit are now signed off and where Working Earths or Working LV Shorts were applied, they have all been removed.

The mains and apparatus are ready to return to service – YES ☐ NO ☐ - (If NO, provide details below)

Comments .....

.....

.....

I surrender this Permit and now regard the mains and apparatus as alive.

Recipient (name) ..... Signature ..... Time ..... Date.....

13. CANCELLATION OF ACCESS PERMIT: All persons who signed onto this Permit have signed off and the recipient has surrendered the Permit. This Permit is now cancelled.

Operator (name)..... Signature .....Operating Authority ..... Time ..... Date.....

Figure 9 – Access Permit for Work – back page

Ausgrid

ACCESS PERMIT FOR TEST

12345

Issued in accordance with Network Access Request N^{0} ..... Due for cancellation: Time .....hrs Date .....

1. PURPOSE: This Access Permit allows access to: .....

.....

.....

.....

.....

to carry out the following: .....

2. ISOLATION POINTS: .....

.....

.....

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3. ACCESS PERMIT EARTHS and/or PERMIT LV SHORTS:

No	Location of Access Permit Earths/Permit LV Shorts	Re-moved	No	Location of Access Permit Earths/Permit LV Shorts	Re-moved
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

4. ADDITIONAL CONTROL MEASURES: .....

.....

.....

5. WARNINGS: .....

.....

.....

.....

6. ISSUE: I hereby certify that the above controls have been carried out in line with Ausgrid's Electrical Safety Rules and are within the scope of my operating authority:

This Access Permit is issued to ..... Permit Folder affixed at .....

Permit Receptacle/s affixed at..... Time.....Date.....

Issued by (Signature) .....(Print name) ..... Operating Authority .....

7. ACCEPTANCE BY RECIPIENT: By signing below, I accept this Access Permit and state that I: (print name) .....

(1) fully understand my responsibilities as an access permit recipient; (2) will treat all mains and apparatus other than those covered by this Access Permit as alive; (3) am satisfied that the controls listed in Sections 1-4 of this Access Permit will allow me, and those who sign onto this Access Permit, to complete the work in compliance with the Electrical Safety Rules; (4) acknowledge any warnings listed in Section 5 of this Access Permit; and (5) am responsible for applying, removing, and recording, working earths and/or working LV Shorts.

Recipient Signature ..... Classification ..... Contact Phone Number .....Time..... hrs. Date.....

Issue Date: 2024 A187

Figure 10 – Access Permit for Test – front page

Attach Additional Worker Sign On/Off Form here - Do not print

8. TRANSFER OF ACCESS PERMIT: (By signing "TRANSFERRED TO" each new recipient accepts the terms of Section 7 of this Access Permit).

TRANSFERRED FROM	TRANSFERRED TO - New Recipient
1. Signed.....Time.....Date.....Comments	1. Signed.....Phone.....Classification..... Name.....Time.....Date.....
2. Signed.....Time.....Date.....Comments	2. Signed.....Phone.....Classification..... Name.....Time.....Date.....
3. Signed.....Time.....Date.....Comments	3. Signed.....Phone.....Classification..... Name.....Time.....Date.....
4. Signed.....Time.....Date.....Comments	4. Signed.....Phone.....Classification..... Name.....Time.....Date.....
5. Signed.....Time.....Date.....Comments	5. Signed.....Phone.....Classification..... Name.....Time.....Date.....

9. WORKER SIGN ON/OFF:

SIGNING ON - I confirm that: (1) I have received information from the recipient on the work to be carried out on the mains and apparatus covered by this Access Permit; (2) I am satisfied I can carry out the work in compliance with the Electrical Safety Rules; and (3) I will treat all other mains and apparatus as alive.				SIGNING OFF - I confirm I have ceased work under this Access Permit and now regard the mains and apparatus covered by this Access Permit as alive.		
Print name	Signed	Time	Date	Signed	Time	Date

I hereby state that..... who is SIGNED ON is unavailable to SIGN OFF and has ceased work on the mains and apparatus referred to in this Access Permit. Signed ..... Print name .....

Time ..... Date .....Witness (sgd) ..... Print name .....

10. ADDITIONAL WORKER SIGN ON/OFF: Additional Worker Sign On/Off Form number..... was completed and is attached to this permit . (Write "NIL" if an Additional Worker Sign On/Off form was not required).

11. WORKING EARTHS AND/OR LV SHORTS: were applied and removed as recorded on the Working Earths/LV Shorts Form No. ..... which is returned with this Permit. (Write "NIL" if there were no Working Earths or Working LV Shorts applied).

12. SURRENDER OF ACCESS PERMIT: I hereby state that all workers authorised by me to work under this Permit are now signed off and where Working Earths or Working LV Shorts were applied, they have all been removed.

The mains and apparatus are ready to return to service – **YES** ☐ **NO** ☐ - (If NO, provide details below)

Comments .....

.....

.....

I surrender this Permit and now regard the mains and apparatus as alive.

Recipient (name) ..... Signature ..... Time ..... Date.....

13. CANCELLATION OF ACCESS PERMIT: All persons who signed onto this Permit have signed off and the recipient has surrendered the Permit. This Permit is now cancelled.

Operator (name)..... Signature ..... Operating Authority ..... Time ..... Date.....

Figure 11 – Access Permit for Test – back page

5.6.1 General

All persons who are required to complete part(s) of an access permit must:

- provide all relevant information in the section(s) of the access permit for which they are responsible; and
- write clearly and legibly, in blue or black ink.

5.6.2 Completing the operator's section

The appropriately authorised operator who is issuing the access permit must complete Section 1 to Section 6 (inclusive) of the permit.

If there are any live mains and apparatus within the vicinity of the work, the operator must specifically note these in Section 5 'Warnings'.

In Section 6 "This access permit is issued to":

- If the access permit is being issued to a Type 1 or Type 2 recipient, the operator must write the name, classification, workgroup description, or recipient type, of the proposed recipient; or
- If the access permit is being issued to a Type 3, Type 4, or Type 5 recipient, the operator must write the name of the recipient.

If there is no relevant information to convey in a section of the access permit (e.g. no permit LV shorts are applied, or there are no warnings to the recipient) the operator must write 'Nil' in that section of the access permit.

5.6.3 Acceptance by recipient

In Section 7 "ACCEPTANCE BY RECIPIENT" – the recipient of the access permit must fulfil the following requirements before completing Section 7 and accepting the permit:

- confirm the controls listed in Sections 1 to 6 of the permit are adequate for the proposed work; and
- understand their responsibilities, as set out in these Rules (see Section 5.3) and as listed in the declaration.

Note: A Type 1 recipient may accept an access permit which has been left for a different worker classification, provided the recipient will be responsible for work which is included in the scope of work which is defined in Section 1 of the access permit.

5.6.4 Transfer of access permit section

Section 8 "TRANSFER OF ACCESS PERMIT" allows transfer of the access permit from one authorised recipient to another authorised recipient who will be responsible for work which is included in the scope of work which is defined in Section 1 "PURPOSE" of the access permit.

If a recipient is required to pass control of the work to another authorised recipient (before the work is finished), then the transferring recipient must sign under the 'Transferred From' section. The person accepting the transfer must sign as the new recipient under the 'Transferred To' section.

If the permit is transferred to a person who had previously signed under 'Sign On', that person must sign off before taking over as the transfer recipient.

Where the transfer to the new recipient occurs in person and all people working under the access permit are on site, members of the workgroup are not required to sign off the access permit during the transfer process. The new recipient must inform all persons signed under 'Sign On' as soon as possible that the access permit has been transferred.

Where the transfer does not occur in person, members of the workgroup must sign off the access permit during the transfer process.

Where an Access Permit for Test is being transferred and there is information that is relevant to the status of the mains and apparatus, and/or the testing thereof, that needs to be communicated to the next recipient, the recipient who is completing the "Transferred From" section must include such information in "Comments" (e.g. "Ready for test" or "Testing complete").

When an operator is issuing an access permit to a Type 3, 4, or 5 recipient, the operator must draw a line through the transfer section and write across it '*Not Applicable'.*

If the recipient has completed the 'Transferred From' section, an appropriately authorised Operator can accept the transfer as the 'Transferred To' person and then surrender the access permit. The operator can then cancel the permit and issue a new access permit for the continuation of work (e.g. if the original permit conditions have been altered).

The operator cannot accept and cancel the access permit on transfer in order to return the mains and apparatus to service.

5.6.5 Worker sign on

Recipient responsibilities

The recipient must provide information regarding the access permit to all workers who intend to sign on to the access permit, as required by Clause 5.3.7.

The recipient must make sure that all the people who will work on or near the mains and apparatus, and all the people who are part of the workgroup that is involved in working on or near the mains and apparatus, have signed on the access permit under 'Sign On' in Section 9 before they start work.

Worker responsibilities

All persons working as a part of the workgroup working on or near the mains and apparatus must read the declaration in the 'Sign On' column, before signing onto the access permit in Section 9 – "WORKER SIGN ON/OFF".
When workers print their name, sign, and write in the time and date, it means that they understand and agree with the following:

- they have received information from the recipient about the work on the mains and apparatus which are covered by the access permit; and
- they will maintain the relevant minimum safe working distance (MSWD) from live mains and apparatus.

5.6.6 Additional worker sign on/off form

Where more workers are required to sign on and off the access permit than Section 9 of the access permit allows, the access permit recipient must complete an (i.e. one only) Additional Worker Sign On/Off Form. (See Clause 5.13.1).

The recipient must cross reference the access permit and the Additional Worker Sign On/Off Form by:

- writing the access permit number in "Associated Access Permit No." in the upper right section of the Additional Worker Sign On/Off Form; and
- writing the Additional Worker Sign On/Off Form number in Section 10 of the access permit – "ADDITIONAL WORKER SIGN ON/OFF".

The recipient must then remove the peel off sticker label from the additional sign-on form and stick the sign-on form to the access permit above Section 8 – on the section with the words "Attach here – Do not print". The Additional Worker Sign On/Off Form must be attached to the access permit before any workers sign onto the form.

If there is no Additional Worker Sign On/Off Form used, the recipient must write "Nil" in section 10, as part of surrendering the access permit.

5.6.7 Worker sign off

When the work is completed or when an individual finishes working on the mains and apparatus, they must sign under the 'Sign Off' column in Section 9, on the same line as they sign onto the access permit under "Sign On".

When workers sign and write in the time and date, it means that they both understand and agree they:

- have stopped work on the mains and apparatus; and
- will treat the mains and apparatus as live.

5.6.8 Person(s) unable to sign off

If any person who had previously signed on is not able to 'Sign Off' due to exceptional circumstances (for example, due to injury or illness) then:

- the recipient must sign for this person in the space provided (at the bottom of Section 9) and in the presence of a witness from the workgroup;
- if no witness from the workgroup is available, the access permit recipient must contact their supervisor or manager; and
- the recipient, supervisor, or manager of the worker must contact and tell the absent person that the access permit has been surrendered.

5.6.9 Person not available to sign off

When a person who is able to sign has left the worksite without completing the 'Sign Off' column, every effort must be made to have the person return and sign off the access permit.

5.6.10 Working earths and/or LV shorts

As required by Clause 5.13.2, the recipient must record the application and removal of any working earths or working LV shorts on a Working Earths/LV Shorts Form.

In Section 11 of the access permit "WORKING EARTHS AND/OR LV SHORTS" the recipient must write the Working Earths/LV Shorts Form No. which records any working earths or working LV shorts, that were applied and removed during the time the access permit was accepted.

If no working earths or working LV shorts were applied, the recipient must write '*Nil*' in this section.

As required by Clause 5.13.2, the recipient must return the Work Earths and/or LV Shorts Form(s) with the surrendered access permit.

5.6.11 Surrender of an access permit

Recipient

In Section 12 of the access permit, "SURRENDER OF ACCESS PERMIT", the recipient must confirm that:

- everybody in the workgroup has signed off the access permit and is clear of the mains and apparatus; and
- where working earths or LV working shorts have been applied, they have been removed.

Following the statement "The mains and apparatus are ready to return to service' the recipient must indicate in the relevant box for either 'Yes' or 'No' to indicate whether the mains and apparatus can be safely re-energised.

If the recipient (or a worker under their supervision) has removed any overhead access permit earths, or permit LV shorts, at the completion of work with the approval of the relevant Control Room Operator in accordance with Clause 9.8.6 or Clause 9.2.4 the recipient must write the specific access permit earths or LV shorts they removed. (e.g. AP earths No. 3 at Pole XY12345).

The recipient must record any relevant special instructions for the Operator in the 'Comments' area. Examples of relevant information to be conveyed to the operator include, but are not limited to:

- *'In-service check to be carried out by operator';*
- *'Cable not to be energised until joint cool at … hours';*
- *'Available for emergency service only';*
- *'Permit required for continuation of work tomorrow'.*

The recipient must then sign this section and hand the access permit to the operator or return it to the permit folder or receptacle for the operator to collect later.

5.6.12 Recipient unable to surrender

If a recipient is not able to surrender the access permit due to exceptional circumstances (for example, due to injury or illness) then the supervisor or manager of the recipient (or an authorised recipient who is delegated by the supervisor or manager) must note the unavailability of the recipient in "Comments" in

Section 12 of the access permit, prior to surrendering the access permit on behalf of the unavailable recipient.

The supervisor or manager of the recipient must contact the recipient as soon as possible to tell them the access permit has been surrendered.

If the recipient cannot be contacted and the work is ongoing, the supervisor or manager must advise the recipient of any subsequently issued access permits required to complete the work, to notify the original recipient should the original recipient return to the worksite prior to receiving notification from the supervisor or manager.

5.6.13 Recipient unavailable to surrender

When a recipient who is able, has left the worksite without surrendering the permit and the permit must be surrendered, every effort must be made to have the recipient return and surrender the access permit.

5.6.14 Cancellation of an access permit

The appropriately authorised operator who is assigned the responsibility of cancelling the access permit must confirm the following before cancelling the access permit in Section 13 “CANCELLATION OF ACCESS PERMIT”:

- that all persons who have signed onto the access permit have correctly signed off; and
- the recipient has correctly surrendered the access permit.

Where the access permit is referenced on a Permit Folder, the operator must return the cancelled access permit to the Permit Folder and complete the details on the Permit Folder.

Where the access permit is not referenced on a Permit Folder (i.e. where the access permit was issued by an operator who signed onto the access permit as a member of the workgroup and remained on site for the duration of the access permit) the operator must indicate the removal of earths/shorts by adding their initials in Section 3 in the ‘Removed’ column, after the operator has visually confirmed the earths/shorts are removed.

Completed Permit Folders and cancelled access permits must be returned to the Head of Operating and Emergency Response, via an approved process.

5.7 Clearance to Work

This section describes when to use a Clearance to Work and the requirements for the completion of a Clearance to Work.

Ausgrid

CLEARANCE TO WORK 12345

Issued in accordance with Network Access Request N°..... Due for cancellation: Time .....hrs Date .....

1. PURPOSE: This Clearance to Work confirms Ausgrid has isolated the following mains and/or apparatus and carried out the control measures listed below for the purpose of the following work: .....

.....

.....

.....

by (company) .....

at (address) .....

near the following mains and/or apparatus: .....

.....

.....

.....

.....

.....

.....

The mains and/or apparatus will remain in this state until this Clearance to Work is surrendered and cancelled.

2. CONTROL MEASURES TAKEN BY AUSGRID:

a) **Isolation Points** the mains and/or apparatus have been isolated at the following locations: .....

.....

.....

.....

.....

.....

.....

b) **Earthing and Short-circuiting equipment** have been applied at the following locations: .....

.....

.....

.....

.....

.....

.....

.....

c) **Additional Control Measures** taken by Ausgrid: .....

.....

.....

.....

.....

3. WARNINGS / LIMITATIONS OF WORK: Additional warnings to the person in charge of work or limitations of the proposed work: .....

.....

.....

.....

.....

4. ISSUE: by Ausgrid - I hereby certify that the above control measures have been carried out in line with Ausgrid's Electrical Safety Rules and this Clearance to Work is now issued to:

Person in charge of the work (Print name) ..... Company .....

Issued by (Print name) ..... (Signature)..... Time ..... Date .....

Location of Permit Folder for return of surrendered Clearance to Work: .....

Issue Date: 2024 A65

Figure 12 – Clearance to Work – front page

5. ACCEPTANCE: by the person in charge of the work.

By signing below I make the following statements:

- I fully understand the isolations and control measures that have been taken by Ausgrid.
- I fully understand any additional warnings, and the limits of my work in relation to these isolations.
- I am responsible for making sure that all other people working under my control also understand the above isolations, control measures, warnings, and limits of work.

Person in charge of work (Print name)..... Signature .....

Company ..... Time ..... hrs. Date .....

Contact Phone Numbers: Working Hours ..... After Hours .....

6. SURRENDER: by the person in charge of the work.

I hereby state that:

- I and all persons under my control have ceased working near the mains and/or apparatus covered by this Clearance to Work.
- I and all persons working under my control now regard the mains and/or apparatus as alive.
- I will immediately notify Ausgrid of the surrender of this Clearance to Work.

Person in charge of work (Print name)..... Signature .....

Company ..... Time ..... hrs. Date .....

NOTE: This surrendered Clearance to Work is to be returned in person to an Ausgrid Operator or left in the Permit Folder at the location shown in Section 4.

7. CANCELLATION: by Ausgrid.

The person in charge of the work has surrendered this Clearance to Work and it is now cancelled

Operator (Print name) ..... Signature ..... Time..... Date .....

Figure 13 – Clearance to Work – back page

5.7.1 When a Clearance to Work is required

A Clearance to Work must be used for work by external parties near LV mains and apparatus, under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines or the SafeWork NSW Guide – Work Near Underground Assets.

The mains and apparatus must be isolated and (when required) short-circuited, as required by Clause 9.1.1 prior to the issue of a Clearance to Work.

5.7.2 Completing a Clearance to Work

The appropriately authorised operator must complete Sections 1 – 4 (inclusive) of the Clearance to Work.

The operator must write clearly and legibly, in blue or black ink.

If there is no relevant information to convey in a section of the Clearance to Work (e.g. no LV shorts are applied, or there are no warnings to the recipient) the operator must write ‘Nil’ in that section of the Clearance to Work.

5.7.3 Issuing a Clearance to Work

After completing sections 1 – 4 of the Clearance to Work, the operator must hand the Clearance to Work to the person in charge of the work and explain the controls that have been applied and any warnings.

The operator must then witness the person in charge of the work complete section 5 of the Clearance to Work.

5.7.4 Cancellation of a Clearance to Work

Following the completion of work, the operator must confirm that the Clearance to Work has been correctly surrendered by the person in charge of the work in Section 6 – “SURRENDER”.

After confirming:

- the Clearance to Work has been correctly surrendered; and
- there is no ongoing work near the mains and apparatus;

the operator must cancel the Clearance to Work by completing Section 7 – “CANCELLATION”.

5.8 Operating Agreement

This section describes the application of an Operating Agreement.

Ausgrid

OPERATING AGREEMENT

1. ISSUE

The following high voltage and/or low voltage Mains/Apparatus have been:

a) Isolated in accordance with (Name of Organisation)..... Electrical Safety Rules

b) Earthed and short-circuited *(strike out if not applicable)*

to enable work by (Name of Organisation) ..... workers:

i. on the interconnection between their network and (Name of Organisation) ..... network; or

ii. on or near (Name of Organisation)..... network, when required to carry out work on or near their network.

(strike out option i or option ii as applicable)

Mains/Apparatus .....

.....

.....

.....

Isolation Points - The Mains/Apparatus have been isolated at the following points:.....

.....

.....

.....

Earthing and Short-circuiting equipment has been applied to the Mains/Apparatus at the following locations: (strike out if not applicable)

.....

.....

.....

The above Mains/Apparatus will remain in this condition until this Operating Agreement is cancelled.

ISSUED BY (Print name) ..... Signature .....

Classification ..... Name of Organisaton ..... Time ..... Date .....

2. ACCEPTANCE BY RECIPIENT

- I hereby acknowledge that I have received advice from the (Name of Organisation) ..... representative that the Mains/Apparatus referred to above have been:
  a) Isolated from all possible sources of supply from the (Name of Organisation) ..... network
  b) Earthed and short-circuited on the (Name of Organisation) ..... network
  (strike out if not applicable) and shall remain so until this agreement is cancelled.
- I am aware of the nature and position of the Mains/Apparatus covered by this agreement and will regard all other Mains/Apparatus as alive.
- I understand it is my responsibility to inform those persons working under this agreement of the Mains/Apparatus covered by this agreement.

ACCEPTED BY (Name of Organisation)..... Representative (Print name) .....

Signature..... Classification..... Time..... Date.....

3. CANCELLATION

The above Mains/Apparatus are no longer required to be isolated/earthed. This Operating Agreement is hereby cancelled. I have advised all persons working under this agreement to regard the above Mains/Apparatus as alive.

CANCELLED BY (Name of Organisation)..... Representative (Print name).....

Signature..... Classification..... Time..... Date.....

Noted by..... Representative ..... Signature .....

(Name of Organisation) (Print name)

Issue Date 09/2022 A71

Figure 14 – Operating Agreement

5.8.1 When an Operating Agreement is required

An Operating Agreement must be used for:

- work on mains and apparatus that are interconnected between Ausgrid and another organisation (where neither organisation has control over all points of isolation of the mains and apparatus); or
- work by another NSW electricity network operator who are required to work near Ausgrid mains and apparatus in order to carry out work on the other network operator's mains and apparatus; or
- work by Ausgrid near another NSW electricity network operator's mains and apparatus, to facilitate work on Ausgrid mains and apparatus.

5.8.2 Operating Agreement process

The organisation that issues an Operating Agreement is required to isolate, and earth if applicable, at the appropriate points.

An Operating Agreement gives an undertaking by the organisation that carries out the isolation (and earthing, if applicable), that the mains and apparatus specified on the Operating Agreement will remain isolated (and earthed if applicable) until a signed cancellation of the Operating Agreement is received.

An Operating Agreement must not be used in place of an access permit. (**Note**: Other NSW electricity network operators carrying out work near Ausgrid mains and apparatus will issue their access authority for the work, following receipt of an Operating Agreement from Ausgrid – See Chapter 15).

Original and Duplicate Copies

A duplicate must be made of the Operating Agreement. The issuer provides the original to the recipient and retains the duplicate until the work is complete.

After cancellation of the Operating Agreement, the original is returned to the issuing organisation, and the working organisation retains the cancelled duplicate.

5.8.3 Issuing an Operating Agreement

Where Ausgrid isolates, and earths and short-circuits where appropriate, mains and apparatus for another organisation, an appropriately authorised Ausgrid operator must complete an Operating Agreement, in duplicate, as follows.

5.8.4 Completing an Operating Agreement

The issuing operator must complete Section 1 and the first dot point of Section 2 of an Operating Agreement.

5.8.5 Acceptance

The Ausgrid operator who will issue the Operating Agreement must meet with the representative of the other organisation who will accept the Operating Agreement to explain the isolation and, if applicable, earthing carried out on Ausgrid's network.

The representative of the other organisation has the right to inspect the isolation and earthing points on Ausgrid's network where such inspection is reasonably practicable to achieve.

Once the representative of the other organisation is satisfied that all the necessary isolation and earthing steps have been carried out by Ausgrid, the representative of the other organisation must complete the 'Accepted by' part of Section 2.

5.8.6 Issue

Following acceptance of the Operating Agreement by the representative of the other organisation, the Ausgrid operator must:

- hand the original copy of the accepted Operating Agreement to the person who accepted it; and
- place the duplicate copy in a permit folder at the point of isolation on Ausgrid's network; and
- write '*Operating Agreement on Issue*' on the front of the permit folder; and
- list the location of any earths on the back of the folder.

5.8.7 Cancellation

When the requesting organisation has completed work and the Operating Agreement is no longer required, another meeting must be arranged between the representatives of both organisations.

The representative of the other organisation must complete the 'Cancelled by' section 3 on both the duplicate and original documents. The Ausgrid operator must then complete the 'Noted by' part of section 3.

The Ausgrid operator must give the duplicate copy to the representative of the other organisation and return the original to the Permit Folder.

Note: The representative of the other organisation who cancels the Operating Agreement need not be the person who accepted it.

5.8.8 Isolation by another organisation for Ausgrid

In some cases, Ausgrid may require another organisation to isolate and, if applicable, earth the end of an Ausgrid interconnection. In this case, the same procedure is followed except the other organisation serves as the issuing organisation and the Ausgrid operator is the recipient of the Operating Agreement.

Where the other organisation has their own Operating Agreement form that provides the relevant information required by an Ausgrid Operating Agreement, the other organisation's form may be used.

In situations where the other organisation does not have their own Operating Agreement form, then Ausgrid's Operating Agreement may be used by the other organisation to issue to Ausgrid. When all the necessary operating work has been completed by the other organisation, the Operating Agreement is completed in duplicate.

In a similar manner, the original and the duplicate copies of the Operating Agreement must be cancelled and exchanged. The organisation that issued the agreement retains the cancelled original copy. The duplicate copy retained by Ausgrid is placed in the permit folder.

5.9 Equipping Permit

This section describes the purpose and application of an Equipping Permit.

Ausgrid

EQUIPPING PERMIT

(Refer to the Electrical Safety Rules for the requirements for usage of Equipping Permits. In particular, an Equipping Permit must be on site prior to the commencement of any work on the mains and apparatus intended for commissioning. If there is no Equipping Permit at the site, the mains and apparatus must be regarded as alive, and any required work must be carried out under Access Permit.)

This Equipping Permit refers to the mains and apparatus, as indicated in the table below, which are intended to be connected to the network for the following project.

This Equipping Permit has been issued by me (the Issuer) to indicate which Accredited Service Providers* and Subcontractors* or Ausgrid work groups* will be working on this project.

Name: (Print) ..... Signature: ..... 1 ..... ASP .....

Company or Division ..... Position: ..... Phone No: .....

Mobile No: ..... Facsimile No: ..... Date: .....

Project Details

Address: ..... 2 .....

LCP/Substation Class & Number: ..... Name: ..... 3 .....

Zone Number: ..... Feeder No: ..... Project Description: .....

.....

.....

Statement by Accredited Service Provider and/or Work Group, as nominated on the System Alteration Order (SAO):

*By signing in the table below, I declare that:

(i) all persons working under my direction are now clear of the new mains and apparatus as described and will henceforth regard all of the mains and apparatus as alive, and that any further work to be carried out must be covered by Access Permit,

(ii) all Working Earths connected by me or my staff have been removed.

Accredited Service Provider and/or Work Group as nominated on the SAO	4 #Print Name	Sign	Time	Date	State whether work is complete or incomplete
Accredited Service Provider #					
Contract Cable Layers #					
Distribution Jointers #					
Subtransmission Jointer #					
Overhead Lineworkers #		7			
Substation Technicians #					
Installation Inspector #					
Customers Electrician #					
Protection Technicians #					
Voltage Regulation Technicians #					
Network Testers #					
Meter Technicians #					
Telecontrol #					

Note: Additional Accredited Service Provider and/or Work Group as nominated on the SAO can be listed in the table on the rear of this document.

Figure 15 – Equipping Permit – front page (numbered points are not included on the document but are shown for the explanation of completion requirements detailed within this section)

(Refer to the Electrical Safety Rules for the requirements for usage of Equipping Permits. In particular, an Equipping Permit must be on site prior to the commencement of any work on the mains and apparatus intended for commissioning. If there is no Equipping Permit at the site, the mains and apparatus must be regarded as alive, and any required work must be carried out under Access Permit.)

Accredited Service Provider and/or Work Group as nominated on the SAO	#Print Name	Sign	Time	Date	State whether work is complete or incomplete

5

All Work Groups which do not work on the project must be crossed out. The issuer (who is usually the Project Manager see above details) must be notified of any additional work Groups and he will arrange to amend the on site Equipping Permit.

This Equipping Permit refers to the mains and apparatus, as indicated in the single line diagram below, which are intended to be connected to the network.

Single Line Diagram
(Refer to System Alteration Order for Confirmation of Final Details.)

6

Operator's Section:

All Accredited Service Providers and Work Groups as nominated on the SAO have signed off the front of this form, and this Equipping Permit in now cancelled.

Signed: ..... 8 ..... Time: ..... Date: .....

On completion return this Equipping Permit to the Operating Superintendent (or equivalent).

Equipment not tested or failed under test to be listed: .....

.....

Figure 16 – Equipping Permit – back page

5.9.1 Purpose

An Equipping Permit fulfils the following two purposes:

- Firstly, it confirms to persons who are working on or near mains and apparatus that are covered by an Equipping Permit, that the mains and apparatus are not connectable and therefore an access permit is not required for the work (except where the mains and apparatus covered by the Equipping Permit are within MSWD from commissioned exposed mains and apparatus, or within a HV cage, and an access permit is required for workers to work on or near the exposed mains and apparatus or within the HV cage); and
- Secondly, it provides an assurance for persons who are required to energise the mains and apparatus (that were covered by an Equipping Permit) that workgroups who were involved in working on or near the mains and apparatus have completed their work and now regard the mains and apparatus as alive.

5.9.2 When an Equipping Permit is required

An Equipping Permit must be issued for work on or near the following mains and apparatus that are intended to be, but are not yet, connectable to the network:

- new mains and apparatus; or
- permanently disconnected apparatus.

Exceptions:

An Equipping Permit is not required:

- where the new mains and apparatus are replacing existing mains and apparatus that are already part of the network and are shown on a system diagram (an Access Permit must be used for such work); or
- where the construction and energisation of new mains and apparatus is completed within one day, and the person responsible for energising the new mains and apparatus is the person responsible for the workgroup who constructed the mains and apparatus; or
- for new sections of mains (i.e. overhead lines or underground cables) which are to be connected within the existing network, where:
  - the new mains do not form part of a contestable project; and
  - no new apparatus will be connected through the connection of the mains.

5.9.3 Issuing an Equipping Permit

An Equipping Permit must be issued by a person who:

- is involved in co-ordinating the construction and connections works; and
- is appropriately authorised to submit Network Access Requests (Refer to Clause 3.3.7).

Note: Separate Equipping Permits may be used for different sections of the mains and apparatus.

The person who is issuing the Equipping Permit must complete point 1 to point 6 (inclusive) of the Equipping Permit, as indicated in Figure 15 and Figure 16.

In points 4 and 5, the person issuing the Equipping Permit must list all the workgroups involved in the construction/reconstruction of the mains and apparatus. The person issuing the Equipping Permit must:

- strikethrough any workgroups listed in point 4 that are not required; and
- write any additional workgroups (that are not already listed) in point 5.

5.9.4 Displaying the Equipping Permit

The Equipping Permit must be on site prior to the commencement of any work on the mains and apparatus intended to be connected to the network.

The Equipping Permit must be located in a prominent position relative to the work.

An Equipping Permit need not be displayed when the work only involves the installation of an underground cable that does not enter a substation, pillar, or other structure.

5.9.5 Worker responsibilities

Workers must not commence (or re-commence) work on new (or permanently disconnected) mains and apparatus that are intended for connection to the network until they have checked that an Equipping Permit covers the work.

5.9.6 Work completed

When each listed workgroup has completed their part of the work, or if the Equipping Permit is due for cancellation, the responsible person for that workgroup must:

- understand the declaration of points (i) and (ii) in point 7; and
- in the appropriate workgroup row (in point 7), add their name, signature, time, date, and whether that part of the work is '*complete*' or '*incomplete*'; and
- advise any other person from their workgroup involved with the work on the mains and apparatus covered by the Equipping Permit, that the mains and apparatus must now be treated as live.

5.9.7 Making mains and apparatus connectable

Where it is reasonably practicable to avoid doing so, workers must not bring mains and apparatus that are covered by an Equipping Permit within the relevant MSWD from exposed mains and apparatus, or within a

HV cage, until the day (24-hour period) the mains and apparatus under the Equipping Permit are being made connectable.

Where mains and apparatus that are covered by an Equipping Permit are being made connectable, the Equipping Permit may remain in place only for the same day (24-hour period) on which the work to make the mains and apparatus connectable occurs. At the end of that day, the Equipping Permit must be cancelled and all remaining work on or near the connectable exposed mains and apparatus must be carried out either under an Access Permit or using live work controls.

A point of isolation, for the issue of an Access Permit, cannot be formed on the mains and apparatus that were covered under an Equipping Permit until after the mains and apparatus up to, and including, the point of isolation are commissioned

5.9.8 Cancelling an Equipping Permit

Completing the Equipping Permit

To cancel an Equipping Permit, an appropriately authorised operator must check the Equipping Permit has been completed properly by each workgroup, then the operator must complete point 8 of the Equipping Permit as shown in Figure 16.

5.9.9 Energising the mains and apparatus

The Equipping Permit must be cancelled and recovered before any part of the mains and apparatus displayed on the Equipping Permit is energised.

5.10 Secondary Systems Clearance

This section describes the requirements for completing and using a Secondary Systems Clearance.

Ausgrid

SECONDARY SYSTEMS CLEARANCE 12345

Issued in accordance with Network Access Request N°..... Due for cancellation: Time .....hrs. Date .....

1. PURPOSE: This Secondary Systems Clearance allows work to be carried out on the following secondary systems: .....

.....

.....

.....

to carry out the following work: .....

.....

.....

2. CONTROL MEASURES:

a) Approval to proceed given by the relevant Area or System Operator. Time..... hrs. Date.. .....

b) Control measures taken: .....

.....

.....

.....

c) Link Isolation Sheet: Yes ☐ No ☐ Location: .....

d) Warnings to workgroup: .....

.....

.....

.....

3. ISSUE:

By signing below, I make the following statements – (1) The requirements of Ausgrid's Electrical Safety Rules have been carried out and the control measures in Section 2 have been completed. (2) I fully understand the limitations of the work in relation to the secondary systems. (3) I am responsible for making sure that all other persons working under my control understand any control measures, warnings and the limitations of the work in relation to the secondary systems.

Name ..... Signature ..... Time..... hrs. Date.....

4. WORKER SIGN ON/OFF:

SIGNING ON - I confirm the recipient has provided me information about the work covered by this Clearance.				SIGNING OFF - I confirm I have ceased work on the secondary systems covered by this Clearance.		
Print name	Signed	Time	Date	Signed	Time	Date

I hereby state that..... who is SIGNED ON is unavailable to SIGN OFF and has ceased the work covered under this clearance. Signed ..... Print name .....

Time ..... Date ..... Witness (sgd)..... Print name .....

5. CANCELLATION:

By signing below, (1) I declare that I and all persons under my control have ceased work on the secondary systems nominated on this Clearance (2) I have notified the Area/ System Operator of the cancellation of this Clearance and the status of the above secondary systems.

Name ..... Signature ..... Time ..... hrs. Date.....

Issue Date: 2024 B39

Figure 17 – Secondary Systems Clearance

5.10.1 When a Secondary Systems Clearance is Required

A Secondary Systems Clearance is required for work on secondary systems (see definition in Chapter 18) where:

- the associated mains and apparatus are not covered by an Access Permit; and
- a NAR is required for work on the secondary systems, as per Clause 4.1.2.

5.10.2 Issuing a Secondary Systems Clearance

An appropriately authorised operator must complete sections 1, 2, and 3 of the Secondary Systems Clearance.

5.10.3 Worker sign on and off

Sign On

All persons who intend to carry out work that is described on the Secondary Systems Clearance (other than the issuer) must sign onto the Secondary Systems Clearance.

The issuer must provide the workers with relevant information regarding the scope of the work under the Secondary Systems Clearance.

After receiving information on the scope of work from the issuer, workers must sign onto the Secondary Systems Clearance in Section 4 ‘Signing On’.

Sign off

At the completion of their work, all workers who signed onto the Secondary Systems Clearance must sign off in Section 4 ‘Signing Off’.

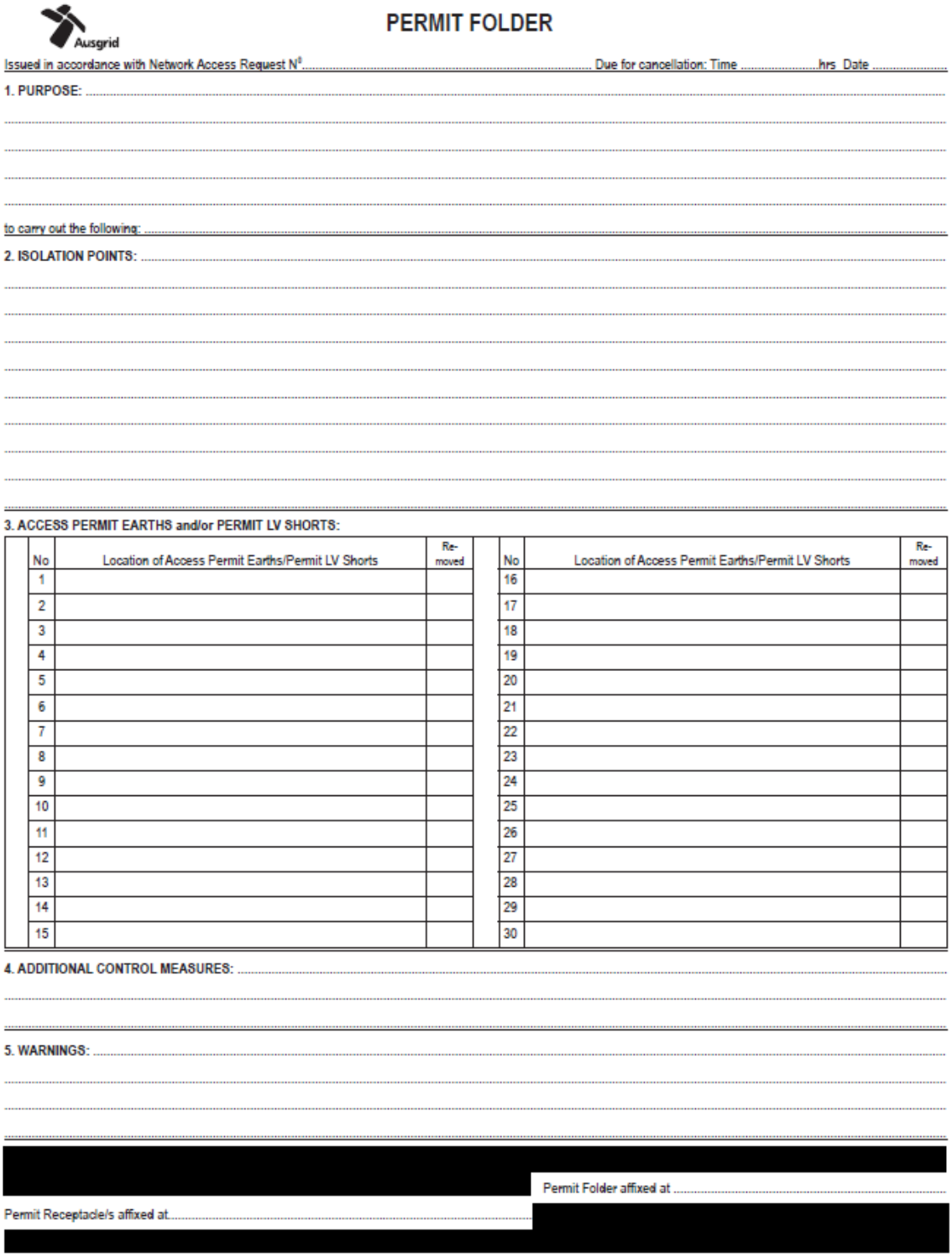
If any worker who had previously signed on is not able to sign off due to exceptional circumstances, then the issuer must follow the process set out in Clause 5.6.8.

5.10.4 Cancellation

Once all workers have signed off the Secondary Systems Clearance, the issuer must cancel the clearance by completing Section 5 and advising the relevant control room operator.

5.11 Permit Folder

This section describes the application of Permit Folders and the requirements for completing and using them.



PERMIT FOLDER

Issued in accordance with Network Access Request N°..... Due for cancellation: Time .....hrs Date .....

1. PURPOSE: .....

to carry out the following: .....

2. ISOLATION POINTS: .....

3. ACCESS PERMIT EARTHS and/or PERMIT LV SHORTS:

No	Location of Access Permit Earths/Permit LV Shorts	Re-moved	No	Location of Access Permit Earths/Permit LV Shorts	Re-moved
1			16		
2			17		
3			18		
4			19		
5			20		
6			21		
7			22		
8			23		
9			24		
10			25		
11			26		
12			27		
13			28		
14			29		
15			30		

4. ADDITIONAL CONTROL MEASURES: .....

5. WARNINGS: .....

[redacted]

Permit Folder affixed at .....

Permit Receptacle/s affixed at.....

[redacted]

PERMITS ISSUED/CANCELLED, UNUSUAL CONDITIONS AND MOVEMENT OF EQUIPMENT - RECORD OVER

Issue Date: 10/2024 A301

Figure 18 - Permit Folder - front

Issued Permits						Cancelled Permits		
Type	Issued to (print)	Issued by (print)	Time	Date	No.	Cancelled by (print)	Time	Date

* Permit Types: AP = Access Permit for Work / APT = Access Permit for Test / CTW = Clearance to Work / OA = Operating Agreement

UNUSUAL CONDITIONS FOR OPERATORS RECONNECTING

MOVEMENT OF EQUIPMENT			
Equipment type	TAKEN FROM SUB No.	USED AT SUB No.	RETURNED BY

Figure 19 – Permit Folder - back

5.11.1 When a Permit Folder is required

Except for situations set out in Clause 5.11.2, an appropriately authorised operator must complete a Permit Folder whenever they isolate and earth, if required, mains and apparatus for the issue of one or more access permit(s), Clearance to Work(s), or Operating Agreement(s).

All access permits, Clearance to Work(s), and/or Operating Agreement(s) that are issued covering the mains and apparatus must be recorded on a Permit Folder, by the operator who issues the access permit(s), Clearance to Work(s), and/or Operating Agreement(s).

There must be only one Permit Folder for each section of isolated mains and apparatus.

5.11.2 Exceptions to the need for a Permit Folder

Exception 1:

A Permit Folder is not required where an Isolation Folder is used, and Access Permit(s) for Work are issued under the Isolation Folder.

Exception 2:

A Permit Folder is not required where only one Access Permit for Work is issued for work on or near the mains and apparatus and:

- there is/are no Clearance to Work(s) or Operating Agreement(s) issued/received, or to be issued/received, for work on or near the mains and apparatus; and
- the operator who issues the Access Permit for Work remains at the worksite until the Access Permit for Work is cancelled.

Operator leaving the site

If a Class 1 operator, or Class 5F operator, issues an Access Permit for Work without a Permit Folder under exception 2 and is then required to leave the work site before the work is complete, the operator must carry out the following before leaving the site:

- complete a Permit Folder; and
- record the Permit Folder location on the access permit; and
- sign off the access permit (if the operator has signed on).

If a Class 2 operator, or Class 5P operator issues an Access Permit for Work without a Permit Folder under exception 2 and is then required to leave the work site before the work is complete:

- all workers must sign off the access permit; and
- the recipient must surrender the access permit; and
- the operator must cancel the access permit; and
- the operator must complete a Permit Folder; and
- the operator must place the cancelled access permit in the Permit Folder.

5.11.3 Location

The Permit Folder must be located at one of the points of isolation of the mains and apparatus.

Where a high voltage (HV) switch is available for attachment of the Access Permit Folder (except as indicated in the note), the folder must be attached to the HV switch in preference to a low voltage (LV) point of isolation.

Note: If work is planned on a ring main unit (RMU) in a substation with multiple RMUs, the Permit Folder must be attached to one of the following:

- a HV point of isolation remote from the substation where the work is done; or
- the LV point of isolation for the transformer associated with the RMU, if there are three or more RMUs.

The Access Permit must be left in a Permit Receptacle (see Clause 5.11.7) attached to the isolated RMU. However, the Permit Folder must not be attached to a HV point of isolation on an in-service unit in the same substation.

5.11.4 Completing a Permit Folder

The operator who issues the initial Access Permit(s), Clearance to Work(s), or Operating Agreement(s) must complete a Permit Folder. The operator must:

- provide all relevant information required by the Permit Folder; and
- write clearly and legibly, in blue or black ink.

5.11.5 Cross-referencing Permit Folders

An appropriately authorised operator must cross-reference all Permit Folders associated with the following situations:

- when the work requires access to different sections of mains and apparatus and separate access permits are issued for each section (as required by Clause 5.5.3); and/or
- when a common point of isolation is formed.

Exception 1: Where Permit Folders are not completed, in accordance with Clause 5.11.2

Exception 2: Where the work on street lighting circuits also requires access to other HV or LV circuits – different operators may issue separate access permits on the street lighting circuit and the other HV/LV circuits. In this situation, the Permit Folders need not be cross referenced. However, the exclusion of the street lighting circuit must be noted on the access permit for the other HV/LV circuits, and the exclusion of the other HV or LV circuits must be noted on the access permit for the street lighting circuit. These exclusions must be noted in the "warnings" section of the access permits.

5.11.6 Leaving access permits in a Permit Folder

Access permits which are left for an access permit recipient and not handed to the recipient directly, must be left:

- in the relevant Permit Folder; or
- where it is necessary to issue an access permit at a location other than the point of isolation, in a Permit Receptacle (see Clause 5.11.7).

Surrendered Access Permits and Clearance to Work(s) must be either;

- handed to the operator who will be cancelling the access permit(s) or Clearance to Work(s); or
- returned to the Permit Folder or Permit Receptacle by the recipient.

Where work is continuing over multiple shifts and the access permit is not required to be surrendered, the recipient must, where reasonably practicable, return the access permit to the Permit Folder, or Permit Receptacle where appropriate, at the end of each shift.

5.11.7 Permit Receptacle

If it is necessary to issue an access permit at a location other than the point of isolation where the Permit Folder is attached, an additional Permit Folder must be used as a 'Permit Receptacle'.

The operator who is responsible for creating the Permit Receptacle must write the following information on the folder.

- The words '*Permit Receptacle*' (in large text); and
- The relevant NAR No; and
- The location of the original Permit Folder.

The operator must also cross out or strikethrough the earthing and permit sections of the folder.

5.11.8 Recovering a Permit Folder

Before re-energising mains and apparatus covered by an access permit, Clearance to Work, or Operating Agreement, the operator must check all forms and folders, to confirm the following:

- all issued access permit(s), Clearance to Work(s), and/or Operating Agreement(s) have been returned; and
- all persons who have signed under 'Sign On' on the back of the access permit(s) have signed off under the 'Sign Off' section; and

- each permit recipient (as issued or transferred) has surrendered their access permit; and
- there are no access permits where a recipient has declared that the mains and apparatus are not ready to return to service.

After checking the surrendered document(s), the operator must cancel them and then update the Permit Folder.

The operator must:

- check for details of any unusual operating conditions on the back of the Permit Folder; and
- as each set of specified earthing and short-circuiting equipment is removed, print their initials against the entry; and
- if access permit earths and/or permit LV shorts have been removed by an access permit recipient in accordance with Clauses 9.2.4 or 9.8.6, initial the folder after visually confirming the earths/shorts removal; and
- record the return of any direct earthing equipment; and
- place all the relevant access permit(s), Clearance to Work(s) or Operating Agreement(s), folders and all operating papers in the Permit Folder and return it to the Head of Operating and Emergency Response, via an approved process.

5.12 Isolation Folder

This section describes the requirements for completing and using Isolation Folders.

Ausgrid

ISOLATION FOLDER 12345

Issued in accordance with Network Access Request N°..... Due for cancellation: Time .....hrs Date .....

1. CLASS 1 OPERATOR

a) IsolationPoints: .....

.....

.....

.....

.....

b) Access Permit Earths and/or Permit LV Shorts applied by Class 1 Operator: (if applicable):

No	Location of Access Permit Earths/Permit LV Shorts	Removed	No	Location of Access Permit Earths/Permit LV Shorts	Removed
1			7		
2			8		
3			9		
4			10		
5			11		
6			12		

c) Additional Control Measures: .....

.....

.....

d) Warnings: .....

.....

.....

e) Issue: I hereby certify that the above controls have been carried out in line with Ausgrid's Electrical Safety Rules and are within the scope of my operating authority:

Issue by Class 1 Operator (Print name) ..... (Signature) .....Time..... hrs Date.....

Isolation Folder affixed at: .....

f) Cross-Referenced Isolation Folders:

Number: ..... Location: .....

Number: ..... Location: .....

Number: ..... Location: .....

Issue Date: 2024 A189

Figure 20 - Isolation Folder - front

MOVEMENT OF EQUIPMENT			
Equipment type	**TAKEN FROM SUB No.**	**USED AT SUB No.**	**RETURNED BY**

UNUSUAL CONDITIONS FOR OPERATORS RECONNECTING

2. RESTRICTED OPERATOR(S)

Operating Commenced – I understand the controls that have been carried out and will issue Access Permits in accordance with the Electrical Safety Rules.				**Operating/work Complete** - I declare that the Access Permit(s) I have issued, have been cancelled and returned.							Class 1 Check
Print name	Signed	Time	Date	Signed	Time	Date	Cancelled Access Permit No.(s)				

Figure 21 - Isolation Folder - back

5.12.1 Purpose

An Isolation Folder is used by a Class 1 Operator to record the details of isolated mains and apparatus, to facilitate the issue of access permit(s) by Restricted Operator(s).

5.12.2 Process

When an Isolation Folder is used, the operators must carry out the following steps, as set out in Clauses 5.12.3, 5.12.4, and 5.12.5.

5.12.3 Class 1 Operator

The Class 1 Operator must:

- carry out the isolation of the mains and apparatus, as required by these Rules (Note: The Class 1 Operator may apply earthing and short-circuiting equipment, when required);
- complete Section 1 of the Isolation Folder, providing all relevant information required by the folder;
- advise the relevant Control Room Operator of the serial number and location of the Isolation Folder; and
- leave the Isolation Folder at:
  - a point of isolation: or
  - an agreed location that is specified on the NAR.

Where multiple Isolation Folders are used in remote rural areas of the Hunter region:

- the isolations must be duplicated on each Isolation Folder; and
- all Isolation Folders must be cross-referenced; and
- the location(s) of the other associated Isolation Folder(s) must be noted on each Isolation Folder.

5.12.4 Restricted operator

The restricted operator must:

- check the information provided on the Isolation Folder; and
- confirm the isolation of the mains and apparatus is adequate for the proposed work; and
- contact the relevant Control Room Operator to obtain permission to proceed (if satisfied); and
- complete Section 2 “Operating Commenced” of the Isolation Folder; and
- record the Isolation Folder number, isolation points, and any earthing and short-circuiting installed by the Class 1 Operator, for inclusion on any access permit(s) to be issued; and
- proceed to the worksite to ensure the requested isolation is appropriate for the task. If the isolation is appropriate, complete the following:
- prove the mains and apparatus de-energised; and
- apply access permit earths which are independent of any access permit earths applied by another restricted operator (i.e. the restricted operator must not issue an access permit which lists access permit earths which have been applied by another restricted operator for another access permit; and
- complete an access permit which must include the following information:
  - the Isolation Folder number; and
  - all isolation points listed on the Isolation Folder; and
  - any earthing and short-circuiting installed by the Class 1 operator (noted with “by Class 1”); and
  - any earthing and short-circuiting applied by the restricted operator.

A restricted operator may issue multiple access permits under an Isolation Folder - however, only one access permit may be on issue at any given time. Before issuing any subsequent access permit, the previously issued access permit must be cancelled.

Once the work for the restricted operator’s workgroup is completed, the restricted operator must:

- return all access permits that were issued and cancelled by them, to the Isolation Folder; and
- complete Section 2 “Operating/work Complete” of the Isolation Folder.

5.12.5 Class 1 Operator

Once all work is complete a Class 1 Operator must check the Isolation Folder to confirm:

- All restricted operators who have signed onto the Isolation Folder under Section 2 “Operating Commenced” have signed off the Isolation Folder under Section 2 “Operating/work Complete”; and
- All cancelled access permits listed in Section 2 “Operating/work Complete” are located in the Isolation Folder.

Once the above points are confirmed the Class 1 Operator must:

- initial in the “Class 1 Check” column of Section 2 for each row that has been completed by a restricted operator; and
- return the Isolation Folder (with all cancelled access permits) to the Head of Operating and Emergency Response, via an approved process.

5.13 Forms

This section provides information of the Additional Worker Sign On/Off Form and the Working Earths and/or LV Shorts Form.

5.13.1 Additional Worker Sign On/Off Form

Ausgrid

ADDITIONAL WORKER SIGN ON/OFF FORM 12345

WORKER SIGN ON/OFF: Access Permit No.: .....

SIGNING ON - I confirm that (1) I have received information from the recipient about the work to be carried out on the mains and apparatus covered by this Access Permit; (2) I am satisfied I can carry out the work in compliance with the Electrical Safety Rules; and (3) I will treat all other mains and apparatus as alive.				SIGNING OFF - I confirm I have ceased work under this Access Permit and and now regard the mains and apparatus covered by this Access Permit as alive.		
Print name	Signed	Time	Date	Signed	Time	Date

I hereby state that..... who is SIGNED ON is unavailable to SIGN OFF and has ceased work on the mains and apparatus referred to in this Access Permit. Signed ..... Print name .....

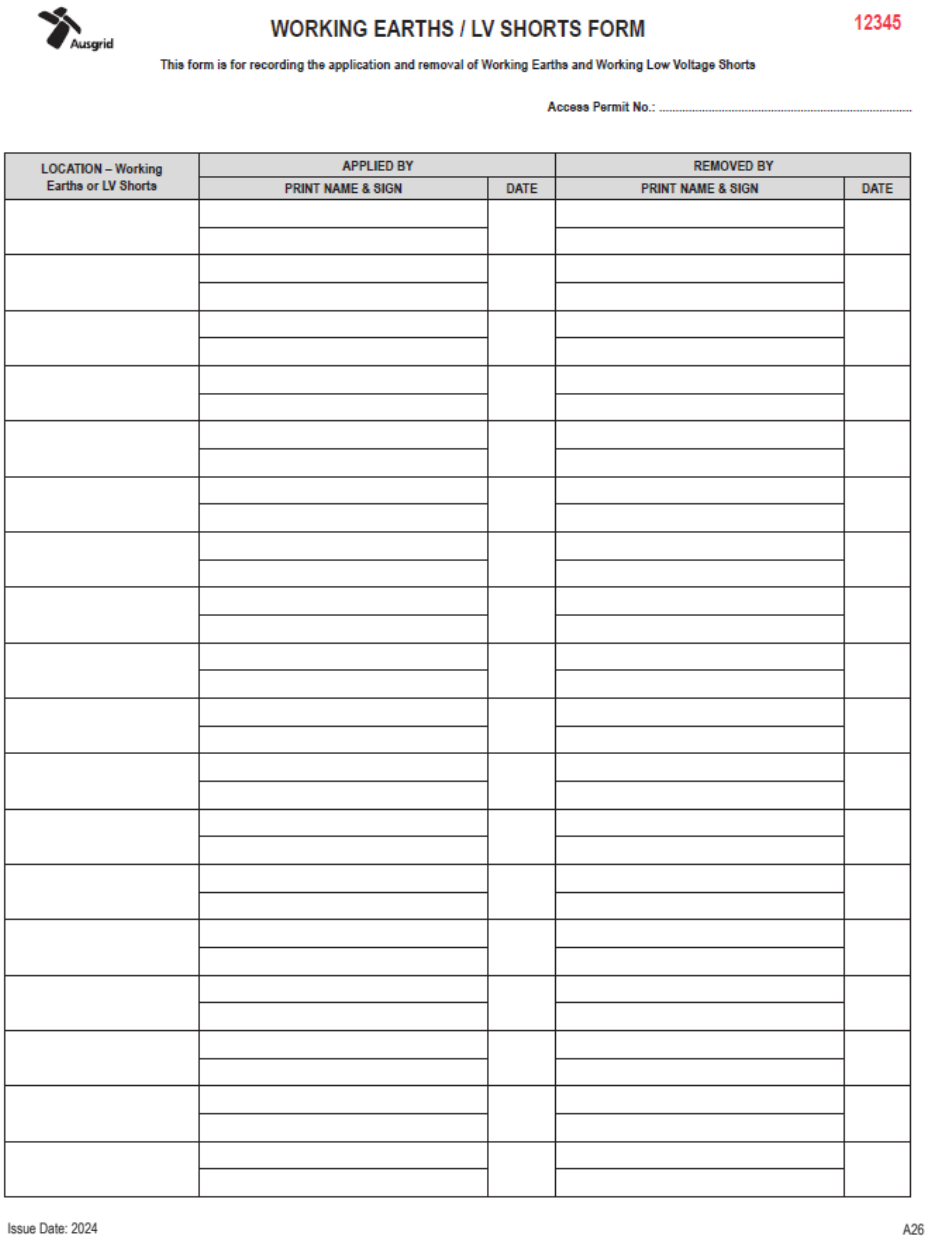
Time ..... Date ..... Witness (sgd)..... Print name .....

Issue Date: 2024 A673

Figure 22 – The Additional Worker Sign On/Off Form

Where there is insufficient space on an access permit for the number of workers required to sign on and off the Access Permit, the Access Permit recipient must complete an Additional Worker Sign On/Off Form (see Figure 22). The form must be completed and attached to the access permit as required by Clause 5.6.6.

5.13.2 Working Earths and/or LV Shorts Form



WORKING EARTHS / LV SHORTS FORM

12345

This form is for recording the application and removal of Working Earths and Working Low Voltage Shorts

Access Permit No.: .....

LOCATION – Working Earths or LV Shorts	APPLIED BY		REMOVED BY	
	PRINT NAME & SIGN	DATE	PRINT NAME & SIGN	DATE

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Figure 23 – The Working Earths / LV Shorts Form

Where working earths and/or working LV shorts are applied, the recipient must complete a Working Earths and/or LV Shorts Form.

The recipient must record the application and removal of all working earths and/or working LV shorts on the form.

When completing a Working Earths/LV Shorts Form, the recipient must record the relevant access permit number, under which the workers are working, on the top right section of the form.

As required by Clause 5.6.10, the recipient must record the Working Earths and/or LV Shorts Form number on the relevant access permit.

When a recipient surrenders an access permit, the recipient must place any referenced Working Earths and/or LV Shorts Form(s) with the relevant access permit and either:

- hand it to the restoring operator: or
- leave it in the Permit Folder.

6 PPE, safety equipment, and tools

This chapter provides the minimum requirements for personal protective equipment (PPE), other safety equipment, and tools required for, and used for, work under these Rules

6.1 General requirements

6.1.1 Checking PPE, safety equipment, and tools

You must check all items of PPE, safety equipment, and tools, before you use them to make sure that they are:

- correct for the intended application; and
- in good working order; and
- free from defects.

Periodically inspect and test the equipment as specified in the Industry Safety Steering Committee - Guide to electrical workers' safety equipment (ISSC 14). If a specific inspection/test is not stated in ISSC 14, the person responsible for the workgroup must examine the equipment at least once every six months.

If you find any equipment that is not in good condition, you must label it and withdraw it from service immediately. Replace withdrawn equipment with equipment in good condition before work begins.

Some items of safety and operating equipment that are electrically inspected, tested, or calibrated periodically have a sticker or label which indicates when the item must be retested or rechecked. Do not use any equipment where the sticker or label is missing, or the item is overdue for re-testing.

6.2 Personal Protective Equipment (PPE)

This section provides the minimum requirements for PPE required for, and used for, work under these Rules.

6.2.1 Protective clothing

Base garments

Full length arc rated clothing (i.e. base garments providing coverage from neck, to wrist, to ankle - e.g. shirt & trousers or coveralls) with a minimum Arc Thermal Performance Value (ATPV) of 4 cal/cm^2 is required for the following situations:

- All work on, near, or in the vicinity of Ausgrid mains and apparatus (see the scope of work in Clause 3.3.1);
- Entry to substations;
- Entry to areas where there are live exposed conductors;
- Entry to underground cable pits.

The requirement for arc rated clothing for entry to substations and areas where there are live exposed conductors applies to both workers and visitors.

Note: The labelling on some protective clothing and other items of PPE may provide the PPE category, formerly known as hazard risk category (HRC), rather than the ATPV. The minimum ATPV relating to the categories is as follows:

Category 1 = 4cal/cm^2 Category 2 = 8cal/cm^2 Category 3 = 25cal/cm^2 Category 4 = 40cal/cm^2

Undergarments

Undergarments, if worn, should contain no more than 10% flammable synthetic materials.

Outer Garments

Outer garments must, as a minimum, be either made of wool, or be Flame Resistant to ISO 14116 (or equivalent).

Outer garments include, but are not limited to, thermal garments, rainwear, high-visibility vests, disposable coveralls.

Figure 24 - Typical Ausgrid clothing and PPE

6.2.2 Footwear

Substation visitors

Substation visitors (instructed persons under the direct supervision of an authorised person, who are entering a substation for the purpose of visual inspection only) must wear, as a minimum, covered, flat-soled footwear, with uppers that do not consist of nylon or other flammable synthetic materials in woven construction.

Safety footwear may be required, depending on site safety signage.

Safety footwear

Workers, other than substation visitors set out above, must wear electrically non-conductive safety footwear when carrying out work under these Rules.

Anti-static safety footwear (which is conductive) must not be worn.

Uppers must not consist of nylon, or other flammable synthetic materials, in woven construction.

The non-conductive footwear must comply with one of the following standards:

- Australian Standard AS/NZS 2210 “Electrically non-conductive” (Marked with the symbol “I”); or
- ASTM F2413 “Electrical Hazard Resistant” (marked with the symbol EH); or
- EN 50321 “Electrically insulating footwear”.

Exception:

Anti-static (conductive) safety footwear may be worn by workers only while climbing conductive sub-transmission structures with energised mains.

Gumboots

Where gumboots are required by these Rules, they must be:

- safety gumboots; and
- made of rubber or PVC; and
- in good condition; and
- be electrically non-conductive, as required above in this Clause under “General”.

6.2.3 LV insulating gloves

Specification

Where required by these Rules, unless otherwise specified, LV insulating gloves must comply with one of the following standards.

- AS 2225 *(superseded)* - '650 Volts Working' voltage rating.
- AS 60903 – Class 00 (500V), Class 00a (650V), or Class 0 (1000V)
- IEC 60903 – Class 00 or Class 0
- EN 60903 – Class 00 or Class 0
- ASTM D120 – Class 00 or Class 0

Where 1000V insulating gloves are required by these Rules, the gloves must comply with one of the following standards:

- AS 60903 – Class 0
- IEC 60903 – Class 0
- EN 60903 – Class 0
- ASTM D120 – Class 0

Other types of gloves (e.g. leather or cotton) are not insulating and must not be relied on for insulating purposes.

Application

Where these Rules require a worker to wear LV insulating gloves, the worker must wear an insulating glove on each hand.

Protective outer gloves

Workers must wear protective outer gloves over LV insulating gloves, as required by Clause 6.2.5

Inspection

Workers must visually inspect and air-test insulating gloves before each use.

Storage

Workers must store insulating gloves as specified in the relevant standard to which they comply.

Cotton inner gloves

Cotton inner gloves may be worn under insulating gloves to absorb perspiration. Inner gloves also provide an additional thermal barrier in the event of exposure to an arc.

6.2.4 Rescue kit insulating gloves

Rescue kit insulating gloves must comply with one of the standards listed above and must be rated at 1000V or Class 0. (Insulating gloves rated at 650V or Class 00 must not be used in rescue kits).

Rescue kit insulating gloves must only be used for rescue purposes.

Protective outers are not mandatory for use with rescue kit insulating gloves used in a rescue situation.

If rescue kit insulating gloves are used, they must be either electrically re-tested prior to reinstatement or discarded.

6.2.5 Protective outer gloves

Where these Rules require a worker to wear LV insulating gloves, the worker must wear protective outer gloves over the LV insulating gloves.

Protective outer gloves must:

- be manufactured from leather; and
- provide adequate mechanical and arc protection for the insulating glove.

Exemptions:

- Protective outer gloves are not mandatory:
  - for use with rescue kit insulating gloves used in a rescue situation; or
  - where the insulating gloves being worn are rated as 'composite' gloves in accordance with the relevant AS/IEC/EN 60903 standard (as indicated by the 'hammer' symbol on the gloves).

- Oil resistant PVC gloves may be used as protective outer gloves over insulating gloves for work on the conductors of oil-filled mains and apparatus. (The PVC gloves must be suitable for use with mineral oil, double dipped, and no greater than 300mm in length).

6.2.6 Arc rated switching gloves

Approved arc rated switching gloves are required for specific operating tasks (see Clause 10.8).

6.2.7 Eye protection

Where required by these Rules, protective eyewear must:

- comply with Australian Standard AS 1337; and
- have non-conductive frames; or
- if glasses with metal frames are worn, they must be covered by non-conductive protective over-glasses.

6.2.8 Face shields

Face shields are used to provide protection to a worker's face, in the event of the worker being subject to an electric arcing fault.

Where required by these Rules, face shield must:

- be arc rated (with a minimum rating of 4 cal/cm^2); and
- be fitted with a chin cup, or arc rated fabric neck guard; and
- be compliant with ANSI Z87.1 or achieve medium impact resistance of AS1337.1

Workers must wear an arc rated face shield when carrying out the following:

- operating work, testing/measuring, or inspection, on or near live exposed LV, as required by Clause 9.5.3; and/or
- work on or near live exposed LV, as required by Clause 9.5.4; and/or
- local operation of LV switches controlling LV distributors, in underground or ground-level situations; and/or
- local operation of HV switchgear, as required by Clauses 10.8.1 and 10.8.2.

Where a workers' face is covered by a face shield compliant with the above, the worker is not required to also wear protective eyewear.

6.2.9 Safety helmets

Where required by these Rules, safety helmets (hard hats) must comply with Australian Standard AS/NZS 1801 "Occupational protective helmets".

Workers must wear a safety helmet in the following situations:

- when carrying out work on or near live exposed LV mains and apparatus, as required by Clause 9.5.3 and Clause 9.5.4; and/or
- when operating LV switches controlling LV distributors, in underground or ground-level situations; and/or
- when operating HV switchgear, as required by Clause 10.8.1 and Clause 10.8.2; and/or
- while within an outdoor switchyard *(except where a site and task specific risk assessment identifies safety helmets are not required)*; and/or
- when working in any situation where the risk assessment, signage, regulations, or the person in charge identifies that safety helmets should be worn.

6.2.10 Hats and headwear

Any hat or headwear that is worn by workers:

- during any work on, near, or in the vicinity of exposed mains and apparatus; and/or
- within a substation or other area where there are exposed conductors; and/or
- within a cable pit;

must not:

- comprise more than 10% flammable synthetic materials; and/or
- contain any exposed metal eyelets or other fully exposed conductive components.

6.2.11 Switching jacket

Approved switching jackets are required for specific operating tasks (see Clause 10.8).

Where a switching jacket is required by these Rules, the switching jacket must be worn as intended, with the front of the jacket fully closed.

6.3 First aid and rescue kits

6.3.1 First-aid kits

Provide portable first-aid kits to treat minor injuries. Carry a first-aid kit on all vehicles and tool trailers and make sure that there is a kit on every worksite. Replace any used or expired items as soon as possible. Inspect all first aid kits every six months to ensure the following:

- the contents match the contents list (to confirm the kit is complete); and
- the items have not passed their expiry date; and
- the container and first-aid markings are not damaged.

Store kits held at a depot in a dry place away from sources of heat, dirt, oil, fumes or corrosives.

Stow kits in vehicles where they are readily accessible but restrained to prevent them getting loose.

Kits must be designed to comply with the NSW Work Health and Safety Regulation 2011 and are described in detail in ISSC 14.

6.3.2 LV rescue kits

As required by Clauses 9.5.3 and 9.5.4, an LV rescue kit must be in place when workers are carrying out work on or near live exposed LV mains and apparatus.

The kit which is relevant to the situation in which the work is being carried out, and the required location of those kits, is set out in Table 10 below.

Rescue kits must meet the requirements of ISSC 14.

Note: Workers must also deploy emergency rescue kits that are required for purposes other than work on or near live exposed LV mains and apparatus (e.g. confined spaces, working at heights) in accordance with their employer's safe systems of work.

Table 10 – Location of LV rescue kits for work on or near live exposed mains and apparatus

Situation	Rescue kit required	Required rescue kit location
When working on or near live exposed overhead mains from a pole, pole platform, or ladder.	Pole-top rescue kit	At the base of every pole from which a person is working aloft.
Working on or near live exposed LV mains and apparatus from an awning on a building	Pole-top rescue kit	Adjacent to the base of the ladder used to access the awning.
Working on or near live exposed LV mains and apparatus, at or below ground level	Low voltage rescue kit	In a position which is readily available and accessible to the safety observer, and outside the MSWD from live exposed conductors.

Figure 25 - Pole top rescue kit

Figure 26 - Low voltage rescue kit

6.4 Detectors and proving equipment

6.4.1 HV detectors

Use HV detectors (e.g. Modiewarks and phasing indicators) to prove that HV conductors are de-energised or for phasing HV conductors. Fit the detectors onto operating sticks or rods (where required) and only use within the limits of the voltage ratings marked on them by the manufacturer.

Test detectors immediately before and after use.

Note: HV detectors designed to detect alternating current will not detect direct current or static charges.

6.4.2 LV detectors

Rating

Test lamps used on live LV mains and apparatus must be rated at (IEC 61010) Category IV 300V, as a minimum.

All other contact type instruments used on live LV mains and apparatus must be rated at (IEC61010) Category IV 600V or Category III 1000V.

Confirming voltage

Only the following LV detectors may be used for confirming phase-to-phase or phase-to-neutral/earth voltages:

- test lamps; or
- dual probe, contact type volt meters/testers/indicators

Proving de-energised

Only the following LV detectors may be used to prove exposed LV conductors (which are normally live or intended to become live) are de-energised:

- test lamps; or
- dual probe, contact type volt meters/testers/indicators; or
- in situations where the contact type detectors listed above are not reasonably practicable, authorised operators may use Modiewark non-contact voltage detectors to prove LV mains and apparatus are de-energised.

Other LV detectors, such as non-contact voltage detectors (proximity testers) or single probe contact type voltage detectors (e.g. the LV-5 detector), may be used to indicate the presence of AC voltage on exposed metalwork in accordance with Section 10.1 - Safe-to-touch testing of network assets, but they must not be used to prove exposed LV conductors (which are normally live or intended to become live) are de-energised.

Ausgrid employees must refer to Technical Guide T0032 – Safety Equipment – Care, Use and Inspection – Low Voltage Instruments, for information on approved LV detectors.

6.4.3 Cable identification equipment

As required by Clauses 9.3.1 and 9.9.2, prior to remotely cutting an underground cable, authorised workers must positively identify the underground cable to be worked on at the worksite.

Where cables are to be identified by electrical or signal generation and detection methods, workers must use only approved equipment compliant with the Ausgrid Technical Guide T0003 – Cable Identification and Phasing.

Figure 27 - Live LV cable identification equipment

Figure 28 - Cable identification generator and receiver

6.4.4 Remote cable cutting equipment

Remote cable cutting equipment must be used to prove insulated underground cables are de-energised at the location of the proposed work.

Workers must not use handheld cable cutters or stabbers to prove cables are de-energised.

Remote cable cutting equipment must comply with the Ausgrid Technical Guide T0031 – Remote Cable Cutting Equipment.

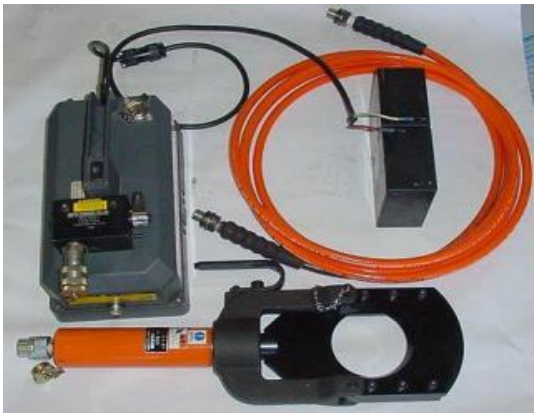

Figure 29 – Remote cable cutting equipment

6.5 Earthing and short-circuiting equipment

6.5.1 High Voltage

Isolated HV mains and apparatus must be earthed and short-circuited to protect workers from induced voltages or unintentional re-energisation of the mains and apparatus.

Earthing and short-circuiting equipment is designed to carry short-circuit current between phases and to earth, limiting the rise in voltage and causing protection equipment to operate.

Earthing and short-circuiting of isolated HV mains and apparatus may be achieved by either the closing of earth switches on apparatus, or the application of portable earthing and short-circuiting equipment (HV earths).

Portable HV earths must be marked with the rated current and time (as shown below in Table 11) and must only be used on apparatus within these limits.

Portable HV earths must be marked with the next inspection and test due dates (see Table 11) and must only be used within these dates.

6.5.2 Low Voltage

LV short circuiting equipment (**LV shorts**) are designed to protect workers against the risk of shock from inadvertent back-feed from distributed energy resources of up to 10kW per phase, by limiting the rise in voltage.

LV shorts must comply with Network Standard NS223 – Low Voltage Short-Circuiting for De-energised Work.

LV shorts must be marked with the next inspection and test due dates (see Table 11) and must only be used within these dates.

Note: LV shorts are not designed to protect against a network distributor being energised from a network source of supply. LV shorts must not be used as HV earths.

Inspection and Test Labels

The following labels must be applied to portable HV earths and LV shorts.

Table 11 – Rating, inspection, and test labels

Label	Example
Rating Provides details of the portable earthing and shorting equipment rating.	
Due for inspection The due for inspection date must be six months from the date of the last inspection	
Due for re-test The due for re-test date must be three years from date of the last test.	

6.6 Screens

6.6.1 LV screens

An LV screen is a barrier of approved non-conductive material which is fitted over live exposed LV mains and apparatus to prevent inadvertent contact.

If an LV screen is installed that meets the following requirements, then the LV mains and apparatus are no longer considered as “exposed”.

The LV screen must:

- Be constructed of approved rigid* non-conductive material (polycarbonate or acrylic); and
- Achieve the requirements of Australian Standard AS 60529 ingress protection rating IP2X (not have any holes or gaps with a diameter of 12mm or greater); and
- Not be in contact with exposed LV mains and apparatus (unless approved); and
- Be fixed in position by means that prevent it being inadvertently dislodged.

*A barrier of flexible insulating material complying with the requirements of Australian Standard AS4202 Class II, or IEC 61112, may be used as a screen for exposed 110V ac conductors on substation panels.

Only authorised persons can erect and remove LV screens, and they must follow approved procedures.

LV screens intended for permanent installation must be approved by Ausgrid – Asset Management – Engineering.

LV screens intended for temporary installation within a substation, for a duration greater than one day, must have a substation screening identification tag attached, as required by Clause 8.2.11.

Before starting work, you must inspect the screens to ensure that they are not dislodged or damaged. In particular, establish that the work will not make any screen ineffective (e.g. by removing a phase barrier, screen panel or making a hole in a screen—see Figure 30). If you doubt the effectiveness of a screen, refer the matter to the person in charge of the work.

Ensure there is no interference with erected screens and that materials or goods are not stacked against them. Wires, rods, conduits or similar objects must not penetrate between the screens or into a screened zone.

During erection of the screens in a substation, consider worker pathways between where the work is carried out and other parts of the substation.

Figure 30 - A screen over exposed LV apparatus in a substation.

6.6.2 Earthed HV screens

An earthed screen is barrier of earthed conductive material, which is designed to prevent access to live exposed HV conductors.

Earthed screens must be specifically designed for the apparatus and must only be installed by Class 1 Operators, to an approved procedure.

Figure 31 – An earthed screen for Hazemeyer switchgear

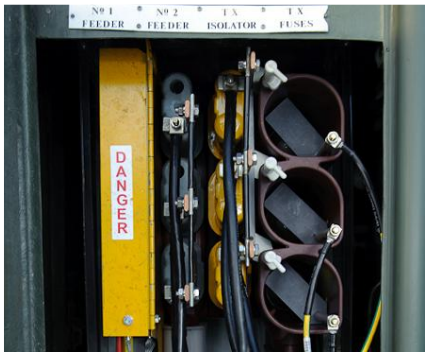

Figure 32 – An earthed screen in place covering live feeder spouts (note the busbar is earthed)

6.7 Low Voltage temporary insulating covers and insulating mats

6.7.1 Temporary insulating covers

LV temporary insulating covers are used for work on or near live LV exposed mains and apparatus. See Section 9.5 for information regarding the use of temporary insulating covers for work on or near live exposed LV conductors.

Where LV temporary insulating covers are required by these Rules, the insulating covers must comply with one of the following standards (unless otherwise approved by Ausgrid):

- Australian Standard AS 4202 – Insulating Covers for Electrical Purposes;
- IEC 61112 – Live Working – Electrical Insulating Blankets;
- IEC 61229 – Rigid Protective Covers for Live Working on a.c. Installations;
- IEC 61479 – Live Working – Flexible Conductor Covers (Line Hoses) of Insulating Material.

6.7.2 Insulating mats

Insulating mats are used to insulate workers at ground level from earth potential, for work on or near live exposed LV mains and apparatus. (See Clause 9.5.4 for information regarding the use of insulating mats for work on or near live exposed LV conductors).

Where insulating mats are required by these Rules, they must comply with either Australian Standard AS/NZS 2978 – Insulating Mats for Electrical Purposes (superseded), or Australian Standard AS/NZS 61111 – Live Working - Electrical Insulating Mats (Class 0).

Figure 33 - LV temporary insulating covers and an insulating mat at a kiosk substation

6.8 Ladders and platforms

6.8.1 Using appropriate ladders

The following table outlines the suitable use of ladders.

Table 12 - Ladder usage

Ladder Type	Use or comment
Non-conductive portable ladder (e.g. fibreglass or timber)	Suitable for work on or near live electrical mains and apparatus (exposed or insulated). **Note:** If the non-conductive portable ladder (e.g. fibreglass or timber) has metallic components such as brackets, rungs or platforms – the metallic components must not be brought closer than the MSWD to live exposed mains and apparatus.
Conductive portable ladders (including ladders made with wire-reinforced stiles)	Must not be used in substations (see Clause 11.1.2). Must not be used by workers who are carrying out work on or near live mains and apparatus (insulated or exposed). Must not be brought closer than the MSWD to live exposed mains and apparatus.

Ladder Type	Use or comment
	Must not be used to ascend poles that contain or support mains and apparatus. **Exception:** Approved special purpose conductive ladders may be used for specific tasks when used following an approved SWMS (e.g. using a conductive hook ladder to access steel towers and sub-transmission mains).

6.8.2 Portable pole platforms

Portable pole platforms provide a work platform for overhead line work and must comply with ISSC 14. Use only approved pole platforms appropriate for that particular type of pole (e.g. wood, concrete, steel or composite fibre poles) and the type of work.

Do not use pole platforms on steel or concrete street lighting columns as they are not designed to be climbed.

6.9 Tools for use on or near live mains and apparatus

6.9.1 LV tools – insulated

Refer to Chapter 18 Glossary – General for the definition of an insulated tool.

Examples of LV insulated tools are LV operating sticks, LV height measuring sticks, and LV insulated vegetation control tools.

Insulated tools must be periodically inspected and retested in accordance with ISSC14.

Insulated tools may only be used on live exposed LV mains and apparatus by authorised persons who have been trained in their use and are working to an approved procedure.

6.9.2 LV tools – covered

Covered tools are used for work on or near live exposed LV as one of the controls to manage the risk of creating an arc between conductors.

Refer to Chapter 18 Glossary – General for the definition of a covered tool.

Live work controls must be in place for their use on live LV mains and apparatus, as required by Clause 9.5.4.

Covered tools must only be used for work on or near live exposed LV if the insulating material covering the tool is in good condition.

Figure 34 – Examples of covered tools.

6.9.3 HV insulated tools - operating and height measuring sticks

Figure 35 - Operating stick with link attachment

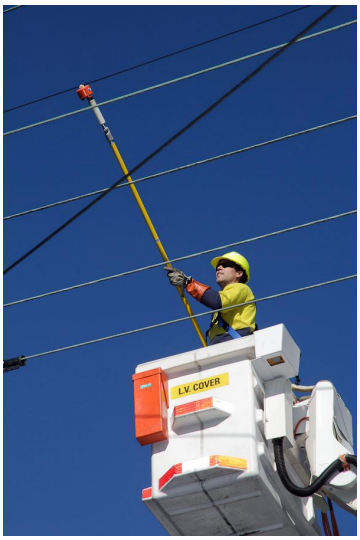

Figure 36 - Using an operating stick with an approved voltage detector to prove HV overhead lines are de-energised.

Operating sticks

Operating sticks are HV insulated tools.

They are used for carrying out operating work on exposed mains and apparatus (e.g. operating links and fuses, proving mains are de-energised with a voltage detector, attaching earthing and short-circuiting equipment).

Operating sticks and height measuring sticks may only be used on live exposed HV mains and apparatus by authorised persons who have been trained in their use.

Telescopic operating sticks must have a foam filled top section. Only this foam filled section is rated for HV. The remaining hollow fibreglass sections are rated only for LV. Authorised persons using telescopic operating sticks must not allow sections that are rated for LV only, to come within the MSWD of live exposed HV conductors.

Height measuring sticks

Height measuring sticks are HV insulated tools.

They are used to measure the height of overhead conductors.

Height measuring sticks may only be used on live exposed HV mains and apparatus by authorised persons who have been trained in their use.

Telescopic height measuring sticks must have a foam filled top section. Only this foam filled section is rated for HV. The remaining hollow fibreglass sections are rated only for LV. Authorised persons using telescopic height measuring sticks must not allow sections that are rated for LV only, to come within the MSWD of live exposed HV conductors.

General

Operating sticks, and height measuring sticks must only be used on or near live exposed HV mains and apparatus at a voltage equal to or less than the voltage rating of the stick.

They must be electrically tested at least every 12 months.

They must be marked with the following:

- Rated voltage; and
- Date tested – or next test due date; and
- Name of the approved testing authority (if not tested by Ausgrid).

(Refer to Distribution Guideline DG230 – Interim Labelling Guideline for Live Line, Operating and Measuring Sticks)

Authorised persons using insulated operating sticks and height measuring sticks must inspect the sticks prior to each use to confirm they are free from defects and are within test date. They must not be used if the test date is missing, cannot be read, or the retest date has passed.

Figure 37 – An example of a test sticker for HV insulated tools

6.9.4 HV insulated tools - vegetation control

HV insulated tools used for vegetation control must be designed to withstand contact with HV mains and apparatus. (Examples of these insulated tools include hydraulic cutting saws, pruning tools and their attachments). These tools must only be used near in-service mains and apparatus which are energised at a voltage equal to or less than the voltage rating marked.

Clean and examine HV insulated tools before use and as required during use. Test at least every six months (refer to ISSC14). Label accordingly, including the date of test and name of the approved testing authority.

Figure 38 – A vegetation control worker a HV insulated hydraulic cutting saw

6.10 Portable electric tools and equipment

6.10.1 Tools and equipment

LV portable electric tools and equipment must be tested and tagged in accordance with Australian/New Zealand Standard AS/NZS 3760 – In-service Safety Inspection and Testing of Electrical Equipment, and AS/NZS 3012 – Electrical Installations - Construction and Demolition Sites.

LV portable electric tools and equipment must be protected by a Residual Current Device, as required by Clause 6.10.2.

Figure 39 – Tested tag on LV portable electrical tool protected by an RCD

6.10.2 Residual Current Devices

Except for specific work that is documented in an Ausgrid controlled procedure (e.g. process control plan), workers must comply with the SafeWork NSW Code of Practice: Managing Electrical Risks in the Workplace, and the SafeWork NSW fact sheet: Electrical Practices - Construction and Demolition Sites when using handheld and portable electrical tools and equipment.

Use an RCD with a rated tripping current not exceeding 30mA to protect all handheld and portable equipment. This RCD protection can be provided by either:

- RCDs installed as part of the fixed wiring of an installation (protecting socket outlets); and/or
- approved portable power boards fitted with RCDs.

If you do not know that RCDs are installed as part of the fixed wiring of an installation, you must use approved portable power boards fitted with RCDs.

The use of RCDs does not eliminate the need for other required safety procedures relating to the use, maintenance and storage of handheld and portable equipment.

6.10.3 Temporary supply points for tools and equipment

Workers must use only approved temporary connection devices to provide LV supply for powered tools and equipment.

Any connection of approved devices must be made by electrically qualified persons using an approved procedure.

6.11 Fire extinguishers

6.11.1 Low voltage

Only the following fire extinguishers are suitable for use on live LV mains and apparatus:

- Carbon Dioxide (CO_2) – red cannister with a black band - marked Class (E); and
- Dry powder – red cannister with a white band – marked Class (E).

Other types of fire extinguisher (water or foam) must not be used on live LV mains and apparatus.

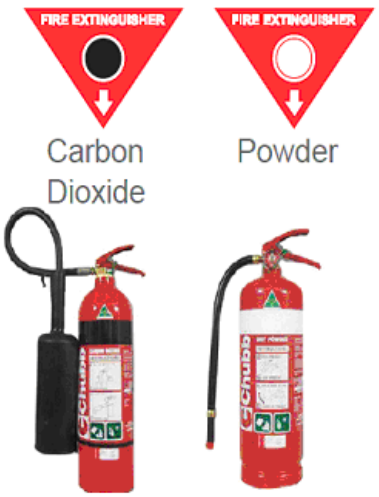

Figure 40 – Class E fire extinguishers (carbon dioxide and chemical powder) are suitable for use on LV equipment fires.

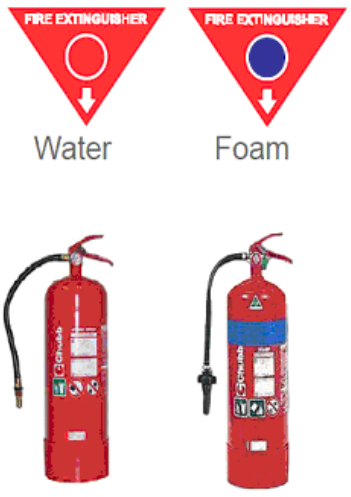

Figure 41 - Pressurised water and foam must not be used on live mains and apparatus.

6.11.1 High voltage

Workers must not use any type of fire extinguisher on live exposed HV mains and apparatus.

7 Minimum Safe Working Distances

This Chapter contains the following clearances that must be maintained from live exposed mains and apparatus:

- Safe working distances for persons:
  - Minimum Safe Working Distance **(MSWD)** (Table 13)
  - Situations where there are reduced MSWD (refer to Section 7.2)
  - Absolute limit of approach (Table 14)
- Clearances for mobile plant and loads (Table 16)
- Clearances to scaffolding (Table 18 and Table 19)
- Clearances for street lighting (Table 21)
- Also included in this section are minimum fixed clearances. These are the minimum clearances that must be achieved by points of isolation (other than commercially manufactured switchgear which complies with national or international standards).

7.1 Minimum Safe Working Distances for persons

7.1.1 Overview

A MSWD is the closest distance that a person (or any part of the person's body, or conductive materials with which they are in contact) may approach live exposed conductors, unless the person is:

- working under the conditions for reduced MSWD (see Section 7.2); or
- authorised to work on or near live exposed conductors and working to an approved live work procedure (see the Ausgrid HV Live Work Manual for HV or Section 9.5 for LV).

The MSWD are dependent on the nominal voltage and whether the person is classified as an ordinary person, instructed person or authorised person (see Clause 7.1.2 for classification of persons).

The MSWD are shown in Table 13.

7.1.2 Conductive materials

Workers must treat all materials (solids, liquids, gases and flames) as conductors of electricity unless the materials are rated as insulated/insulation for the relevant voltage and/or approved for use within MSWD.

7.1.3 Classification of persons

MSWD depend on the personnel classification. These include:

- ordinary person
- instructed person
- authorised person.

Refer to Chapter 17 Glossary – Personnel, for the definitions of ordinary, instructed, and authorised, persons.

7.1.4 Minimum Safe Working Distances

Table 13 provides the MSWD for ordinary, instructed, and authorised persons. The remaining tables in this section describe various circumstances where these distances will vary. For example, the distances when using cranes, plant and attached loads to live electrical apparatus (refer to Table 16).

Tools or objects that are specifically designed for testing, operating, or working on live exposed conductors may be brought within the MSWD, provided the tools or objects meet any relevant test specifications.

Table 13 - Summary of MSWD for ordinary persons, instructed persons, and authorised persons.

Nominal Line Voltage	Ordinary Persons (m)	Instructed Persons (m)	Authorised Persons (m)
Extra-low voltage (ELV) – nominal voltage (V)			
Direct current (dc)			
0 – 60 dc	No mandatory controls required to manage the risk of electric shock		
>60 – 120 dc	No contact allowed	Insulated contact only *(see note 1)*	Insulated contact only *(see note 1)*
Alternating current (ac)			
0 – 25 ac	No mandatory controls required to manage the risk of electric shock		
>25 – 50 ac	No contact allowed	Insulated contact only *(see note 1)*	Insulated contact only *(see note 1)*
Low voltage (LV) – nominal voltage (V)			
Direct current (dc)			
>120 – 1500 dc	3.0	0.5	0.5
Alternating current (ac)			
>50 – 1000 ac	3.0	0.5	0.5
High Voltage (HV) – nominal voltage (kV)			
Alternating current (ac)			
>1 - 11	3.0	0.7	0.7
12.7kV SWER	3.0	0.7	0.7
22	3.0	0.7	0.7
33	3.0	1.0 *(see note 2)*	1.0 *(see note 2)*
66	3.0	1.0	1.0
132	3.0	1.5	1.5
220	6.0	2.5	2.5
330	6.0	3.0	3.0
500	8.0	4.0	4.0

Note 1: Tools covered with insulating material that is visually assessed as being in good condition are sufficient to meet the requirement for insulated contact with extra low voltage (ELV) conductors.

Note 2: When a person is walking within an outdoor substation below exposed 33kV mains and apparatus, the MSWD may be reduced to 0.9m.

Increased MSWD

Some categories of work will require clearances greater than those in this table. Examples include vegetation management (Refer to Section 10.5) and the use of cranes and mobile plant near overhead mains (Refer to Section 7.5)

Reduced MSWD

Some categories of work allow authorised persons to work to reduced MSWD. Refer to Section 7.2 for details.

7.2 Reduced Minimum Safe Working Distances

This section describes the requirements for working to a reduced MSWD.

7.2.1 Working to a reduced MSWD

Authorised persons may approach closer to live exposed HV mains and apparatus than the MSWD set out in Clause 7.1.4 only for the following tasks:

- appropriately authorised operators who are performing operating work within the scope of their operating authority; or
- authorised persons who are:
  - carrying out a task for which reduced MSWD are approved; and
  - following an approved written instruction (see Clause 7.2.4); and
  - applying approved controls; and
  - observed by a safety observer (see Clause 7.2.3).

  Note: Work of this type is restricted to very specific tasks where live mains and apparatus could become exposed during the work (e.g. adjusting spout shutters on indoor switchgear).

Authorised persons who are working to reduced MSWD must remain outside the absolute limits of approach from live exposed HV mains and apparatus, as set out in Clause 7.2.2.

7.2.2 Absolute limit of approach

Authorised persons who are working to reduced MSWD must not approach live exposed mains and apparatus any closer than the absolute limits of approach that are set out below in Table 14.

Table 14 – Absolute limit of approach distances

Nominal Line Voltage (kV)	Absolute Limit of Approach (m)
1 - 33	0.4 (see note)
66	0.6
132	1.2
220	1.9
330	2.0
500	3.2

Note: When completing operating work on specially designed equipment (using an insulating operating stick or approved earthing equipment), the absolute limit of approach can be reduced from 0.4m to 0.3m for live exposed conductors up to and including 22kV.

7.2.3 Requirements for safety observers

Where a safety observer is required by Clause 7.2.1 for work which is carried out utilising a reduced MSWD, the safety observer must:

- be an electrically qualified authorised person;
- know the hazards and appropriate safety controls required for the work;
- achieve the training, competency, and other criteria required, as set out in the Ausgrid training matrix and/or authorisation system, for an authorised person under these Rules; and
- be positioned within audible range of, and in direct line of sight to, the worker who is carrying out the work.

7.2.4 Written instructions

Written instructions relating to reduced MSWD must be issued with the authority of the Ausgrid Group or Business Unit Manager and must include the network voltage, the required controls, and the minimum clearance (which must be no less than the absolute limit of approach as set out in Clause 7.2.2).

These instructions may be either standard procedures or specific instructions for an individual job.

7.3 Maintaining MSWD

Persons who plan, and persons who carry out, work in the vicinity of live exposed mains and apparatus must consider if additional controls, such as those outlined below, are required to ensure that workers maintain the relevant MSWD:

- visual indication; and/or
- signage; and/or
- hoarding; and/or
- safety observer(s).

Figure 42 – An example of hoarding used to prevent workers encroaching MSWD

7.4 Fixed clearances

This section describes minimum fixed clearances for high voltage (HV) work.

7.4.1 Minimum fixed clearances for high voltage work

Isolated HV mains and apparatus must be separated from live exposed conductors by the minimum fixed clearances detailed in Table 15 – Minimum fixed clearances for high voltage work.

Exception: Minimum fixed clearances do not apply to commercially manufactured switchgear which complies with national or international standards.

Table 15 – Minimum fixed clearances for high voltage work

Nominal Line Voltage (kV)	Minimum Fixed Clearance (m)
1 - 11	0.16*
11 - 33	0.32
66	0.63
132	1.1
220	2.1
*For voltages up to and including 11kV, increase the clearance (0.32m is recommended) if there is a risk of birds or rodents bridging the gap.	

Note: Minimum fixed clearances are not for construction design purposes. Refer to the relevant Network Standards for construction design clearances.

7.5 Mobile plant

This section describes the minimum approach distances for mobile plant from live exposed mains and apparatus, and the controls required.

7.5.1 Scope

The approach distances and controls in this section apply for all work relating to the construction, maintenance, and operation of the Ausgrid network.

Notes:

- Mobile plant includes cranes, hoists, borer/erectors, EWPs and associated loads.
- The distances in this section do not apply to external parties who are working under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines, or the SafeWork Guide – Work Near Underground Assets.

7.5.2 Operator classification

Untrained Persons

The approach distances in Table 16 column B apply where the mobile plant operator:

- is not authorised in accordance with the Ausgrid training matrix and/or authorisation system; and
- does not hold a NSW or nationally recognised qualification for working in the vicinity of live electrical apparatus as a non-electrical worker.

Trained Persons

The approach distances Table 16 column C apply where the mobile plant operator:

- is not authorised in accordance with the Ausgrid training matrix and/or authorisation system; but
- holds a NSW or nationally recognised qualification for working in the vicinity of live electrical apparatus as a non-electrical worker.

Authorised Persons

The approach distances in Table 16 column D apply where the mobile plant operator and the safety observer are authorised in accordance with the Ausgrid training matrix and/or authorisation system.

7.5.3 Minimum approach distances

The approach distances in Table 16 apply to mobile plant that is used in conjunction with the controls set out in this section.

Note: Grab cranes, or floating cranes, or their loads, must not approach closer than the distances shown in column B of Table 16

Table 16 - Minimum approach distances of mobile plant and loads to live exposed conductors (and insulated overhead mains).

Nominal Line Voltage (kV)	Minimum Approach Distance (m)				
	Without an Observer	With an Observer			
	All Persons (A)	Untrained Persons (B)	Trained Persons (C)	Authorised Persons (D)	
				Uninsulated plant	Insulated plant *(Note 1)*
LV (exposed)	3.0	3.0	1.0	0.5	Physical clearance (no contact allowed)

Nominal Line Voltage (kV)	Minimum Approach Distance (m)				
	Without an Observer	With an Observer			
	All Persons (A)	Untrained Persons (B)	Trained Persons (C)	Authorised Persons (D)	
				Uninsulated plant	Insulated plant *(Note 1)*
LV (insulated overhead)	3.0	3.0	1.0	*(Note 2)* 0.5 *(Note 3)* Physical clearance (no contact allowed)	Physical clearance (no contact allowed)
1 – 11	3.0	3.0	1.2	0.7	
12.7kV SWER	3.0	3.0	1.2	0.7	
22	3.0	3.0	1.2	0.7	
33	3.0	3.0	1.4	1.0	
66	3.0	3.0	1.4	1.0	
132	3.0	3.0	1.8	1.5	
220	6.0	6.0	2.4	2. 4	
330	6.0	6.0	3.7	3.0	
500	8.0	8.0	4.6	4.5	
Up to 1500V dc	3.0	3.0		1.0	

Note 1: Insulated plant = insulated portions of mobile plant complying with Clause 7.5.11.

Note 2: Without temporary insulating covers applied to the insulated mains as per Clause 10.2.3.

Note 3: With temporary insulating covers applied to the insulated mains as per Clause 10.2.3.

7.5.4 Safety observer

Any time mobile plant is operating, and there is a reasonable probability the mobile plant or load will move within the approach distances provided in Column A of Table 16, the mobile plant must be observed by a safety observer.

The safety observer is required to observe the approach of the crane, plant or load to electrical apparatus and to warn the mobile plant operator in sufficient time to ensure the relevant approach distances are maintained.

The safety observer must:

- be trained in accordance with the Ausgrid training matrix and/or authorisation system; and
- be able to clearly observe the approach distances; and
- be able to communicate with the mobile plant operator at all times while the mobile plant is operating; and
- be positioned to minimise the risk of exposure to hazards.

The safety observer must not:

- carry out any other duty during the period of observance; or
- observe more than one item of mobile plant at any period of observance; or

- be located on the work basket of an EWP during the period of observance.

Exceptions:

- A safety observer is not mandatory for an item of stationary plant which:
  - is supporting a static load comprising a pole with inadequate strength or footing; and
  - is located outside the distances in Table 17 Column D from live exposed conductors (except where the exposed conductors are low voltage conductors that have been covered by temporary insulating covers that comply with Clause 6.7).
- A safety observer is not mandatory where an effective limiting device has been set to prevent any component part of the mobile plant or load approaching closer than the relevant minimum approach distances in Table 16, provided that:
  - the limiting device is effective under stress conditions; and
  - the limiting device is inspected and tested at regular intervals.

7.5.5 Persons in contact with the plant or loads

While the mobile plant is operating within the distances of Column A of Table 16, only persons implementing the controls listed below may be in contact with any part of the mobile plant or load, and the ground or earthed situation.

The mobile plant operator

The mobile plant operator may operate the controls of cranes or plant while standing on the ground, or while in contact with an earthed situation, only if one or more of the following controls are implemented:

- The mobile plant or the controls are effectively insulated in accordance with Clause 7.5.11; or
- The mobile plant operator wears LV insulating gloves or gumboots, and the voltage of any overhead electrical apparatus does not exceed 1000 volts; or
- The mobile plant operator stands on an equipotential metallic mat which is electrically connected to all metalwork associated with the controls.

Authorised persons

Workers at the worksite, other than the mobile plant operator, may contact the mobile plant or load while standing on the ground, or while in contact with an earthed situation, only under the following conditions:

- The contact is with mobile plant that is insulated in accordance with Clause 7.5.11; or
- The contact is with a load consisting of a timber or composite fibreglass pole; or
- They are holding a non-conductive tag line which is attached to the load to control the movement of the load; or
- The contact is with a load which is suspended by a non-conductive lifting rope, or a conductive lifting rope with a non-conductive section or sling, which is located between the load and the overhead mains; or
- The workers are wearing LV insulating gloves or gumboots.

Ordinary persons

Where there is a risk of persons, other than those implementing the controls listed above, making contact with the mobile plant and the ground at the same time, an exclusion zone must be established around the plant and/or load.

7.5.6 Stability of the plant or load

Appropriate controls must be implemented to prevent conditions such as terrain, weather, or the functional behaviour of the plant, causing the plant or load to come within the approach distances in Table 16. Examples of these controls include, but are not limited to:

- Preparation of the surface on which the mobile plant is required to operate; and/or
- Mechanical limiting devices on the mobile plant; and/or
- Non-conductive tag lines attached to loads.

7.5.7 Earthing requirements

Mobile plant (that is not insulated in accordance with Australian Standard AS1418.10) must be earthed as follows:

Within a substation

Mobile plant that is not in transit within a substation must be bonded to the substation earth grid, as follows:

- Where the mobile plant is operating and there is a reasonable probability the mobile plant or load will come within the distances in Table 16 Column A, the earthing conductor must be capable of carrying the prospective earth fault current.
- For all other situations, the earthing conductor must have a current carrying capacity equivalent to no less than 16mm^2 copper.

External to a substation but operating within it

When mobile plant is positioned outside of a substation and operating within the substation:

- Where signage indicates the substation fence is not connected to the substation earth grid:
  - a site-specific earthing study must be carried out to determine the controls required.
- In all other situations:
  - the mobile plant must be connected to the substation earth grid (as if it was positioned within the substation); and
  - a temporary non-conductive barrier must be established to limit contact with the mobile plant while it is connected to the substation earth grid; and
  - the controls required by Clause 7.5.5, must be applied to persons who are in contact with the mobile plant or associated loads.

Refer to Network Standard NS222 for further details;

External to a substation

Whenever mobile plant is operating within the approach distances of Table 16 Column A, the mobile plant must be connected to earth by a cable which is capable of carrying the prospective earth fault current. The method of connection to earth is to follow the order of preference below:

1. A permanently installed system earth (excluding energised SWER substation earths);
2. An alternate earth connection such as a pole nail or ground anchor;
3. A temporary driven earth stake;
4. An earthing chain (minimum 16mm steel chain with at least 300mm in contact with the ground surface). **Note:** An earthing chain must only be used where there is no permanent earth available, and a temporary earth stake cannot be driven due to hard pavement or sealed road surfaces.

Exception: The earthing requirements above are not required where a site-specific earthing study mandates alternate controls instead of earthing.

For work in the vicinity of overhead sub-transmission mains

For work on sub-transmission mains and distribution mains that run parallel to sub-transmission mains – the mobile plant must be earthed and/or equipotentially bonded as required by Section 0.

For work on or near exposed HV conductors

The mobile plant must be earthed as required by the Ausgrid HV Live Work Manual.

7.5.8 Inadvertent contact with live exposed conductors

Step and touch potential risk

If uninsulated mobile plant contacts live overhead conductors -

- A competent person at the site must immediately:
  - Contact the Ausgrid Control Room or Ausgrid Emergency number; and
  - Remain at least 8m from the mobile plant and in a position to keep other persons at least 8m clear of the plant.

- The mobile plant operator should:
  - Remain inside the cabin or on the vehicle (where safe to do so); and
  - Warn all other persons to keep away from the plant and not touch any part of the crane, rope, or load; and
  - Without anyone approaching the mobile plant, operate the plant in such a manner to break contact, where possible;
  - When unable to move the plant clear of the overhead conductors, remain inside the cabin, or on the vehicle, and take no further action until advised that the mains have been isolated, proved de-energised, and earthed/short-circuited as required by these Rules.
  - Only when it is essential to leave the cabin or vehicle because of fire, or some other hazard, jump clear of the vehicle (as far from the vehicle as safely possible) – do not make contact with the vehicle and the ground at the same time. When moving away from the plant, jump, hop, or shuffle, to manage the risk of step potential.

If the plant operator is immobilised, the mains must be isolated, proved de-energised, and earthed/short-circuited as required by these Rules, before assistance is given.

Tyre pyrolysis

If uninsulated plant makes contact with exposed high voltage conductors, the risk of tyre pyrolysis (an explosion of the tyre caused by the combination of hydrocarbons, heating, and pressure increase, resulting from the electrical current through the tyre) must be managed by establishing a suitable exclusion zone.

For work by or for Ausgrid, refer to the Plant and Equipment requirements within the Ausgrid Health and Safety Management System.

7.5.9 Mobile plant near live exposed LV

Mobile plant and loads may come within the distance of Table 16 Column D from live exposed LV conductors only if the mobile plant is used as part of a LV live work procedure in accordance with Clause 9.5.6.

7.5.10 Mobile plant near live exposed HV

Mobile plant and loads may come within the distances of Table 16 Column D from live exposed HV conductors only if the mobile plant is used as part of a HV live work procedure in accordance with the Ausgrid High Voltage Live Work Manual.

7.5.11 Tasks requiring an insulated EWP

If workers are using an EWP to carry out the following tasks, the EWP must be an insulated EWP, rated for LV as a minimum:

- work on or near live exposed LV mains and apparatus; and/or
- work on or near live insulated LV overhead mains and apparatus; and/or
- carrying out operating work, other than earthing overhead mains and apparatus that are already earthed and short-circuited.

7.5.12 Insulation requirements for elevating work platforms

An EWP must be regarded as being insulated only if the work basket is fully insulated to prevent inadvertent exposure to persons on the work basket to a difference of potential between the structural components of the work basket, and the insulation of the elevating work platform complies to Australian Standard 1418.10 – Cranes, Hoists, and Winches: Part 10 – Mobile elevating work platforms.

Testing of the EWP insulation must be carried out in accordance with the requirements of Australian Standard AS1418.10 – Cranes, hoists, and winches. Part 10: Mobile Elevating Work Platforms

A current test certificate indicating that the EWP has passed the necessary routine insulation tests must be readily available at the worksite.

The following information must be recorded:

1. testing organisation name
2. test date

3. EWP ‘passed’ or ‘failed’
4. test equipment number and calibration date.

Note: The test certificate must include items 1 to 4 inclusive. Item 4 may be excluded where the accredited service provider (ASP) demonstrates (to the satisfaction of Ausgrid’s authorised representative) that these details are readily available from the ASP’s quality system.

7.6 Vehicles

This section provides the minimum approach distances for vehicles (and mobile plant that is stowed for transit) which are driven by persons in the vicinity of overhead mains and apparatus.

7.6.1 Minimum approach distances – overhead mains and apparatus

No part of a vehicle in transit may approach live overhead mains and apparatus closer than the distances in Table 17. This includes the load, exhaust pipe, or attachments such as rotating/flashing lights or radio aerials. Refer to Figure 43 below.

Figure 43 – An illustration of the maximum overall height of a vehicle ***(Image courtesy of SafeWork NSW)***

Table 17 - Minimum approach distances for vehicles from live overhead mains and apparatus

Nominal Line Voltage (kV)	Minimum Approach Distances for Vehicles in Transit – from Live Overhead Mains and Apparatus (m)
LV	0.6
1 – 11	0.9
12.7kV SWER	0.9
22	0.9
33	0.9
66	1.5
132	2.1
220	2.9
330	3.4
500	4.4
up to 1500Vdc	0.9

7.6.2 Equipotential bonding requirements - vehicles

Stationary vehicles within substations, which have equipment in contact with isolated mains and/or apparatus (e.g. via electrical test leads or oil hoses), must be bonded to the substation earth grid via a conductor with a current carrying capacity equivalent to no less than16mm^2 copper.

7.7 Scaffolding

This section describes the electrical controls required for the use of scaffolding in substations and near overhead lines.

7.7.1 Using fixed and mobile scaffolding in substations

Any time scaffolding is being erected, altered, moved, or dismantled, within a substation, the work must be observed by a safety observer.

The safety observer is required to observe the clearances between scaffold components and any live exposed conductors, and to warn the scaffolding workers if there is a risk that the required clearances may be breached.

Workers must maintain the minimum clearances specified in Clause 7.7.3 between any scaffolding components and live exposed mains and apparatus.

To reduce the risk of induced voltages, metal scaffolds must be effectively earthed, as required by Clause 9.11.6.

Figure 44 – Non-conductive (fibreglass) scaffolding in a substation

7.7.2 Using fixed and mobile scaffolding in the vicinity of overhead lines

The minimum clearances that must be maintained between scaffolding and overhead mains are given in Clause 7.7.3 below.

Workers who are installing scaffolding must allow for conductor blowout when assessing these clearances.

Note: These clearances apply to authorised or instructed persons working under these Rules and not to work by external parties under the WorkCover NSW Code of Practice - Work Near Overhead Powerlines. (See Section 15.2 for the requirements for work by external parties).

7.7.3 Scaffolding – minimum clearances

The clearances in Table 18 apply to conductive scaffolding during erection and dismantling.

The clearances in Table 19 apply to conductive scaffolding once the scaffold is erected.

The clearances in Table 20 apply to non-conductive scaffolding.

When carrying out high voltage testing on isolated mains and apparatus, no part of the scaffold (or portable structure) may be closer than the minimum fixed clearance for the applicable test voltage (as specified in Table 15).

Table 18 - Clearances to conductive scaffolding – during erection and dismantling

Voltage	Conductor	Clearance (m) (maximum sag or blowout must be added)		Controls
		More than	Up to and including	
Low voltage (including aerial services)	Exposed	-	4.0	Access permit required.
	Insulated (PVC or XLPE)	-	0.5	Access permit required.
		0.5	4.0	Install temporary insulating covers.
High voltage (up to and including 132kV)		-	4.0	Access permit required

Table 19 – Clearances to conductive scaffolding—when erected

Voltage	Conductor	Clearance (m) (maximum sag or blowout must be added)		Controls
		More than	Up to and including	
Low voltage (including aerial services)	Exposed	-	0.5	Access permit required
		0.5	4.0	Install visual markers and hoarding with internal signage.
	Insulated (PVC or XLPE)	-	Less than 0.1m	Access permit required.
		0.1	0.5	Install visual markers and hoarding with internal signage.
High voltage (up to and including 132kV)	Exposed or covered	-	Less than 1.5	Access permit required
		1.5	4.0	Install hoarding with internal signage

Table 20 – Clearances to non-conductive scaffolding

Voltage	Minimum clearance to live exposed mains and apparatus (m)
LV and HV (up to and including 132kV)	1.5

7.7.4 Hoarding

For details of the type of acceptable materials and the distances above and below the conductor/cable that must be mechanically shielded, refer to the Industry Safety Steering Committee - Guide for Network Operators to Provide Information to the Construction Industry for Working Near Overhead Power Lines (ISSC 32).

Where hoarding is required, attach warning signs to the worker side of the hoarding. The warning sign must warn of the presence of the electrical hazard (on the other side of the hoarding) and warn that the hoarding must not be removed.

7.7.5 Enclosure of conductors

The enclosure of conductors typically occurs where there is a need to maintain supply to a worksite. The conductors must be isolated until safely enclosed.

Generally only LV will be considered suitable for enclosing. HV may be enclosed as specified by a risk assessment and the inclusion of suitable control measures.

Before conductors are re-energised, the internal clearances and safety conditions as outlined in Table 19 should be met.

An enclosed LV conductor will only be re-energised when the clearance between the conductor(s) and the enclosure is:

- 0.5 metres or more for bare conductors; and/or
- 0.1 metres or more for aerial bundled cable (**ABC**) conductors, for worst case conditions (sag and blowout)

Warning signs must be attached to the worker side of the enclosure, warning of the presence of the electrical hazard on the other side of the hoarding and that the hoarding should not be removed.

For requirements for acceptable materials for enclosing conductors refer to the Industry Safety Steering Committee - Guide for Network Operators to Provide Information to the Construction Industry for Working Near Overhead Power Lines (ISSC 32).

7.8 Street lighting

This section describes clearances for street lighting equipment from live exposed conductors.

7.8.1 Clearances for street lighting equipment

New installations

New streetlighting installations must achieve the clearances from overhead mains and apparatus specified by Network Standard NS220 – Overhead Design Manual.

During installation

During the installation, replacement, or repositioning of street lighting brackets and equipment, the relevant MSWD must be maintained between any part of the bracket or equipment and live exposed conductors.

previously installed equipment

Workers may carry out work on existing streetlighting equipment where the street lighting bracket is fixed in position and where parts of the bracket are:

- within the clearances required by Network Standard NS220; or
- within the relevant MSWD from live exposed conductors,

provided:

- the workers, and any moveable conductive material they are holding, maintain the relevant MSWD from live exposed conductors; and
- the worker is working from an insulated EWP (LV or HV), or a timber/fibreglass, pole, ladder, or platform; and
- the bracket is fixed in position; and
- the work will not involve any movement of the bracket; and
- the minimum clearance between the street lighting bracket that is fixed in position and live exposed conductors is greater than the distances shown in Table 21 below.

If the above conditions cannot be achieved, the mains and apparatus must be isolated in accordance with these Rules, or the work must be carried out using the relevant live work controls (see the Ausgrid HV Live Work Manual for HV or Section 9.5 of these Rules for LV).

Table 21 - Clearance between installed street lighting brackets and exposed conductors

Nominal Line Voltage (kV)	Clearance between any fixed part of street lighting brackets and equipment and exposed conductors (m)	
	Bracket and exposed conductors attached to the same pole	**Bracket and exposed conductors not attached to the same pole**
LV	0.16	0.5
11	0.32	1.5
12.7kV SWER	0.32	1.5
22	0.32	1.5
33	0.9	2.1
66	0.9	2.1
132	1.5	3.1

8 Designated work areas

8.1 Defining a safe work area with a yellow tape barrier

This section provides a uniform set of requirements for installing tape barriers and signage to define safe work areas for work under access permit conditions.

8.1.1 Purpose of a yellow tape barrier

Yellow tape barriers are used to define a physical boundary between the mains and apparatus that are safe to work on or near under an access permit, and live mains and apparatus.

8.1.2 When a yellow tape barrier is required

A yellow tape barrier must be used to define the safe work area (i.e. the mains and apparatus that are covered by an access permit) for work on or near the following apparatus:

- HV mains and apparatus located within a substation; and
- Sydney City enclosed-type LV switchboards in distribution substations.

Exceptions:

A yellow tape barrier is not required for the following:

- HV switchgear at remote points of isolation – where there is no work to be carried out at the remote location; or
- underground cables (except on associated cable terminations); or
- cross-bonding and earthing link boxes; or
- gas and oil charging equipment; or
- shutters or covers secured by operator locks and operator danger tags.

Figure 45 – An example of a safe work area defined by a yellow tape barrier (barrier-in method).

8.1.3 Taping principles

All workers involved in the job or task (from planning to execution) are responsible for observing a safe work area.

Operator responsibilities

Only Operators who are appropriately authorised may use yellow tape in association with an access permit (Refer to Section 3.4). The Operator is responsible for erecting the safe work area which allows workers to maintain minimum safe working distances from any live exposed mains and apparatus.

A safe work area must be established prior to issuing an access permit and must not be removed until the access permit has been cancelled.

Only the operator can erect, remove, or reposition yellow tape barriers. The operator must remove the yellow tape as soon as possible after cancelling all surrendered access permits.

Yellow tape must be arranged in such a way, so it is possible for people to work on the mains and apparatus without interfering with or going beyond the tape.

In outdoor switchyards, yellow tape must not be attached to, or pass through, a structure which supports:

- a point of isolation for the work; or
- live mains and apparatus; or
- mains and apparatus that are under an Equipping Permit.

Recipient responsibilities

The access permit recipient is responsible for maintaining the safe work area.

Where the tape-in method is used, the recipient of the access permit is responsible for ensuring that everyone enters and leaves the defined safe working area through the taped entrance corridor.

Worker responsibilities

Workers must not cross (go over, through, or under) or move a yellow tape barrier. (See Clause 8.1.4 for exceptions).

Workers must sign onto a relevant access permit before entering a safe work area defined by a yellow tape barrier, as required by Clause 8.1.5.

Persons planning work

If proposed work requires specific taping arrangements, the person who is submitting the NAR must include the specific taping requirements, as part of the NAR.

8.1.4 Exceptions to taping principles

Exception 1

Yellow tape may be lowered, and yellow tape support stands temporarily removed, for a short time by:

- the recipient of an access permit to which the tape barrier applies; or
- a member of the workgroup who is directed by the recipient;

only to allow equipment to be brought in or out of a safe work area that is defined by barrier-in method, when the equipment:

- is required for the work under the scope of the access permit; and
- it cannot be brought into or out of the safe work area through the entrance way.

The tape, and any support stands, must be put back exactly in the original position as soon as possible.

Only the standard yellow tape support stands may be temporarily removed by the recipient, or a member of the workgroup under the direction of the recipient. Entry/exit bollards must not be moved by any person other than an appropriately authorised operator.

Exception 2

When equipment adjacent to an area under an access permit has been totally taped off (by barrier-out method), and it is essential to gain access to the adjacent equipment, a person may move, or cross, the tape to enter the equipment area (if the tape is blocking the only available entrance to that area) provided the following requirements are met.

The person who intends to move or cross the tape must not be either of the following:

- the recipient of the access permit to which the tape barrier applies; or
- a person who is signed onto the access permit to which the tape barrier applies.

The person who intends to move or cross the tape must advise the following persons prior to moving or crossing the tape (if the following persons are present at the site):

- the recipient of the access permit to which the tape barrier applies; and

- all persons who are signed onto the access permit to which the tape barrier applies.

If the person moves the tape, they must replace the tape in its original position immediately after gaining entry or exit.

Exception 3

Where it is not reasonably practicable for mobile plant and equipment to be included within a yellow tape barrier safe work area, equipment such as crane booms and loads, oil hoses, and test leads, may pass over or under the tape barrier. However, person(s) in an EWP are not permitted to pass over a yellow tape barrier.

8.1.5 Signing onto an access permit

Workers must sign on to an access permit before entering a barrier-in yellow-taped safe work area.

Workers must sign onto an access permit when entering part of a switchyard that is included in the safe work area defined by a barrier-out yellow-tape barrier if:

- The workers will be carrying out work on or near exposed mains and apparatus within the safe work area; or
- The work that the workers intend to carry out is included in the purpose of the work described on the access permit.

8.1.6 Taping methods

Yellow tape barriers must be applied using either the barrier-in method (see Clause 8.1.7 for details) or barrier-out method (see Clause 8.1.8 for details).

8.1.7 Barrier-in method

To apply the barrier-in method an operator must erect yellow tape around the apparatus covered by the access permit(s) to which the tape barrier applies.

The inside of the taped area then defines the safe work area.

The barrier-in method must include:

- a single entrance corridor (with a nominal width of 1 to 1.5 metres and length of 1 to 2 metres); and
- entrance clearly marked with four* bollards which are labelled ‘Entry/Exit’ (*except when used on indoor metal-clad switchgear, where two bollards are permitted); and
- taped entry corridors which join the main taped work area at right angles with the taped entry located in the centre of a taped boundary side where practicable.

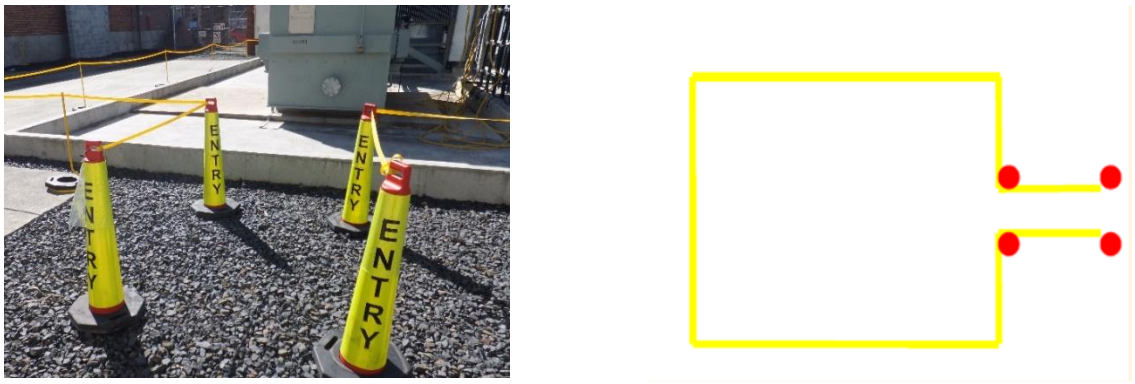

Figure 46 – A photograph and diagram illustrating correct entry to a safe work area with the entrance corridor tape formed at right angles to the safe work area.

In a small number of situations, the layout of the equipment inside the station may not allow the corridor to be in the centre or achieve a right-angle return. In this case, the entry may be readjusted, but it still must be clearly defined by the use of four or more high visibility bollards.

Where yellow tape stands are used to support yellow tape, they must be:

- positioned no greater than 4m apart; and

- weighted down to prevent them being blown over or inadvertently knocked down.

Note: The barrier-in method is generally used in open switchyards as the most practical method of identifying the equipment under access and establishing a safe work area.

Figure 47 – A typical application of barrier-in method in an outdoor switchyard

Indoor metal-clad switchgear

If the barrier-in method is used to identify the safe work area for indoor metal-clad HV switchgear;

- the entry/exit point may be created using only two entry/exit bollards as shown in Figure 48 below; and
- where access is required to both the front and the rear of the switchgear panel the requirements of Clause 8.1.9 apply.

Figure 48 – An example of a barrier-in method used on indoor metal-clad switchgear

8.1.8 Barrier-out method

With the barrier-out method, an operator must erect a yellow tape barrier in such a way as to provide access to the apparatus which is covered by the access permit to which the tape barrier applies and prevent access to all adjacent live apparatus in the station.

Since access is prevented to all adjacent live apparatus, high visibility bollards are not required at the entrance.

Figure 49 - An example of barrier-out method used on indoor metal-clad switchgear.

Figure 50 – Examples of barrier-out method used on indoor metal-clad switchgear

Note: The barrier-out method is most commonly used for indoor switchgear. However, it may be used in outdoor switchyards where the apparatus type or layout makes the tape-out method the most appropriate method. See example in Figure 51.

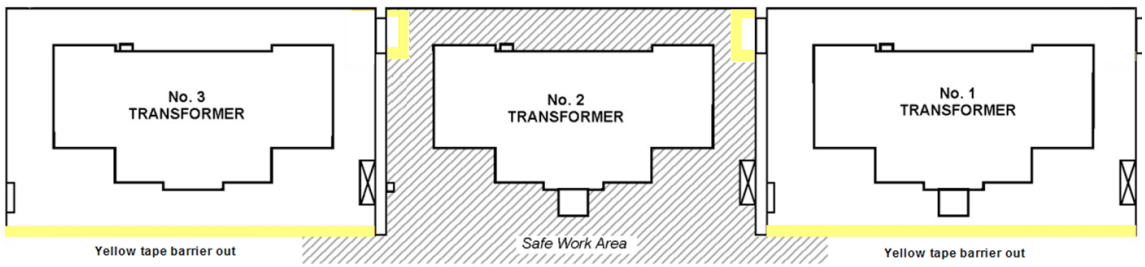

Figure 51 - A diagram illustrating barrier-out method used on transformer bays

8.1.9 Multiple safe work areas

If the equipment to be worked on cannot be contained within one defined safe working area, a second safe work area can be created. The access permit must identify the number of safe work areas and list all entranceways. Entranceways must be identified by a number on a Permit Receptacle at the entranceway to the safe working area.

The Permit Receptacle must also refer to the following:

- identifying number of the access permit; and
- location of the permit folder; and
- the number and location of any other Permit Receptacles.

8.1.10 Danger high voltage overhead signs

Where exposed live mains and apparatus pass over a pathway or a work area marked with yellow tape, the operator who issues the access permit must display a 'Danger High Voltage Overhead' sign to clearly identify the location of the adjacent exposed live mains and apparatus.

Additional 'Danger High Voltage Overhead' signs can also be erected by the recipient of an access permit if the pre-worksite risk assessment indicates this additional safety requirement.

8.1.11 Location of access permit(s)

For barrier-in safe work areas, the access permit must be left in a Permit Receptacle at the entrance to the safe work area.

For barrier-out safe work areas in outdoor switchyards, the access permit must be left in either:

- the permit folder at a point of isolation; or
- in a Permit Receptacle, which is located as close as practicable to the apparatus to be worked on or near, but outside the relevant MSWD from any exposed conductors

For barrier-out safe work areas on indoor switchgear, the access permit must be left in the permit folder at a point of isolation.

8.1.12 Outdoor switchyard and enclosure fences

If an enclosure or switchyard fence, or wall, will form part of the boundary of the safe work area, then the fence, or wall, may be used instead of yellow tape to define that part of the safe work area (it is not mandatory to attach yellow tape along the fence or wall).

Any gates to the enclosure or safe work area, other than the gate used as the entry/exit point, must have yellow tape attached across them.

8.1.13 Safe work area equipment

Only the approved equipment shown in Table 22 may be used to define a safe work area with a yellow tape barrier.

Table 22 - Approved yellow tape barrier equipment.

Equipment	Illustration	Comments
Yellow tape		Ausgrid follows the industry standard in the use of yellow tape in creating a safe work area.
Ausgrid standard tape supporting stands		Stands must be powder-coated or painted yellow.

Equipment	Illustration	Comments
Entry/Exit bollards with weights		Bollards fitted with high visibility retroreflective entry / exit sleeves must be used to define the entry and exit point when a tape-in method is used.
Bollard weights		To increase the weight factor for tape supporting stands.
'Danger HV Overhead' signs		See Clause 8.1.10 for the application of these signs.

8.2 Labels, tags, and signs

This section describes the requirements for labelling mains and apparatus, danger, warning, and hazard signs and labels, and the danger, warning, and information tags, required by these Rules.

8.2.1 Labelling mains and apparatus

For all mains and apparatus, clearly label every switch, transformer, cable, end box, or termination if the identity is not obvious.

Change the labels if the connections to mains and apparatus are altered causing an alteration to the network.

The authorised person in charge of the work must make sure that the mains and apparatus are clearly and permanently labelled to comply with the Ausgrid Network Standard NS158 - Labelling of Mains and Apparatus.

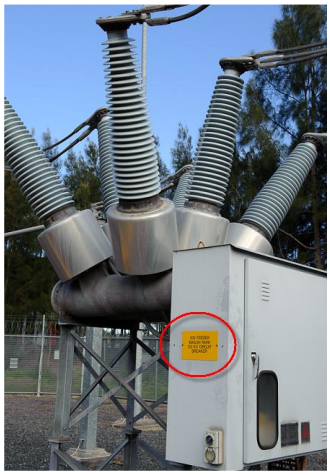

Figure 52 - Labelling on typical mains and apparatus

8.2.2 Warning Do Not Operate (WDNO) labels

The letters “WDNO” (being the acronym for Warning Do Not Operate) must be added to the labels of switches that:

- are connectable to the network; but
- do not have any mains and apparatus connected to them; or
- control mains and apparatus that are not intended to be energised without further system alteration.

Such switches:

- may have been removed from the Ausgrid network technical maintenance plan; and/or
- must be subject to an appropriate commissioning process prior to operation;

therefore, the letters “WDNO” must be added to the switch label.

Notes:

- If mains and apparatus are connected to a switch which is labelled WDNO, the mains and apparatus are regarded as connectable, therefore an access permit is required for any work on or near such mains and apparatus.
- If mains and apparatus are connected to a switch which is labelled WDNO and the mains and apparatus are not in a condition which allows them to be safely energised, an Operators Danger Tag must also be attached to the switch, as required by Clause 8.2.3.
- If the absence of mains and apparatus connected to a switch which is labelled WDNO results in the switch not being able to be safety closed, an Operators Danger Tag must also be attached to the switch, as required by Clause 8.2.3.

See Network Standard NS158 for further information on WDNO labels.

Notifying System Control

A person who is authorised to submit NARs must submit a SAO to notify System Control when a switch is to be labelled WDNO.

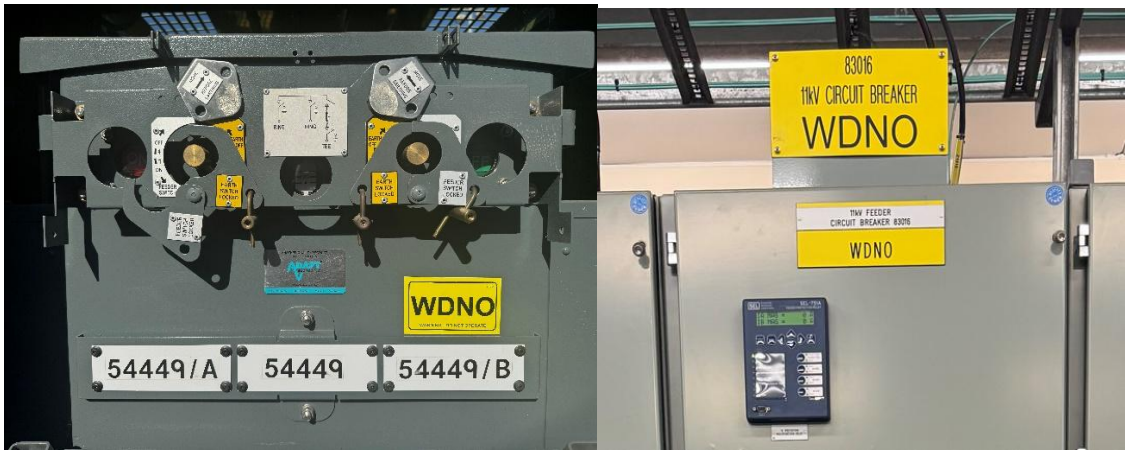

Figure 53 – Examples of switches labelled WDNO

8.2.3 Operator Danger Tags

Figure 54 - Both sides of an Operators Danger Tag

Appropriately authorised operators must attach an Operator Danger Tag (see Figure 54 above) to mains and apparatus as follows:

- to every point of isolation used for the issue of an access permit, Operating Agreement (issued by Ausgrid), or Clearance to Work (except for an LV point of isolation at a customer switchboard where a switchboard isolation envelope is used to secure the point of isolation – see Clause 8.2.5); and/or
- on earth switches that are used for access permit earthing – where operation of the earth switch by the recipient is not intended. (**Note:** Earth switches which are intended for operation by the permit recipient must not have an operator danger attached); and/or
- to every point of isolation of mains and apparatus that cannot be energised without creating an electrical hazard which is likely to be life threatening; and/or
- on substation doors – when there a requirement to prevent entry by persons, due to an electrical hazard which is potentially life threatening; and/or
- on switchgear shutters – when there is a requirement to prevent approach to live exposed conductors.

Operator Danger Tags must be fixed to the controls of switches or other controlling devices. If this is not practicable, they must be attached in a position where they can be clearly seen and will alert any person about to operate the switch or controlling device.

When an Operator Danger Tag is to be attached to a pole, or structure, within the normal reach of ordinary persons, the tag must be attached as securely as practicable.

Where a common point of isolation is formed, a separate Operator Danger Tag must be attached for each Permit Folder to which the common point of isolation applies.

Removal

Workers must not interfere with an Operator Danger Tag, or the apparatus to which the tag applies. Operator Danger Tags which have been installed by an operator must only be removed by:

- an operator with an appropriate operating authority; or
- a person under instruction and the direct supervision of an operator with an appropriate operating authority.

Closing a point of isolation

Operators must not close a point of isolation while an Operator Danger Tag remains locked to, or attached to, the point of isolation.

Operator danger tags must only be used by an operator. They must be securely attached and clearly visible.

8.2.4 Personal Danger Tags

Application

Personal Danger Tags must be used in the following situations:

- Electrically qualified workers who create point(s) of isolation for work on LV mains and apparatus, other than where an access permit, Operating Agreement, or a Clearance to Work is required, must complete and attach a Personal Danger Tag (see Figure 55) to each point of isolation; and/or
- Where portable earths and/or LV shorts are applied to permanently disconnected mains and apparatus (as required by Clause 10.4.5). The person in charge of the work must complete and attach a Personal Danger Tag to the portable earths and/or LV shorts.

Purpose

Personal Danger Tags warn everyone that the isolations must not be restored, or the earthing and short-circuiting equipment must not be removed, without the consent of the person who attached the tag.

Removal

The Personal Danger Tag must only be removed by, or with the consent of the person who attached it. Where this is not possible (and all attempts to contact the person have failed), the immediate supervisor of the person who attached the tag may remove the tag, after a thorough investigation of the status of the equipment and the worksite to ensure the safety of all personnel.

Closing a point of isolation

Workers must not close a point of isolation while a Personal Danger Tag remains attached the point of isolation.

Figure 55 – Both sides of a personal danger

8.2.5 Switchboard Isolation Envelope

Where a switch on a customer switchboard is used as a point of LV isolation (for work that is remote from the switchboard) and the switch is not capable of being locked open, or the customer switchboard is not capable of being locked or secured closed - the operator must attach a Switchboard Isolation Envelope (See Figure 56) to the switch or switchboard.

Where service fuse(s) are used as a point of LV isolation (for work that is remote from the switchboard) and the customer switchboard is not capable of being locked or secured closed - the operator must place the fuse cartridge(s) in a Switchboard Isolation Envelope and attach the envelope to the switchboard.

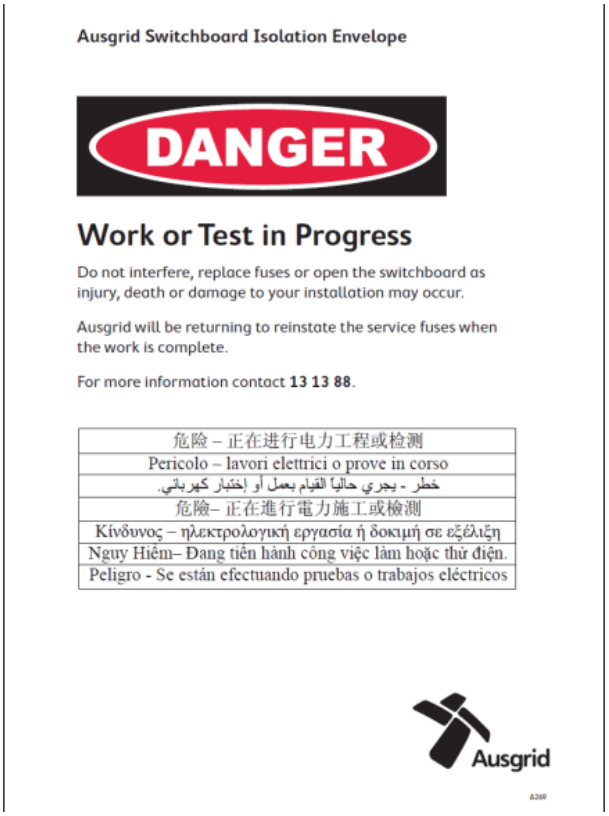

Figure 56 – A switchboard isolation envelope

8.2.6 Warning Tags

Yellow warning tags are attached to equipment as follows:

Table 23 - Use of yellow warning tags

For	How it is applied	By whom
Equipment which may be operated under access permit	Attach yellow warning tags to LV controlling devices (when an access permit is issued) to indicate that these controlling devices may be operated by the access permit recipient, or a member of the recipient's workgroup. List the equipment on the access permit (e.g. '*Transformer tap changer, fans and oil pump 415V supply switched off and warning tagged*').	Applied and removed by an operator
Defective equipment	Attach yellow warning tags to defective equipment. Notify the control room if the defective equipment could affect operations on the network. Where appropriate, indicate the nature of the defect. If there are no details on the tag, the control room should be contacted for information.	Applied by the worker discovering the defect, and removed by the worker remedying the defect
Identifying working earths in switchyards	Attach yellow warning tags to working earths applied in an outdoor switchyard where there are also hand-applied access permit earths. This is to clearly identify the working earths.	The access permit recipient is responsible for attaching and removing these warning tags.

Figure 57 – The reverse side of a yellow warning tag and warning tags in use

8.2.7 High voltage cage danger sign

See Chapter 18 Glossary – General, for the definition of a cage.

A 'High Voltage Cage' danger sign, as shown below in Figure 58, must be attached to each entrance of a cage.

Figure 58 – A High Voltage Cage danger sign.

Operators may carry out operating work in a cage only if absolute limits of approach can be maintained.

Persons carrying out work, other than operating work, must sign onto a relevant access permit prior to entering a cage.

The cage entrance must be locked at all times except when an access permit is issued or during operating work.

If a cage also has a strong magnetic fields sign, as detailed below in Clause 8.2.9, workers must not enter the cage while the mains and apparatus are energised*.

*Entering the cage to prove the mains and apparatus are de-energised is permissible.

8.2.8 Danger high voltage overhead signs

'Danger High Voltage Overhead' signs must be displayed as required by Clause 8.1.10.

Figure 59 – A 'Danger High Voltage Overhead' sign.

8.2.9 Strong magnetic fields

The sign shown below in Figure 60 is used where magnetic fields created by electrical apparatus exceed recommended occupational levels.

Workers must not enter delineated areas with this sign attached while the apparatus is energised.

Notes:

- Entering the delineated area to prove the mains and apparatus are de-energised is permissible.
- It is not necessary to prove insulated cables are de-energised at the worksite.

Refer to Network Standard NS174C – Environmental Handbook for further information on:

- electric and magnetic fields (EMF); and
- specific advice for workers who are pregnant or those with medical implants. (Ausgrid employees who have medical implants must also refer to the Ausgrid Health and Safety Management System).

Figure 60 – A strong magnetic fields sign.

8.2.10 Temporary ‘Powerlines Overhead’ warning sign

Where work must be completed in the vicinity of overhead powerlines, temporary warning signs may be erected to make workers aware of the danger of overhead powerlines.

Figure 61 - Temporary 'Powerlines Overhead' warning sign

8.2.11 Substation screening identification tag

The substation screening identification tag identifies installed LV substation screening that is not intended for permanent installation. The tag comes as a single sheet comprising two sections—substation copy and depot copy.

As required by Clause 6.6.1, the substation copy section must be completed and attached to the screening in a prominent location. The remainder of the tag (depot copy) must be completed and returned to the depot.

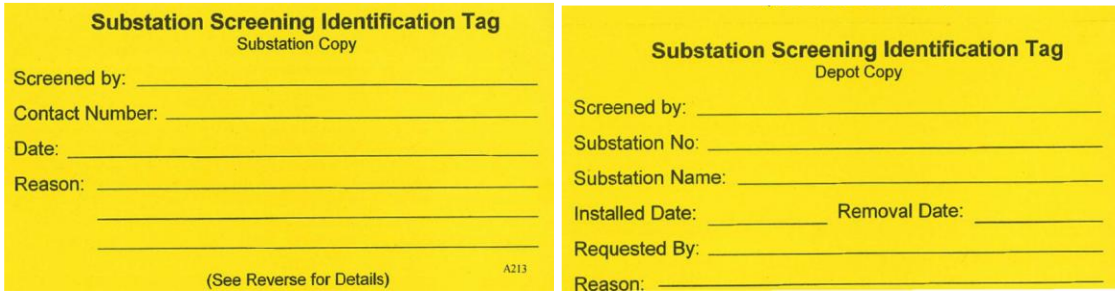

Figure 62 – Both sections of the substation screening identification tag—substation copy and depot copy

8.2.12 Switching information tag

Switching information tags are pre-printed cards used by operators to record preliminary isolations and earthing when a permit is not issued. The tag may also be used to record details that need to be passed on to another operator, such as earthing equipment movements and phasing issues. When completing a switching information tag, operators must also add their name, date, and signature.

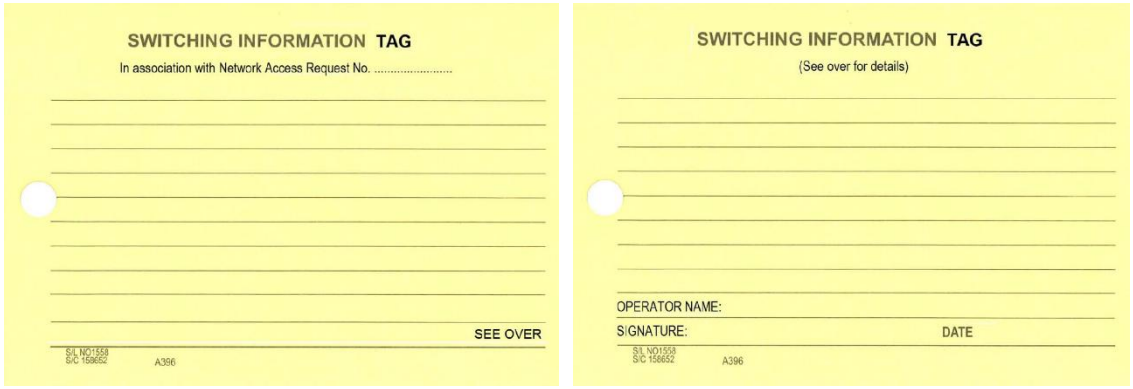

Figure 63 – Both Sides of a switching information tag

9 Access the network

9.1 Work on or near mains and apparatus

This section describes the requirements for working on or near exposed LV and HV mains and apparatus.

Figure 64 - Various parts of the network used by Ausgrid to supply electricity — overhead lines, a circuit breaker, and a transformer.

9.1.1 Working on or near exposed LV mains and apparatus

You must treat all exposed LV mains and apparatus as live until isolated and proven de-energised by an authorised person. The authorised person must complete all of the following steps for either option 1 or 2 below.

Option 1 - Isolated from all sources of supply

1. Isolate the mains and apparatus from all possible sources of electricity supply; and
2. Prove the exposed conductors are de-energised using approved testing equipment; and
3. Issue an access permit as required by Section 5 .

Figure 65 – Illustration of the steps required under Option 1

Option 2 (LV network distributors only) - Isolated from network sources of supply and shorted

1. Isolate the LV network distributor from:
   - network sources of supply (including distributed energy resources forming part of the network, regardless of capacity); and
   - customer installations which contain distributed energy resources with a capacity greater than 10kW per phase. (Note: Other customer installations may remain connected); and
2. Prove the exposed conductors are de-energised using approved testing equipment-; and.
3. Immediately apply LV shorts as per the requirements of Clause 9.2.3; and
4. Issue an access permit as required by Section 5.

Figure 66 – Illustration of the steps required under Option 2

Notes:

- **Possible sources of supply**

  Possible sources of electrical supply may include distributed energy resources at customer installations (such as stand-by generators, parallel generation plants, solar panels, inverter/ uninterrupted power systems (UPS), multiple control supplies, auxiliary control systems, transformation up from extra LV systems).

- **Induced voltages**

  If there is the possibility of hazardous induced voltages occurring, then earth and short-circuit LV mains and apparatus using approved methods. Otherwise, use live LV work procedures.

9.1.2 Insulation effectiveness on LV mains and apparatus

Low voltage mains and apparatus covered by tape, rubber, plastic, PVC, fabric or other similar materials must be treated as exposed unless these materials have been designed to a relevant Standard, specifically for the purpose, and are in good condition.

Insulated LV overhead mains

The insulation of overhead conductors covered with PVC or XLPE insulation (e.g. services and LV ABC) can be subject to breakdown due to ultraviolet exposure. Refer to Clause 10.2.3 for the controls required to manage this risk for work on or near live LV insulated overhead conductors.

Underground LV cables

Underground LV cables may also be subject to a breakdown of insulation. Refer to Clauses 9.3.4 and 9.3.5 for the controls required for work on or near live LV underground cables.

9.1.3 Working on or near exposed HV mains and apparatus

Treat all exposed HV mains and apparatus as live until isolated, proven de-energised, earthed and short-circuited, and an access permit issued by an authorised person. The authorised person must complete the following steps:

1. Isolate the mains and apparatus from all possible sources of electrical supply, except where:
   - there are limited points of HV isolation and the conditions of Clause 9.6.3 are met; or
   - the HV mains and apparatus include distribution substations with LV distributors which are short-circuited in accordance with Clause 9.2.3; and
2. Prove the exposed conductors are de-energised using approved testing equipment; and
3. Earth and short-circuit the conductors, as required by Section 9.8; and
4. Where required by Section 8, define the safe work area using tape barriers; and
5. Issue an access permit.

If any HV work cannot be done in accordance with the above procedures, then you must use other control measures that are authorised by the Ausgrid manager who has the authority to issue exemptions to these Rules.

Figure 67 - Illustration of the steps required to allow work on or near high voltage mains and apparatus

9.1.4 Insulation effectiveness on HV mains and apparatus

You must treat HV mains and apparatus that are covered with insulation but do not have an earthed metal sheath or screen as exposed, unless they are specifically listed below, and the insulation is in good condition:

- Hazemeyer Magnefix MD4 switchgear, and associated cable terminations covered with approved screens;
- spouts covered by non-metallic bus shutters on commercially manufactured switchgear conforming with Australian or International standards; or

- commercially manufactured switchgear, consisting of insulated busbars and components, conforming to Australian or International standards.

Figure 68 – An example of an 11kV unscreened cable that must be treated as exposed

9.2 Low voltage work – isolated

This section describes the isolation, proving de-energised, and shorting of low voltage (LV) mains and apparatus,

9.2.1 Isolating LV mains and apparatus

Isolation means mains and apparatus are disconnected from sources of electrical energy.

Workers who are required to isolate LV mains and apparatus must do so using one or more of the following methods:

- open switches; or
- withdraw circuit breakers; or
- remove fuses, links, or connections; or
- open bonds (and, if there is a risk of them moving and breaching the point of isolation, tie them back, or apply temporary insulating covers to exposed parts).

Securing points of isolation

Points of isolation must be secured with a danger tag and, where the apparatus accommodates, a lock, to prevent unauthorised or unintentional re-energisation.

Neutral conductors

For the purpose of isolating LV mains and apparatus, only LV phase conductors are to be isolated. LV neutral conductors are to remain connected. (**Note:** Neutral conductors associated with the isolated mains and apparatus may need to be disconnected as part of the work, or for testing).

Confirming points of LV isolation are not bypassed by a connected load

If an electrical load (e.g. customer installation or street lighting luminaire) is connected across a point of isolation (where the active and neutral connections are on different sides of the open point) the load will electrically bypass that point of isolation. Therefore, any person who is responsible for creating a point of isolation of LV mains and apparatus must confirm that there is no load connected across the point of isolation.

Verifying isolation

Where LV mains and apparatus (other than street lighting circuits) are to be isolated from all possible sources of supply (i.e. as per Option 1 of Clause 9.1.1) the appropriately authorised operator responsible for the isolation of the LV mains and apparatus must verify the disconnection from all possible sources of supply, using an appropriate electrical test method. Generally, this will be the test method known as ‘lamping clear’ - where LV test lamps are used to test from a live source to the isolated mains and apparatus to confirm ‘no glow’ to each of the isolated phase conductors.

Refer to Clause 10.3.2 for the requirements for the verification of isolation of street lighting circuits.

9.2.2 Proving LV mains and apparatus are de-energised

Following isolation of LV mains and apparatus, the authorised person responsible for the isolation must prove that the mains and apparatus are de-energised at, or as close as reasonably practicable to, the location of the proposed work.

For worksites with multiple work locations, where it is not reasonably practicable for the authorised person carrying out the isolation to prove the mains and apparatus are de-energised at all proposed work locations, the authorised person carrying out the isolation must prove the mains and apparatus are de-energised at a minimum of one of the proposed work locations.

The relevant authorised person must demonstrate a de-energised status to a non-electrically qualified worker and clearly identify energised and de-energised mains and apparatus.

In addition, as required by Clause 5.3.7, the recipient of an access permit covering LV mains and apparatus must prove the mains and apparatus are de-energised at each worksite prior to work.

Approved LV detectors, compliant with Clause 6.4.2, must be used to prove that LV mains and apparatus are de-energised.

The approved LV detector must be tested (using a known source of supply or an approved proving unit for the detector) both immediately before and immediately after proving mains and apparatus are de-energised, to confirm it is operating correctly.

For work on the cores of underground LV cables, the mains and apparatus must be proved de-energised at the worksite by remote cutting, using approved equipment. (Refer to Section 9.3)

Ensure testing equipment is appropriate for the specific voltage.

When proving LV mains and apparatus are de-energised using an approved contact type detector, the conductors must be clean and clear of contamination or oxide at the point of detector contact with the conductor.

Ausgrid employees must refer to Technical Guide T0032 – Safety Equipment – Care, Use and Inspection – Low Voltage Instruments, for information on approved LV detectors.

Figure 69 – Test lamps in use

9.2.3 Shorting LV network distributors

LV shorting is applied to network distributors (including direct distributors, as set out in Clause 12.4.2) to protect against potential sources of supply from connected customer installations.

LV network distributors are to be shorted between the neutral and all phase conductors when all of the following apply:

- isolation from network sources of supply has occurred (including distributed energy resources forming part of the network, regardless of capacity); and
- customer installations which contain distributed energy resources with a capacity greater than 10kW per phase are isolated; and
- customer installations, with a distributed energy resource capacity of up to and including 10kW per phase, remain connected; and
- live work procedures are not used.

LV short circuiting equipment

LV short circuiting equipment (LV shorts) must comply with the requirements of Network Standard NS223 – Low Voltage Short Circuiting for De-energised Work.

Application of LV shorts

LV shorts must only be applied by trained and competent persons.

LV shorts must be applied in accordance with Network Standard NS223 – Low Voltage Short Circuiting for De-energised Work.

Workers who are applying and removing LV shorts must apply the controls required by Clause 9.5.3 for work on or near live exposed LV.

The conductors must be clean and clear of contamination or oxide at the point at which the shorts are attached.

Permit LV shorts

For the issue of an access permit, LV shorts must be applied as close as practicable to the worksite, and generally within the conductor route distances from the work site outlined below. These shorts are referred to as “permit LV shorts”.

- LV overhead bare open wire - 100m
- LV ABC - 300m
- LV underground mains - 200m

Conductor route distances from the worksite to the LV shorts may vary from the distances specified above provided the distances comply with Technical Guide T0029 – Short Circuits for LV Distribution Networks.

Permit LV shorts may only be applied under the direction of an appropriately authorised operator.

Working LV shorts

If the worksite moves from the original location, or the work will break conductor connections such that the mains will not be short-circuited within the distances from the work site specified above, trained and competent workers must apply additional LV shorts which are known as “working LV shorts”, under the direction of the access permit recipient.

The recipient must record the application and removal of working LV shorts on a Working Earths/LV Shorts Form.

Planning work using LV shorts

Persons who are planning work using LV shorts must assess whether the work can be completed with the LV mains and apparatus remaining short-circuited as required by this Clause. If the work cannot be completed with the LV mains and apparatus remaining short-circuited, the mains and apparatus must be isolated from all possible sources of supply as per Option 1 of Clause 9.1.1.

9.2.4 Removal of Permit LV shorts

Permit LV shorts (LV shorts that are listed on an access permit) must not be moved or altered and must remain connected to the LV mains and apparatus until all access permit(s) on which the permit LV shorts are listed are signed off, surrendered, and cancelled. The two possible exceptions to this requirement are set out below.

Exception 1: Temporary removal for testing

Permit LV shorts may be temporarily removed for the purpose of carrying out testing with non-hazardous low voltages by the permit recipient, or a worker under the direct supervision of the permit recipient.

The recipient is responsible for:

- Notifying the recipients of all other access permits on issue (as listed on the Permit Folder) prior to removing the permit LV shorts; and
- Directly supervising workers who may remove and/or restore permit LV shorts on behalf of the recipient;
- Compliance with the requirements of Clause 10.6.1; and

- Restoring the permit LV shorts immediately upon the completion of testing.

All workers other than those conducting the testing must stand clear while the shorts are removed and those workers conducting the testing must wear LV insulating gloves and protective eyewear when approaching within the MSWD of exposed LV mains and apparatus.

Exception 2: At the completion of work

When work on or near mains and apparatus under an access permit is complete, permit LV shorts may be removed by the recipient (or a worker who is under the direct supervision of the recipient) before the access permit is surrendered and cancelled, provided:

- the workgroup will carry out no further work on or near the mains and apparatus under the access permit; and
- the permit LV shorts are not required for any other access permit; and
- the recipient receives approval from the relevant Control Room Operator.

The following process must be followed:

- The recipient must contact the relevant Control Room Operator to gain approval to remove the permit LV shorts and confirm they are not required for another access permit which is on issue on the mains and apparatus; and
- All members of the workgroup must sign off the access permit; and
- After all members have signed off, but prior to surrendering the access permit, the recipient must remove, or directly supervise the removal of, the permit LV shorts; and
- The recipient must write, in the surrender section of the access permit, the specific permit LV shorts that have been removed (see Clause 5.6.11); then
- The recipient must surrender the access permit and advise the relevant Control Room Operator.

Recording by the Operator

If a Permit Folder is used, the operator must record the removal of permit LV shorts on the Permit Folder, as required by Clause 5.11.8. If a Permit Folder is not used, the operator must record the removal of permit LV shorts on the access permit, as required by Clause 5.6.14.

9.2.5 Work on isolated mains and apparatus near live LV

Where it is not reasonably practicable for workers who are working on isolated mains and apparatus under an access permit to maintain the MSWD from live exposed LV mains and apparatus, workers must:

- apply the controls required for work on or near live exposed LV mains and apparatus as per Clause 9.5.4 while working near the live exposed LV; or
- enclose the live exposed mains and apparatus with a LV screen which complies with Clause 6.6.1.

9.2.6 Work on a point of LV isolation

Where it is not reasonably practical to avoid working on LV apparatus which is used as a point of isolation, workers must install suitable temporary insulation or screens to prevent any conductive material inadvertently bridging the point of isolation.

When work near a point of LV isolation creates a risk of conductive material inadvertently bridging the point of isolation, workers must install suitable temporary insulation or screens to prevent any conductive material inadvertently bridging the point of isolation.

9.3 Low voltage – cables

This section describes the requirements for work on or near underground LV cables.

9.3.1 General

Workers must not work on the cores of the following cables (LV network distributor cables, street lighting circuit cables, conductive pilot cables, or conductive communication cables) until:

- they have signed onto an access permit covering the cable; and
- the cable is identified at the worksite (see Clause 9.3.2); and

- the cable is remotely cut at the worksite (see Clause 9.3.3).

9.3.2 Identifying LV cables

Workers must identify an LV cable(s) at the worksite using at least one of the methods in Table 24 (prior to remotely cutting the cable in accordance with Clause 9.3.3).

Regardless of the identification method used, the cable identification must be verified by a second person.

As required by Clause 3.3.11, workers must be authorised to identify, and verify the identification of, underground cables using signal generation and detection methods, or fault location tests.

Table 24 – LV cable identification methods

ID	Method	Description
a	Visual identification	Visually trace the cable along its entire length from the point where it has been isolated to the worksite.
b	Signal generation and detection	Use an approved signal generator and associated signal detector, in accordance with Technical Guide T0003 – Cable Identification and Phasing.
c	Fault location tests	Whilst applying HV to the faulty core or sheath, visually observe the generation of smoke, flame, sparks, or other clear evidence of a breakdown together with the audible discharge of energy at the fault location worksite. Note: Where a cable fault causes an open circuit in all cores of the cable, the primary fault location tests must, where it is reasonably practicable to do so, be carried out from both ends of the cable.
d	Conduit “rodding”	Where a cable is in a conduit and cannot be identified using methods (a), (b), or (c), the cable may be traced by “rodding” (inserting non-conductive rod(s) into the conduit).
e	Other methods	Cable ends which are de-energised may be identified by other approved methods. For example, the use of an approved insulation resistance tester (IRT) and phasing resistors.

Exception: If it is not reasonably practicable to identify the cable(s) using one of the methods in Table 24, the remote cutting of the cable(s), as required by Clause 9.3.3, may proceed only if a proposal detailing:

- the reasons why the cable identification methods in Table 24 are not reasonably practicable to implement; and
- the available cable information; and
- the alternate controls that have been, or will be, implemented to confirm the correct cable is to be remotely cut;

is endorsed by System Control and approved by the Level 3 Ausgrid manager (or their delegate) of the workgroup carrying out the work or submitting the NAR.

9.3.3 Remote cutting LV cables

LV Cables (including pilot cables) must be remotely cut as required by Table 25 below.

Table 25 – When remote cable cutting is, or is not, required

Remote Cutting	Description
Remote cutting is required	• to prove the de-energised status of an identified cable with the use of approved equipment • when the work requires the identified cable to be cut, or the conductor will be exposed during the course of the work

Remote Cutting	Description
	• when the cables cannot be identified.
Remote cutting is not required	If the cable can be identified by visual tracing from a point of isolation (or some other approved method) and the following conditions apply: • it is a live LV cable • it is a communications cable • for sheath or serving repairs • it is an insulation repair where the cable is not to be cut.

When required by Table 25, immediately after the identification, remotely cut the cable:

- using approved equipment (see Clause 6.4.4);
- in the presence of the person who is going to do the work;
- at the point where the work will be done;

in accordance with the requirements of the Ausgrid Technical Guide T0031 – Remote Cable Cutting Equipment.

For work to repair a fault which creates an open circuit in all cores of the cable, the cable must be remotely cut either side of the cable fault location.

9.3.4 LV cables with visible insulation defects

Workers must not make uninsulated contact with a live LV underground cable if the insulation appears defective.

This includes cables with visible calcium adipate – See Technical Guide T0155 – Low Voltage Underground Cables – Degradation of Insulation.

9.3.5 LV cables with exposed conductive sheath or armour

Hazard

Under certain fault conditions, hazardous a.c. voltages can be present on the exposed conductive sheath or armour of low voltage underground cables.

Testing

Exposed conductive sheath or armour of low voltage cables must be tested to confirm it is not live, prior to working on or near the cable.

Where the work will be carried out in a cable pit with multiple conductive sheathed or armoured cables, the testing of the cables must be verified by a second competent person.

Where Ausgrid employees carry out testing of these cables, they must do so in accordance with Technical Guide T0052 – Confirming the Absence of AC Voltages on the Exposed Conductive Sheath or Armour of Low Voltage Network Cables.

PPE required for testing

The person conducting the above testing must wear the following PPE, in addition to the full-length arc rated clothing required by Clause 6.2.1:

- LV insulating gloves (as specified in Clause 6.2.3); and
- Gumboots (compliant with Clause 6.2.2).

Controls for work post-testing

No work is to occur on or near a cable that has a voltage of 5Vac or greater present on the conductive cable sheath or armour. Workers must immediately report the result and prevent access to the cable or pit until the hazard is investigated, identified, and rectified.

If the testing confirms the conductive cable sheath or armour is not subject to a voltage of 5Vac or greater, work within 500mm of the cable may proceed, provided workers wear LV insulating gloves and gumboots (as detailed above), and make no uninsulated contact with the cable.

9.3.6 High-density polyethylene (HDPE) insulated cables

This clause applies to low voltage single core, stranded aluminium conductor, high density polyethylene (HDPE) insulated cables.

Hazard

These cables may be subjected to deterioration of the PVC sheath and HDPE insulation.

Risk controls

Due to the risk of worker electric shock arising from a breakdown of cable insulation, any work within 300mm of these cables must be carried out:

- with the cable isolated as required by these Rules and all workers signed onto a relevant access permit covering the cable; or
- with workers wearing LV insulating gloves and gumboots. Workers must not allow uninsulated parts of their body to come in contact with the cable or surrounding soil.

9.3.7 CONSAC cables

Concentric Outside Neutral Active Core (CONSAC) is a low voltage multi core cable with a PVC outer sheath, solid or stranded aluminium cores wrapped in layers of insulating papers, with an aluminium concentric neutral sheath.

Hazard

Cable failure is caused by movement of the cores at a termination or at a joint which causes the insulating papers to move thus compromising the insulation of the cores.

Controls

A CONSAC cable must be isolated in accordance these Rules and workers must sign onto a relevant access permit covering the cable, prior to:

- any work that disturbs the cores (including, but is not limited to, making and breaking connections); or
- stripping of the extruded aluminium sheath.

9.3.8 Waveform (wavecon) cables

Workers must not strip the extruded aluminium sheath of a common neutral and earth polymeric waveform (wavecon) cable while the cable is live.

Where it is necessary to remove the extruded aluminium sheath from a waveform (wavecon) LV cable, the cable must be isolated in accordance with these Rules and the workers must be signed onto a relevant access permit covering the cable.

9.3.9 Handling live LV cables – all types

Workers must wear LV insulating gloves when moving any live LV insulated underground distribution cable with their hands (regardless of the cable type) due to the risks associated with a breakdown of insulation that may not be visible or identifiable.

9.3.10 Cutting cables, conduits, or cover strips

When cutting any cable, conduit, or cover strip, workers must implement the following controls to prevent inadvertent damage to any cable that is not intended to be cut:

- excavate removable soil or backfill to a minimum radius of 200mm around any cable, conduit, or cover strip, before cutting it; or
- where a 200mm radius cannot be achieved, install a physical barrier between the cutting tool and adjacent underground assets or unexcavated soil.

See Technical Guide T0031 - Remote Cable Cutting Equipment and Technical Guide T0154 – Cutting Installed Underground PVC Conduit and Cover Strip, for further information.

9.3.11 Excavation of underground cables – general

Refer to Network Standard NS156 – Excavating Near Ausgrid Underground Cables or Conduits for the requirements for excavation near Ausgrid underground cables.

9.3.12 Excavation of faulted underground cables

All workers involved in the excavation of faulted underground cables (following 'pot holing' to locate the cable cover strip/tiles), within the following distances from the cable:

1. below a depth of 150mm above the cable cover strip; or
2. within 300mm of the cable;

must sign onto the relevant access permit issued for the testing and/or repair of that cable, before commencing work.

9.3.13 Communications cables

This Clause applies to both conductive communications cables (e.g. protection pilot cables) and non-conductive (fibre-optic) communications cables.

Access permit

An access permit is required for any work which requires the electrical isolation of conductive communications cables.

An Access Permit for Test is required for the application of hazardous test voltages to any conductive communications cable.

Secondary Systems Clearance

A Secondary Systems Clearance is required for any work on a communications cable where:

- the work will interrupt a protection, automation, or control system; and
- the communication cable is not covered by an access permit.

9.4 Low voltage – connection and disconnection

This section describes the requirements for connecting and disconnecting low voltage mains, apparatus, services, and installations.

9.4.1 Connecting and disconnecting LV mains and apparatus

When energising new, and re-energising modified, LV mains and apparatus, you must carry out appropriate electrical tests to check for:

- Phasing; and/or
- phase-to-phase faults; and/or
- phase-to-earth/neutral faults.

Make sure everyone is clear of the conductors and that any plant, tools, materials, and earthing equipment (if any) are removed before you connect LV mains and apparatus to a live LV source of supply.

When you are disconnecting LV mains and apparatus:

1. Disconnect the connections at the source of supply; and
2. If a neutral conductor is involved, disconnect the neutral conductor last.

When connecting LV mains and apparatus to a live LV source of supply:

1. Connect the neutral conductor first—if a neutral conductor is involved; and
2. Connect the live (active) conductors to the source of supply last.

To ensure that a voltage difference does not exist at the connection, check the phasing from all possible sources of supply. If there is any possibility of interconnection to another power source, you must phase all new or disconnected connections before connections are made.

To check the phasing, you must use approved equipment such as:

- test lamps
- voltmeters
- indicating devices.

9.4.2 Connection and disconnection of installations to the LV network

Hazard

An installation which is incorrectly or unsafely connected to the network could create a situation where a person receives an electric shock which could be fatal.

Testing requirements

Workers must comply with Network Standard NS282 – Service Testing, when connecting or reconnecting* any installation to the LV network.

* This is required when any conductor connections to an installation are disconnected (broken) and are to be reconnected (made). It is not required if an installation is isolated and re-energised only through the operation of a Service Protection Device (SPD).

Measured values of the tests required by Network Standard NS282 must be recorded in a relevant form, system, or register, for each installation.

Polarity

Both the service mains neutral and the customer's neutral must be positively identified. This must be done by an electrical method such as a lamp test or a test with another approved device.

Neutral Conductor

Workers must not energise an installation, or allow an installation to remain energised, beyond the service protection device (or main switch(es) for installations with barge board mounted, bolted, or metal clad, service fuses) without the installation having a NS282 compliant connection to neutral.

Disconnection

When overhead services are to be left disconnected, the disconnection must be at the customer's terminals or at the street mains, not at the customer's switchboard.

Ausgrid Employees

Ausgrid employees must comply with the Ausgrid Work Instruction – Service Testing and Connection.

9.4.3 Connection of loads across circuits

Workers must not connect any load between different LV circuits. (For example, workers must not connect a street lighting luminaire between a LV distributor phase conductor and a street lighting circuit neutral conductor).

9.4.4 Connection of loads across switches

Workers must not connect any load across a switch (as defined by these Rules) which may be used as possible point of isolation, on LV network distributors or street lighting circuits. The active and neutral connections to any load must be on the same side of the switch.

9.4.5 Connection of loads across bonds or IDTs

Workers must not connect any load across bonds, or IDTs, on LV network distributors or street lighting circuits. The active and neutral connections to any load must be on the same side of the bonds or IDTs.

9.5 Low voltage – live work

This section describes the requirements for work on or near exposed live low voltage (LV) mains and apparatus.

Background

The Electricity Supply (Safety and Network Management) Regulation 2014 (NSW) requires an electricity supply network operator to "take all reasonable steps" to make the electricity network safe. This includes, but is not limited to:

- the safety of members of the public; and
- the safety of persons working on the electricity supply network; and

- the management of safety risks arising from the loss of electricity supply.

The isolation of low voltage mains and apparatus generally requires an interruption of supply to customers. The interruption of electricity supply to our communities can have significant consequences, such as:

- The safety of those who rely on electricity supply for life support equipment is affected by supply interruptions.
- Electricity supply interruptions to traffic signals and public transport systems can impact public safety.
- The interruption of electricity supply to vulnerable customers such as hospitals and nursing homes can impact public safety.
- The interruption of electricity supply to essential services such as water and sewerage systems can impact public safety, hygiene and the environment.
- The interruption of electricity supply to medical facilities, security systems, communication and data services, fire protection systems, and commercial building services can result in risk, disruption and financial impacts to the community.
- Mortality rates increase during extreme weather conditions. The safety of those who rely on heating, cooling or telecommunications can be affected by supply interruptions during extreme weather conditions.

The live work controls are designed to allow workers to safely carry out work on or near mains and apparatus without requiring the interruption of electricity supply to the community.

9.5.1 Assessment of whether the work should be carried out live

The assessment process described below applies to all work on or near exposed low voltage mains and apparatus (excluding the work described in Clause 9.5.3 that is carried out in accordance with approved procedures).

Actions

The following assessment process must be followed when planning work on or near exposed low voltage mains and apparatus (LV work). Figure 70 below illustrates this process in a flowchart.

Assessment by persons planning low voltage work

Persons who plan LV work are responsible for the following assessments.

- **Question 1: Is the task allowed on the live LV work task list?**

  The person planning the live LV work must confirm that the task is allowed under the Live LV Work Task List (separately published Appendix A of these Rules).

  Assessment

  If the answer to Question 1 is yes (i.e. the task is allowed on the Live LV Work Task List), the person planning the work should proceed to Question 2.

  If the answer to Question 1 is no (i.e. the task is not allowed on the Live LV Work Task List) the mains and apparatus must be isolated in accordance with these Rules. (Refer to Section 4.1 for the planning process for isolated work).

- **Question 2: Can the live work controls be achieved for the specific task and site?**

  The person planning live LV work must assess if the live work controls of Clause 9.5.4 of this document can be effectively achieved for the specific tasks and arrangements and conditions of the site. (Persons planning live work may need to consult with live authorised workers, or other subject matter experts, in this assessment).

  Note: For work carried out by or for Ausgrid, refer to Technical Guide T0124 – Low Voltage Assessment Framework.

  Exemption: This pre-work task and site-specific assessment is not required for:

  - Regulated disconnection/reconnection and metering tasks on behalf of Ausgrid

  Assessment

  If the answer to Question 2 is yes (i.e. the person planning the work assesses that the applicable live work controls can be achieved for the task), the work may be planned to be undertaken live (noting a further on-site assessment must be undertaken by the live LV workers.

If the answer to Question 2 is no (i.e. the person planning the work assesses that the applicable live work controls cannot be achieved for the task), the mains an apparatus must be isolated in accordance with these Rules. (Refer to Section 4.1 for the planning process for isolated work).

Assessment by authorised live LV workers

Following the above assessments, the authorised live LV workers who are intending to carry out the planned live LV work must make the following assessment prior to undertaking live work.

- **Question 3: Can the live LV work be carried out safely?**

  The authorised live LV workers intending to carry out the live work must assess if the live controls can be effectively achieved and the live work carried out safely, having regard to the site conditions and arrangement at the time of the work being undertaken.

  Assessment

  If the answer to Question 3 is yes (i.e. the workers assess that the live controls can be effectively achieved, and the work carried out safely), the work on or near live exposed LV mains and apparatus may proceed.

  If the answer to Question 3 is no (i.e. the workers assess that the live controls cannot be effectively achieved), the mains an apparatus must be isolated in accordance with these Rules. (Refer to Section 4.1 for the planning process for isolated work).

Proceeding with live LV work

Live LV work may only proceed if the answers to Questions 1 to 3 are yes.

Note:

If, at any time before or during the performance of a task live, the appropriate live work controls are not able to be fully and safely implemented or if there are concerns from the work crew about performing the work live, work must be safely paused, and further assessments undertaken.

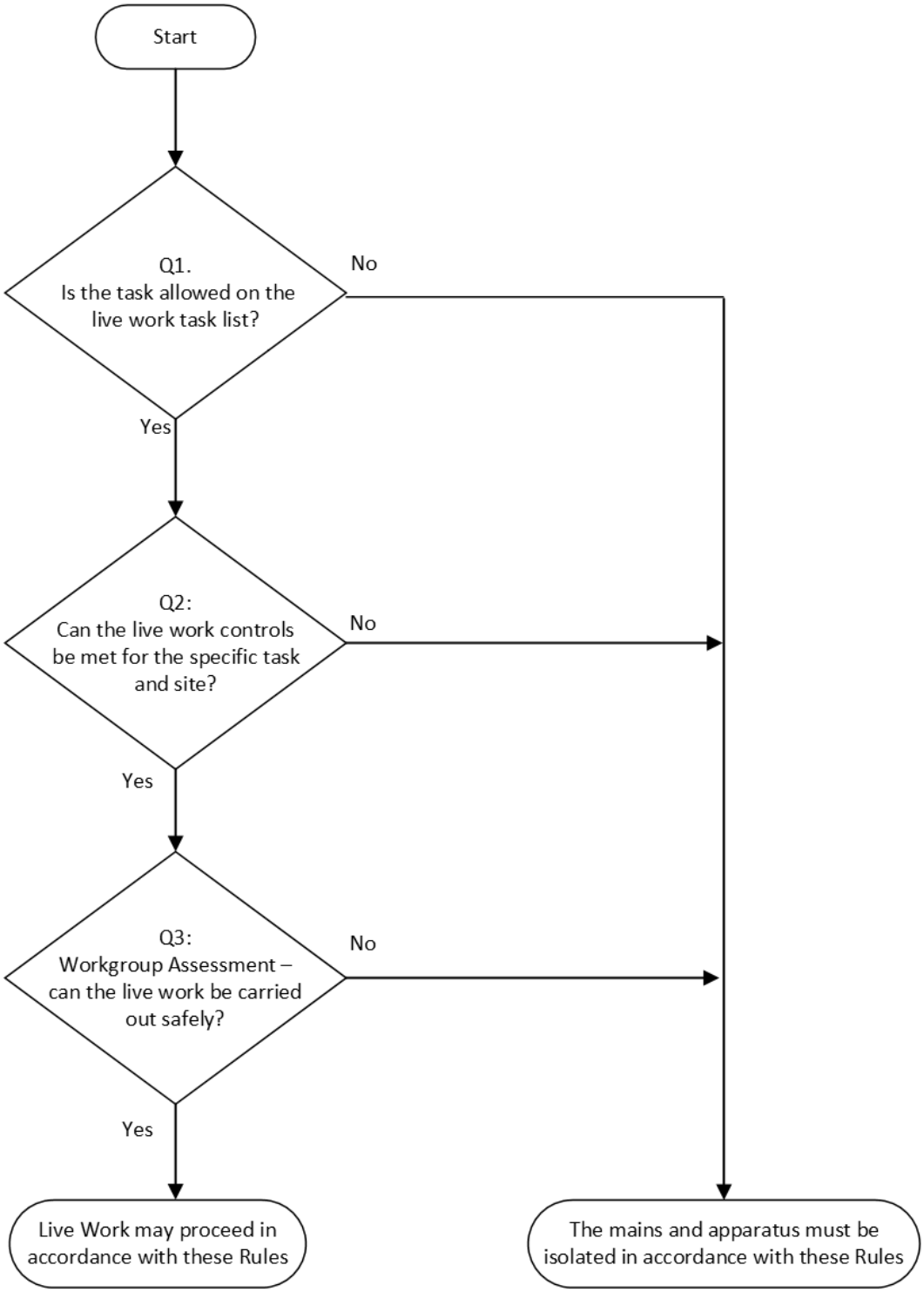

Figure 70 – Flowchart illustrating the LV work planning process

9.5.2 Authorisation to work on or near live exposed LV

Authorised Persons

Work on or near live exposed low voltage mains and apparatus, other than the operation of mobile plant which is carried out in accordance with Clause 9.5.6, may only be carried out by persons who are:

- authorised to work on, near, or in the vicinity of mains and apparatus; and
- electrically qualified (except for apprentices who are trained, assessed, and working under direct supervision, as set out below); and

- trained, assessed as competent, and authorised by their employer to carry out the task on or near live LV exposed mains and apparatus.

Employers of persons who carry out work on or near live exposed LV mains and apparatus must implement appropriate means to ensure the maintenance of competency of the worker(s), in accordance with the Energy Network Australia Guideline ENA DOC 044 – Guideline for Energised Low Voltage Work.

Apprentices

(Persons employed under an electrical apprenticeship)

Before working on or near exposed live low voltage mains and apparatus, apprentices must:

1. receive practical training in carrying out the task using live work controls, on de-energised or protected equipment in a training environment, and
2. be assessed* as competent to carry out the work on or near live exposed low voltage mains and apparatus under the direct supervision of an authorised person.

   *The assessment must be carried out by a person who has both:
   - formal qualification in workplace assessment, and
   - a thorough knowledge of the task and the required controls.

Once trained and assessed as competent (as detailed above) apprentices may only work on or near live exposed low voltage mains and apparatus under the direct supervision of an authorised person who is:

1. competent to carry out the live work safely, and
2. able to ensure approved low voltage live work procedures are followed.

9.5.3 Operating, testing/measurement, and inspection

If you are carrying out the following activities on or near live exposed LV mains and apparatus:

1. operating work (other than the making and breaking of conductor connections, or installation/removal of bolt-in fuses, via live work methods); or
2. the following testing/measurement – proving de-energised, verifying isolation, identifying neutral, proving polarity, measuring or recording of voltage or current or impedance, verifying correct phasing, cable identification or fault location; or
3. visual or thermographic inspection,

you must, as a minimum:

- Wear the following PPE:
  - LV insulating gloves with leather protective outer gloves; and
  - a safety helmet that is compliant with Clause 6.2.9; and
  - protective eyewear that is compliant with Clause 6.2.7; or
  - If working, in underground or ground level situations, or near conductors with a cross-sectional area of 6mm^2 or greater – an arc rated face shield that is compliant with Clause 6.2.8; and

  PPE exemptions: A safety helmet and an arc rated face shield are not required for work:
  - on or near 110V ac VT secondary circuits; or
  - where the work also requires a worker to wear Personal Protective Equipment (PPE) to manage the risk of working with asbestos, or asbestos containing materials and the PPE that the worker is wearing (to manage the asbestos risk) is a powered air purifying respirator (PAPR), which incorporates a helmet and face shield.
- Not wear any exposed metallic jewellery, or other adornments (such as bracelets, rings, neck chains, watches, clothing with metal threads, metal components, or other conductive items); and
- Use approved operating or testing equipment; and
- Where you pass between live exposed live LV overhead conductors, you must:
  - apply approved temporary insulation to all conductors within reach; and
  - be observed by a safety observer (who meets the requirements of a safety observer as set out in Clause 9.5.4); and

- have an appropriate emergency rescue kit readily available and accessible to the safety observer at each location (see Clause 6.3.2); and

- For work, under the scope of this Clause, to be carried out on LV service pillars, confirm that the task is permitted on page 3 of Appendix A – Live LV Task List; and
- Follow other approved precautions* to control the risk of inadvertent contact with other live conductors, neutral conductors, or conductive material at earth potential. (For Ausgrid employees, refer to the Low Voltage Live Work Manual and relevant Operating Advices).

*The approval of precautions for these tasks must be by a suitably authorised officer of the employer, following a risk assessment after consultation with persons who have a clear understanding of the work being performed and the risks associated with that work.

9.5.4 Controls for work on or near live exposed LV

If you are carrying out work (other than operating, testing, or visual inspection) on or near live exposed LV mains and apparatus, you must implement all the following control measures:

1. Insulate earth potential

You must insulate yourself from earth potential and insulate any conductive material at earth potential[1] that is within your reach[2].

Insulation from earth potential must be achieved by:

- Working from a timber or fibreglass ladder, pole, or platform, or
- Working from an insulated EWP, or
- Working from an insulating mat[3] that complies with Clause 6.7, and,
- Applying temporary insulating covers, compliant with Clause 6.7, to any conductive materials at earth potential that are within your reach.

2. Insulate all other conductors

You must apply temporary insulating covers to all other live exposed conductors[4] that are within your reach[2], other than the conductor you are working on.

Temporary insulating covers must comply with Clause 6.7.

You must visually inspect them prior to use to ensure they are in good condition.

You must adequately secure any temporary insulating cover you apply to exposed conductors, to prevent it being inadvertently dislodged.

Should you, or any mobile plant operating at your worksite, make inadvertent contact with a temporary insulating cover, you must immediately check that the insulating cover has not been dislodged and that no electrical contact has been made or is possible due to the exposure of an uninsulated section of live low voltage mains or apparatus.

Temporary insulating covers may need to be applied to exposed conductors beyond your reach, depending on the nature of the work being undertaken.

For Ausgrid employees, refer to Technical Guide T0089 Electrical Temporary Insulating Covers and Screens, for further information.

Exemptions: Applying temporary insulating covers to all other live exposed conductors that are within reach is not mandatory in the following situations:

- If you are working on overhead mains from a position below the lowest live overhead conductor (such that the only parts of your body capable of reaching the live exposed conductors are your insulating glove covered hands or forearms); or

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[1] Conductive material at earth potential includes, but is not limited to, steel and concrete poles, earth wires and downleads, earthed metal brackets and fittings, metal sheathed or armoured cables, communication cable catenary wires.

[2] Your reach includes your extended reach with any conductive tools and/or equipment that you may be using.

[3] If an insulating mat is not suitable due to the work environment (e.g. wet conditions where water or mud would short circuit the mat) workers may insulate themselves from earth by wearing rubber gumboots that comply with Clause 6.2.2 – provided they remain standing or squatting during the live work

[4] "Other conductors" include, but are not limited to, neutral conductors, conductors of unlike phases of the same distributor, all conductors of a different distributor, street lighting conductors, any conductive material at a different electrical potential to the conductor being worked on. If you are working on or near a neutral conductor, and there is a live exposed low voltage conductor at a different potential within 0.5m you must treat the neutral conductor as live.

- If you are applying screening to substation 110Vac terminal strips, in accordance with the Ausgrid Low Voltage Live Work Manual.

3. Insulating gloves

You must wear LV insulating gloves with protective leather outer gloves, and you may only make contact with the live exposed conductor with your insulating glove covered hands.

4. One potential at a time

You may only work on one potential at a time.

5. Body separation

You must keep uninsulated parts of your body separated from all conductors – both the exposed conductor being worked on, and the adjacent conductors covered with temporary insulating covers. (Temporary insulating covers compliant with Australian Standard AS 4202 are designed to protect against inadvertent contact only).

6. Safety Observer

If you are working on or near live exposed low voltage mains and apparatus, a safety observer must witness your work practices.

The safety observer must be an electrically qualified authorised person who knows the hazards and appropriate safety controls associated with the work.

The safety observer must have successfully completed nationally recognised training and assessment in rescue from live apparatus, resuscitation, and first aid, as required by the Ausgrid training matrix and/or authorisation system.

Role of the Safety Observer

A safety observer for low voltage live work must:

a) Ensure the appropriate safety controls are implemented and monitored for compliance as far as reasonably practicable and alert the live workers to any unsafe actions that may inadvertently occur; and

b) Be in a position where they can adequately visually monitor the work. If the observer is unable to maintain clear vision of the live work, a secondary safety observer must be appointed to assist; and

c) Maintain effective and immediate communication with the live worker(s) while the live work is in progress. (Note: communication aids such as two-way radios may be required in some environments); and

d) Be able to stop the work if necessary. The safety observer has the authority to temporarily stop the work at any time, to allow the work team to review their actions and controls; and

e) Be prepared to perform or assist in a rescue. If observing workers carrying out live work from an EWP with remote base controls, the safety observer must have the EWP remote base controls readily accessible and within 2m of them, while live work is in progress; and

f) Ensure, so far as reasonably practicable, that unauthorised persons remain clear of the immediate worksite.

A single safety observer may monitor more than one live worker, provided the workers are at the same location (e.g. the same pole or EWP), working on the same task and electrical potential, and site conditions allow.

A safety observer for low voltage live work must not:

a) Be inattentive or distracted; or

b) Carry out any other activity while observing; or

c) Be located within the Minimum Safe Working Distance from live exposed low voltage mains and apparatus; or

d) Be located in the work basket of an EWP. (A secondary observer may be located within an EWP basket to assist the observer, if the observer is unable to clearly view the work being undertaken).

Requirements for the Work Group

The workgroup must:

a) Know who is fulfilling the role of the safety observer at any given point during the live work.

b) The workers carrying out the live work must:

   i) Maintain effective and immediate communication with the safety observer at all times. (Communication aids such as two-way radios may be required in some environments).

ii) Where intended critical steps in the live work process may not be reasonably foreseen by the safety observer, workers must inform the observer of such intended steps prior to carrying them out.

iii) Listen to any advice, warning, or direction given by the safety observer and take appropriate action.

Exemption: (To the requirement for, or electrical qualification of, a safety observer)

You may work on or near live exposed low voltage mains and apparatus without a safety observer, or with a safety observer who is not electrically qualified, only if the following conditions are met:

a) A documented risk assessment details the appropriate risk controls measures so the work can be carried out safely without an observer, or with an observer who is not electrically qualified, and

b) Safe methods of working and documented procedures are approved for the work without a safety observer, or with an observer who is not electrically qualified.

7. Personal Protective Equipment (PPE)

In addition to wearing:

a) Full length arc rated clothing (as required by Clause 6.2.1); and

b) Safety footwear (as required by Clause 6.2.2);

you must wear the following PPE when carrying out work on or near live exposed low voltage mains and apparatus:

c) Low voltage insulating gloves (as required in section 3 of this clause); and

d) A safety helmet (hard hat) that is compliant with Clause 6.2.9; and

e) Protective eyewear, that is compliant with Clause 6.2.7; or

f) If working, in underground or ground level situations, on or near conductors with a cross-sectional area of 6mm^2 or greater – an arc rated face shield that is compliant with Clause 6.2.8.

PPE exemptions: A safety helmet and an arc rated face shield are not required for work:

- on or near 110V ac VT secondary circuits; or
- where the work also requires a worker to wear Personal Protective Equipment (PPE) to manage the risk of working with asbestos, or asbestos containing materials and the PPE that the worker is wearing (to manage the asbestos risk) is a powered air purifying respirator (PAPR), which incorporates a helmet and face shield.

8. Jewellery

You must not wear any exposed metallic jewellery, or other adornments (such as bracelets, rings, neck chains, watches, clothing with metal threads or metal components, or other conductive items).

9. Tools

Portable hand tools used for work on or near live exposed low voltage mains and apparatus must, wherever reasonably practicable, be covered with appropriately rated insulation that is in good condition.

You must securely store tools and other conductive objects which could fall onto live exposed conductors. (Objects falling from pockets are particularly hazardous).

Tool containers for use on live exposed low voltage mains and apparatus should provide a secure, non-conductive method to store and carry tools.

Tool lanyards must not be used for work on or near live exposed LV.

10. Working together

When working together on or near live exposed low voltage mains and apparatus with another worker you must both work on the same electrical potential wherever reasonably practicable. If this is not reasonably practicable, you must maintain a minimum of 500mm separation between workers and not pass conductive material from one to another.

11. Rescue kit

A rescue kit appropriate for the type of work being undertaken must be readily available and accessible to the safety observer at each location where live work is being carried out (see Clause 6.3.2).

12. Defibrillator

Where a safety observer is in place, an Automatic External Defibrillator (AED) must be available at the worksite.

9.5.5 Exposed neutral conductors

If you are working on or near an exposed earthed neutral conductor and it is known that there is also a live exposed LV conductor less than 0.5m away, you must treat the earthed neutral conductor as live.

9.5.6 Mobile plant near live exposed LV

This section provides the controls required, in addition to the controls required by Section 7.5, for the operation of uninsulated mobile plant near live exposed LV mains and apparatus (i.e. within the approach distances of Table 16 Column D).

Refer to Clause 10.2.3 for the requirements for the operation of mobile plant within 500mm of insulated overhead mains.

Training

The mobile plant operator and observer must have completed the training required for an authorised person, as set out in Clause 7.5.2.

Controls

In addition to the controls of Section 7.5 the following controls must be applied.

a) **Temporary insulating covers**

All exposed conductors, at an electrical potential other than earth potential, must be covered with temporary insulating covers compliant with Clause 6.7.

The temporary insulating covers must be applied to all exposed conductors within an area at least 0.5m greater than the reasonably foreseeable planned operating envelope of the mobile plant and load.

b) **Contact with the exposed conductors**

Persons controlling the mobile plant must not allow any part of the mobile plant or load (other than a timber or composite fibreglass pole) to make contact with the temporarily insulated exposed conductors.

Should any contact occur between any mobile plant or load and a temporary insulating cover, the electrically qualified worker supervising the work must immediately check that the insulating cover has not been dislodged and that no electrical contact has been made or is possible with a section of live exposed low voltage mains or apparatus.

Note: If a timber or composite fibreglass pole is to remain, once erected, in contact with an exposed conductor covered with temporary insulating covers – the temporary insulating covers must be adequately secured at the point of contact to prevent possible movement of the temporary insulating covers allowing exposed conductors to come into contact with the pole.

c) **Contact with the mobile plant and loads**

Mobile plant operator

The controls of Clause 7.5.5 apply for the mobile plant operator contacting the mobile plant and the ground or earthed situation at the same time.

Authorised persons

The controls of Clause 7.5.5 apply for authorised persons in contact with plant & loads that are within the approach distances of Table 16 Column D from live exposed LV conductors covered with temporary insulating covers but not in contact with them.

If a timber or composite fibreglass pole comes into contact with live exposed LV conductors that are covered with temporary insulating covers, workers on the ground or in an earthed situation may only make contact with the pole if they are wearing LV insulating gloves or gumboots.

d) **Supervision**

All work utilising mobile plant near live exposed LV mains and apparatus must be carried out under the direct supervision of an electrically qualified worker who is authorised to carry out work on or near the live exposed LV mains or apparatus.

Note: The supervising electrically qualified person may fulfil the role of the safety observer for the mobile plant.

9.5.7 Live insulated LV overhead mains and apparatus

See Clause 10.2.3 for the controls required for work on live insulated LV overhead mains and apparatus.

9.5.8 Live insulated LV underground cables

See Section 9.3 for the controls required for work on live insulated LV underground cables.

9.5.9 Ausgrid Low Voltage Live Work Manual

In addition to these Rules, Ausgrid employees must also refer to and comply with the Ausgrid Low Voltage Live Work Manual (Technical Guides T0120 to T0125), for work on or near live exposed low voltage mains and apparatus.

Figure 71 – Applying temporary insulating covers to low voltage overhead mains

9.6 High voltage – isolation

This section describes isolation of high voltage (HV) mains and apparatus, isolation by making a break in the circuit and using locking devices to secure isolation.

9.6.1 Isolating high voltage mains and apparatus

Isolate HV mains and apparatus from a source of supply by making a break in the electrical circuit, for example:

- at a switch or isolator; or
- by withdrawing fuses or opening links; or
- by removing or separating connections.

Figure 72 – Open 132kV isolator with closed earthing switch

Ensure the method of isolation is approved and appropriate to the voltage involved.

Separation distances between the contacts or connections must be no less than the minimum fixed clearances (described in Clause 7.4.1).

Points of isolation must be secured with a danger tag and, where the apparatus accommodates, a locking device, to prevent unauthorised or unintentional re-energisation.

9.6.2 Isolation by operating a switch

If a switch cannot be withdrawn or mechanically locked open (e.g. at HV links which are manually operated by link sticks), apply an operator danger tag that must be:

- clearly visible for anyone attempting to operate the switch; and
- in a secure position to avoid removal or damage.

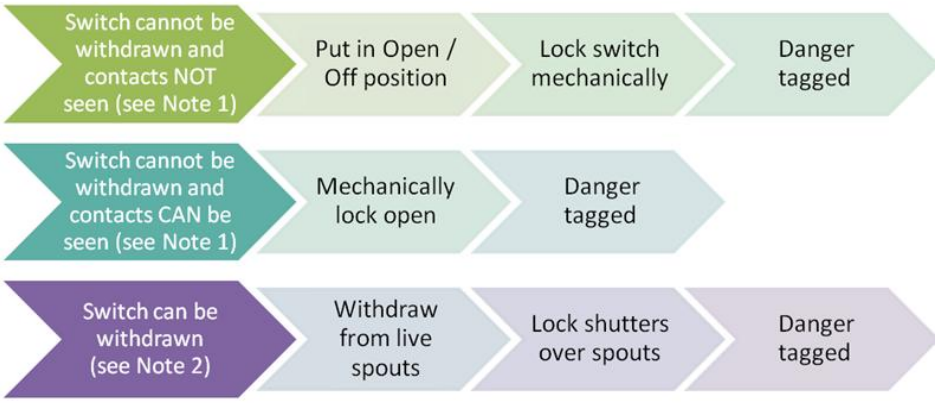

Figure 73 - Precautions taken when operating a switch to isolate high voltage mains and apparatus.

Note 1: If the switch operating shaft cannot be locked, lock any covers preventing access to the switch operating shaft and apply an operator danger tag.

Note 2: For solid insulated switchgear (or insulation enclosed switchgear where removable switch-caps are withdrawn), prevent access to live contacts by securing dust caps in an approved manner.

Note 3: Make remote switch control circuits inoperable using one of the following:

- open, lock, and danger-tag an isolation control switch at the site where the point of network isolation is located
- remove fuses or opening links and apply operator danger tags.

Note 4: Where switches used as points of isolation are spring, hydraulically or pneumatically operated, discharge the stored energy, so the switches cannot be accidentally closed.

When using an access permit to work on a switch, leave the stored energy charged only when:

- the recipient of the access permit requests that the switch's stored energy is left charged; and
- the stored energy is left charged relative to an approved operating procedure; and
- the stored energy is noted in 'Warnings' on the access permit.

Note 5: Isolation by making the break in the circuit in a medium other than air—such as oil, sulphur-hexafluoride, vacuum, or solid insulation (unless approved)—is not suitable for the application of HV for test purposes.

Insulating mediums other than air are not suitable for work or other tests which involve the removal of earthing and short-circuiting equipment at the point of isolation. Without special approved precautions, do not remove earths from solid insulation enclosed switchgear (e.g. Hazemeyer, Krone) which is considered to have the break in a medium other than air.

9.6.3 HV lines with limited isolation points

Background

There are some rural overhead HV lines where limited points of HV isolation makes isolation from all possible sources of supply (from LV customers supplied by substations on the HV line) not reasonably practicable.

Application

The provisions of this clause only apply in the following situations:

- isolation of LV/11kV/12.7kV SWER/22kV distribution mains and apparatus;
- in rural areas (not urban, suburban, or industrial areas); where
- isolation of all substations (from possible sources of LV supply) between HV isolation points, or from a HV isolation point to the end of the HV line, would take an unreasonable time and cause unacceptable customer interruption duration.

Controls

The isolation, earthing, and short-circuiting requirements for issue of an access permit in the situations described above, are as follows:

- The HV mains and apparatus must be isolated from the HV network;
- On radial sections of mains, the HV isolation area must be minimised wherever more than 200kVA total capacity of distribution substations are connected downstream of existing HV switches/circuit breakers/links/line fuses.
- access permit earths must be applied:
  - between the worksite and all HV points of isolation; and
  - between the worksite and any substations connected to the isolated HV mains.
- Where a worksite includes a substation:
  - the substation must be isolated from all possible sources of LV supply; or
  - the LV distributors from the substation must be isolated from all possible sources of LV supply; or
  - the LV distributors from the substation must be isolated and shorted as required by Clause 9.2.3.

Outside the access permit earths (i.e. between the access permit earths and points of isolation from the HV network, or between access permit earths and the termination of the overhead line), the following substations must be isolated from all possible sources of LV supply:

- all distribution substations with interconnections to substations outside the isolation area; and
- all substations supplying customers with known distributed energy resource capacity greater than 10kW per phase; and
- all substations with a capacity greater than 200kVA; and
- for 12.7kV SWER lines – any SWER substation within 150m of an access permit earth.

Other substations outside the access permit earths need not be isolated from possible sources of LV supply.

Isolation Folder

It is permissible to use the provisions of this Clause in conjunction with an Isolation Folder (where the Class 1 Operator(s) completes the isolations required by this Clause and the Class 2A operator(s) install the required access permit earths and/or permit LV shorts).

9.6.4 Using locking devices to secure isolation

Where the apparatus includes, or facilitates, the application of a locking device, the operator who is creating a point of isolation at the apparatus must apply the/a locking device (in addition to a Danger Tag) to secure the isolation point by preventing the unauthorised or unintentional closure of the point of isolation.

Locking devices must only be unlocked by an appropriately authorised operator.

Note: A locking device may be a keyed locking device or a suitable interlock mechanism incorporated into the switch operating mechanism.

Workers must not interfere with, force, or override, a locking device on a point of isolation.

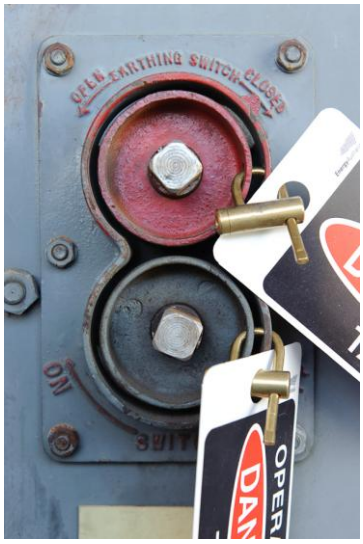

Figure 74 - Applied locking devices

9.6.5 Working on a point of isolation

Workers must not carry out any work on a switch which forms a point of HV isolation.

9.7 High voltage – proving de-energised

This section describes proving high voltage (HV) conductors are de-energised.

9.7.1 Proving HV conductors are de-energised

Prove that HV conductors are de-energised by using approved methods and detecting equipment with appropriately rated and tested operating rods and sticks. Only use the detecting equipment within the limits of its marked voltage rating.

Check the detecting equipment to prove it is in proper working order immediately before and immediately after proving that the HV conductors are de-energised.

Figure 75 - Checking HV detector

Figure 76 - Proving HV conductors are de-energised

9.8 High voltage – earthing and short-circuiting

This section describes earthing and short-circuiting of mains and apparatus.

9.8.1 Earthing and short-circuiting – general

HV conductors are considered earthed where:

- there is a continuous electrical connection to the general mass of earth; and
- the electrical path does not pass through a fuse; or

- the electrical path does not pass through a transformer (except a current transformer), a reactor, a powerline carrier wave trap, or any apparatus that provides a relatively high impedance.

Earthing and short-circuiting equipment must be rated to carry the prospective peak fault current for a length of time equal to the clearing-time of back-up protection.

Figure 77 – Portable earthing and short-circuiting equipment

Access permit earths

Earthing and short-circuiting equipment must be applied between all points of HV isolation and the worksite. These earths are known as access permit earths and must be listed on the access permit.

At least one set of access permit earths must be as close as practicable to the worksite.

Exception: For work on or near busbars within a substation, it is not necessary to apply earthing and short-circuiting equipment between all points of HV isolation and the worksite, provided the busbars are earthed and short-circuited as required by Clause 9.8.2.

Note: Where a point of isolation of HV mains and apparatus is made on the LV network (such as distribution substation LV fuses), it is not necessary to apply earthing and short-circuiting equipment between the LV point of isolation and the worksite. Apply earthing and short-circuiting equipment between all HV points of isolation and the worksite.

Training

Workers must be electrically qualified, trained, and assessed as competent, to erect earthing and short-circuiting equipment.

The application of access permit earths must be carried out by a suitably authorised operator, or by a trained and competent person under the direct supervision of an appropriately authorised Operator.

Working earths may be applied by the access permit recipient, or by trained and competent workers under the direct supervision of the access permit recipient.

Proving De-energised

Rule: HV conductors must be proved de-energised immediately before applying the earthing and short-circuiting equipment.

Exceptions: There are three exceptions to the need to prove mains and apparatus are de-energised immediately prior to the application of earthing and short-circuiting equipment, as detailed below:

1. Where the conductors are fully enclosed and cannot be proved de-energised - and an integral earthing and short-circuiting switch is used.

   Note: The fault making capacity of the switch must be fully rated for the prospective peak fault levels. Earthing switches associated with non-withdrawable circuit breakers need not be fully rated for the prospective peak fault levels if they are interlocked with the feeder and busbar disconnectors on each side of the circuit breaker. These earthing switches can be closed only after the circuit breaker and disconnectors are opened. The interlocks must be fully operational.

2. The recipient of an access permit may apply working earths to overhead mains without proving the mains are de-energised, only if:

- There are existing earths (access permit earths or working earths) on the same line within sight; or
- The recipient visually traces the overhead mains from existing earths to the site of the proposed working earths, and the visual trace is verified by a second person.

  If this cannot be done, the line must be retested before the application of working earths.

3. Where the conductors cannot be proven de-energised and alternate controls are approved by the Ausgrid manager who has the authority to issue exemptions to these Rules.

9.8.2 Earthing and short-circuiting – mains and apparatus other than overhead lines

Prior to issuing an access permit, the following apparatus must be earthed and short-circuited as set out below:

- Pole transformers (**PT**) directly connected to underground cables (e.g. 'Q type' PTs)—where an access permit is issued for this type of PT, or a test will be carried out on the HV cable, apply additional earthing and short-circuiting equipment to the HV conductors between the cable sealing ends and the drop-out fuses at the PT.
- For access permits issued at a substation for work on:
  - Insulation enclosed switchgear or solid insulation switchgear—apply earthing and short-circuiting equipment to the feeder connections at the worksite to show that the mains and apparatus are de-energised. The transformer connections can be directly earthed through the transformer fuse terminals.
  - Metal clad ring main units—the feeder earthing switches, and the transformer earthing switches are to be left in the 'Earth On' position but not locked.
- Busbars—apply a minimum of one set of earthing and short-circuiting equipment directly to the busbars. It is not necessary to apply earthing equipment between the busbar and each source of HV supply. When the busbar is divided into sections, short-circuit and earth each section before dividing.

A circuit breaker may form part of an electrical path used to earth and short-circuit mains and apparatus, provided the circuit breaker is;

1. Closed, made inoperable, locked, and danger-tagged (if not intended for operation by the recipient); or
2. Closed, made inoperable, and warning tagged (if intended for operation by the recipient).

A switch (other than a circuit breaker or fuse) may form part of an electrical path used to earth and short-circuit mains and apparatus, provided the switch is;

1. Closed, locked (if possible), and danger-tagged (if not intended for operation by the recipient); or
2. Closed and warning tagged (if intended for operation by the recipient).

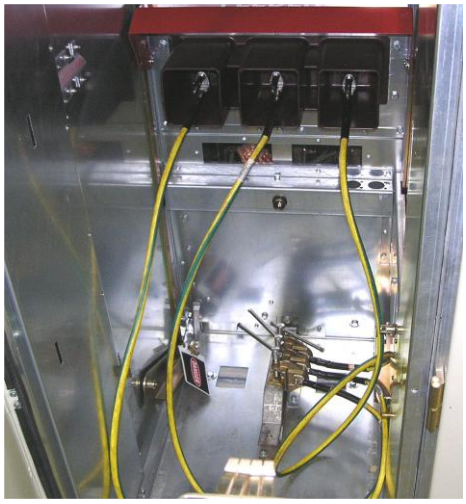

Figure 78 – Earthing applied to 11kV horizontal racking switchgear

Working Earths

Where the work includes the breaking of conductor connections that would result in mains and apparatus no longer being earthed and short-circuited (other than those situations permitted by Clause 9.8.5) the access permit recipient (provided they are electrically qualified and trained to apply earths) is responsible for the installation of working earths to ensure all sections of the mains and apparatus being worked on remain earthed and short-circuited.

In an outdoor switchyard, where both access permit earths and working earths are applied by hand, identify the working earths with a warning tag (see Clause 8.2.6).

9.8.3 Earthing and short circuiting – overhead mains and apparatus

Rule: At least one set of earths must be visible to everyone working on or near the overhead mains and apparatus.

Exception: HV ABC and HV covered conductors, which must be visually traced to the earths at the exposed earthing points, as required by Section 9.10.

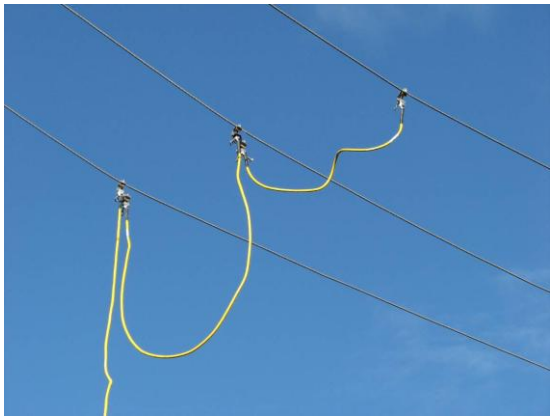

Figure 79 - Three phases earthed and short-circuited on HV overhead line

Means of connecting to the general mass of earth

Earthing and short-circuiting equipment which is intended to be connected to overhead mains and apparatus (excluding SWER systems – see Clause 9.8.4) must be connected to the general mass of earth following the order of preference set out below:

- Option 1 – wherever it is reasonably practicable – to a permanently installed system earth; or
- Option 2 – (for earthing HV distribution mains only - not sub-transmission) where option 1 is not reasonably practicable and the surrounding distribution substations have a combined earthing system – to a LV neutral conductor; or
- Option 3 – where options 1 or 2 are not reasonably practicable or applicable – to an alternate earth connection such as a pole nail or ground anchor (stay); or
- Option 4 – where options 1, 2, and 3 are not reasonably practicable or applicable – to a temporary driven earth stake.

For further information, see the Ausgrid Distribution Guideline DG180B – Application of Portable Earthing to Overhead Lines.

Applying earthing and short-circuiting equipment

When applying earthing and short-circuiting equipment to overhead mains, workers must work ‘from the ground up’, that is:

- Connect the phase-to-earth lead to earth before connecting it to a conductor (always apply the phase-to-earth lead first and remove it last); and
- Connect one end of a phase-to-phase (short-circuiting) lead to a conductor which has already been earthed, before connecting the other end to the next conductor; and
- Always maintain the relevant MSWD from exposed conductors (as indicated in Chapter 7) until the earth is connected to the conductor; and

- Always use an insulated tool to apply earthing and short-circuiting equipment.

Working Earths

Where the worksite moves from the initial location, the access permit recipient (provided they are electrically qualified and trained to apply overhead earths) is responsible for the installation of working earths to ensure at least one set of earths are visible to everyone working on the line.

Where the work includes the breaking of conductor connections that would result in a section of overhead mains no longer being earthed, the access permit recipient (provided they are electrically qualified and trained to apply overhead earths) is responsible for the installation of working earths to ensure all sections of the overhead mains being worked on remain earthed and short-circuited.

Prior to installing working earths, the recipient must:

- visibly identify an existing set of earths on the same line from the worksite; or
- positively trace the line from the existing set of earths to the worksite and have the trace verified by a second person; or
- if the recipient, or the operator who issued the access permit and signed onto the access permit as a member of the workgroup, is a Class 2A, 2D, 2Dh, or Class 1 operator, the recipient, or the workgroup operator if applicable, may confirm that the new location is the correct line and within the isolated area – then retest the line to prove that it is de-energised.

9.8.4 Earthing – Single Wire Earth Return (SWER) lines

When earthing a SWER line, at least one earth connection must be to a permanent earthing facility, or a temporary earth that is proven to have a resistance to earth of less than 25 Ohms (to be proven by standard earth resistance test methods, immediately prior to connection).

If the SWER line is to be divided, any section of line between the worksite and HV point(s) of isolation must have at least one connection to an earth with a proven resistance to earth of less than 25 Ohms.

Before working on SWER substation poles, visually inspect SWER transformer earthing arrangements to confirm it is not visibly damaged.

Figure 80 – A SWER substation

9.8.5 Situations where earthing and short-circuiting equipment is not required

For work carried out on isolated HV mains and apparatus (provided the conductors are discharged to earth immediately before the work is started), earthing and short-circuiting is not required for HV mains and apparatus in any of the following situations:

- draw-out type equipment withdrawn clear of live conductors;
- mains and apparatus (other than overhead) separated from all possible sources of HV supply by other mains and apparatus which are earthed and short-circuited;
- dismantled HV equipment where it is not practical to use fixed earths;
- when work involves the application of test voltages; or

- in approved circumstances, when it is not practical to do the work if earth leads are attached.

9.8.6 Removing access permit earths

Access permit earths (earthing and short-circuiting equipment which is specified on an access permit) must not be moved or altered and must remain connected to the mains and apparatus until all access permit(s), on which the access permit earths are listed, are signed off, surrendered, and cancelled. The three possible exceptions to this requirement are set out below.

Exception 1: The relevant Control Room Operator can give approval for the recipient of an access permit, to remove, or directly supervise the removal of, access permit earths before work is finished, when either of the following applies:

- the work involves dismantling of isolated HV equipment and it is therefore impossible to leave the access permit earths in place; or
- the applied access permit earths would prevent the work being done.

The recipient is responsible for:

- notifying the recipients of all other access permits on issue (as listed on the Permit Folder) prior to removing the access permit earths;
- directly supervising workers who may remove and/or restore access permit earths on behalf of the recipient; and
- restoring the access permit earths as soon as possible.

Exception 2: Provided the requirements for isolation will be met, the recipient of an access permit, or a worker under their direct supervision, may partially or completely remove any access permit earths applied by hand, or left intentionally unsecured, to do any of the following:

- perform protection system checks;
- identify underground cables;
- check phasing on underground cables;
- locate faults on underground cables;
- apply test voltages; or
- clean spouts or repair shutter gear.

The recipient is responsible for:

- notifying the recipients of all other access permits on issue (as listed on the Permit Folder) are notified prior to removing the earths; and
- directly supervising workers who may remove and/or restore access permit earths on behalf of the recipient; and
- restoring the access permit earths as soon as possible; and
- ensuring their workgroup complies with the following clauses:
  - Clause 9.6.2 - Isolation by operating a switch (Note 5)
  - Clause 10.6.3 - Testing with the earth and short-circuit removed
  - Clause 10.6.2 - Applying hazardous voltages for testing.

Exception 3: When work on or near mains and apparatus under an access permit is complete, overhead access permit earths may be removed by the recipient (or a worker who is under the direct supervision of the recipient) before the access permit is surrendered and cancelled, provided:

- the workgroup will carry out no further work on or near the mains and apparatus under the access permit; and
- the access permit earths are not required for any other access permit; and
- the recipient receives approval from the relevant Control Room Operator.

The following process must be followed.

- The recipient must contact the relevant Control Room Operator to gain approval to remove the access permit earths and confirm they are not required for another access permit which is on issue on the mains and apparatus; and

- All members of the workgroup must sign off the access permit; and
- After all members have signed off, but prior to surrendering the access permit, the recipient must remove, or directly supervise the removal of, the access permits earths; and
- The recipient must write, in the surrender section of the access permit, the specific access permit earths that have been removed; then
- The recipient must surrender the access permit and advise the relevant Control Room Operator.

9.9 High voltage – cables

This section describes the requirements for identifying and remotely cutting HV (distribution and/or sub-transmission) cables before starting work.

9.9.1 General

Workers must not work on the cores of a HV cable (including distribution and/or sub-transmission cables) until:

- they have signed onto an access permit covering the cable; and
- the cable is identified at the worksite (see Clause 9.9.2); and
- the cable is remotely cut at the worksite (see Clause 9.9.3).

9.9.2 Identifying HV cables

Workers must identify a HV underground cable(s) (including distribution and/or sub-transmission cables) at the worksite using at least one of the methods set out in Table 26 (prior to remotely cutting the cable in accordance with Clause 9.9.3).

Regardless of the identification method used, the cable identification must be verified by a second person.

As required by Clause 3.3.11, workers must be authorised to identify cable(s) using method (b).

As required by Clause 3.3.14, workers must be authorised to identify cable(s) using method (c).

Table 26 - HV cable identification methods

ID	Method	Description
a	Visual identification	Visually trace the cable, along its entire length, to the worksite from: • the point where the cable has been isolated, earthed, and short-circuited; or • for sub-transmission cables only, a cable sheath link box that can be identified by permanently affixed labels.
b	Signal generation and detection	Use an approved signal generator and associated signal detector, in accordance with Technical Guide T0003 – Cable Identification and Phasing. Signal generation must commence from: • the point where the cable has been isolated, earthed, and short-circuited; or • for sub-transmission cables only, a cable sheath link box that can be identified by permanently affixed labels.
c	Fault location tests	Whilst applying HV to the faulty core or sheath, visually observe the generation of smoke, flame, sparks, or other clear evidence of a breakdown together with the audible discharge of energy at the fault location worksite. Note: Where a cable fault causes an open circuit in all cores of the cable, the primary fault location tests must, where it is reasonably practicable to do so, be carried out from both ends of the cable.

ID	Method	Description
d	Conduit “rodding”	Where a cable in a conduit cannot be identified using methods a), b) or c), the cable may be traced by “rodding” (inserting non-conductive rod(s) into the conduit).
e	Detection of oil or gas leaks	Where methods a) to d) are not reasonably practicable, a sub-transmission cable may be identified by positive evidence of major gas or oil leaks, or a primary fault with a corresponding rapid reduction of oil or gas pressure.

Exception: If it is not reasonably practicable to identify the cable(s) using one of the methods in Table 26, the remote cutting of the cable(s), as required by Clause 9.9.3, may proceed only if a proposal detailing:

- the reasons why the cable identification methods in Table 26 are not reasonably practicable to implement;
- the available cable information; and
- the alternate controls that have been, or will be, implemented to confirm the correct cable is to be remotely cut;

is endorsed by System Control and approved by the Level 3 Ausgrid manager (or their delegate) of the workgroup carrying out the work or submitting the NAR.

9.9.3 Remote cutting of HV cables

Immediately after the identification, remotely cut the cable:

- using approved equipment (see Clause 6.4.4);
- in the presence of the person who is going to do the work;
- at the point where the work will be done; and
- in accordance with the Ausgrid Technical Guide T0031 – Remote Cable Cutting Equipment.

For work to repair a fault which creates an open circuit in all cores of the cable, the cable must be remotely cut either side of the cable fault location.

Notes:

The requirements of this clause apply to HV distribution and/or sub-transmission cables.

Steel wire armour may be removed, if required, to allow the cable to be remotely cut.

Exception: It is not necessary to remotely cut a high voltage cable where work is not being performed on the cores (e.g. for serving or sheath repairs).

9.9.4 Excavation of underground cables – general

Refer to Network Standard NS156 – Excavating Near Ausgrid Underground Cables or Conduits for the requirements for excavation near Ausgrid underground cables.

9.9.5 Cutting cables, conduits or cover strips

To prevent damage to any adjacent buried cables, you must excavate removable soil or backfill to a minimum radius of 200mm around any cable, conduit, or cover strip, before cutting it. Additional precautions such as physical barriers may also be required to prevent damage to adjacent cables.

9.9.6 Excavation of faulted underground cables

All workers involved in the excavation of faulted underground cables, within the following distances from the cable:

- below a depth of 150mm above the cable cover strip (identified by hand excavated “potholes”); or
- within 300mm of the cable;

must sign onto the relevant access permit issued for the testing and/or repair of that cable, before commencing work.

9.9.7 Induction and transferred earth potential controls

In addition to the controls required in this Section, workers must apply the controls required Clause 9.11.5 to manage the induction and/or transferred earth potential controls associated with working on HV distribution and sub-transmission cables.

9.9.8 Sub-transmission cable sheath link boxes

Permit requirements

As required by Clause 5.1.1, workers must sign onto a relevant access permit before gaining access to a sub-transmission cable sheath link box.

Identification

Cable link boxes may be identified by permanently affixed labels that provide the correct feeder number as per the System Diagram.

If there are no permanently affixed labels, workers must follow the cable identification requirements of Clause 9.9.2 to confirm the link box is connected to the correct feeder sheaths.

Induction and/or transferred earth potential controls

In addition to the other controls required in this Clause, to manage the induction and/or transferred earth potential controls associated with working on sub-transmission cable sheath link boxes, workers must implement the controls required by Clause 9.11.5, Table 28.

9.10 High voltage – HV ABC and covered conductors

9.10.1 HV Aerial Bundled Cable (ABC)

The Ausgrid network contains both HV ABC with an earthed metal screen, and HV ABC with non-metal screen.

Non-metal screen

Workers must maintain the relevant exposed conductor MSWD from HV ABC with a non-metal screen until the cable is isolated, earthed and identified as set out below.

Note: HV ABC with a non-metal screen is able to be identified by tags that are attached to the cable at supporting poles with the letters ‘NMS’.

Metal screen

Where HV ABC with a metal screen is installed as an overhead cable:

- workers must maintain the relevant exposed conductor MSWD from the HV ABC until the cable is proven to be effectively screened and earthed through testing with an approved non-contact HV detector; and
- workers must not carry out any work on HV ABC with a metallic screen until the cable is isolated, earthed, and identified as set out below.

Isolation, earthing, and identification requirements

The following conditions are required for work on HV ABC:

- the mains must be isolated as required by these Rules; and
- the mains must be earthed and short-circuited between all points of isolation and the worksite, at permanently installed earthing points; and
- at least one set of access permit earths must be installed as close as practicable to the worksite; and
- workers must visually trace the overhead cable from at least one set of earths to the worksite; and
- a second worker must verify the visual trace by visually tracing the overhead cable from the worksite back to the earthing and short-circuiting.

Note: Where HV ABC has been installed as an underground cable, underground cable identification equipment and methods must be used to identify the cable.

Remote cutting

Where the work will require cutting of the HV ABC, or work on the cores of the cable, the HV ABC must be remotely cut to prove the cable is de-energised at the worksite, prior to carrying out any work on the conductive cores of the cable.

9.10.2 HV covered conductors

Workers must maintain the relevant exposed conductor MSWD from HV covered conductors until the is conductors are identified, isolated, proved de-energised, and earthed, as required below:

- the mains must be isolated as required by these Rules; and
- the mains must be earthed and short-circuited between all points of isolation and the worksite, at permanently installed earthing points; and
- at least one set of access permit earths must be installed as close as practicable to the worksite; and
- workers must visually trace the overhead line from at least one set of earths to the worksite; and
- a second worker must verify the visual trace by visually tracing the overhead line from the worksite back to the earthing and short-circuiting; and
- the mains must be proved de-energised at the worksite by the use of a non-contact HV voltage detector.

Figure 81 – HV covered conductors with earthing and short-circuiting equipment installed

9.11 Earth potential rise and induced voltage mitigation

In addition to the isolation, earthing, short-circuiting, and access permit requirements of these Rules, the controls within this section are required to manage the hazards of induced voltages, earth potential rise, and transferred earth potential.

9.11.1 Hazards

Refer to Technical Guide T0157 – Earth Potential Rise and Induced Voltage Hazards, for information on the hazards of induced voltages, earth potential rise, and transferred earth potential.

9.11.2 Lightning

Workers must cease work on or near mains and apparatus when there is nearby lighting activity. Work may only resume once the storm has passed. Consideration must also be given to the location of the storm and the associated affected network.

9.11.3 Equipotential bonding

In the following Clauses within this Section, equipotential bonding is one of the controls required, in addition to access permit earths and working earths, to protect workers from induced voltages or transferred earth potentials.

Unless otherwise stated, equipotential bonding conductors must have a minimum current carrying capacity equivalent to 16mm^2 copper.

Workers must either wear LV insulating gloves or use insulated tools while attaching and removing equipotential bonds.

9.11.4 Controls – overhead lines

The following table sets out the minimum controls required to manage the risks of induced voltages, earth potential rise, and transferred earth potential, associated with work on:

- overhead sub-transmission lines; or
- overhead distribution lines in common spans with an energised sub-transmission line; or
- overhead distribution lines which run parallel (less than 20m apart for more than 500m) to an energised sub-transmission line between the worksite and the access permit earths.

Table 27 – Controls required to manage the risks of induced voltages and earth potential rise when working on overhead lines

Category & Description	Examples	Controls required
Outside MSWD Task does not require a worker to come within the MSWD of phase conductors or make contact with earthing systems.	Climbing inspection Street lighting maintenance	Nil
No break Task requires work on or near a phase conductor or earth wire but does not require a break in the continuity of these systems. The task can involve controlled detachment / attachment of these systems, with continuity being maintained.	Insulator replacement. Vibration damper replacement. Transfer from old to new pole. Crossarm replacement	1. The mains must be isolated and access permit earths applied in accordance with these Rules, and 2. A visible earth (access permit or working earths) must be located within 250m (see note) of the work location, and 3. If working from an uninsulated EWP, and greater than 30m from a structure (i.e. midspan): a. Bond[5] the EWP to the conductor; and b. Earth[6] the EWP via an earth stake; and c. Persons must not make contact with the mobile plant and the ground at the same time 4. If working from an uninsulated EWP, and within 30m from a structure: a. Bond[6] EWP chassis to the structure. **Note:** Where span lengths exceed 250m, the distance to the earths may exceed 250m provided: • the earths are applied at the next accessible structure; and • an induction study proves the proposed distance to the earths is acceptable.
Break/make Task requires breaking and/or remaking in the continuity of a phase conductor or earth wire, with work being performed above ground level. (Excluding UGOHs and earthing downleads).	Re-tensioning. Mid-span joint replacement. Replacement of short conductor sections.	1. The mains must be isolated and access permit earths applied in accordance with these Rules, and 2. The mains must be earthed either side of the work location (access permit or working earths) - within one structure distance, and 3. Prior to making or breaking connections of phase conductors or earth wires, a bridging lead[6] must

[5] Must be a conductor with a minimum current carrying capacity equivalent to 16mm^2 copper. All earth leads and bridging leads must be inspected and tested as per the requirements for portable earthing equipment (see Clause 6.5).

[6] Must be a conductor with a minimum current carrying capacity equivalent to 70mm^2 copper (unless otherwise approved). All earth leads and bridging leads must be inspected and tested as per the requirements for portable earthing equipment (see Clause 6.5).

Category & Description	Examples	Controls required
		be applied across the intended break in continuity, and 4. If working within from an uninsulated EWP, and greater than 30m from a structure (i.e. midspan): a. Bond[5] the EWP to the conductor; and b. Earth[6] the EWP via an earth stake; and c. Persons must not make contact with the mobile plant and the ground at the same time. 5. If working from an uninsulated EWP, and within 30m from a structure: a. Bond[6] EWP chassis to the structure.
Break/make – UGOH Task requires breaking and/or remaking of conductor connections at a UGOH		1. The mains must be isolated and access permit earths applied in accordance with these Rules, and 2. The overhead mains must be earthed (access permit or working earths) within one structure distance, and 3. The underground cable must be earthed at the point of isolation, or next UGOH, whichever is closer. 4. If working from an uninsulated EWP: a. Bond[6] EWP chassis to the structure.
Conductor on the ground Task requires contact with a phase conductor or earth wire, with work being performed at ground level.	Recovery of a fallen conductor.	1. The mains must be isolated and access permit earths applied in accordance with these Rules, and 2. The mains must be earthed either side of the work location (access permit or working earths) - within one structure distance, and 3. Prior to making or breaking any phase conductor or earth wire connections, a bridging lead[6] must be applied across the intended break in continuity, and 4. All contact with the conductor must be performed either: **a. Using equipotential bonding controls:** i. The conductor/earth wire and all associated plant & equipment must be located entirely on a conductive equipotential mat; and ii. The conductor/earth wire must be bonded[6] to the conductive mat; and iii. Persons must not make simultaneous contact both inside and outside of the equipotential zone; and iv. Access onto the equipotential zone shall be via an insulating mat; and v. If within 30m of a known earth (e.g. structure earth), the equipotential zone must be bonded[6] to this known earth. or **b. Using insulated controls:** i. Wear 1000V insulated gloves with outers; and ii. Wear gumboots; and

Category & Description	Examples	Controls required
		iii. Cover the conductor/earth wire with LV temporary insulating covers where there is a risk of contact between the conductor and uninsulated parts of the body.
Stringing Task requires significant longitudinal movement of a phase conductor or earth wire	Stringing new conductors. Reconductoring of more than one span. Replacement of overhead earth wire.	1. The mains must be isolated and access permit earths applied in accordance with these Rules, and 2. Prior to making or breaking phase conductors or earthing system, a bridging lead[6] must be applied across the break, and 3. Earths (access permit or working) must be applied at the nearest practicable location, outside both ends of the stringing section, and 4. An induction study must be performed. 5. The following controls must also be applied, except where the induction study shows they are not required: Puller/tensioner machines, drums, blocks, and all associated equipment shall be located entirely on an equipotential zone. This equipotential zone shall: a. be situated on a conductive grid, connected[6] to two earth stakes at opposite ends; and b. have a barricaded physical perimeter, establishing an exclusion zone preventing persons from making contact inside and outside of the equipotential zone simultaneously, and c. have a single defined entrance, utilising an insulating mat entirely traversing the exclusion zone, and d. have a rolling earth connected to the conductor/earth wire at both equipotential zones. This rolling earth shall be connected both to a separate earth stake and the conductive grid; and e. have all equipment within the equipotential zone bonded[5] to the equipotential zone; and f. if within 30m of a known earth (e.g. structure earth), the equipotential zone shall be bonded[6] to this known earth. 6. Any additional controls that are required by the induction study must also be implemented.
Splicing Task requires accessing earthing system to perform fibre splicing, with work being performed at ground level.	Splicing of optical ground wire (**OPGW**) to OPGW fibre cables. Splicing of OPGW to 'all dielectric self-supporting' (ADSS) fibre cables.	1. Prior to making or breaking the earthing system continuity, a bridging lead[6] must be applied, and 2. The connection of the earth wire to earth at adjacent structures must be visually confirmed, and 3. The work and all associated equipment must be located entirely on an equipotential zone: a. The earth wire and all associated equipment must be bonded[6] to the conductive mat; and b. The conductive mat must be bonded[6] to the nearest structure or substation earth; and

Category & Description	Examples	Controls required
		c. Persons must not make simultaneous contact both inside and outside of the equipotential zone; and d. Access onto the equipotential zone shall be via an insulating mat.
Sub-transmission earth downleads Task requires the make and/or break of a sub-transmission feeder earth downlead - without breaking the longitudinal integrity of the line earthing system.	Replacing a corroded downlead or earth bond. Reinstate a stolen downlead. Replacing an earth rod/stake	1. Prior to making or breaking connections on the earthing system, a bridging lead[6] must be applied across the intended break in continuity, and 2. Workers must not make any uninsulated contact with the earth downlead until the bridging lead is in place.

9.11.5 Controls – underground cables

Workers must apply the controls detailed in Table 28 below, to manage the risks of induced voltages and/or transferred earth potential risks associated with work on underground HV & sub-transmission cables (cable cores and/or cable sheath) that are remotely earthed.

Note: These controls are in addition to the isolation, earthing, cable identification, remote cutting, and access permit requirements of these Rules, for work on underground cables.

Table 28 – Controls required to manage the risks of induced voltages and earth potential rise when working on underground cables

Cable voltage	Controls required
11kV	When working within a zone substation, on an 11kV cable which is remotely earthed; or When working on an 11kV cable which is remotely earthed within a zone substation: Workers must apply the following controls, as a minimum: • connect a temporary equipotential bond across any open cable cores and/or sheath; or • insulate themselves from the local earth (while in contact with the remotely earthed cable) by: ▪ working from an insulated mat (compliant with Clause 6.7.2); or ▪ wearing gum boots; or ▪ wearing 1000V insulating gloves.
33kV & 66kV	When working on 33kV or 66kV cables, workers must apply the following controls, as a minimum: • connect a temporary equipotential bond across any open cable cores and/or sheath; or • insulate themselves from the local earth (while in contact with the remotely earthed cable) by: ▪ working from an insulated mat (compliant with Clause 6.7.2); or ▪ wearing gum boots; or ▪ wearing 1000V insulating gloves.

Cable voltage	Controls required
132kV	When working on 132kV cables, workers must apply the equipotential controls detailed below. **Equipotential controls** The workers must carry out all work on the cable from within an equipotential zone. The equipotential zone must consist of a wire mesh or other form of conductive mat which is bonded to: • the cable (cores and sheath); and • associated equipment being used; and • two local temporary earth stakes; or • for concrete cable pits, the pit earth tag. If work is occurring on two cable ends, both ends of the cable must be bonded to the equipotential zone. Workers must not make simultaneous contact both inside and outside of the equipotential zone. Workers must enter and exit the equipotential zone via an insulating mat.
Sub-transmission cable sheath link boxes	Workers must: • wear Class 2 (17kV) insulating gloves; and • (where practicable) work from an insulating mat (compliant with Clause 6.7.2); and/or • (where practicable) wear gum boots.

Figure 82 - Equipotential zone using wire mesh

9.11.6 Controls – substations

This clause provides the controls required to manage the risk of induced voltages and earth potential rise when working within a substation.

Table 29 – Controls required to manage the risks of induced voltages and earth potential rise, when working in substations

Apparatus/equipment	Controls required
HV and sub-transmission cables within a substation	Workers must apply the controls required by Clause 9.11.5.

Apparatus/equipment	Controls required
Tail-ended transformers	Prior to carrying out any work on the conductors within the tail-ended transformer workers must apply the controls required by Clause 11.5.4.
Mobile plant	Workers must connect mobile plant to the substation earth grid, as required by Clause 7.5.7.
Vehicles	Workers must connect vehicles to the substation earth grid, as required by Clause 7.6.2.
Metallic scaffolding	Workers must connect metallic scaffolding to the substation earth grid. See Network Standard NS222 for further information.
Use of LV power supplies, power tools, and equipment	Workers must apply the controls required by Network Standard NS165 – Safety Requirements for Work in and around Live Substations & Network Standard NS 222 – Major Substation Earthing Design.
Temporary conductive structures	Workers must connect temporary metallic structures to the substation earth grid as required by Network Standard NS 222 – Major Substation Earthing Design (or an earthing study carried out under NS 222).
Conductive materials longer than 5m	Workers must apply the controls required by Network Standard NS222 – Major Substation Earthing Design.

9.12 Work on earthing systems

9.12.1 Earth connections to HV mains and apparatus

Some components of HV mains and apparatus are designed to be permanently connected to earth. Workers must maintain a continuous low impedance electrical path from these components to earth while the apparatus is energised.

If the electrical path to the earth connections listed immediately below is found to be inadvertently open-circuited, restoration of the electrical connection must be carried out under an access permit covering the mains and apparatus:

- HV cable screens; or
- Surge diverters (lightning arrestors) connected to HV conductors; or
- Transformer HV windings, including:
  - Star point connection of star-connected transformer HV windings; or
  - Delta connected tertiary HV windings; or
  - Phase-to-earth connected VT's; or
  - SWER transformers.

Restoration of earth connections to mains and apparatus other than those listed directly above, may be carried out by electrically qualified workers with the mains and apparatus remaining energised, only where the controls required to carry out the work safely are documented:

- in an approved Ausgrid Technical Document; or
- in a risk assessment, which is approved by the Level 3 Ausgrid Manager (or their delegate) of the workgroup planning to carry out the work.

Exceptions: Earth connections to the following apparatus may be repaired with the apparatus remaining energised only where electrically qualified workers apply the controls required by the Ausgrid Workplace Instruction NW000-W0244 – Restoration of Earth Connections:

- surge diverters (lightning arrestors); and/or

- HV distribution cable screens.

9.12.2 Temporary connections to earth

Where mains and apparatus are intended to be energised while being connected to earth by a temporary earthing arrangement, the temporary earthing arrangement must comply with Network Standard NS222.

9.12.3 Temporary bridging leads

Where the work involves the making or breaking of connections within an earthing system that is connected to energised HV mains and apparatus (other than the phase-to-earth connected apparatus listed in Clause 9.12.4) electrically qualified workers must install a temporary bridging lead across the point of connection/disconnection prior to carrying out the work. Workers must not make any uninsulated contact with an earthing system that has an open-circuit connection until a bridging lead is in place across the open-circuit.

If a temporary bridging lead is to be left in place (where the workers who applied the bridging lead are not at the worksite) a warning tag must be applied to the bridging lead. The warning tag must indicate the purpose of the bridging lead and what works are required to enable its removal.

9.12.4 Phase-to-earth connected apparatus

Workers are not permitted to make or break any connections on earth systems that are connected to the following apparatus on HV distribution lines while the apparatus is energised:

- SWER substations; or
- NULEC reclosers with internal VTs; or
- S&C intellirupter reclosers with phase-to-earth connected VTs.

9.12.5 Sub-transmission cable sheath link boxes

See Clause 9.9.8 for the controls required for work on sub-transmission cable sheath link boxes.

9.12.6 Excavation near SWER substations

Before carrying out any excavation work below ground level within 15m of a SWER substation, the substation must be isolated and earthed in accordance with these Rules, and workers must sign onto a relevant access permit covering the substation.

9.13 Energising mains and apparatus

This section provides the requirements for the energisation of mains and apparatus.

9.13.1 Re-energising isolated mains and apparatus

Mains and apparatus which have been isolated for the issue of an access permit, Clearance to Work, or Operating Agreement, must not be re-energised until:

- every access permit, Clearance to Work, or Operating Agreement for which the isolation was created has been cancelled; and
- all earthing and short-circuiting equipment that was applied to the mains and apparatus has been removed.

9.13.2 Restoration of supply to points of isolation

No section of the network is to be restored up to a point of isolation (other than by automatic reclose or Fault Location, Isolation, and Service Restoration (FLISR)) until recipients of access permits issued from that point of isolation confirm that they, and all workers who have signed onto the permit, are standing clear of the mains and apparatus.

9.13.3 Energising mains and apparatus in a substation

When an operator, who is located within a substation, is energising the following substation mains apparatus, the operator must advise other workers within the substation, and the other workers (other than the operator(s) performing the switching) must vacate the switchroom, switchyard, or cable basement, which contains the mains and apparatus, until after the mains and apparatus are energised:

- new mains and apparatus; or
- modified mains and apparatus; or
- apparatus which has been subject to intrusive maintenance; or
- mains and apparatus which have been subject to a network fault current.

9.13.4 Energising underground cables – external to a substation

Underground cables must not be energised unless all new or repaired cables and joints, in trenches or joint holes, are:

- backfilled; or
- the cables and joints must be covered by at least two layers of sandbags; and
- excavations at the points of entry or access to a substation must be backfilled; and
- all excavations that are not backfilled must be safely barricaded and protected, with arrangements in place for regular checking to ensure that they remain safely barricaded and protected.

Figure 83 - An open excavation with barricades

9.13.5 Energising cable joints in a cable tunnel

When energising any new, or modified, cable joint within a cable tunnel – the operator who will be energising the cable joint must advise the Ausgrid section responsible for providing access to cable tunnels to prevent access to the cable tunnel immediately prior to energisation and during the 24 hrs following energisation.

9.14 Work on or near live exposed HV

9.14.1 Authorisation

As required by Clause 3.3.8, work on or near live exposed HV mains and apparatus may only be carried out by persons who are authorised by Ausgrid in accordance with the Ausgrid HV Live Work Manual.

9.14.2 HV Live Work Manual

Work on or near live HV overhead mains and apparatus must be carried out in accordance with the Ausgrid HV Live Work Manual. Refer to the Manual for all details of work on or near live exposed HV mains and apparatus.

10 Task specific controls

10.1 Safe-to-touch testing of network assets

Workers must test the following apparatus to confirm the absence of hazardous voltages, due to a breakdown of insulation, before they make contact with the apparatus:

- Any metallic structure, external to a substation, containing low voltage (but not HV) mains and apparatus (this includes metallic pillars, metallic streetlight outreach brackets, and customer meter boxes); and
- All poles (whether wood, composite fibreglass, concrete, or steel); and
- Exposed conductive sheathed or armoured cables.

Note: Where a workgroup will be working on the above apparatus, at least one member of the workgroup must test the apparatus before any member of the workgroup makes contact with the apparatus.

10.1.1 Testing methods

For conductive sheathed or armoured cables, refer to the testing requirements in Clause 9.3.5

For metallic structures and all poles, the following testing requirements apply.

The initial testing (testing that is carried out by persons other than those investigating reported voltages) must be carried out using either:

- a non-contact (proximity) type detector, which is capable of detecting an electric field from a source voltage of 50Vac and greater; or
- a low impedance voltmeter.

If the non-contact detector indicates a voltage is present, further testing must be carried out using a low impedance voltmeter to determine the actual voltage that is present. Persons must not come into uninsulated contact with the asset until the actual voltage is determined.

If the voltage measured with a low impedance meter is 5Vac or greater, persons must not come into uninsulated contact with the asset until the source of the voltage is investigated, identified, and rectified.

Note: Where a low impedance voltmeter is not readily available, a high impedance voltmeter which is connected in parallel with incandescent test lamps, may be used to measure the actual voltage present.

10.1.2 Personal Protective Equipment (PPE)

For conductive sheathed or armoured cables - refer to the PPE requirements in Clause 9.3.5.

For metallic structures and all poles - the use of LV insulating gloves is not mandatory for the initial testing with an approved non-contact LV detector (as verifying that these normally de-energised assets are safe to touch is not classed as work on or near live exposed low voltage mains and apparatus). However, if the non-contact detector indicates a voltage is present, or if persons report receiving a shock from the asset, LV insulating gloves must be worn for the further testing to determine the actual voltage present.

10.2 Working on or near overhead mains and apparatus

This section describes the specific controls for working on or near overhead mains and apparatus.

Figure 84 – Overhead mains.

10.2.1 Poles

Electrical test

As required by Section 10.1 all poles must be tested for hazardous leakage voltages before contact is made with the pole.

Mechanical test

Before climbing or working on any pole or structure, workers must inspect and test the mechanical condition of pole or structure, as required by Network Standard NS146, to ensure it is not in danger of collapsing during the course of the work.

Conductive poles and structures

All poles or structures must be treated as conductive for HV lines.

For work on or near live exposed LV mains and apparatus:

- Steel or concrete poles must be regarded as conductive.
- Timber, fibreglass, or fibreglass composite poles and crossarms need not be regarded as conductive.

Note: The conductivity of timber poles and crossarms can be affected by moisture.

10.2.2 Working on conductors in the vicinity of live overhead mains and apparatus

When working on or erecting an overhead line that is above, below, or in the vicinity of an existing overhead line, the risk of the conductor being worked on becoming energised through contact with, or coming within flashover distance of, an adjacent live conductor must be assessed, and appropriate controls must be implemented.

When erecting, removing, or restringing, overhead mains that cross, or share a common span with other live exposed conductors[7], the adjacent live conductors may remain live only if approved, documented, safe work methods[8] are followed that prevent the isolated mains coming within the relevant MSWD from the energised conductors.

For work by Ausgrid employees, refer to the Ausgrid Procedure NW000-P0343 – Controlling the Movement of Overhead Conductors.

Refer to Section 7.5 for the controls required when working with mobile plant on conductors in the vicinity of exposed live mains and apparatus.

10.2.3 Work on or near live insulated LV overhead mains

The insulation of overhead conductors covered with PVC or XLPE insulation (e.g. services and LV ABC) can be subject to breakdown due to ultraviolet exposure.

For that reason, the following controls must be implemented for any work within 500mm of these conductors:

- Only electrically qualified workers may carry out work (other than the operation of mobile plant) within 500mm of these conductors when they are energised; and
- Electrically qualified workers must visually assess the condition of the insulation prior to carrying out any work; and
- If the insulation is visually assessed as being in good condition, workers must only contact the insulated conductors with their LV insulating glove covered hands; or
- If the insulation is visually assessed as being in poor condition and the conductors are bundled, the conductors must be isolated in accordance with these Rules (due to the risk of creating an arc). If the conductors are not bundled, the mains may either be isolated or the live controls of Clause 9.5.4 utilised.

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[7] Live exposed conductors include, but are not limited to, street lighting circuits that are not isolated in accordance with Section 10.3.

[8] The approval of Safe Work Methods must be by a suitably authorised officer of the employer, after consultation with persons who have a clear understanding of the work being performed and the risks associated with that work.

Mobile plant

Authorised persons, as defined by Clause 7.5.2, may operate mobile plant within 500mm of PVC or XLPE insulated cables provided the cables are covered with temporary insulating covers that comply with Clause 6.7.1. The mobile plant must not be brought into contact with the covered conductors.

10.2.4 De-energised overhead conductors on the ground

The following controls are required to manage the risk of a worker receiving an electric shock, in the event of the conductor being worked on becoming inadvertently energised through contact with an adjacent live exposed conductor.

When working (under a relevant access permit) on a de-energised overhead exposed conductor which is:

1. on the ground; and
2. electrically connected to overhead spans that are not lowered to the ground, and
3. those spans cross or share a common span with live exposed conductors between the worksite and the conductor termination or strain point.

Persons working on or near the conductor at ground level must implement either the equipotential or insulated controls set out below:

Equipotential controls

Workers at ground level must only work on the conductor from a conductive equipotential mat which is bonded to the conductor.

The bonding cable must be a minimum of 35mm^2 flexible copper cable, fitted with a clamp which allows connection to the conductor using an appropriately rated insulated handle or tool.

The worker(s) must complete the following prior to making any contact with the conductor:

- Place all tools for the job onto the mat; and
- Stand completely on the mat; and
- Attach the clamp to the conductor using an appropriately rated insulated handle or tool.

Tools, or other conductive material, must not be passed between any worker standing on the conductive mat and any worker who is not.

Insulated controls

Workers at ground level must:

- wear LV insulating gloves; and
- stand on an insulating mat, or wear gumboots; and
- Cover the conductor with LV temporary insulating covers where there is a risk of contact between the conductor and uninsulated parts of the body.

10.3 Work on or near street lighting circuits

10.3.1 Isolation

To reduce the risk of an isolated street lighting circuit becoming inadvertently energised, workers carrying out the isolation of the street lighting circuit must create isolation points as close as reasonably practicable to the worksite. (For overhead circuits, this may require the breaking of bonds to create isolation points).

10.3.2 Verifying isolation

Street lighting circuits are generally de-energised during daylight hours. Therefore, isolation from a de-energised street light control point (SLCP) that is identified by plans only is not acceptable. Isolation from the correct SLCP must be verified, as follows:

- If the street lighting circuit is de-energised at the time the point of isolation is to be created, the SLCP must be operated, and the circuit tested at the worksite to confirm that the energising and de-energising of the circuit aligns with the operation of the SLCP.
- If the circuit is energised at the time the point of isolation is to be created, the circuit must be tested at the worksite to confirm that the de-energising of the circuit aligns with the operation of the SLCP.

(This is not required for fault finding on a circuit where the SLCP fuse has blown, or where a circuit has developed an open circuit fault).

- Where the isolation points for overhead street lighting circuits are open bonds, the verification must be achieved by visually tracing the circuit to all isolation points.

10.3.3 Proving de-energised

Once the isolation is verified, the street lighting circuit must be proved de-energised as per Clause 9.2.2.

10.3.4 Neutral conductors

Workers must not break any street lighting circuit neutral conductor connections until they confirm:

- there are no luminaires connected to any section of neutral conductor planned to be disconnected; and
- any remaining sections of street light neutral conductor are bonded to the low voltage distributor neutral.

10.3.5 Additional controls

Even though street lighting conductors are isolated, verified as isolated, and proven de-energised as required above, there remains a risk of the conductors becoming inadvertently energised through:

- an additional unidentified SLCP, or an incorrectly connected luminaire, providing an inadvertent parallel supply; or
- the street lighting conductor coming into contact with another live exposed conductor in an adjacent span.

Therefore, workers must:

- wear LV insulating gloves when working within 500mm of these exposed conductors; and
- only make contact with the conductors with their insulating glove covered hands.

These additional controls must be listed on any access permit issued for work on the conductors under “Warnings”.

Exemption: These additional controls are not required for work by external parties working near, but not on, streetlighting conductors under the WorkCover NSW Code of Practice -Work Near Overhead Power Lines.

10.4 Mains and apparatus that are not connectable

This section describes the requirements for work on or near exposed mains and apparatus that are not connectable to the network - i.e.:

- new mains and apparatus that have not yet been made connectable; or
- previously commissioned or connectable mains and apparatus that have been made permanently disconnected (see the definition in Chapter 18).

10.4.1 Permits

An access permit is not required for work on mains and apparatus that are not connectable to the network.

As required by Clause 5.9.1, an Equipping Permit is required for work on or near new, or permanently disconnected mains and apparatus, that are intended for connection to the network.

10.4.2 Cables

Before commencing work on cables that are not connectable to the network, they must be identified and remotely cut at the proposed location of the work, as required below.

Cable identification

Table 30 details the two options to identify cables that are not connectable to the network.

Table 30 – Methods to identify non-connectable cables

Methods Available	Description
Physically trace the cable	Identify the ends of the cable using appropriate cable plans. Where it is reasonably practicable to do so, physically trace the entire length of the cable from end to end. Where this is not reasonably practicable, the cable may be physically traced from one end to the location of the proposed work. The physical trace must be verified by a second person.
Unable to physically trace (e.g. direct buried cables)	Identify the ends of the cable using appropriate cable plans. Where it is reasonably practicable to do so, locate and uncover both ends of the cable. Where it is not reasonably practicable to locate and uncover both ends of the cable, one end of the cable must be located and uncovered. The cable is then to be identified at the location of the proposed work using approved cable identification methods and equipment. The cable identification must be verified by a second person.

Note: Where it is not reasonably practicable to carry out the cable identification requirements of Table 30 above, the remote cutting of the cable(s) may proceed only if a proposal detailing:

- the reasons why the cable identification methods in Table 30 are not reasonably practicable to implement; and
- the available cable information; and
- the alternate controls that have been, or will be, implemented to confirm the correct cable is to be remotely cut;

is endorsed by System Control and approved by the Level 3 Ausgrid manager of the workgroup carrying out the work or submitting the NAR (or their delegate).

Remote Cutting

Immediately after the identification, remotely cut the cable:

- using approved equipment (see Clause 6.4.4); and
- in the presence of the person who is going to do the work; and
- at the point where the work will be done;

in accordance with the requirements of the Ausgrid Technical Guide T0031 – Remote Cable Cutting Equipment.

Leave all cut cables short-circuited and appropriately capped in accordance with the sealing of cables procedures in the Ausgrid Network Standard NS 130 - Specification for Laying of Underground Cables up to 11kV. This includes abandoned cables that are disconnected from the network.

An access permit is not required for work on cables that are not connectable to the network.

An Equipping Permit is required for new mains or permanently disconnected mains that are intended to be connected to the network, or to other mains and apparatus covered by an Equipping Permit.

10.4.3 Overhead mains and apparatus

The following controls are required before workers commence work on overhead mains that are not connectable to the network.

Exception: The following requirements do not apply to new overhead mains and apparatus that are erected and made connectable on the same day.

Workers must visually trace the line to confirm:

- if the mains are new, that they have not yet been made connectable, as defined in Chapter 18; or
- if the mains were previously commissioned or connectable, that they are permanently disconnected, as defined in Chapter 18; and
- there are no portable earths attached to HV mains and/or no LV shorts attached to LV mains, by other workgroups.

If portable earths or LV shorts have been attached to the mains by another workgroup, the second workgroup must identify and notify the workgroup who installed the earths and/or LV shorts.

For HV mains, the workers must earth and short-circuit the mains and apparatus using portable earthing equipment which is within sight of everyone working on the mains. The rules for the installation of working earths shall apply to the installation of such earthing and short-circuiting equipment (see Clause 9.8.3).

For LV mains, the workers must prove the mains are de-energised at the worksite and attach LV shorts.

The person in charge of the work must complete and attach a Personal Danger Tag to the portable earths and/or LV shorts, as required by Clause 8.2.4.

The portable earths and/or LV shorts (with attached Personal Danger Tags) must remain in place for the duration of the work.

Exemption: The requirements of this Clause, for portable earths and/or LV, shorts, are not required for work on or near permanently disconnected street lighting conductors, provided workers apply the controls required by Clause 10.3.5.

Where the overhead mains fit the criteria set out in Clause 9.11.4, workers must apply the controls of Clause 9.11.4 to manage the risk of induced voltages.

10.4.4 Connection of overhead mains

Where new or permanently disconnected overhead mains are intended to be connected to the network the operator who is intending to re-energise the mains must visually trace the line to confirm the absence of any portable earths and/or LV shorts which indicate other workgroups are carrying out work on the mains, immediately prior to re-energisation.

10.4.5 Permanently disconnected overhead mains

Wherever reasonably practicable, overhead mains that are no longer required for the continuity of supply must be either physically removed or remain connectable to the network.

Where overhead mains are left as permanently disconnected (see the definition in Chapter 18), they must remain short-circuited and connected to earth by a conductor with a current carrying capacity of no less than 70mm^2 copper.

10.4.6 Permanently disconnected substation apparatus

Where a section of busbar or overhead conductor remains as permanently disconnected (see the definition in Chapter 18) within an outdoor substation, it must be short-circuited and connected to the substation earth grid by a conductor with a current carrying capacity equivalent to no less than 16mm^2 copper.

Where reasonably practicable, permanently disconnected apparatus within a substation must be short circuited and connected to the substation earth grid by a conductor with a current carrying capacity equivalent to no less than 16mm^2 copper.

If there is a cable (other than control, protection, automation, or auxiliary supply cables) that remains connected to the apparatus, the cable must be cut and sealed close enough to the apparatus to allow the cable to be visually traced from the endbox to the sealed end.

10.5 Vegetation management

This section details the requirements for carrying out vegetation management near Ausgrid mains and apparatus.

10.5.1 General

Where vegetation management is carried out in accordance with the Electricity Supply (Safety and Network Management) Regulation 2014, and within the Minimum Safe Working Distances (MSWD) of an Ordinary Person, only the following methods can be used:

- Standard Vegetation Control – Vegetation management performed by persons authorised to conduct Standard Vegetation Control up to the clearances shown in Table 31, Table 32 and Table 33.
- Close Approach Vegetation Control (CAVC) – Vegetation management performed by persons authorised to conduct CAVC work up to the clearances shown in Table 34, Table 35 and Table 36.
- HV Live Work – Vegetation management performed in accordance with Ausgrid's HV Live Work Manual. Persons carrying out this method must be authorised for HV Live Work.
- Network outage – Where the above conditions cannot be safely maintained, then a network outage is required.

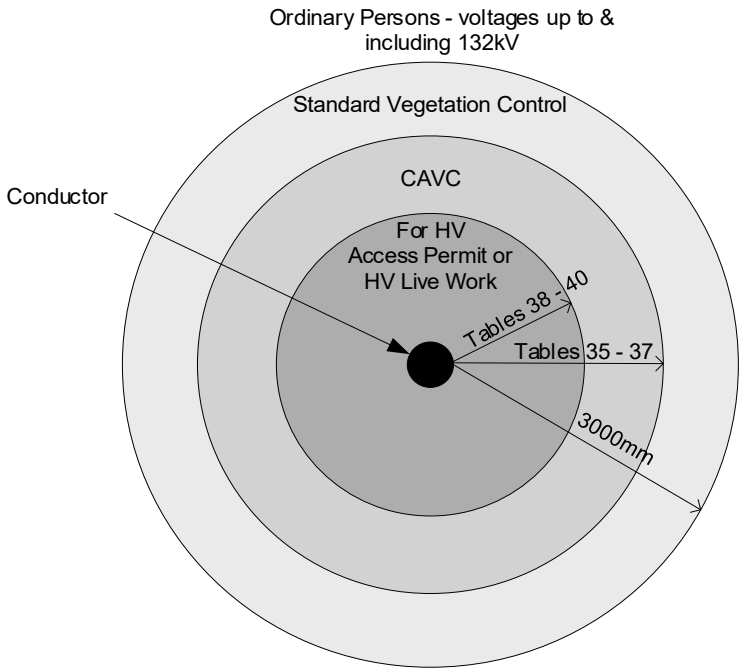


Figure 85 - Vegetation clearance from energised overhead mains

10.5.2 Regulations related to vegetation management

The following documents relate to vegetation management under these Rules

- WorkCover Code of Practice - Amenity Tree Industry
- Industry Safety Steering Committee - Guide for the Management of Vegetation in the Vicinity of Electricity Assets (ISSC 3)—for general information and for some safety aspects of clearing operations
- Energy Network Association ENA DOC 023-2009 - Guidelines for safe vegetation management work near live overhead lines.

10.5.3 General precautions

Workers carrying out vegetation management activities must ensure such activities do not:

- Place members of the public at risk; or
- Damage Ausgrid mains and apparatus; or
- Damage third party property.

Vegetation in contact with mains and apparatus

If any part of a tree is in contact with live exposed mains and apparatus, there may be hazardous voltages present. This is especially applicable during wet conditions when contact occurs with live high voltage mains and apparatus. Hazardous voltages may also be present for some distance around the bases of these trees. Intermittent contact hazards may also occur during strong wind conditions.

Exposed conductors covered with temporary insulating covers

Exposed conductors that are covered with temporary insulating covers must be regarded as exposed. Workers must maintain the clearances that are required for exposed conductors.

Reporting

Workers must report any known hazardous situations that may affect workers or members of the public to Ausgrid (see emergency phone numbers) and take effective measures on-site to prevent workers or members of the public from entering areas where hazardous voltages are likely to be present.

10.5.4 Standard vegetation control

Standard Vegetation Control refers to the control of vegetation where the vegetation clearance from overhead mains and apparatus is less than 3000mm (for up to & including 132kV) but greater than the minimum vegetation clearance specified in the Standard Vegetation Control - Table 31, Table 32 and Table 33. Also refer to Figure 85 above.

Standard Vegetation Control work may be carried out from either an insulated EWP, the ground (ground line), or from a tree (climber).

Authorisation

To perform Standard Vegetation Control, workers must:

- hold a current Standard Vegetation Control authorisation; and use approved Standard Vegetation Control work procedures.

Exemption:

Electrically qualified Ausgrid employees may carry out Standard Vegetation Control in emergency situations, without holding a Standard Vegetation Control authorisation, provided they:

- are trained in the use of approved tools required for the task; and
- use approved tools; and
- work to an approved procedure.

Safety observer

During Standard Vegetation Control work one or more members of the workgroup must be appointed as the safety observer. The safety observer(s) shall:

- Hold standard vegetation control authorisation and be trained and competent in the task being undertaken; and
- Not perform any other task while acting as safety observer; and
- Remain on the ground; and
- Not observe more than one vegetation management work activity at any time; and
- Maintain a clear line of sight to the work being performed; and
- Be in a position to alert the workgroup to any potentially unsafe actions that may inadvertently occur including infringement of MSWD or any non-compliance with approved work procedures; and
- Have the authority to temporarily stop the work at any time.

Exemption:

Electrically qualified Ausgrid employees may carry out Standard Vegetation Control in emergency situations without a Safety Observer, provided they:

- are trained in the use of approved tools required for the task; and
- use approved tools; and
- work to an approved procedure.

Insulated mobile plant

Insulated mobile plant used for standard vegetation control must comply with Cranes, hoists and winches Part 10: Mobile elevating work platforms (AS/NZS 1418.10:2011) and be tested and certified in compliance with Clause 7.5.11. Insulated mobile plant must be rated and tested to the relevant voltage.

Insulated tools

Insulated tools used for standard vegetation control must comply with Clause 6.9.4.

When carrying out standard vegetation control work from a groundline position, no part of any insulated tools may extend beyond the height of the overhead powerlines being cleared.

Uninsulated tools

Uninsulated tools (e.g. chainsaws) may be used, provided the uninsulated tool and vegetation clearance maintain same clearance as the relevant vegetation worker MSWD at all times.

Climbing

Climbers must not climb any tree where any part of that tree is within, or may move within, minimum vegetation clearances during the work activity, and must not position themselves so that they could fall or swing inside the relevant MSWD.

10.5.5 Standard Vegetation Control – MSWD and vegetation clearances

Table 31, Table 32 and Table 33 show the minimum safe working distances that must be observed for the relevant voltage by standard vegetation control authorised persons and the equipment they are using, and the minimum allowable vegetation clearances from the mains and apparatus.

Table 31 - Standard vegetation control from an insulated EWP

<table>
<tr><th colspan="2">Insulated EWP</th><th rowspan="2">Insulated Mobile Plant Clearance (mm)</th><th colspan="3">Using Insulating Tools/Equipment</th><th colspan="3">Using Non-Insulating Tools/Equipment</th></tr>
<tr><th>Voltage (kV)</th><th>Worker MSWD (mm)</th><th>Insulated Tool Clearance (mm)</th><th>Vegetation Clearance Below/ Beside (mm)</th><th>Vegetation Clearance Above (mm)</th><th>Non-Insulated Tool Clearance (mm)</th><th>Vegetation Clearance Below/ Beside (mm)</th><th>Vegetation Clearance Above (mm)</th></tr>
<tr><td>LV insulated</td><td>500</td><td rowspan="2">Physical Clearance (No Contact)</td><td>300</td><td colspan="2" rowspan="2">No Clearance Required</td><td>500</td><td colspan="2">No Clearance Required</td></tr>
<tr><td>LV bare</td><td>1000</td><td>300</td><td>1000</td><td>1000</td><td>1000</td></tr>
<tr><td>11</td><td>1200</td><td>700</td><td>700</td><td>700</td><td rowspan="5">Not Permitted</td><td>1200</td><td>1200</td><td rowspan="5">Not Permitted</td></tr>
<tr><td>22</td><td>1200</td><td>700</td><td>700</td><td>700</td><td>1200</td><td>1200</td></tr>
<tr><td>33</td><td>1500</td><td>1000</td><td>1000</td><td>1000</td><td>1500</td><td>1500</td></tr>
<tr><td>66</td><td>1500</td><td>1000</td><td>1000</td><td>1000</td><td>1500</td><td>1500</td></tr>
<tr><td>132</td><td>2000</td><td>2000</td><td>2000</td><td>2000</td><td>2000</td><td>2000</td></tr>
</table>

Table 32 - Standard vegetation control from a tree (climber)

<table>
<tr><th colspan="2">Climber</th><th colspan="3">Using Insulating Tools/Equipment</th><th colspan="3">Using Non-Insulating Tools/Equipment</th></tr>
<tr><th>Voltage (kV)</th><th>Worker MSWD (mm)</th><th>Insulated Tool Clearance (mm)</th><th>Vegetation Clearance Below/ Beside (mm)</th><th>Vegetation Clearance Above (mm)</th><th>Non-Insulated Tool Clearance (mm)</th><th>Vegetation Clearance Below/ Beside (mm)</th><th>Vegetation Clearance Above (mm)</th></tr>
<tr><td>LV (insulated)</td><td>500</td><td>300</td><td colspan="2">No Clearance Required</td><td>500</td><td colspan="2">No Clearance Required</td></tr>
<tr><td>LV (bare)</td><td>1000</td><td>300</td><td>No Clearance Required</td><td rowspan="5">Not Permitted</td><td>1000</td><td>1000</td><td rowspan="5">Not Permitted</td></tr>
<tr><td>11</td><td>1200</td><td>700</td><td>1200</td><td>1200</td><td>1200</td></tr>
<tr><td>22</td><td>1200</td><td>700</td><td>1200</td><td>1200</td><td>1200</td></tr>
<tr><td>33</td><td>1500</td><td>1000</td><td>1500</td><td>1500</td><td>1500</td></tr>
<tr><td>66</td><td>1500</td><td>1000</td><td>1500</td><td>1500</td><td>1500</td></tr>
<tr><td>132</td><td>2000</td><td>2000</td><td>2000</td><td>2000</td><td>2000</td></tr>
</table>

Table 33 - Standard vegetation control from the ground (ground line)

Ground line		Using Insulating Tools/Equipment			Using Non-Insulating Tools/Equipment		
Voltage (kV)	Worker MSWD (mm)	Insulated Tool Clearance (mm)	Vegetation Clearance Below/ Beside (mm)	Vegetation Clearance Above (mm)	Non-Insulated Tool Clearance (mm)	Vegetation Clearance Below/ Beside (mm)	Vegetation Clearance Above (mm)
LV (insulated)	500	300	No Clearance Required		500	No Clearance Required	
LV (bare)	1000	300	No Clearance Required	Not Permitted	1000	1000	Not Permitted
11	1200	700	700		1200	1200	
22	1200	700	700		1200	1200	
33	1500	1000	1000		1500	1500	
66	1500	1000	1000		1500	1500	
132	2000	2000	2000		2000	2000	

10.5.6 Close Approach Vegetation Control (CAVC) work

Close Approach Vegetation Control (CAVC) refers to the control of vegetation where the vegetation clearance from overhead mains and apparatus is less than the clearances specified for Standard Vegetation Control but greater than the minimum vegetation clearance specified for Close Approach Vegetation Control - Table 34, Table 35 and Table 36. Also refer to Figure 84.

CAVC work may be carried out from either an insulated EWP, the ground (ground line), or from within a tree (climber).

Authorisation

To perform CAVC, workers must:

- hold a current CAVC authorisation; and
- use approved CAVC work procedures that are documented in a relevant CAVC manual

In addition, all members of the workgroup must have already performed (and are familiar with) the approved work under de-energised conditions using an appropriate safe work method statement (SWMS).

Maximum voltage

CAVC techniques are not permitted near energised conductors that are at voltages greater than 66kV.

Safety observer

During all CAVC work one or more members of the workgroup must be appointed as the safety observer. The safety observer(s) shall:

- Hold CAVC authorisation and be trained and competent in the task being undertaken; and
- Not perform any other task while acting as safety observer; and
- Remain on the ground; and
- Not observe more than one vegetation management work activity at any time; and
- Maintain a clear line of sight to the work being performed; and
- Be in a position to alert the workgroup to any potentially unsafe actions that may inadvertently occur including infringement of MSWD or any non-compliance with approved work procedures; and
- Have the authority to temporarily stop the work at any time.

Vegetation above HV

Cutting vegetation above live high voltage is permissible only when working from an insulated EWP.

Cutting limits

When cutting vegetation above overhead mains, cutting lengths should be limited to a maximum of 200mm on vegetation with a maximum diameter of 50mm.

Cutting vegetation that has grown over multiple phases is allowed under CAVC conditions, provided the vegetation worker tools do not pass over two phases (where they exist in a horizontal construction) at any point in time. Multiple EWP set-ups may be required to achieve this.

Insulated mobile plant

Insulated mobile plant used for CAVC must comply with Cranes, hoists and winches Part 10: Mobile elevating work platforms (AS/NZS 1418.10:2011) and be tested and certified in compliance with Clause 7.5.11. Insulated mobile plant must be rated and tested to the relevant voltage.

Insulated tools

Insulated tools used for CAVC must comply with Clause 6.9.4.

When carrying out CAVC work from a groundline position, no part of any insulated tools may extend beyond the height of the overhead powerlines being cleared.

Uninsulated tools

Uninsulated tools (e.g. chainsaws) may be used, provided the uninsulated tool and vegetation clearance maintain same clearance as the relevant vegetation worker MSWD at all times.

Climbing

Climbers must not climb any tree where any part of that tree is within, or may move within, minimum vegetation clearances during the work activity, and must not position themselves so that they could fall or swing inside the relevant MSWD.

10.5.7 CAVC - MSWD and vegetation clearances

Table 34, Table 35 and Table 36 show the minimum safe working distances that must be observed for the relevant voltage by CAVC authorised persons and the equipment they are using, and minimum allowable vegetation clearances from the mains and apparatus.

Table 34 – CAVC from an insulated EWP

Insulated EWP Nominal Voltage (kV)	Worker MSWD (mm)	Insulated Mobile Plant Clearance (mm)	Insulated Tools Clearance (mm)	Vegetation Clearance (mm) Below / Beside / Above
LV (insulated)	500	Physical clearance (no contact allowed)	300	No clearance required
LV (bare)	1000	Physical clearance (no contact allowed)	300	No clearance required
11	1200	700	300	100
22	1200	700	300	150
33	1500	1000	300	200
66	1500	1000	300	400

Table 35 – CAVC from a tree (climber)

Climber	Worker MSWD (mm)	Insulated Tools Clearance (mm)	Vegetation Clearance (mm)	
Nominal Voltage (kV)			Below / Beside	Above
LV (insulated)	500	300	No clearance required	
LV (bare)	1000	300	No clearance required	
11	1200	300	700	Not Permitted
22	1200	300	700	
33	1500	300	700	
66	1500	300	1000	

Table 36 – CAVC from the ground (ground line)

Ground Line	Worker MSWD (mm)	Insulated Tools Clearance (mm)*	Vegetation Clearance (mm)	
Nominal Voltage (kV)			Below / Beside	Above
LV (insulated)	500	300	No clearance required	
LV (bare)	1000	300	No clearance required	
11	1200	300	100	Not Permitted
22	1200	300	150	
33	1500	300	200	
66	1500	300	400	

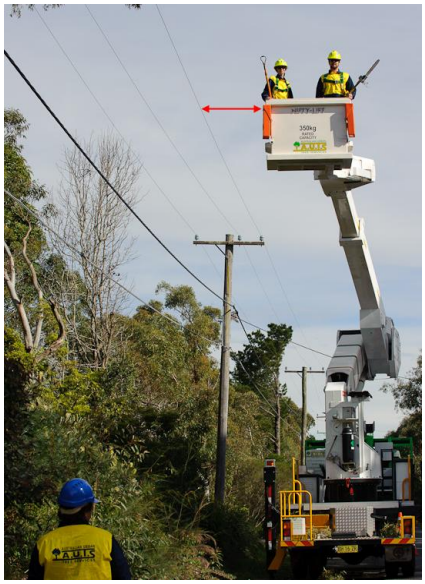


Figure 86 - CAVC workers allowing for minimum approach distances using an observer.

Figure 87 - CAVC work from groundline position ensuring insulated tool does not extend beyond the height of overhead high voltage powerlines.

Figure 88 - CAVC workers using an approved procedure to cut vegetation.

10.5.8 Network configuration requirements for CAVC work

Distribution

The following network configuration requirements must be in place before CAVC work is carried out on 11kV or 22kV feeders:

- the auto-reclosing function of the circuit breaker which controls the section of feeder must be made ‘non-auto’; and
- the sensitive earth fault protection covering the section of feeder must be operational; and
- where available (as shown on the system diagram) the upstream circuit breaker/recloser must have instantaneous protection (e.g. work mode / work tag / live line / hot line tag) enabled; and
- FLISR must be set to non-auto for schemes that may impact the section of the feeder; and
- the pick-up value of the primary protection system for the section of feeder must comply with the primary protection requirements of Network Standard NS263 for the fault levels at the work site.

Sub-transmission

The following network configuration requirements must be in place before CAVC work is carried out on 33kV or 66kV feeders:

- the auto-reclosing function of the circuit breaker which controls the section of feeder must be made 'non-auto'; and
- all protection schemes for the section of feeder must be operational (or equivalent alternate protection systems in place); and
- Large Area Restoration (LAR) is set to non-auto for the feeder; and
- if the work is to occur on closed-ring feeders, where the mains and apparatus at the worksite are not covered by a high-speed unit protection scheme (see Chapter 18 for definition), the feeders must be radialised.

10.5.9 Before starting CAVC work

Network Access Request

As required by Section 4.1, a person who is authorised to submit NARs must submit a NAR for CAVC work.

Person in Charge responsibilities

Before commencing CAVC work at each worksite, the person in charge of the workgroup must:

- nominate an accredited member of the workgroup as the safety observer before CAVC work begins; and
- confirm there is radio or telephone contact available at all times between the CAVC work crew at the worksite and the relevant Control Room Operator; and
- contact the relevant Control Room Operator via radio or telephone to confirm:
  - the specific worksite; and
  - the network configuration requirements of Clause 10.5.8 are in place.

Control Room Operator

Before giving permission to the CAVC crew to proceed with the work, the Control Room Operator must confirm:

- the network configuration requirements of Clause 10.5.8 are in place; and
- the Control Room network diagrams are pinned with CAVC tags at the appropriate circuit breakers.

10.5.10 CAVC work in progress

During the CAVC Work, the Control Room Operator must:

- not alter the switching arrangements or the load flow on the feeder under work conditions; or
- not make the upstream reclosing device 'auto' before advising the CAVC workgroup to stand down; or
- not switch off the sensitive earth fault protection before advising the CAVC workgroup to stand down; and
- contact the CAVC workgroup and advise them to stand down before any attempt is made to close back a tripped feeder on which CAVC work is being done; and
- advise CAVC workgroups of any electrical storms forecast or seen on the lightning tracking system.

If the Control Room Operator must change the network arrangements, the workgroup must stop the CAVC procedure and move to a safe distance from the mains and apparatus until conditions are suitable for CAVC work to recommence.

10.5.11 On completion of CAVC work

When the work is finished, the person in charge of the CAVC workgroup must advise the Control Room Operator that all the work is complete, and all members of the workgroup are clear of the mains and apparatus.

10.6 Applying test voltages

This section describes the requirements for applying test voltages. Testing equipment must only be used by those instructed in the use of the equipment and the precautions required.

Hazardous or non-hazardous test voltages

Voltages applied for testing purposes may be either hazardous or non-hazardous.

A hazardous voltage is a voltage source with the capacity to produce a current of 30mA ac or 100mA dc within a human body (as per Australian Standard AS 60479 – Effects of Current on Human Beings and Livestock).

Example: A low voltage insulation resistance tester with a short circuit capacity of 1mA d.c. cannot produce a current of 100mA d.c. within a human body – therefore it is a non-hazardous voltage source.

Cables and capacitors

If test voltages are applied to underground cables or capacitors, they should be shorted and/or discharged to earth at the completion of the testing to discharge any stored energy. Allow adequate time for the stored energy to discharge fully, as voltage recovery is possible when cables and capacitors are only momentarily shorted or discharged to earth following the application of test voltages.

10.6.1 Applying non-hazardous voltages for testing

Although contact with a non-hazardous voltage will not produce a hazardous electric shock, the following controls are required to manage the risk of other hazards that may arise from a person's reaction to contact with some non-hazardous test voltages.

Before applying non-hazardous voltages for testing purposes to mains and apparatus under an Equipping Permit or access permit, the person in charge of the test shall complete the following:

- Ensure other workers who are working on an Equipping Permit or recipients of all other access permits (as listed on the Permit Folder) are notified and give verbal assurance that they will stand clear until the test is completed; and
- Take precautions, where necessary, to prevent persons making contact with the mains and apparatus under test.

10.6.2 Applying hazardous voltages for testing

Before applying hazardous voltages for testing purposes to any mains and apparatus under an Access Permit for Test, or an Equipping Permit, the person in charge of the test shall complete the following:

- Ensure other workers who are working on an Equipping Permit or in the vicinity of the test location are notified and give a verbal assurance that they will stand clear until the test is completed, the mains and apparatus have been discharged and earthed and they have been instructed that it is safe to enter the area; and
- Ensure workers assisting with the test are notified and give a verbal assurance that they will stand clear until the test is completed, the mains and apparatus have been discharged and earthed and they have been instructed that it is safe to enter the area; and
- Prevent persons encroaching the relevant MSWD (for the nominal system voltage) from the mains and apparatus under test by the use of one or more of the following mandatory precautions. In all cases, a "DANGER – HIGH VOLTAGE TESTING" sign must be displayed when applying hazardous voltages for testing purposes; and
- Attach "DANGER – HIGH VOLTAGE TESTING" notices to the mains and apparatus under test where live parts are not exposed or accessible without the use of a tool and
- Where live parts are accessible, define an exclusion area for the hazardous voltage test by erecting a black and yellow rope barrier* with "DANGER – HIGH VOLTAGE TESTING" notices attached,

  Notes:

  - Where the mains and apparatus are within safe work area that is defined by a yellow tape barrier using a tape-in arrangement, the yellow and black rope (and sign) is to be erected across the entrance to the taped area, as a minimum.
  - In some situations (e.g. testing in cable pits) there are no adjacent structures to support a yellow and black rope barrier. In those situations, pedestrian pit guard barriers may be used in place of the black and yellow rope barrier - provided the top railing of the pedestrian barrier is a striped black and yellow colour and "DANGER – HIGH VOLTAGE TESTING" notices are attached to the barrier, as shown in Figure 92 below.
  - Obvious physical barriers such as fences and walls etc may be used as part of the definition of the exclusion area.

- Prevent access to the mains and apparatus under test by the use of a means to secure and “DANGER – HIGH VOLTAGE TESTING” notice. Examples of this include locking a cage containing the mains and apparatus under test, locking shutters on metal clad switchgear or lockable cable terminations; and
- Where mains and apparatus are remote from the point of application of test voltages and are exposed and accessible, the person responsible for the testing must ensure a suitable exclusion area is provided and a stand-by person or persons are present to prevent people coming into contact with the mains and apparatus under test.

Note: A stand-by person is not required where the mains and apparatus under test are in their normal in-service position and exposed, but not normally accessible without climbing above ground or floor level without the use of a ladder or other mechanical device.

No person shall cross over, under, or be within a black and yellow rope barrier (or testing exclusion area defined by other barriers) with “DANGER – HIGH VOLTAGE TESTING” notices attached.

Only the person in charge of testing can authorise the removal or lowering of a black and yellow rope barrier and notices.

People requiring access to the test area shall contact the person in charge of testing.

Figure 89 - Lockable cable termination with danger notice

Figure 90 - Black and yellow rope barrier with danger notice

Figure 91 – HV testing tag applied

Figure 92 – Pedestrian barrier with black and yellow rail and danger notice

10.6.3 Testing with the earth and short-circuit removed

When removing the earth and short-circuit equipment at a point of isolation, you must also provide one the following between the equipment under test and the live mains and apparatus:

- an approved barrier; or
- an earthed screen; or
- an earthed section of mains and apparatus.

If this cannot be done, provide isolation in air or by other approved procedures.

Air gap - Low Voltage

The gap in air must be no less than the minimum safe working distances (MSWD) for authorised persons (see Table 13). They should not be minimum fixed clearances (see Table 15) which can only apply when the mains and apparatus are earthed and short-circuited. That is, a break in air is suitable for test voltages up to 1kV provided the air gap is equal to or greater than the MSWD for the nominal system voltage that would exist across the air gap.

Air gap - High Voltage

Table 37 refers to minimum clearances in air for applying test voltages while the earths and short-circuits are removed at the point of isolation.

Table 37 – Applicable minimum clearances in air for applying test voltages while the earths and short-circuits are removed at the point of isolation.

Equipment Voltage (kV)	Minimum Clearance in Air (m)		Test Voltages used (kV)	
	AC Test	DC Test	AC Test	DC Test
11	0.7*	0.7*	30	25
33	1.0*	1.0*	70	85
66	1.9	1.2	140	150
132	4.5	2.2	250	270
*The minimum safe working distance figures from Table 13 are used for 11kV and 33kV equipment, as the calculated minimum clearance in air for the required test voltages is less than these figures.				

10.7 Tong or clip-on ammeters

This section describes the requirements for using tong or clip-on ammeters.

10.7.1 General

Tong or clip-on ammeters may only be used by workers who have been instructed in their use and the risk controls required.

Workers must not use them on exposed high voltage (HV) conductors unless the ammeter is appropriately rated for the voltage and used in conjunction with appropriately rated insulated operating equipment.

10.7.2 Use on or near live exposed LV conductors

Where practicable, apply the ammeter to LV mains and apparatus where they are insulated rather than where they are exposed.

Where LV tong or clip-on ammeters are used on or near live exposed LV conductors, workers must implement the controls required by Clause 9.5.3. In addition to those controls, workers must not allow the tong or clip-on ammeter to make contact with exposed conductors at two different electrical potentials at the same time.

Figure 93 - Two types of tong ammeters used to measure current

10.8 Operating HV switchgear – PPE requirements

This section sets out the PPE that must be worn by operators when carrying out the local operation* of energised HV switchgear (*local operation = within 3m of the switchgear).

Clause 10.8.1 provides the PPE requirements when upstream protection schemes are set to instantaneous setting (i.e. 'work mode' / 'work tag / 'live line' / 'hot line tag' enabled).

Clause 10.8.2 provides the PPE requirements when upstream protections schemes are not, or cannot be, set to instantaneous.

The following PPE is required, in addition to the full-length arc rated protective clothing required by Clause 6.2.1, to provide arc protection for workers who are operating HV apparatus.

Other PPE may be required to control risks other than exposure to an electric arcing fault (such as mechanical impact or falling objects). Workers must refer to the PPE requirements of the site or their employer's safe systems of work.

10.8.1 Arc Flash PPE Requirements – with instantaneous protection

Table 38 provides the PPE requirements, in addition to the full-length arc rated protective clothing required by Clause 6.2.1, when upstream protection schemes are set to instantaneous setting (i.e. 'work mode' / 'work tag / 'live line' / 'hot line tag' enabled).

Table 38 – Additional PPE required for HV switching – with instantaneous protection.

Apparatus	Operating task	Additional PPE required
Withdrawable switchgear	Racking circuit breakers – with a barrier in place (switchgear door or racking shield)	No additional PPE required for arc protection.
Withdrawable switchgear	Racking circuit breakers – without a barrier (switchgear door or racking shield)	Safety helmet; and Arc rated face shield; and Switching gloves.
Withdrawable switchgear	Phasing	No additional PPE required for arc protection.
Withdrawable switchgear	Applying earths in switchgear spouts by hand – where the busbar is live	Safety helmet; and Arc rated face shield; and Switching gloves. Note: Alternate Ausgrid approved arc protection for the head, eyes, and face, may be worn in place of a safety helmet and face shield - where a safety helmet is not mandated by site WHS requirements.
Hazemeyer / Magnefix switchgear	Phasing	Safety helmet; and Safety eyewear; and Switching gloves.
Hazemeyer / Magnefix switchgear	Open/close Apply earths.	Safety helmet; and Arc rated face shield; and Switching gloves.
Oil-filled switchgear	Open/close Apply/remove earth switch	Safety helmet; and Arc rated face shield; and Switching gloves.

Apparatus	Operating task	Additional PPE required
Non-IAC vacuum or gas insulated switchgear	Open/close Apply/remove earth switch	Safety helmet; and Arc rated face shield; and Switching gloves.
IAC switchgear	Open/close Apply/remove earth switch	No additional PPE required for arc protection.
Overhead switches	Open/close Apply/remove earth switch	No additional PPE required for arc protection.

10.8.2 Arc Flash PPE Requirements – without instantaneous protection

Table 39 provides the PPE requirements, in addition to the full-length arc rated protective clothing required by Clause 6.2.1, when upstream protection schemes are not, or cannot be, set to instantaneous setting (i.e. 'work mode' / 'work tag / 'live line' / 'hot line tag' is not enabled).

Table 39 – Additional PPE required for HV switching – without instantaneous protection

Apparatus	Operating task	Additional PPE required
Withdrawable switchgear	Racking circuit breakers – with a barrier in place (switchgear door or racking shield)	No additional PPE required for arc protection.
Withdrawable switchgear	Racking circuit breakers – without a barrier (switchgear door or racking shield)	Safety helmet; and Arc rated face shield; and Switching gloves; and Switching jacket; or Ausgrid supplied rainwear jacket.
Withdrawable switchgear	Phasing	No additional PPE required for arc protection.
Withdrawable switchgear	Applying earths in switchgear spouts by hand – where the busbar is live	Safety helmet; and Arc rated face shield; and Switching gloves; and Switching jacket; or Ausgrid supplied rainwear jacket. Note: Alternate Ausgrid approved arc protection for the head, eyes, and face, may be worn in place of a safety helmet and face shield - where a safety helmet is not mandated by site WHS requirements.
Hazemeyer / Magnefix switchgear	Phasing	Safety helmet; and Safety eyewear; and Switching gloves.
Hazemeyer / Magnefix switchgear	Open/close Apply earths.	Safety helmet; and Arc rated face shield; and Switching gloves; and Switching jacket; or Ausgrid supplied rainwear jacket.

Apparatus	Operating task	Additional PPE required
Oil-filled switchgear	Open/close Apply/remove earth switch	Safety helmet; and Arc rated face shield; and Switching gloves; and Switching jacket; or Ausgrid supplied rainwear jacket.
Non-IAC vacuum or gas insulated switchgear	Open/close Apply/remove earth switch	Safety helmet; and Arc rated face shield; and Switching gloves
IAC switchgear	Open/close Apply/remove earth switch	No additional PPE required for arc protection.
Overhead switches	Open/close Apply/remove earth switch	No additional PPE required for arc protection.

10.9 Telecommunication transmitters

10.9.1 Electromagnetic fields

Persons working on, near, or in the vicinity of the Ausgrid network may encounter telecommunication equipment, which is installed on, or in, Ausgrid structures. This equipment may present electromagnetic energy hazards.

Refer to the following Ausgrid Network Standards for the controls to manage these risks:

NS102 – Working on or near poles with telecommunication transmitters; or

NS169 – Telecommunication Installations on Ausgrid HV Transmission Towers.

10.10 Work in cable pits

This section provides the minimum controls required to manage the electrical risks associated with working in a cable pit.

Note: The controls in this section (other than the authorisation requirement of Clause 10.10.1) also apply to work in substation cable basements, cable tunnels, and excavated cable joint bays.

10.10.1 Authorisation to enter

As required by Clause 3.3.13, workers must be authorised to enter an Ausgrid cable pit.

10.10.2 Assessing electrical risks

Prior to, and immediately upon, entry to a cable pit, workers must assess the condition of cable and/or joint insulation and/or sheath, to confirm the condition is suitable to allow work to proceed.

If the cable pit contains LV cables with exposed conductive sheath or armour, workers must apply the controls of Clause 9.3.5.

10.10.3 Preventing damage to a cable

To manage the risk of the work causing damage to a cable in a cable pit, workers must:

- minimise the force (pressure or tension) they place on an energised cable; and
- not remove a HV cable support that leaves the cable unsupported.

10.10.4 Working near HV cable joints

Workers must implement the following controls to manage the risk of exposure to an arc arising from a failed HV (including sub-transmission) cable joint:

- workers must not move any HV cable joint while the cable is energised; and
- for all work other than visual inspection, workers must install arc suppression blankets and/or curtains between the worker and any energised HV cable joint that is within 3m of the worker.

10.10.5 General controls for work on cables

If the cable pit contains LV cables, refer also to Section 9.3 for the controls for work on or near LV cables.

If the cable pit contains HV (including sub-transmission) cables:

- refer to Section 9.9 for the requirements for the identification of, and remote cutting of, cables; and
- refer to Clause 9.11.5 for the controls to manage the risk of induction or transferred earth potential.

10.11 Drones

10.11.1 General

The operation of any drone within the vicinity of exposed mains and apparatus, by an Ausgrid employee, contractor to Ausgrid, or ASP, must comply with the Ausgrid Drone Operations Manual.

10.11.2 Drones in contact with live mains and apparatus

In addition to the controls required by the Ausgrid Drone Operations Manual, the following controls must be applied when a drone is intentionally brought into contact with or, is used to attach a fitting (such as a line fault indicator, bird diverter, or aerial marker) to, a live overhead conductor.

Condition assessment

The overhead mains and adjacent structures must be assessed as being in suitable condition to allow the work to proceed.

Network configuration

The following network configuration requirements must be in place before a drone is intentionally brought into contact with, or is used to attach a fitting to, a live overhead HV conductor:

- the auto-reclosing function of the circuit breaker which controls the section of the feeder must be made ‘non-auto’; and
- the sensitive earth fault protection covering the section of feeder must be operational; and
- where available (as shown on the system diagram) the upstream circuit breaker/recloser must have instantaneous protection (e.g. work mode / work tag / live line / hot line tag) enabled; and
- FLISR must be set to non-auto for schemes that may impact the sections of the feeder; and
- the pick-up value of the primary protection system for the section of feeder must comply with the primary protection requirements of Network Standard NS263 for the fault levels at the work site.

11 Substations

This chapter provides controls that are specific to work in substations.

See also the Ausgrid Network Standard NS 165 - Safety Requirements for Non-Electrical Work in and around Live Substations for controls required for structural and civil works within a substation.

See also Chapter 13 for controls required for work in substations which are owned and or operated by other organisations.

11.1 Substations – general

11.1.1 Substation doors and gates

Entrances to substations and any other areas where live exposed conductors are present, must always be locked when not in use.

Exception: Hatch entries to basement chamber or underground substations may remain open, when required for confined spaces purposes while workers are within the substation, provided an Ausgrid employee or contractor/partner is continually present while the hatch remains open, to prevent unauthorised entry to the substation.

Workers must take every precaution to ensure that unauthorised persons cannot enter while still allowing for access (e.g. passage of materials, ventilation, or emergency exit).

Fire doors must be left closed when not required to be open for access.

Figure 94 – Locking a substation entrance

11.1.2 Ladders

Conductive portable ladders (metal ladders, or wooden ladders with wire reinforcements) must not be used in substations.

Exception: Approved special purpose conductive ladders may be used for specific tasks when used following an approved SWMS (see Clause 6.8.1 Table 12).

11.1.3 Equipotential bonding

To manage the risk of induction and transferred earth potential when working within a substation, workers must apply the earthing and equipotential bonding controls of Clause 9.11.6.

11.1.4 Material storage

Keep stored materials away from exposed mains and apparatus. Make sure materials do not block doorways, passageways, or stop normal work being done on mains and apparatus.

Once you have completed work in an area where there are exposed mains and apparatus, make sure you remove all portable ladders, tools, ropes, rubbish, and any other unnecessary materials.

11.2 Outdoor substations

This section provides controls that are specific to work in outdoor substations

11.2.1 Carrying objects

Workers who are carrying objects within or through an outdoor substation must carry the objects in a manner that allows the workers to maintain the relevant MSWD from live exposed conductors.

While working in an outdoor substation, workers must assess the ability to maintain the relevant MSWD before lifting any conductive object above their shoulders.

Figure 95 – An example of carrying an object in a substation.

11.2.2 Umbrellas

Workers must not take an umbrella into an outdoor substation.

11.2.3 Workers who are taller than 1.9m

Workers who are taller than 1.9m must pay extra attention to maintaining the relevant MSWD, as design clearances assume a worker height of 1.9m.

11.3 Indoor distribution substations

Indoor distribution substations include basement chamber, surface chamber, upper-level chamber, and underground style substations.

11.3.1 Access and egress

Before working in an indoor distribution substation, workers must check that the entries/exits can be easily opened and are not obstructed.

Workers who are performing work in an indoor substation, must not block or obstruct any exits or passageways or access to fire extinguishers, telephones, control switches or other operating equipment.

11.3.2 Optical Arc Fault Detection

Where Optical Arc Fault Detection (OAFD) protection is installed within a distribution substation, workers must:

- only enter the substation via the personnel entrances which is marked with a sign stating “OPTICAL ARC FLASH DETECTION INSTALLED. USE THIS ENTRANCE”; and
- immediately upon entry, check the substation voltmeter and OAFD indication panel near the substation entrance; and
- remain in the substation only if:
  - the voltmeter indicates healthy volts; and
  - for type 1 OAFD indication panels with one green indication light - the green indication light is illuminated; or

- for type 2 OAFD indication panels with three (3) green indication lights – at least two (2) of the indication lights is illuminated (or if only one (1) indication light is illuminated, and workers have confirmed that the healthy relay is protecting the energised transformer).

If the voltmeter indicates low volts and/or the OAFD indication panel green light(s) are not illuminated, workers must leave the substation immediately, notify the relevant Control Room Operator, and refer to Operating Advice 14 / 2012 for further information or required actions.

11.4 Substation batteries

This section outlines controls for work on or near batteries which provide direct current (dc) supply to network protection, automation, and control schemes.

This section does not apply to batteries that form Network Distributed Energy Resources. Refer to chapter 16 for requirements for Network Distributed Energy Resources.

11.4.1 Working on or near batteries

All direct current battery systems are stored energy devices and should always be treated as energised equipment.

Direct current battery systems are capable of causing harmful arcing if worked on while connected and may result in electric shock, electrical or chemical burns, fire, or explosion in adverse circumstances.

For work on battery terminals and connections, workers must, where reasonably practicable, use insulated or covered tools.

As required by Clause 7.1.4, workers must not make uninsulated contact with exposed conductors at nominal voltages between 60Vdc and 120Vdc.

The spray released by gassing cells is strongly corrosive. Do not get this spray in your eyes or on your skin or clothes.

11.4.2 Work in battery rooms or near nickel cadmium batteries

When working in a battery room, or near banks of batteries consisting of nickel cadmium batteries with liquid electrolyte with cells on charge, workers must;

- ventilate the room or space by opening all available doors and windows or, activate exhaust fans if they are available; and
- not use an open flame, while cells are on charge; and
- not smoke; and
- limit the risk of sparks from jumper leads, metallic watch bands, jewellery, tools or construction materials.

Note: Where it is necessary to use an open flame, or attach jumper leads, workers must confirm the batteries are not on charge.

11.5 Working on specific substation apparatus

This section describes voltage transformers, current transformers, capacitors and interlocks.

11.5.1 Magnetic voltage transformers

Before any work begins on a magnetic voltage transformer (other than a withdrawable-type voltage transformer), ensure:

- high voltage (HV) and secondary windings are isolated
- HV windings are earthed and short-circuited.

Exception 1

If the voltage transformer is connected to HV mains and apparatus via fuses that are not designed to be readily accessible for withdrawal, then isolate the busbar to work on the voltage transformer provided that:

- the busbar is earthed and short-circuited
- the low voltage (LV) winding is isolated

- any exposed conductors associated with the HV winding are momentarily discharged to earth immediately before work is started on the voltage transformer.

Exception 2

If the voltage transformer is directly bonded to HV mains and apparatus (i.e. not connected by HV fuses or links), then isolate the busbar to work on the voltage transformer provided:

- the busbar is earthed and short-circuited
- the LV winding is isolated.

Exception 3

Gas insulated switchgear voltage transformers fitted with a primary isolator do not need to be isolated from the primary circuit provided:

- the secondary winding of the voltage transformer is isolated
- the associated feeder, busbar or power transformer to which the voltage transformer is normally connected is isolated and earthed.

Figure 96 - 11kV—110V voltage transformer

11.5.2 Capacitive voltage transformers

For capacitive voltage transformers, the following precautions apply:

- Connect the HV access permit earth as close as possible to the connection of the capacitive voltage transformer so that there is no form of inductive impedance between it and the earth.
- Do not apply the access permit earth immediately after isolation. Allow at least five minutes for the capacitors to discharge.
- Before undertaking work that involves the open circuiting of any connection in the primary circuit of the capacitive voltage transformer, you must short-circuit the primary connection to one of the following:
  - the frames of individual capacitors and to earth
  - the earthed metal base of an integrated type of capacitive voltage transformer—the main primary connection must then be disconnected.
- As an added precaution, prior to touching the secondary connections, the secondary connections must be momentarily discharged to earth.

There is no requirement to apply access permit earths to the secondary winding of capacitive voltage transformers.

11.5.3 Current transformers

To prevent dangerous induced voltages, workers must not open the secondary winding of any energised current transformer.

Workers must not make uninsulated contact with exposed conductors on secondary circuits of energised current transformers.

When current transformers (or circuit breakers containing current transformers) are subject to HV testing, or current injection testing, the secondary terminals of the current transformers must be earthed and short-circuited before testing commences.

11.5.4 Tail-ended transformers

Prior to carrying out any work on the conductors of a tail-ended transformer in a zone or sub-transmission substation, workers must sign onto an access permit covering the tail-ended transformer, then prove de-energised and connect equipotential bonds (with a minimum current carrying capacity equivalent to 6mm^2 copper) to the links within the cable end box of the transformer.

11.5.5 Capacitors

Treat capacitors as live until they are isolated, discharged, earthed and short-circuited in an approved manner. This includes capacitors in a frequency injection cell or ripple filters, and capacitors connected to form banks. Allow five minutes discharge time before applying earths.

11.5.6 Interlocks

Interlocks ensure that the correct operating sequence is carried out or prevents inappropriate access to equipment. Interlocks must not be forced or overridden.

Example: On a ring main unit (RMU), the feeder switch must be in the ‘Off’ position first before an interlock allows the earthing switch to move to the ‘Earth On’ position. This will free the endbox interlock and will then allow you to gain access to the endbox of the earthed feeder.

Figure 97 - Interlock engaged to prevent access to cable end box.

12 Interconnected mains and apparatus

This chapter describes the controls required for work on mains and apparatus that are interconnected between Ausgrid and another organisation.

Other organisations include:

- NSW Electricity Network Operators (i.e. Transgrid, Endeavour Energy, Essential Energy, Sydney Trains); and
- Electricity generators connected to the Ausgrid HV network; and
- HV customers.

The Head of System Control is responsible for establishing and maintaining operating protocols between Ausgrid and these other organisations with interconnected HV mains and apparatus.

12.1 Ausgrid requesting isolation by another NSW Network Operator or HV generator

This section describes the arrangements when Ausgrid requires another NSW network operator or HV generator to carry out isolation and earthing of interconnected HV mains and apparatus.

12.1.1 Arranging isolation and earthing

The person planning the work is required to submit a NAR. System Control will then arrange for the isolation and earthing by the other network operator or generator.

12.1.2 Securing isolation and earthing

All isolation and earthing must be secured by an operating agreement between Ausgrid and the other organisation.

12.1.3 Verbal or electronic operating agreement

Where verbal, or electronically recorded, agreements are specified in the operating protocol between Ausgrid and the other organisation, operating agreements may be made verbally, or recorded electronically, between the control rooms of the two organisations.

In this situation, the Control Room Operator and the other organisation's controller(s) must work together to isolate and earth the mains and apparatus as required by these Rules.

The Control Room Operator and the other organisation's controller must advise each other of the safety procedures followed before:

- any access permit is issued; or
- any HV test is applied to the mains and apparatus; or
- any access permit earths are removed; or
- the mains and apparatus are put back in service when the work is finished.

When the other organisation's controller informs the Control Room Operator of the isolation and earthing of the interconnected mains and apparatus, the Control Room Operator must relay the information to the Class 1 Operator who will be issuing the access permit.

Once the Class 1 Operator receives the information from the Control Room Operator, the Class 1 Operator must issue an Ausgrid access permit for the work. The isolations and earthing by the other organisation must be recorded on the access permit.

Note: There may be additional access authority requirements if the work is to occur within a substation controlled by the other network operator (see Chapter 13).

12.1.4 Written Operating Agreement

Where verbal, or electronically recorded, agreements between control rooms are not specified in the Operating Protocol between Ausgrid and the other organisation, isolation and earthing, as required by these Rules, must be secured by a written Operating Agreement. (See Section 5.8 for the use of Operating Agreements).

Once the Class 1 Operator accepts an Operating Agreement from the person authorised by the other organisation, the Class 1 Operator must issue an Ausgrid access permit for the work. The isolations and earthing by the other organisation must be recorded on the access permit, and the Operating Agreement referenced.

The Class 1 Operator must place the original copy of the Operating Agreement in the relevant permit folder.

12.1.5 Work on Ausgrid assets totally controlled by Transgrid

Occasionally work or testing is done on HV mains and apparatus owned by Ausgrid, where both ends terminate at substations owned by Transgrid. If neither end of the cable is controlled by an Ausgrid switch, the following applies:

1. For work on the cable termination: Transgrid issues their own access authority, to an Ausgrid worker who is authorised to receive Transgrid access authorities, on the feeder panel at the place of work. The Ausgrid worker can then work on the termination.
2. For work on the cable remote from either substation: following Step 1 above, the Ausgrid Class 1 Operator must visually check Transgrid's isolation and also the Transgrid access authority that was issued to the Ausgrid worker for work on the cable termination.

   The Ausgrid Class 1 Operator must then issue an Ausgrid access permit for the work on the cable. The access permit must reference the Transgrid access authority (permit) and note the requirement for cable identification. The access permit must be placed at the location specified in a Permit Receptacle.
3. The Ausgrid Class 1 Operator must place the Permit Folder at the Transgrid place of issue, as close as practicable to the point of isolation.
4. The Ausgrid worker must not cancel or otherwise surrender the Transgrid access authority unless the Ausgrid access permit has been surrendered beforehand.

12.2 Ausgrid requesting isolation by a HV customer

This section describes the requirements when Ausgrid requires a HV customer to carry out isolation and earthing of interconnected HV mains and apparatus.

12.2.1 HV customer connections

HV mains and apparatus forming part of a customer installation must comply with Network Standard NS195 – High Voltage Customer Connections (HVCs).

12.2.2 Arranging isolation and earthing

The person planning the work must arrange for the HV customer to carry out the required isolation and earthing.

12.2.3 NAR

A NAR must be submitted and include the following details:

- the work location and specific work tasks on Ausgrid's mains and apparatus
- all arrangements made with the HV customer including:
  - appointments
  - specific earthing requirements
  - the name and contact details of the responsible person from the HV customer.

12.2.4 Arranging permits

Once the mains and apparatus are isolated and earthed by the HV customer, a representative from the HV customer is to issue a written Operating Agreement to an Ausgrid Class 1 Operator, to secure the isolation and earthing.

The Class 1 Operator must confirm the following before issuing an Ausgrid access permit:

- the mains and apparatus of the HV customer are isolated and earthed at the specified points; and
- the HV customer's mains and apparatus are earthed as close as practicable to the Ausgrid worksite.

Following receipt of the Operating Agreement from the HV customer's representative and confirmation of the above, the Class 1 Operator is to issue an Ausgrid access permit for the work. The isolations and earthing by the HV customer must be recorded on the access permit, and the Operating Agreement referenced.

The Class 1 Operator must place the original copy of the Operating Agreement in the relevant permit folder.

If an Operating Agreement is unavailable from the HV customer, an Ausgrid Operating Agreement must be used (see Section 5.8 for a sample of an Operating Agreement).

12.2.5 Cancelling Permits

Once the Ausgrid access permits are cancelled, the original and the duplicate copies of the Operating Agreement must be cancelled and exchanged with the HV customer's nominated person. The retained copy must be placed in the permit folder. The HV customer retains the cancelled original copy.

The permit folder, together with all the relevant papers, must be sent to the Head of Operating and Emergency Response, via an approved process.

12.3 Another organisation requesting isolation by Ausgrid

This section describes the requirements when another organisation (network operator, HV generator, or HV customer) requests isolation and earthing by Ausgrid, for work on interconnected HV mains and apparatus.

12.3.1 Securing isolation and earthing

All isolations, and earthing (if required*), must be secured by an operating agreement between Ausgrid and the other organisation.

(*The other organisation may request isolation of the mains and apparatus only and not earthing and short-circuiting).

12.3.2 Verbal or electronic operating agreements

Where verbal or electronically recorded agreements are specified in the operating protocol between Ausgrid and the other organisation - isolation and earthing (if required) may be secured by a verbal, or electronically recorded, operating agreement between the control rooms of the two organisations.

The Control Room Operator and the other organisation's controller(s) must work together to isolate and earth the mains and apparatus as required by these Rules.

The Control Room Operator and the other organisation's controller must advise each other of the safety procedures followed before:

- any access permit is issued; or
- any hazardous voltage test is applied to the mains and apparatus; or
- Access permit earths are removed; or
- the mains and apparatus are put back in service when the work is finished.

12.3.3 Written Operating Agreements

Where verbal, or electronically recorded, agreements between control rooms are not specified in the operating protocol between Ausgrid and the other organisation, isolations and earthing (if required) must be secured by a written Operating Agreement.

Once the mains and apparatus are isolated and earthed as requested, a Class 1 Operator must issue an Operating Agreement to the person nominated by the other organisation to secure the isolation and earthing.

See Section 5.8 for details on the use of written Operating Agreements.

12.4 LV direct distributors

This section describes the controls required to manage the isolation of, or from, direct distributor customer installations.

12.4.1 Isolation by Ausgrid for work on the installation

Where a direct distributor customer requests isolation of a direct distributor by Ausgrid for work on their installation, an appropriately authorised Ausgrid operator must:

- isolate the direct distributor from the network, in accordance with Clause 9.2.1; and
- prove the direct distributor is de-energised, in accordance with Clause 9.2.2; and
- issue an Operating Agreement to the person nominated by the customer.

The operator must explain the controls implemented for the isolation to the nominated person before handing them the Operating Agreement.

12.4.2 Isolation for work by Ausgrid

This Clause defines the controls required where Ausgrid requires the isolation of a LV direct distributor from the customer installation.

Where the installation is protected by a Service Protection Device (SPD), the Ausgrid operator must create a Clause 9.2.1 compliant isolation point at this SPD.

Where the installation does not have an SPD, and isolation is to be from the customer main switch(es):

- if an Ausgrid Operator is required to operate customer switches, the customer or their representative must sign an Authorisation and Indemnity Form – see Figure 99. The Ausgrid Operator must then form a Clause 9.2.1 compliant isolation point at the customer main switch(es); or
- if the customer main switch(es) are operated by the customer or their representative - once isolation of the direct distributor is verified, the Ausgrid operator must receive an Operating Agreement from the customer or their representative

Alternatively, where the requirements of Clause 9.2.3 can be met, the direct distributor may be isolated from network sources of supply, proved de-energised, and short-circuited with LV shorts, as required by Clause 9.2.3.

Where the above controls are not implemented, the direct distributor conductors must be treated as live.

13 Working in substations controlled by other organisations

This chapter describes the controls required for work on Ausgrid HV mains and apparatus that are located within a substation that is operated or controlled by another organisation.

13.1 Working in Transgrid substations

This section describes the controls required for work on Ausgrid HV mains and apparatus that are located within a substation owned or operated Transgrid.

13.1.1 Transgrid access authorities (permits)

If the work on Ausgrid mains and apparatus occurs within a Transgrid substation, Ausgrid workers will also need to sign onto a Transgrid access authority (permit) – which is issued in addition to the Ausgrid access permit or Equipping Permit.

Exception: A Transgrid access authority is not required where the work is carried out under an Ausgrid access permit on Ausgrid cables that are located in a cable basement within a Transgrid substation.

Note: Transgrid access permits are called 'access authorities'.

A Transgrid access authority will not be issued until the Transgrid operator has completed all of the following:

- examined the Ausgrid access permit issued by an Ausgrid Class 1 Operator, or Equipping Permit; and
- taken Ausgrid personnel to the worksite to explain the reasons for the yellow tape barrier (erected by Transgrid); and
- identified the isolated mains and apparatus.

The permit recipient is responsible for the safety of Ausgrid workers under the permit recipient's control. The permit recipient is also responsible for keeping the gate to the Transgrid premises locked when the Transgrid authorised person in charge is not available.

13.1.2 Authorisations

Workers must be authorised by Transgrid to work under a Transgrid access authority in a Transgrid substation.

To accept a Transgrid access authority, workers must be authorised by Transgrid as an Authorised Person in Charge (APIC).

13.1.3 Place of issue

The NAR must specify the 'place of issue' of the Ausgrid access permit. When the 'place of issue' is at a Transgrid substation, the access permit will be left in the permit container.

Figure 98 – Permit container on a Transgrid Substation

13.1.4 Permit Folders

After the Permit Folder has been prepared, it is left at the Ausgrid zone substation or control point that controls the mains and apparatus (see Clause 5.11.1).

When the only switch available to isolate mains and apparatus is installed at a Transgrid substation, the Permit Folder is left in the container provided for the issuing of access permits (e.g. a cable to a street excavation).

13.1.5 Connecting new or altered mains and apparatus

When Ausgrid requires the connection of new or altered mains and apparatus at a Transgrid substation, the person planning the work must initiate a system alteration order (SAO) and send it to System Control. This must be submitted with the notification timeframe required by the System Control Document NSEC 007 “Submitting Network Access Requests.” System Control will arrange with the Transgrid nominated person to make the connection.

13.2 Working in substations controlled by another organisation – other than Transgrid

This section describes the controls required for work on Ausgrid HV mains and apparatus that are located within a substation which is owned or operated by an organisation other than Transgrid.

13.2.1 Access permits

If the work on Ausgrid mains and apparatus occurs within a substation which is owned or operated by another organisation (other than Transgrid) - in addition to the Ausgrid access permit or Equipping Permit, Ausgrid workers may also need to sign onto an access authority which is issued by the other organisation - depending on the Electrical Safety Rules of the other organisation.

If work on Ausgrid mains and apparatus requires workers to work on or near the other organisations exposed mains and apparatus within the substation - in addition to the Ausgrid access permit or Equipping Permit, the workers must sign onto an access authority that is issued by the other organisation covering the mains and apparatus of the other organisation.

13.2.2 Place of issue

The NAR must specify the ‘place of issue’ of the Ausgrid access permit.

The access permit must be placed in a Permit Receptacle in the container provided for the issuing of access permits or attached to the perimeter fencing of the substation as close as possible to the entrance.

13.2.3 Permit Folder

The Permit Folder must be left at an Ausgrid point of isolation.

When the only switch available to isolate the mains and apparatus is at the substation (e.g. a cable to a street excavation), the Permit Folder must be attached to the perimeter fencing of the substation as close as possible to the entrance, unless a container is provided for the issuing of access permits.

13.2.4 Operating another organisation’s mains and apparatus

HV customers are required by Network Standard NS195 to use trained and authorised personnel to carry out operating work.

An Ausgrid Class 1 operator may operate the interconnected HV apparatus of a HV customer only where it is not reasonably practicable for the HV customer to provide their own authorised operator.

Before carrying out any operating work, the owner or lessee of the mains and apparatus must, where reasonably practicable, sign an indemnity and authorise the Ausgrid operator to operate their equipment (see Figure 99).

The Ausgrid operator must:

- Hold a current Class 1 operating authority; and
- obtain a current line diagram showing connections within the installation and information relating to the particular equipment; and

- investigate the isolation and earthing requirements necessary for the work; and
- assess, so far as reasonably practicable, the condition of the apparatus to confirm it is safe to operate.

When an Ausgrid access permit is issued by an Ausgrid operator, the operating work must comply with these Rules.

Authorisation and Indemnity Form

The following Ausgrid employees are hereby authorised to enter substations and/or switch rooms, and operate electrical apparatus, which are owned and/or operated by the undersigned company;

for a period of: _____ from (date): _____ to (date): _____

It is understood that all Ausgrid employees listed below have been authorised by Ausgrid in accordance with their Electrical Safety Rules to carry out the above duties.

Employee	Operating Authority

_____
(Name of company)

Hereby indemnifies Ausgrid and its employees against any damage or losses caused by equipment failure during the operation of the equipment.

_____
Company representative
(print name and position)

_____
Witness
(Ausgrid representative print name)

_____
(Signature)

_____
(Signature)

Date: _____

Issue Date: 10/2024 A10

Figure 99 - Authorisation and indemnity form

14 Working on, near, or in the vicinity of another organisation's mains and apparatus

This chapter describes the controls required to work on or near Ausgrid mains and apparatus that requires workers to work on, near, or in the vicinity of (but not electrically interconnected with) HV mains and apparatus owned or operated by another organisation.

14.1 Other NSW Network Operators

The requirements in this section apply to NSW Network Operators (i.e. Transgrid, Endeavour Energy, 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".

14.1.1 Work in the vicinity

For work in the vicinity of the other network operator's mains and apparatus – the Ausgrid officer who is planning the work must notify the other network operator of the proposed work.

The other network operator will review the proposed work and either notify Ausgrid of:

- their approval for the work to proceed; or
- the need for the mains and apparatus to be isolated and earthed, and an Operating Agreement issued for work, as set out in Clause 14.1.2 below.

14.1.2 Work on or near

For work on or near the other NSW network operator's mains and apparatus – the other NSW network operator is required to:

- isolate the mains and apparatus; and
- for HV mains and apparatus - apply earthing and short-circuiting equipment:
  - between all HV points of isolation and the worksite; with
  - at least one set of earths being located as close as reasonably practicable to the worksite; and
  - (for overhead mains and apparatus) at least one set of earths being visible from the worksite; or
- for 1500V dc rail traction circuits – the mains must be rail-connected at the isolation points.

NAR

The person planning the work is required to submit a NAR. The NAR must include the following details:

- the relevant Ausgrid mains and apparatus; and
- the relevant mains and apparatus owned or operated by the other network operator.

System Control will then arrange for the isolation and earthing by the other network operator.

Arranging Permits

Once the mains and apparatus are isolated and earthed by the other NSW network operator, a representative from the other NSW network operator is to issue a written Operating Agreement to an Ausgrid Class 1 Operator, to secure the isolation and earthing.

The Class 1 Operator must confirm the following before issuing an Ausgrid access permit:

- the mains and apparatus of the other network operator are isolated and earthed at the specified points; and
- the other network operator's mains and apparatus are earthed within sight of and as close as practicable to the Ausgrid worksite.

Following receipt of the Operating Agreement from the other network operator's representative and confirmation of the above, the Class 1 Operator is to issue an Ausgrid access permit for the work. The access permit must include the mains and apparatus of the other network operator and reference the Operating Agreement.

The Class 1 Operator must place the original copy of the Operating Agreement in the relevant Permit Folder.

If an Operating Agreement is unavailable from the other organisation, an Ausgrid Operating Agreement must be used (see Section 5.8 for a sample of an Operating Agreement).

Cancelling Permits

Once the Ausgrid access permits are cancelled, the other organisation's Operating Agreement must be cancelled by the Ausgrid Class 1 Operator and returned to the other organisation's nominated person.

The original and the duplicate copies of the Operating Agreement must be cancelled and exchanged with the other organisation. The retained copy is placed in the Permit Folder. The organisation that issued the Operating Agreement retains the cancelled original copy.

The Permit Folder, together with all the relevant papers, must be sent to the Head of Operating and Emergency Response, via an approved process.

Endeavour Energy

Endeavour Energy may issue an Endeavour Energy Access Authority to an Ausgrid authorised permit recipient instead of issuing an Operating Agreement to an Ausgrid operator.

In that situation, the requirements for the acceptance, signing onto, signing off, and surrendering the Endeavour Energy Access Authority are the same as the requirements for acceptance, signing onto, signing off, and surrendering an Ausgrid access permit.

14.1.3 Sydney Light Rail – Aesthetic Power Supply System

The Sydney Light Rail Aesthetic Power Supply (APS) system consists of a centre third rail which is divided into 8m long segments to supply power to light rail vehicles. A centre rail segment can only be energised to 750Vdc when a tram is positioned on top of the segment. When a tram is not positioned on top of a segment, this segment is connected to the side rails.

When undertaking work within 3 metres of Sydney Light Rail tracks, the Sydney light rail operator must be notified. Where a Sydney Light Rail Operator Track Possession Permit has been issued all workers must sign onto the Permit. The Sydney Light Rail Operator will provide a "Person in Charge" to implement the permit. The track possession permit will prevent trams from travelling in the permit area, thus preventing the centre rail from being energised. This permit allows the centre rail section within the permit area to be treated as electrically safe and hence can be treated as isolated for this situation with no further permits or Operating Agreements required.

14.2 Organisations other than NSW Network Operators

The requirements in this section apply to HV mains and apparatus owned or operated by organisations other than NSW Network Operators (e.g. HV customers).

14.2.1 Work in the vicinity

Where the work on or near Ausgrid mains and apparatus requires workers to work in the vicinity of the other organisations mains and apparatus – the Ausgrid officer who is planning the work must notify the other organisation of the proposed work.

If the Electrical Safety Rules of the other organisation require their mains and apparatus to be isolated and earthed for the work to proceed, the requirements of Clause 14.2.2 will apply.

14.2.2 Work on or near

Where the work on or near Ausgrid mains and apparatus requires workers to work on or near another organisation's mains and apparatus – the other organisation is required to:

- isolate the mains and apparatus; and
- apply earthing and short circuiting:
  - between all HV points of isolation and the worksite;
  - as close as reasonably practicable to the worksite; and
  - (for overhead mains and apparatus) visible from the worksite.

The person who is planning to work must make arrangements with the other organisation to carry out the isolation and earthing.

Network Access Request

The person planning the work must submit a NAR including the following details:

- the relevant Ausgrid mains and apparatus; and
- arrangements made with the other organisation (including appointments and specific earthing requirements); and
- the name of the responsible representative from the other organisation.

Arranging Permits

Once the mains and apparatus are isolated and earthed by the other organisation, a representative from the other organisation is to issue a written Operating Agreement to an Ausgrid Class 1 Operator, to secure the isolation and earthing.

The Class 1 Operator must confirm the following before issuing an Ausgrid access permit:

- mains and apparatus of the other organisation are isolated and earthed at the specified points; and
- other organisation's mains and apparatus are earthed within sight of and as close as practicable to the Ausgrid worksite.

Following receipt of the Operating Agreement from the other organisation's representative and confirmation of the above, the Class 1 Operator is to issue an Ausgrid access permit for the work. The access permit must include the mains and apparatus of the other organisation and reference the Operating Agreement.

The Class 1 Operator must place the original copy of the Operating Agreement in the relevant permit folder.

If Operating Agreement is unavailable from the other organisation, an Ausgrid Operating Agreement must be used (see Section 5.8 for a sample of an Operating Agreement).

Cancelling Permits

Once the Ausgrid access permits are cancelled, the other organisation's Operating Agreement must be cancelled by the Ausgrid Class 1 Operator and returned to the other organisation's nominated person.

The original and the duplicate copies of the Operating Agreement must be cancelled and exchanged with the other organisation. The retained copy is placed in the Permit Folder. The organisation that issued the Operating Agreement retains the cancelled original copy.

The Permit Folder, together with all the relevant papers, must be sent to the Head of Operating and Emergency Response, via an approved process.

15 Work by other organisations on, near, or in the vicinity of Ausgrid mains and apparatus

This chapter sets out the requirements when another organisation is carrying out work on, near, or in the vicinity of Ausgrid mains and apparatus.

15.1 Other NSW Network Operators

The requirements in this section apply to NSW Network Operators (i.e. Transgrid, Endeavour Energy, 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".

15.1.1 Work in the vicinity

For work by another NSW network operator in the vicinity of the Ausgrid mains and apparatus – the other network operator must notify Ausgrid of the proposed work.

Ausgrid will review the proposed work and reply to the other network operator to:

- confirm whether Ausgrid does, or does not have, any objection to the work proceeding; and
- notify if Ausgrid require the mains and apparatus to be isolated and earthed, and an Operating Agreement issued for work, as set out in Clause 15.1.2 below.

Note: As set out by the ISSC 37 Guide, the other NSW network operator's safe systems of work shall apply for the work.

15.1.2 Work on or near

For work on or near Ausgrid HV mains and apparatus by the other NSW network operator – Ausgrid is required to:

- isolate the mains and apparatus; and
- apply earthing and short circuiting:
  - between all HV points of isolation and the worksite; with
  - at least one set of earths being located as close as reasonably practicable to the worksite; and
  - (for overhead mains and apparatus) at least one set of earths being visible from the worksite.

For work on or near Ausgrid LV mains and apparatus by the other NSW network operator – Ausgrid is required to isolate the mains and apparatus and apply LV shorts as required by these Rules.

NAR

The request from the other network operator may be received by either the Ausgrid business unit responsible for maintaining the mains and apparatus, or directly through to System Control between control rooms. Where the request is received by the relevant Ausgrid business unit, a responsible officer from the business unit must submit a NAR including:

- the relevant Ausgrid mains and apparatus; and
- arrangements made with the other organisation (including appointments and specific earthing requirements); and
- the name of the responsible representative from the other network operator.

Arranging Permits

An appropriately authorised operator is to issue a written Operating Agreement to the representative from the other NSW network operator, to secure the isolation and earthing of the Ausgrid mains and apparatus.

The other NSW network operator will then be responsible for issuing their own access authority for work on or near the Ausgrid mains and apparatus.

The work is to be carried out under the safe systems of work of the other network operator.

Note: This same arrangement will apply to Ausgrid exposed mains and apparatus that are non-connectable.

15.2 External parties (organisations other than other NSW Network Operators)

This section applies to organisations, other than NSW Network Operators working under the Electricity Supply Act and Regulations (i.e. external parties who are working under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines).

15.2.1 Enquiry process

The process for receiving and managing enquiries relating to work by external parties working under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines, is set out in the Ausgrid Technical Guide T0113 – Application of ISSC32 for Advice to Third Parties Working Near Overhead Powerlines.

15.2.2 Work in the vicinity

External parties who are working under, and are accredited in accordance with, the WorkCover NSW Code of Practice – Work Near Overhead Power Lines, may carry out work in the vicinity of live exposed mains and apparatus – within the "Accredited Person Zone" as defined by the Code of Practice.

15.2.3 Work near

HV

Where external parties (working under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines) are intending to carry out work within the distances from Ausgrid HV mains and apparatus that are specified by the Industry Safety Steering Committee Guide ISSC32 as requiring the mains and apparatus to be isolated - the work must be carried out under an Ausgrid Access Permit for Work, with the mains and apparatus isolated and earthed in accordance with these Rules. The Access Permit for Work must be issued by a Class 1 operator to a person who is authorised by Ausgrid to receive access permits.

Note: The same requirements apply to work near Ausgrid exposed HV mains and apparatus that are non-connectable.

LV

Where external parties (working under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines) are intending to carry out work within the distances from Ausgrid LV mains and apparatus that are specified by the Industry Safety Steering Committee Guide ISSC32 as requiring the mains and apparatus to be isolated, the work must be carried out under a Clearance to Work with the mains and apparatus isolated and shorted in the same manner as that required by these Rules for the issue on an access permit.

See section 5.7 for further information about the use of a Clearance to Work.

Note: The same requirements apply to Ausgrid exposed LV mains and apparatus that are non-connectable.

15.2.4 Work on

Persons who are working for organisations other than NSW Network Operators (working under the Electricity Supply Act and Regulations) are not permitted to carry out work on Ausgrid mains and apparatus.

16 Network Distributed Energy Resources

16.1 Scope

This section provides the Rules relating to Distributed Energy Resources (DER) that form part of Ausgrid's network and provide electricity supply to the Ausgrid network through inverters.

This includes, but is not limited to, community batteries, stand-alone power systems (SAPS), and microgrid supply systems.

16.2 Application

16.2.1 Application of these Rules

These Rules apply to:

- any work on Ausgrid mains or services that are connected to an Ausgrid DER; or
- any work involving SCADA systems of the Ausgrid DER that are monitored by, or provide alarms to, System Control.

Workers who are carrying out work, other than the work listed directly above, on an Ausgrid DER (on the inverter side of the main a.c. isolation switch) must comply with the electrical controls included in the safe systems of work developed and being applied by the organisation which is authorised by Ausgrid to carry out the work on the DER.

16.2.2 Isolation

The main a.c. isolation switch of an Ausgrid DER may be operated by:

- an electrically qualified Ausgrid employee, who has received specific instruction on the operation of the switch; or
- where Australian Energy Market Operator (AEMO) regulated metering is installed - an AEMO accredited metering provider with Level 2D ASP authorisation; or
- a worker who is authorised by an organisation which is authorised by Ausgrid to carry out work on the DER.

If an organisation which is carrying out work on the DER requires the isolation of Ausgrid mains or services that are connected to an Ausgrid DER, an appropriately authorised Ausgrid operator is to confirm and secure the isolation through an Operating Agreement that is issued to the person nominated by the other organisation.

17 Glossary – Personnel

Energy Networks Association (ENA) generic definitions are included (where available) in italics.

Person	Description
Access permit recipient	See recipient.
Accredited Service Provider (ASP)	An accredited service provider (ASP) is either an individual or a company with current accreditation under the NSW Government - Accredited Service Provider scheme. There are three levels of accreditation: • Level 1 accreditation—involving the contestable construction of transmission and distribution works such as the installation of high voltage (HV) and low voltage (LV) distribution cables and substations (i.e. distribution work). • Level 2 accreditation—involving the contestable installation of overhead and underground service mains and metering equipment, the disconnection and reconnection of supply to carry out work on an installation and energising installations. • Level 3 accreditation—involving the design of electrical reticulation systems to be constructed as contestable works.
Authorised person	*ENA—means a person with technical knowledge or sufficient experience who has been approved or has the delegated authority to act on behalf of the Network Operator, to perform the duty concerned.* An authorised person is a trained and competent person approved to carry out specific duties relating to the supply of electricity. See Chapter 3 for the requirements to be deemed an authorised person under these Rules.
CAVC certified persons	A worker who holds a current close approach vegetation control (CAVC) authorisation. Annual refresher training by a registered training organisation (RTO) is required to keep this accreditation. CAVC certified persons include climber/groundworkers and those working from an EWP.
Classification	In relation to minimum safe work distances – whether a person is an ordinary, instructed, or authorised person. In relation to Access Permits - the trade, skill base, or role a worker is employed in. For example, line worker, cable jointer, technician, power worker, engineer, tester, etc. This may include roles within multi-skilled workgroups that have multiple trades/roles.
Contract officer	An Ausgrid employee who is responsible for arranging access to the network for work carried out by contractors to Ausgrid.
Contractor	*ENA—means an entity engaged by a Network Operator to carry out work on the electricity network.* Employed by Ausgrid on a contract basis, a contractor can also be an employee of a corporate body, person or group of persons or organisation employed on a contract basis.
Electrically qualified person	A person who holds one or more of the following qualifications, or equivalent*, or greater. • UEE30811 – Certificate III in Electrotechnology Electrician • UET30619 – Certificate III in ESI – Power Systems – Distribution Overhead • UET30819 – Certificate III in ESI – Power Systems – Distribution Cable Jointing

Person	Description
	*Equivalence shall be determined by the Electrical Safety Manager.
Employee	An employee is a worker engaged by an employer (whether under a contract of employment or apprenticeship) and includes a contractor or sub-contractor, and a person employed by a contractor or sub-contractor, who carries out work for an employer.
Employer	An employer is a network operator or service provider, as the case may be, who engages an employee.
External parties	Ordinary persons, or persons who are accredited under the WorkCover NSW Code of Practice – Work Near Overhead Power Lines, who work near or in the vicinity of the Ausgrid electricity network under either: • the WorkCover NSW Code of Practice – Work Near Overhead Power Lines; or • the SafeWork NSW Guide – Work Near Underground Assets; for purposes other than the construction, commissioning, operation, or decommissioning, of the Ausgrid electricity network
Instructed persons	*ENA—A person who is adequately advised or supervised by an authorised person so they can avoid the dangers which electricity may create.* For the purpose of visual inspection only – an instructed person is deemed to be any unauthorised person who is under the direct supervision of an authorised person. For the purpose of work on, near, or in the vicinity of mains and apparatus (other than visual inspection as described above): • an instructed person is deemed to be a person providing specialist services, who are required to work on or near the network on a unique or infrequent basis. (e.g. apiarists removing bees from network assets, equipment specialists providing advice on apparatus such as transformer tap changers); and • an authorised person whose training has expired is not deemed to be an instructed person. As required by Clause 3.3.1, any instructed person must be under the direct supervision of an authorised person.
Limited operator	An operator who holds a Class 1hl or 1hs operating authority.
Network connections officer	An Ausgrid compliance officer, network connections co-ordinator, or network connections inspector.
Network operator	*ENA—means the owner, controller or operator of an electricity network.* Also known as an electricity supply authority.
Operator	An operator is a person authorised by Ausgrid to carry out operating work on the Ausgrid network. Operators may only carry out operating work within the limits of their operating authority.
Operator – mobile plant	A person who operates mobile plant.
Ordinary person	*ENA—means a person without sufficient training or experience to enable them to avoid the dangers which electrical apparatus may create.*
Recipient	A recipient is an appropriately authorised person who receives an Access Permit for work on or near, or testing of, mains and apparatus.

Person	Description
Restricted operator	An operator who holds a Class 2 or Class 5 operating authority.
Safety observer	*ENA—means a person competent for the task and specifically assigned the duty of observing and warning of unsafe approach to electrical apparatus or other hazards.* A safety observer's function is to witness the work being carried out to ensure the appropriate safety controls (precautions) are implemented and maintained. There are various types of safety observers such as: • safety observer for mobile plant; • safety observer for LV live work; • safety observer for HV live work; • safety observer for the application of reduced MSWD. Typically, a safety observer must be hazard and risk-aware, be able to warn about any approach to electrical apparatus, be trained to do rescue, and be able to stop the work if necessary.
Specially authorised	A person who is issued a special authorisation to receive Ausgrid Access Permits, for work near Ausgrid overhead mains and apparatus under the WorkCover Code of Practice "Work Near Overhead Power Lines". The special authorisation is limited to a specific location and timeframe. The specially authorised person must successfully complete training in Ausgrid Access Permit procedures prior to being issued a letter of authorisation. This letter must be shown to the operator issuing the Access Permit to prove that the person is authorised to receive the permit.

Stand-by person	A stand-by person is an Ausgrid employee who:
	• currently holds the following authorisations:
	  ▪ authorised to work on, near, or in the vicinity of mains and apparatus;
	  ▪ authorised to enter substations; and, if required
	  ▪ authorised to receive access permits (unrestricted);
	• may accompany instructed people into substations; and
	• may also be required to accept an Access Permit to enable work by instructed people (who must sign on to the Access Permit under 'Sign On').

Supervision	When considering the most appropriate level of supervision of workers, it is best to consider two (2) levels of supervision. **Direct supervision**—This means the personal supervision of a worker, at all times, on a close and continuous basis, within visual contact and audible to each other. **General/broad supervision**—This means the worker does not require constant oversight of specific tasks but requires personal contact with a qualified worker on a recurrent (periodic) basis when working on de-energised electrical mains and equipment and when performing non-electrical tasks. Periodic supervision means being under instruction and direction for tasks being performed with checks and tests being made prior to commissioning or energising of circuit(s) and apparatus/equipment.
Worker	An authorised or instructed person who is carrying out work on, near, or in the vicinity of Ausgrid mains and apparatus in accordance with these Rules.
Workgroup	A workgroup is a team of workers specifically instructed to complete one job at a single worksite (as defined on the Access Permit). All workers who form part of a workgroup can work under the direction of the same Access Permit recipient.

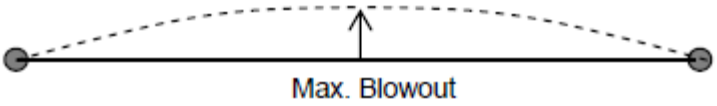
Person	Description
	Under most circumstances, a workgroup consists of only one classification or skill set and an Access Permit is issued for each workgroup. Where completion of a task requires two or more different classifications (or skills sets) and the permit recipient has the technical and practical ability to ensure the safety of the work being performed by all classifications, participating workers can be considered part of a single workgroup and only one Access Permit issued.

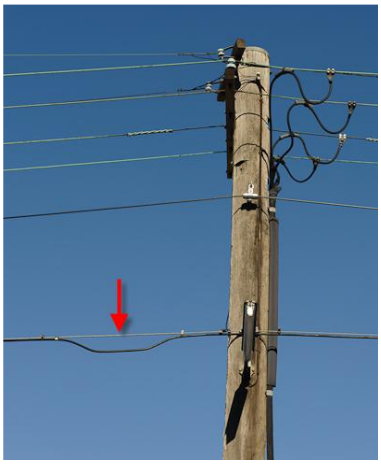
18 Glossary – General

Note: This glossary provides definitions of various terms and in no way replaces the descriptions and definitions described in these Rules. The purpose of this glossary is to explain or further describe the technical and unfamiliar words. Where there is any confusion between what is stated in the glossary and what is stated in these Rules, descriptions in these Rules prevail.

Energy Networks Association (ENA) generic definitions are included (where available) in italics.

Term	Description
Aerial Bundled Conductor/Cable (ABC)	ABC are overhead cables where multiple insulated conductors are in a bundled formation. Low voltage (LV) ABC consists of four insulated conductors. HV ABC consists of three insulated and screened phase conductors and a bare catenary wire. HV ABC is screened by either a metal or a non-metal screen.
Absolute limit of approach	An absolute limit of approach is the absolute minimum distance you must keep any part of your body (or anything you are holding) from an exposed live high voltage (HV) conductor when performing operating work or work which has been authorised in writing by an Ausgrid Group or Business Unit manager.
Access authority	A document that is used by another Network Operator that is equivalent to an Ausgrid Access Permit.
Access permit	Either, and/or both, an Ausgrid Access Permit for Work or an Ausgrid Access Permit for Test (see the definitions below).
Access Permit for Work	A pre-printed form which, when issued in accordance with these Rules, allows the recipient, and persons who sign onto the access permit, to work on or near exposed mains and apparatus in accordance with these Rules
Access Permit for Test	A pre-printed form which, when issued in accordance with these Rules, allows the recipient, and persons who sign onto the access permit, to work on or near, and/or apply hazardous test volts to, exposed mains and apparatus in accordance with these Rules.
Access permit earths	Access permit earths are earthing and short-circuiting equipment. They are used as one of the controls required to allow persons to work on or near exposed HV mains and apparatus. Access permit earths must be applied as required by these Rules. Access permit earths are not the same as working earths (see definition of working earths).
Alive	See live.
Approved	*ENA—means having appropriate organisation endorsement in writing for a specific function.* Approved means authorised in writing by an Ausgrid Group or Business Unit Manager (or their delegate) and recorded in relevant Ausgrid documentation.
Arc Thermal Performance Value (ATPV)	Informal: The arc rating of protective personal equipment (PPE) usually expressed in calories/cm^2. Formal: In arc testing, the incident energy on a material or a multi-layer system of materials that results in a 50% probability that sufficient heat transfer through the tested specimen is predicted to cause the onset of a second-degree skin burn injury based on the Stoll curve, without break-open.
Auxiliary circuit/supply (substations)	A low voltage circuit within a substation that provides low voltage supply to substation lighting and power outlets, or to substation apparatus, such as transformer fans, pumps, tap changers, or cubicle heaters.

Term	Description
Barrier	A temporary or permanent structure used to prevent access to live exposed conductors. A barrier is a physical structure that presents an obstacle to the electrical apparatus. The following conditions apply: • Unless the barrier is a screen manufactured from approved non-conductive materials, it must not be erected within MSWD (measured from live conductors) • Barriers must by erected and removed only by authorised persons.
Blowout	Blowout is the horizontal deviation in an overhead conductor position, from the centre line, due to wind forces. A line at the midpoint of each span (at right angles to the centreline) to a calculated catenary equation defines the maximum blowout for the span.  **Figure 100 - Estimating maximum blowout**
Bond *(verb)*	To form an electrical connection.
Bond *(noun)*	An electrical connection, and (for overhead mains) the non-tension section of conductors required to connect overhead spans.
Bulk Supply Point	Supplies power to Ausgrid's supply network and can be: • a power station • a substation • a switching station • a connection to a HV feeder which is owned by another authority.
Cable pit	A below-ground concrete or brick enclosure which contains underground cables.
Cage	A cage is a fully fenced or walled area, room, or compartment, within a substation, where: • workers are unable to maintain the relevant minimum safe working distances from exposed HV mains and apparatus as required by these Rules: or • the safety clearances required by Australian Standard AS 2067 are not achieved. **Kiosk Substations** A kiosk type substation with exposed HV conductors (such as exposed cables and connections) is not considered a cage. However, an Access Permit is required if work will be done on or near exposed HV conductors inside the kiosk.
Capacitor Voltage Transformers (CVT)	A capacitor voltage transformer (CVT), or capacitance coupled voltage transformer (CCVT) is a transformer used in power systems to step down HV and provide a LV for measurement or to operate a protection relay. A CVT uses capacitance (i.e. uses electrical forces to create voltage) rather than induction, which uses magnetic forces to induce voltage.

Term	Description
Catenary wire	A suspended wire, used to support a cable.  **Figure 101 - A catenary wire supporting a communications cable**
Clearance to Work	A pre-printed form, which is used to allow external parties to work near LV mains and apparatus under the WorkCover NSW Code of Practice "Work Near Overhead Power Lines", or the SafeWork NSW Guide – Work Near Underground Assets.
Close Approach Vegetation Control (CAVC)	Close Approach Vegetation Control (CAVC) refers to the control of vegetation where the vegetation clearance from overhead mains and apparatus is less than the clearances specified for Standard Vegetation Control but greater than the minimum vegetation clearance specified for Close Approach Vegetation Control. Refer to Section 10.5 for further information.
Commissioned	Commissioned means the mains and apparatus are installed, and perform, in accordance with the design intent as defined in the design documentation (i.e. ready for normal service).
Commissioning	Commissioning is the formal process of verifying and recording that installed mains and apparatus comply with, and perform in accordance with, the design intent as defined in the design documentation. Commissioning includes all relevant Factory Acceptance Tests (FAT), Site Acceptance Tests (SAT), energisation checks (e.g. phasing, "service voltage" tests, "soak" tests) and in-service checks.
Common point of isolation	A point of isolation that: • has isolated mains and apparatus on both sides of the point of isolation; and • forms a point of isolation for both sections of isolated mains and apparatus.
Conductor	*ENA - means a wire, cable, or form of metal designed for carrying electric current.* A conductor is any wire, bar, tube, or object that forms part of an electric circuit and can be energised.
Connectable	Connectable means physically capable of being made live - by closing a switch, inserting a fuse, or the making of bonds) or the new mains and apparatus being within minimum fixed clearances from commissioned exposed mains and apparatus. Once connectable, mains and apparatus form part of the network and must be shown on a system diagram.

Term	Description
Contestable work	Contestable work includes the design, construction, and installation of electricity works required to connect a customer's installation to an electricity network. Customers are required to fund the cost of contestable work, and they have the choice of selecting an accredited service provider (ASP) to carry out the work. The following work has also been declared contestable and can only be carried out by ASPs with Level 2 accreditation (see definition for ASP) who have obtained authorisation from Ausgrid specifically for each category of work involved: • disconnection and reconnection of a customer's installation at the point of supply • installation and connection of an underground service cable • installation and connection of an overhead service main • installation and connection of Rule compliant whole current metering and load control equipment on behalf of an Ausgrid responsible person • energising installations (with a total electrical load less than 100 amps per phase) prior to inspection by Ausgrid. The legislation relevant to contestable work is the NSW Electricity Supply (General) Regulation (2001). It is also described in Electrical Standard - Service Provider Authorisation (ES 4).
Covered conductors (HV)	HV covered conductors are overhead conductors that are covered by layer of non-conductive material that complies with relevant Australian or international standards. HV covered conductors are not covered by an earthed metal screen and are therefore not regarded as insulated.
Covered tools	Covered tools are hand tools that • have a coating of LV rated insulating material (to a relevant Australian or international standard); but • are not designed to allow the worker to maintain the relevant MSWD during use.  **Figure 102 - Examples of covered tools**
Danger tag	A tag made of non-conductive material that displays the words "DANGER" and "THIS APPARATUS MUST NOT BE OPERATED". There are two types of Danger Tags covered by these Rules – Operator Danger Tags (see Clause 8.2.3) and Personal Danger Tags (see Clause 8.2.4).
De-energised	*ENA - means not connected to any source of electrical supply but not necessarily isolated.* De-energised mains and apparatus are not isolated until action is taken to perform an isolation.

Term	Description
Direct distributor	Low voltage service conductors or consumer mains that: • supply an electrical installation with 200A per phase or greater; and • are connected directly to an Ausgrid substation.
Distributed Energy Resources	(Previously referred to as “embedded generation”). An electric energy source connected directly to a distribution network - not via a transmission network.
Distributor (LV network)	A low voltage circuit from a distribution substation to which customer electrical installations are connected, or intended to be connected.
Drone	A remotely piloted aircraft
Earth/earthed/ earthing	The terms earth/earthed/earthing refer to mains and apparatus electrically connected to the general mass of the earth by a conductor to ensure and maintain the effective dissipation of electrical energy.
Earth potential rise	Earth potential rise occurs when a large current flows to earth through an earth grid impedance. As a declining gradient, the potential is highest at the point where the current enters the ground. Earth potential rise is a concern in the design of electrical substations because the high potential may be a hazard to people or equipment. The potential gradient (drop of voltage with distance from source) may be so high that a person could be injured due to the voltage differential between two different points of contact.
Electric shock	The perceptible, and physical, effect of an electric current passing through the body of a human or animal.
Electrical station	An electrical station is any enclosed substation or switching station of the indoor, outdoor (including pole transformers), or underground type.
Embedded generation	**Note:** This term has been replaced in these Rules by the term ‘distributed energy resources’.
Energised	*ENA - means connected to a source of electrical supply.*
Enclosure	An enclosure is an area surrounded by a chain-wire or mesh fence (at least 1.2m high) containing HV mains and apparatus. These fences (when installed) restrict access to exposed HV mains and apparatus inside switchyards and substations. Minimum safe working distances can be maintained within an enclosure.  **Figure 103 - Enclosure in switchyard**

Term	Description
Equipotential bonding	Special purpose metal connections intended to bring exposed conductor parts or conductive parts to the same (or approximately the same) potential.  **Figure 104 – Earthing mat used to create equipotential bonding**
Equipping Permit	An Equipping Permit is a pre-printed form which details mains and apparatus that are intended to be connected to the Ausgrid electricity network. It allows installation or testing work on the mains and apparatus as detailed on the permit.
Exposed	*ENA - means an electrical conductor, approach to which is not prevented by a barrier of rigid material or by insulation which is adequate under a relevant Australian Standard specification for the voltage concerned.* A conductor is exposed if any barrier or insulation is not sufficient to achieve the requirements of Australian Standard AS 60529 ingress protection rating IP2X (i.e. allows access to hazardous parts with a 12mm “standard” finger). A conductor is effectively guarded when one of the following is used, and it is in good condition: • a fixed barrier • insulation • earthed metal barrier • earthed metallic or non-metallic screen • LV terminal shrouding. **Notes:** • Refer to Clause 9.1.2 for information on the effectiveness of insulation for LV mains and apparatus. • Refer to Clause 9.1.4 for information on the effectiveness of insulation for HV mains and apparatus.
Extra Low Voltage	Voltages not greater than 50V a.c. or 120V d.c.
Hazardous voltage	An electrical potential, greater than 60V dc or 25V ac, with the capacity to produce a current greater that 30mA a.c. or 100mA d.c. in the human body. (Refer to Australian Standard AS 60479 – Effect of Current on Human Beings and Livestock).

Term	Description
High-speed unit protection scheme(s)	See 'Unit Protection Scheme(s)'.
High Voltage	Voltages greater than 1000V a.c. or 1500V d.c.
Hoarding	Hoarding is a temporary barrier which is erected, when required, to prevent workers from inadvertently encroaching within the relevant MSWD from live exposed mains and apparatus.  **Figure 105 - Hoarding in use**
Induced voltage	Induced voltage is a voltage generated in a conductor when subjected to a moving magnetic field. Dangerous induced voltages (or transferred earth potential) may also occur (especially during fault conditions) in pilot cables, certain communication cables, out of service power cables, overhead conductors, cable sheaths, cross-bonding cables, and when the secondary of a current transformer is open-circuited.
Installation *(noun)*	An electrical installation as defined by the Service and Installation Rules of New South Wales.
Insulated	Insulated means separated from other conducting surfaces by a dielectric (non-conducting) substance permanently offering a high resistance to the passage of a current.
Insulated tools	An insulated tool is a tool which is: • Appropriately rated for the voltage of the exposed mains and apparatus on which it is to be used; and • Designed to allow the user to maintain the relevant Minimum Safe Work Distance during use. See Clause 6.9.1 for the requirements for their use.
Internal Arc Classification (IAC)	The classification of switchgear which achieves the performance criteria of IEC62271-200 to verify the effectiveness of the switchgear design in protecting persons in the event of an internal arcing fault.

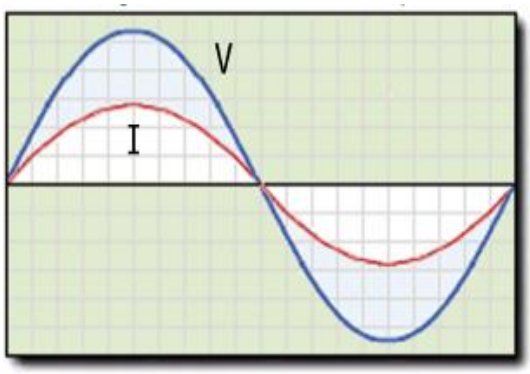
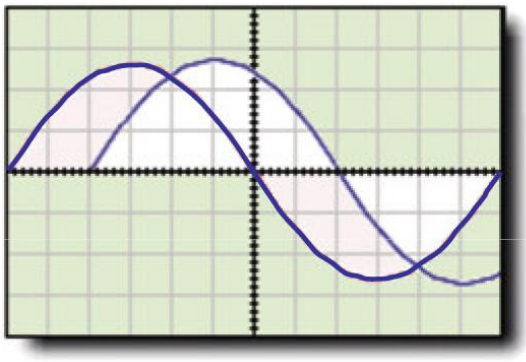
Term	Description

Isolate / isolated / isolation	*ENA - Isolated means disconnected from all possible sources of electricity supply by means which will prevent unintentional energisation of the apparatus and which is assessed as a suitable step in the process of making safe for access purposes.*
	Mains and apparatus are isolated if they are:
	• disconnected from sources of electrical energy by operating work such as:
	  ▪ opening switches; or
	  ▪ removing fuses, etc; and
	• and the following controls are implemented to prevent inadvertent re-energisation:
	  ▪ locking devices are applied (where the apparatus facilitates); and
	  ▪ danger tags are attached.

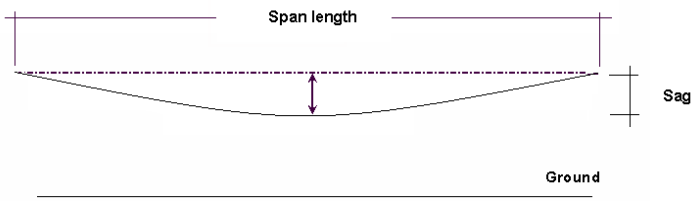
Isolation Folder	An isolation folder is a pre-printed envelope used to record isolation and earthing carried out by a Class 1 operator, to facilitate proving de-energised, earthing and short-circuiting, and the issue of Access Permit(s), by appropriately authorised restricted operator(s).
Live	Live (or alive) means energised or subject to hazardous induced or capacitive voltages.
Live work	Work, which is carried out by appropriately authorised persons utilising approved controls, on or near live exposed mains and apparatus. See Section 9.5 of these Rules for the controls required for LV live work. See the Ausgrid HV Live Work Manual for the controls required for HV live work.
Low Voltage	Voltages greater than 50V a.c or 120V d.c. but not greater than 1000V a.c. or 1500V d.c.
LV shorts	Short circuiting leads connected between all phases and the neutral conductor of a network distributor. LV shorts are designed to protect workers against the risk of shock arising from inadvertent back-feed from distributed energy resources with a capacity of up to 10kW per phase, by limiting the voltage rise.
Mains and apparatus	Electrical equipment, the conductors of which: • form part of the electricity supply network; and • are normally live or intended to be made live. Examples include, but are not limited to: • an overhead line • a cable • a generator • a transformer • switchgear • fuses and links. **Note:** For the purpose of the application of these Rules, the term ‘mains and apparatus’ is also to be interpreted as applying to conductors forming part of a customer installation, where the work on or near those conductors falls under the scope of these Rules as per Clause 1.1.2.
Minimum Safe Working Distances (MSWD)	Minimum safe working distances are the physical distances that a person, and any tools or equipment with which a person is in contact (other than insulated tools), must maintain from live exposed mains and apparatus. (See Clause 7.1.4).

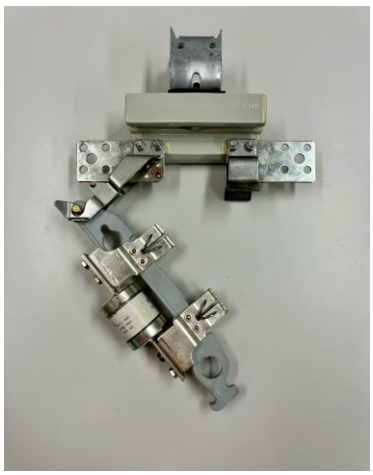
Term	Description
Must	*ENA - Is to be interpreted as mandatory*
Near	*ENA - means a situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming within the relevant safe approach distances.* Near means there is a reasonable possibility a part of your body, or any moveable object you might be wearing, touching, or carrying (which is not designed for safe use on live conductors of the same or higher voltage) may come closer to a live exposed conductor than the minimum safe working distance.
Network	*ENA - An electrical network means transmission and/or distribution systems consisting of electrical apparatus which are used to convey or control the conveyance of electricity between generators' points of connection and customers points of connection.* The network includes all the mains and apparatus used to distribute electricity. In these Rules, the network ends at the customer's point of connection, as defined in the Service and Installation Rules of New South Wales. The terms used to describe the parts of the network are: • transmission and sub-transmission network—all mains and apparatus energised at nominal voltages of 33kV and above • HV distribution network—all mains and apparatus energised at a nominal voltage above 1kV but less than 33kV • LV distribution network—all mains and apparatus energised at a nominal voltage above 50 volts, up to and including 1kV.
Nominal voltage	Nominal voltage is the typical voltage (excluding variations). It is the system voltage during normal operations.
Operating Agreement (written)	An Operating Agreement is a pre-printed form which is used as the written agreement between Ausgrid and another organisation, to confirm that the mains and apparatus specified on the Operating Agreement will remain isolated (and earthed and short-circuited if required) until the Operating Agreement is cancelled.
Operating agreement (verbal/electronic)	An agreement which is made verbally, or electronically, between the control rooms of two or more Electricity Network Operators (in accordance with the operating protocols of the organisations) to confirm that the mains and apparatus specified in the agreement will remain isolated (and earthed and short-circuited if required) until the agreement is verbally, or electronically, cancelled. Note: Operating protocols with other Electricity Network Operators may refer to a verbal operating agreement as a "verbal clearance".

Term	Description
Operating work	Work involving: • the operation of switches, the opening or closing of links, fuses, or other connections intended for ready removal or replacement; • proving electrical apparatus de-energised for access; • Access Permit earthing and/or short-circuiting; • enabling or disabling protection equipment and voltage regulation equipment; • locking and or tagging of electrical apparatus and erection of barriers and or signs; • issuing of Access Permit(s), Clearance to Work(s), Operating Agreements, and associated folders; • high voltage phasing; • commissioning electrical assets by switching; • operating transformer manual tap changers – provided MSWD from exposed HV conductors can be maintained.
Overhead line	*ENA – means any aerial conductor or conductors with associated supports, insulators and other apparatus erected, or in the course of erection, for the purpose of the conveyance of electrical energy.* Overhead lines do not include: • any supporting structures (e.g. pole) • conductors within the boundary of a substation.
Permanently disconnected	Permanently disconnected mains and apparatus were previously part of the network but cannot be energised by any operating work because of the absence of electrical connections to any source of supply and are outside minimum fixed clearances. Permanently disconnected mains and apparatus must not be intended to be reconnected for any immediate or proposed project. Permanently disconnected mains and apparatus must meet the following conditions: ▪ Overhead conductors (excluding those on steel lattice towers, or those forming street lighting circuits) require a bay to be removed from any source of supply and be suitably short circuited and earthed. ▪ Overhead conductors on steel lattice towers require the bolted bonds to be permanently removed from any source of supply and be suitably short circuited and earthed. ▪ Overhead street lighting conductors require bonds to be permanently removed. ▪ Underground conductors require that cables are cut away and ends short-circuited and sealed outside of minimum fixed clearances to any other exposed conductors. ▪ Substation apparatus requires all connections, other than control, automation, protection, and auxiliary circuits, to be removed from the apparatus.

Term	Description
Permit Folder	A Permit Folder is a pre-printed envelope which is used to: • record multiple Access Permits, Clearance to Works, or Operating Agreements, that are issued on the same mains and apparatus; and • record the number and location of all Access Permit earths; and • hold all relevant field operating papers (e.g. switching tags, link sheets). The purpose of a Permit Folder is to ensure: • all Access Permits, Clearance to Works, and Operating Agreements are cancelled; and • all Access Permit earths are removed; before the mains and apparatus are re-energised.
Permit Receptacle	A Permit Receptacle is an envelope (currently the Permit Folder) which is used to issue an Access Permit at a location other than the point of isolation where the Permit Folder is attached. Refer to Clause 5.11.7 for the requirements for the use of a Permit Receptacle.
Phase	One segment of a three-phase system, in which the three phases are displaced by 120 degrees.  **Figure 106 – Voltage (V) and current (I) in-phase** **Note:** When a load draws a current from an alternating supply, the load will have the same frequency as the supply voltage. When the voltage and current waveform pass through their zero values and increase to their peak values in the same direction and at the same instance in time, the current is regarded as being in phase with the voltage. (V = voltage and I = current).
Phase difference	The difference between two voltage waves in time.  **Figure 107 – Representation of phase difference**
Phasing	Phasing is a test to prove that energised conductors on each side of an open point are in phase and can be safely joined together.

Term	Description
Pick-up	Pick up is the minimum current that will operate a relay
Pilot cable	The term pilot cable may be applied to conductors that convey voltage or current signals from one point to another for comparison with other voltage or current signals as part of a protection scheme. Pilot cables may also be used to transfer switching signals from one point to another. While the terminal points of a pilot cable may be within an installation, they may also be in different installations that could be some distance apart. Pilots can include fibre optic cables that convey light converted from electrical information.
Pole Transformer (PT)	A pole transformer is a transformer mounted on a utility pole.
Pot head	A pot head is cable termination from multicore cable to overhead conductor or busbar.
Recloser	A pole-mounted circuit breaker with automatic reclosing function.
Regulation	When the word Regulation is used throughout these Rules, it means the NSW Electricity Supply (Safety and Network Management) Regulation 2014 and any regulation that subsequently amends or repeals the Regulation or any other State legislation that amends, repeals, or incorporates the requirements of the Regulation. These Rules (see definition) assist workers to comply with the requirements of the NSW Electricity Supply (Safety and Network Management) Regulation 2014 and Ausgrid's Electricity Network Safety Management System.
Remote cable cutting	Is a method of cutting an underground cable, where all workers are physically distant from the location of the cut. Remote cable cutting is used to prove underground cables are de-energised at the worksite.
Road crossing conductors	Overhead conductors that: • are connected between an Ausgrid (or joint use) pole which supports Ausgrid LV network distributor mains and an Ausgrid (or joint use) lead-in pole to which services are connected; and • cross, but do not run parallel to, a public road.
Rules	Rules means Ausgrid's Electrical Safety Rules.
Safe system of work	A safe system of work is characterised by an integrated, continually improved set of processes and procedures undertaken within a specified work context which together: • ensure that work tasks, work environments, processes and procedures are designed such that they are unlikely to result in physical or psychosocial harm to the relevant workers; • identify, eliminate (where possible) and control foreseeable risks to acceptable levels, to minimise the hazards and risks in workplace operations; • minimise harm when it occurs; • comply with consultation requirements of workers; and • facilitate return to work processes.

Term	Description
Sag	Sag is the vertical distance between the highest and lowest point of the curve of a conductor. The sag of the conductor varies depending on several factors, such as the tension, weight, and temperature of the line. If the sag is large (low tension), and the line becomes heavily loaded, the sag will further increase due to I^2R losses and may breach safety clearances. If the sag is too small (high tension), contraction in winter may breach safety clearances.  **Figure 108 – Vertical sag distance on a span of overhead conductor**
Screen – LV	A barrier of approved non-conductive material which is fitted over live exposed low voltage mains and apparatus to prevent inadvertent contact. Refer to Clause 6.6.1 for further information on LV screens.
Screen – earthed	A barrier of earthed conductive material, designed to prevent access to live exposed HV conductors. Refer to Clause 6.6.2 for further information on earthed screens.
Screen – cable	A conductive or semi-conductive layer surrounding the cores of an underground cable which is designed to be connected to earth.
Secondary systems	Circuits and equipment associated with network protection, automation, control, communications, or substation metering.
Should	*ENA – Is to be interpreted as advisory or discretionary.*
Single Wire Earth Return (SWER)	A SWER is a single-wire line for supplying single-phase electrical power from an electrical grid to remote areas at low cost. Its distinguishing feature is that the earth is used as the return path for the current to avoid the need for a second wire (or neutral wire) acting as a return path. It is principally used for rural electrification.
Spouts	Spouts are apertures (openings) which allow access to contacts connected to busbar and feeder connections. The contacts are insulated from the frame of the switchgear housing. Circuit breakers have six bushings with contacts that engage with the busbar and feeder contacts in the spouts, when the circuit breaker is racked into the housing. The main interrupting contacts are within the circuit breaker. When a circuit breaker is racked into position, contact is made between the busbar and feeder spout contacts. Interlocks prevent a circuit breaker being racked in or out while the main contacts are closed, because the main contacts must interrupt the flow of current. As a circuit breaker is racked out, shutters close to cover the spouts to stop inadvertent contact with the contacts. Likewise, this occurs when a circuit breaker is racked in and the shutters open.
Street lighting circuit	A low voltage circuit to which only street lighting luminaires are connected and to which a customer electrical installation is not intended to be connected.

Term	Description
Substation	*ENA - means a switchyard, terminal station or place at which high voltage supply is converted or transformed.* There are various types of substations on the Ausgrid network as set out below. **Chamber** – A substation that forms a room within, or a part of, a building. **Distribution** – A substation that converts HV supply to LV for supply to customers. These substations may be pole-mounted, kiosk, outdoor enclosure, chamber, or underground, type substations **Zone** – A substation that converts sub-transmission voltages (33kV & greater) to HV for distribution (generally 11kV). **Sub-transmission station (STS**) – A substation that converts sub-transmission voltages (33kV and greater) to HV for distribution (generally 11kV). For the purpose of the application of these Rules, unless otherwise specified, the word "substation" is to be interpreted as applying to all electrical stations - both substations (as defined by the ENA above) switching stations (see the definition of "switching station" below), and other areas where there are exposed HV conductors.
Sub-transmission	Relating to HV mains and apparatus at voltages 33kV or greater that transmit electricity supply.
Switch	A switch is a device designed and used to make or break an electric circuit.  **Figure 109 – Example of a switch – 132kV isolator**  **Figure 110 – Example of a switch – LV switch fuse**
Switchgear	Switchgear refers to a number of electrical disconnectors (e.g. HV and LV fuses and circuit breakers) used to de-energise and isolate equipment to allow work to be done, and also to clear faults by interrupting fault current and ensuring the arc is quenched. Typically, HV switchgear is a metal-enclosed structure with circuit breakers that are tripped manually or automatically when electrical protection schemes sense fault currents. Circuit breakers can be either electrically operated via a solenoid or spring operated. Circuit breakers use one of the following insulating and arc extinguishing methods: • oil circuit breakers • air circuit breakers • vacuum components • sulphur hexafluoride (SF_6).

Term	Description
Switching station	A switching station is an electrical station that does not contain transformers and operates only at a single voltage level. Switching stations are sometimes used as collection and/or distribution nodes for parallel circuits and may provide switching alternatives for back-up lines.
Switchyard	A large outdoor area, at ground level, identified by approved signage and surrounded by fences or walls that prevent unauthorised access. High voltage exposed conductors within the area must maintain standard design safety clearances.  **Figure 111 - An example of a switchyard**
Tail-ended transformer	A transformer with the primary winding connected directly to a HV cable, where the point of primary isolation of the transformer is remote from the substation (i.e. there is no point of primary isolation and/or earthing at the substation in which the transformer is located).
Tap/tapping	With regard to transformers, “tap” is the turns ratio setting of the transformer. (Most network transformers have multiple tap settings). With regard to conductors, the terms “taps” or “tappings” have historically been used in parts of Ausgrid to describe conductor connections. These Rules now use the term “bonds” to describe these conductor connections. (See “bond” *noun*).
Temporary insulating covers	Insulating covers which are applied to exposed mains and apparatus as part of approved live work procedures. See Clause 6.7.1 for the requirements for temporary insulating covers.
Transferred earth potential	Transferred earth potential refers to the voltage-to-earth of grounding systems that will appear on conductors as a result of the source system grounding electrode being above normal earth potential. The larger voltages are usually developed by ground fault currents returning to their source through earth. Transferred earth potential occurs most frequently if the grounding of a facility (or associated equipment within the facility) is less than adequate.

Term	Description
Transformer	A transformer is a device that transfers electrical energy from one voltage level to another, inductively, through magnetically coupled conductors (the transformer's windings). There are also transformers for special applications (such as current transformers and voltage transformers) that enable metering and/or measurement of conditions in high voltage circuits. (Refer to capacitor voltage transformer for an example of alternative transformer technology).
Unit protection scheme(s)	Unit protection schemes on feeders use communications between all ends of the feeder. When a fault is detected, unit protection schemes trip all ends of the feeder using those communications. (Usually, the communications are via fibre optic cables but may be by copper pilot cables). **High-speed** High-speed unit protection schemes typically operate with no time delay. Examples of high-speed unit protection schemes on feeders include: • Line Current Differential protection; and • Distance protection with intertrips **Not high-speed** Some unit type protection schemes have a delay between the time a fault is detected and the tripping of all feeder ends. These are not regarded as high-speed unit protection schemes. Examples of these types of schemes which are not high speed include: • Translay Pilot wire protection; and • Overcurrent type protection with intertrips.
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	*ENA - means a potential difference between conductors or between conductors and the general mass of earth.* There are three common types: • Extra LV is normally not more than 50V alternating current (ac) or 120V ripple free direct current (dc). • LV is normally more than 50V alternating current (ac) or 120V ripple free direct current (dc) but is not more than 1kV alternating current (ac) or 1500V direct current (dc). • HV is normally more than 1kV alternating current (ac) or 1500V direct current (dc).
Warning do not Operate (WDNO) Labels	WDNO labels are used to warn people that mains and apparatus must not be energised. See Clause 8.2.2 for the requirements for WDNO labels.
Working earths	Working earths are earthing and short-circuiting equipment which are applied to HV mains and apparatus in addition to access permit earths. They are applied by, or under the direction of, an access permit recipient to meet the requirements of these Rules.

Term	Description
Worksite	A worksite is the physical location of the mains and apparatus to be worked on or near, as defined on the relevant access permit for the work. There may be several locations of work within the one worksite.

19 Terminology

19.1 Abbreviations and Acronyms

This list includes abbreviations used in these Rules, as well as common abbreviations used in the transmission and distribution industry.

Abbreviation / Acronym	Description
//	parallel
ABC	aerial bundled conductor
ABS	air break switch
ac	alternating current
ACB	air circuit breaker
ADSS	all dielectric self-supporting (fibre optic cables)
AEMO	Australian energy market operator
AOp / ASO	area operator / assistant system operator
AP	access permit for work
APR	access permit recipient
APT	access permit for test
ASP	accredited service provider
ATPV	arc thermal performance value
Aux	auxiliary
BI	bus isolator
BSP	bulk supply point
Bus	busbar
CAVC	close approach vegetation control
Cap	capacitor
C/O	changeover
CB	circuit breaker
CBD	central business district
CCT	covered conductor - thick
CLC	customer load control
CONSAC	concentric outside neutral active core (LV cable type)
CTW	clearance to work
CT	current transformer
CVT	capacitive voltage transformer
DATT	data acquisition telecontrol and tele-indication
dc	direct current
Dist	distributor
DO or DOp	district operator
DOLF	HV drop-out link fuse (term used in the Hunter). See HDO.
DT	danger tag
EFI	earth fault indicator
ESO	electrical supply operative
E/Sw or ESw	earth switch

Abbreviation / Acronym	Description
EWP	elevating work platform
Fdr	feeder
FIU	frequency injection unit (associated with customer load control)
FLISR	fault location, isolation, and service restoration
FSw	fuse switch
GRN	government radio network
HDO	high voltage drop-out fuse
HV	high voltage
HVC	high voltage customer
HVLW	high voltage live work
IAC	internal arc classification
IDL	inter-distributor link
IDT	inter-distributor tee
isol	isolator
Jntr	cable jointer
kV	kilovolt (thousand volts)
LA	lightning arrester / surge diverter
LAR	large area restoration
LBS	load break switch
LDC	line drop compensation
LDT	locked and danger-tagged
LI	line isolator
LLC	live line clamp
LV	low voltage
LVCR	low voltage control room
LVF	low voltage fuse
LVL	low voltage link
LVLW	low voltage live work
LW	line worker
Maint.	maintenance
MDI	maximum demand indicator
MSB	main switch board
MSDS	no longer in use. Refer to SDS.
MSWD	minimum safe working distance
MWG	multi-skilled workgroup
NA	non-auto
NAR	network access request
NATA	National Association of Testing Authorities
N/C	normally closed
N/O	normally open
NOC	network outage co-ordinator (previously ‘Sydo’ in Sydney)
No.	number

Abbreviation / Acronym	Description
OA	operating agreement
OCB	oil circuit breaker
ODT	open and danger tagged
OH	overhead
OHM	overhead mains
OLDT	open, locked and danger tagged
OOS	out of service
OPGW	optical ground wire
ORDT	open, removed and danger tagged
P	pole
Pa	panel
PAC	protection, automation, and control
PE (cell or switch)	photo electric
PF	power factor
PPE	personal protective equipment
protn.	protection
PSN	public safety (radio) network
PT	pole transformer
PVC	polyvinyl chloride
PW	power worker (an electrically qualified worker authorised to work on or near the electricity network)
recl.	recloser
RAGCB	reclosing, automatic, gas-insulated, circuit breaker
RMCB	ring main circuit breaker
RMI	ring main isolator
RMU	ring main unit (consisting of ring main isolators and a fuse switch)
Rx	reactor
SAPS	stand-alone power systems
S/BY	stand-by
S/C	short circuit or sealing contactor (relay operations)
SAO	system alteration order
SCADA	supervisory control and data acquisition
SDS	safety data sheet. Formerly called a material safety data sheet (MSDS).
SE	sealed end (cable is terminated and is de-energised)
SEF	sensitive earth fault
SEL	sensitive earth leakage
SF_6	sulphur hexafluoride gas
SL	street light
SLCP	street light control point
SOp/SO	system operator
SPD	service protection device
SRR	switching request register
STS	sub-transmission substation

Abbreviation / Acronym	Description
Sub	substation
SW	switch
SWER	single wire earth return
tail-ended tx	tail-ended transformer
TC	tap changer
Trans mains	transmission mains
Tx	transformer
T/Con	technician substation construction
T/PE	technician protection
T/Tele	technician telecontrol
T/Trans	technician transmission
T/VR	technician voltage regulation
UG	underground
UGOH	underground to overhead (a pot head is also a UGOH)
U/S	unserviceable
USL	underslung link
VR	voltage regulator or voltage regulation
VT	voltage transformer
WDNO	warning do not operate
WHS	work health and safety
XLPE	cross-linked polyethylene

19.1.1 Ausgrid System Terminology

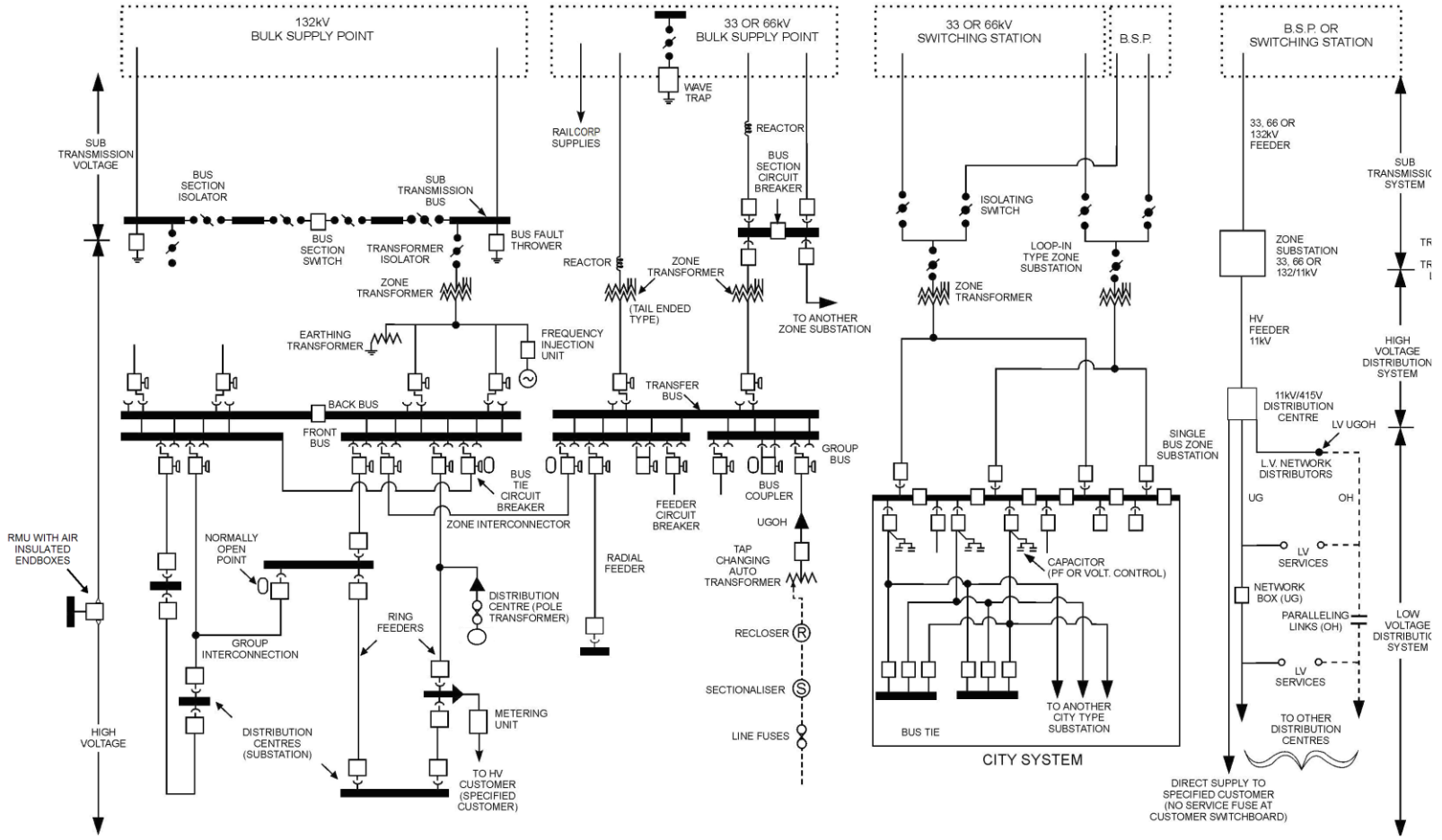


Figure 112 - Diagram showing appropriate usage of Ausgrid system terminologies
Note: System diagrams show UG as dotted lines and OH as solid lines. LV diagrams show OH as dotted lines and UG as solid lines.

20 References

This list includes references to documents included in the Rules and generally used in the transmission and distribution industry.

References
Ausgrid Electrical Standards • ES4 – Service Provider Authorisation
Ausgrid Network Standards • NS 130 – Laying Underground Cables up to and Including 11kV • NS 146 – Inspection Procedure for Working on Poles • NS 156 – Excavating Near Ausgrid Underground Cables or Conduits • NS 158 – Labelling of Mains and Apparatus • NS 165 – Safety Requirements for Non-Electrical Work in and around Live Substations • NS 195 – High Voltage Customer Connections • NS 196 – Mobile Generators • NS 220 – Overhead Design Manual • NS 222 – Major Substation Earthing Design • NS 223 – Low Voltage Short-Circuiting for De-energised Work • NS 282 – Service Testing
Ausgrid Technical Guides • T0003 – Cable Identification and Phasing • T0029 – Short Circuits for LV Distribution Networks • T0031 – Remote Cable Cutting Equipment • T0032 – Low Voltage Instruments • T0037 – Network Access and Security – Locks and Keys • T0052 – Confirming the Absence of AC Voltages on the Exposed Conductive Sheath or Armour of Low Voltage Network Cables • T0077 – Service Termination Boxes • T0089 – Electrical Temporary Insulating Covers and Screens • T0113 – Application of ISSC32 for Advice to Third Parties Working Near Overhead Powerlines • T0120 to T0125 – Low Voltage Live Work Manual (Books 1 - 5) • T0154 – Cutting Installed Underground PVC Conduit and Cover Strip • T0155 – Low Voltage Underground Cables – Degradation of Insulation • T0157 – Earth Potential Rise and Induced Voltage Hazards • T0158 - Labelling Guideline for Live Line, Operating, and Measuring Sticks • T0159 – Isolation at Switchboards
Ausgrid Distribution Guidelines • DG 180B – Application of Portable Earthing to Overhead Lines

References
Ausgrid Manuals • HV Live Work Manual • Low Voltage Live Work Manual (T0120 to T0125) • Drone Operations Manual
Ausgrid System Control documents • NSEC 007 – Submitting Network Access Requests
Operating procedures • Operating Advices (suite of documents)
Ausgrid company procedures/workplace instructions • Procedure HS000-P0038 – Amendment, Publication, and Communication of the Electrical Safety Rules • Procedure NW000-P0343 – Controlling the Movement of Overhead Conductors • Workplace Instruction NW000-W0244 – Restoration of Earth Connections
Australian Standards • AS/NZS 1418.10: Cranes, hoists and winches Part 10: Mobile elevating work platforms • AS 2225: Insulating gloves (superseded) • AS 2550.10: Cranes, hoists and winches - Safe use Part 10: Mobile elevating work platforms • AS/NZS 2978: Insulating mats for electrical purposes (superseded) • AS/NZS 3012: Electrical installations - Construction and demolition sites • AS/NZS 3675: Conductors—Covered overhead – For working voltages 6.35/11 (12)kV up to and including 19/33 (36)kV • AS 4202: Insulating covers for electrical purposes • AS/NZS 7000: Overhead line design – Detailed procedures • AS/NZS 60479: Effects of current on human beings and livestock • AS 60903: Live working – electrical insulating gloves • AS/NZS 61111: Live Working – electrical insulating mats
International Standards • IEC 60903: Insulating Gloves • IEC 61112: Live working – electrical insulating blankets • IEC 61140: Protection against electric shock • IEC 61229: Rigid protective covers for working on a.c. installations • IEC 61230: Live working – portable equipment for earthing or earthing and short circuiting • IEC 61243: Live working – voltage detectors • IEC 61479: Live working – Flexible conductor covers (line hoses) of insulating material

References
Energy Networks Association (ENA) • ENA DOC 001: National Electricity Network Safety Code • ENA DOC 003: National guidelines for safe access to electrical and mechanical apparatus • ENA DOC 023: Guidelines for safe vegetation management • ENA DOC 042: Manual reclose guidelines • ENA NENS 04: National guidelines for safe approach distances to electrical and mechanical devices • ENA NENS 09: National guidelines for the selection, use and maintenance of personal protective equipment for electrical hazards
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 the Management of Vegetation in the Vicinity of Electricity Assets (ISSC 3) • Guide to electrical workers' safety equipment (ISSC 14) • Guide to Electricity Workers' Escape & Rescue Procedures (ISSC 24) • Guide for Network Operators to Provide Information to the Construction Industry for Working Near Overhead Power Lines (ISSC 32) • Guide for working on, near, or in the vicinity of the apparatus of another Network Operator (ISSC37)
SafeWork NSW • Amenity Tree Industry - Code of Practice (WorkCover NSW) • Work Near Overhead Power Lines - Code of Practice (WorkCover NSW) • Work near underground assets – Guide