

Australian Standard[®]

High-voltage live working

Part 1: General



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 - Energy Networks Association
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-

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Australian Standard[®]

High-voltage live working

Part 1: General

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PREFACE

This Standard was prepared by the Standards Australia subcommittee EL-052-01 High-voltage Live Working for Committee EL-052, Electrical Energy Networks, Construction and Operation.

The objective of this Standard is to set out the minimum standards for high-voltage live working to ensure the safety of electrical workers and the public.

This Standard is the first of a four Part series as follows:

AS

- 5804.1 Part 1: General (this Standard)
- 5804.2 Part 2: Glove and barrier work
- 5804.3 Part 3: Stick work
- 5804.4 Part 4: Barehand work

The intention of having four separate Parts to the Standard is to highlight the different methods of live work.

Part 1 of this series is an integral part of each of the other parts of the series and is intended to be read first.

The subsequent parts of this series are not intended be read alone, but always in conjunction with Part 1.

This Standard has its origins in the documents of the former Electricity Supply Association of Australia (ESAA) documents; HB ESAA LLM 01—2000, *Guidelines for live line barehand work*, HB ESAA LLM 02—2000, *Guidelines for live line stick work*, HB ESAA LLM 03—2000, *Guidelines for live line glove and barrier work* and ESAA ND/NL 04—1995, *Guidelines for use of helicopters for live line work*. All but ESAA ND/NL 04—1995 are now published as Energy Networks Association (ENA) documents.

Over time, changes in Australian Standards, industry standards and legislative requirements, as well as technological advances and other factors relevant to the information contained in this document, may affect the accuracy of the information contained in this document. Accordingly, caution should be exercised in relation to the use of the information in this document.

The terms ‘normative’ and ‘informative’ are used to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

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STANDARDS AUSTRALIA

Australian Standard
High-voltage live working**Part 1: General**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out the minimum industry requirements for the high-voltage work methods for—

- (a) glove and barrier work;
- (b) stick work; and
- (c) barehand work.

These requirements may be enhanced or supplemented, provided the risk assessment process associated with the change does not result in reduced safety standards.

SPECIFIC WORK PRACTICES AND MAINTENANCE AND TESTING REQUIREMENTS ARE SET OUT IN PARTS 2, 3 AND 4 OF THIS STANDARD. PARTS 2, 3 AND 4 SHALL BE READ IN CONJUNCTION WITH THIS PART 1.

This Standard does not constitute a high-voltage live work manual, nor does it set down high-voltage live work procedures and techniques. All procedures and techniques are to be developed by the network operator or service provider in accordance with the requirements in this Standard.

For the purpose of this Standard, works such as the following are not considered as high-voltage live work and are excluded from this Standard:

- (i) Low voltage live work.
- (ii) High-voltage switching operations.
- (iii) Load and voltage readings and phasing identification.
- (iv) The measurement of distances to high-voltage conductors.
- (v) The safe removal of foreign objects on electrical apparatus where there is no risk of electrical flashover.

NOTE: List items (i) to (v) are not a conclusive list of operational work excluded from this Standard but represents the work traditionally undertaken by authorized power company workers.

This Standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.2 OBJECTIVES

The objectives of this Standard are to—

- (a) ensure that all live work is managed to achieve a high standard of safety for the live worker and the general public at the worksite;
- (b) achieve a high level of operational security for the electricity network;

- (c) specify the minimum standards required for high-voltage live work methods;
- (d) specify the minimum requirements of high-voltage live work equipment; and
- (e) identify additional reference information for the development and application of the high-voltage live work process.

Throughout this Standard reference to live worker unless specifically notified, shall refer to an authorized high-voltage live worker.

1.3 PRINCIPLES AND APPLICATION

While the principles of high-voltage live work contained in this Standard have been written around work on overhead lines, these principles may be equally applicable to work in other areas such as substation electrical apparatus, when combined with appropriate staff selection, training and work controls.

Network operators and service providers shall also comply with all other Standards, regulations, codes and guidelines related to high-voltage work.

Live work methods may be used to work on electrical apparatus that is de-energized or earthed, if all work is undertaken and all procedures are observed, as though the electrical apparatus is energized.

1.4 REFERENCED AND RELATED DOCUMENTS

See Appendix B for a list of documents referenced in this Standard and for a list of related documents.

1.5 LIVE WORK METHODS

1.5.1 General

High-voltage live work is a process in which a live worker safely performs work on energized high-voltage electrical apparatus.

Live work is done by three methods specified in Clauses 1.5.2, 1.5.3 and 1.5.4.

1.5.2 Glove and barrier method

A method of performing high-voltage live work based on the principle that the live worker always maintains a minimum of two independent levels of rated insulation to prevent phase-to-earth or phase-to-phase contact between the electrical apparatus being worked on and other adjacent potentials. The live worker operates at varying potential between the electrical apparatus being worked on and other electrical apparatus and earth potentials. Glove and sleeve insulation is applied between the live worker and the electrical apparatus being worked on and barrier insulation between the live worker and other potentials.

NOTE: See AS 5804.2 for full details.

1.5.3 Stick work method

A method of performing live high-voltage work based on the principle that the live worker always maintains a minimum approach distance (MAD) from any energized electrical apparatus while performing live work using insulated live work sticks. The live worker normally operates fully insulated from the electrical apparatus being worked on and can be at or near earth potential.

NOTE: See AS 5804.3 for full details.

1.5.4 Barehand method

A method of performing high-voltage live work based on the principle that a live worker can safely be in contact with energized electrical apparatus, while wearing conductive clothing for protection against the electric field and be fully insulated from any other object at a different potential. The live worker operates at electrical apparatus potential and insulated from all other potentials and earth.

NOTE: See AS 5804.4 for full details.

1.6 DEFINITIONS

For the purpose of this Standard, the definitions given below apply.

For additional information on related definitions and terminology, refer to the following Standards:

IEC 60050-651;

IEC 60743,;

IEEE 935; and

IEEE 516.

1.6.1 Acceptance test

A type of test made at the option of the purchaser.

1.6.2 Apparatus

See *Electrical apparatus*.

1.6.3 Approved

Having appropriate organizations endorsement in writing for a specific function.

1.6.4 Authorized person

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.

1.6.5 Bond

The connection of conductive objectives together to ensure that they are at the same electrical potential.

1.6.6 Brush contact

Momentary accidental or inadvertent contact.

1.6.7 Competent

Means having the training, skills, knowledge and attributes a person needs to complete a task.

1.6.8 Conductive clothing

Clothing made of natural or synthetic material with integral interwoven conductive fibres used to provide electrical continuity between all parts of the clothing and to reduce the effect of the electric field on the worker.

1.6.9 Contact area

The area within one metre of the nearest energized high-voltage conductor or component whilst carrying out glove and barrier work.

1.6.10 De-energized

Disconnected from all sources of supply but not necessarily isolated, tested and earthed.

1.6.11 Design test

Type of test made on a sample treated as representative of an industrial product. These tests will not generally be repeated in quantity production

1.6.12 Disruptive discharge

Passage of an arc following dielectric breakdown [IEV 651-01-18].

NOTE: The term 'sparkover' is used when a disruptive discharge occurs in a gaseous or liquid dielectric.

The term 'flashover' is used when a disruptive discharge occurs over the surface of a solid dielectric surrounded by a gaseous or liquid medium.

The term 'puncture' is used when a disruptive discharge occurs through a solid dielectric.

1.6.13 Earthed

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

1.6.14 Elastomer

Elastomer macromolecular material which returns rapidly to its initial dimensions and shape after substantial deformation by a weak stress and release of the stress. [IEV 212-04-05].

NOTE: The definition applies to room temperature test conditions.

1.6.15 Electrical apparatus

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

1.6.16 Electrical distance (electrical factor)

The distance in air required to prevent with a probability considered as negligible a disruptive discharge between energized parts and/or between energized parts and earthed parts during live working [IEV 651-01-21].

NOTE: The probability is considered as negligible as far as the safety is not compromised. The safety is defined as freedom from unacceptable risk of harm.

1.6.17 Electrical hazard

Potential source of harm when electric energy is present in an electrical installation [IEV 651-01-30].

1.6.18 Electricity network

Transmission and 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.

1.6.19 Elevated work box (EWB)

A work platform suspended by a crane.

1.6.20 Energized

At a potential significantly different from that of earth at the worksite and which presents an electrical hazard [IEV 651-01-14].

NOTE: A part is energized when it is electrically connected to a source of electric energy. It can also be energized when it is electrically charged under the influence of an electric or magnetic field.

1.6.21 Ergonomic distance

Distance to take into account inadvertent movement and errors in judgement of distances while performing work [IEV 651-01-22 MOD].

1.6.22 Full body harness

Harness comprising straps, fittings, buckles or other elements, suitably arranged and assembled to support the whole body of a person and to restrain the wearer during a fall and after the arrest of a fall.

1.6.23 High-voltage

Voltage exceeding 1000 V a.c. or exceeding 1500 V d.c.

1.6.24 Hydrophobic

Low level of wettability by water of a surface. A hydrophobic surface is water-repellent and results in water beading on the surface of the insulation.

1.6.25 Insulated

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

1.6.26 Insulated temporary jumper

Devices designed and used to keep electrical circuits effectively continuous for short periods of time at the work location. The bypass jumpers are insulated to protect personnel from brush or accidental contact, except the portions of these devices (clamps and ferrules) which are not insulated and therefore offer no protection.

1.6.27 Insulating

Made essentially or totally from insulating material.

1.6.28 Insulating barrier (cover-up equipment)

A barrier of insulating material specifically designed, approved and tested for use as a line cover, insulator cover, cut-out cover, crossarm cover, dead-end cover or as a cover for similar live work equipment. Insulating barriers can be rigid or flexible and are intended to provide electrical protection for the live worker, plant and attached loads should accidental brush contact with live components occur.

1.6.29 Insulating basket liner

An insulating liner that is installed into an EWP basket (see Clause 1.6.31) to provide additional insulation for live workers performing the glove and barrier method.

1.6.30 Insulating blanket

Flexible sheet made of elastomer or plastic material used to cover conductors, or electrical apparatus, which are energized, de-energized or earthed.

1.6.31 Insulating elevating work platform (EWP)

An aerial device incorporating insulation approved and electrically and mechanically rated and tested.

1.6.32 Insulating gloves and sleeves

Gloves and sleeves specifically designed, approved and tested to a rated voltage.

1.6.33 Insulating ladder

Ladder made of insulating material.

1.6.34 Insulating platform

A platform of insulating material specifically designed, approved and tested for use with the appropriate live high-voltage work method.

1.6.35 Insulating positioning tower

A structure of insulating material that is used under live work conditions to access energized electrical apparatus. This structure can be either fixed or mobile.

1.6.36 Insulating rope

Synthetic rope designed, manufactured, tested and maintained to ensure appropriate insulating qualities and intended to come within the electrical distance.

1.6.37 Insulating tool

Tool made essentially or totally from insulating material [IEV 651-01-26].

1.6.38 Insulating tubes and rods

Fibreglass-reinforced plastic (FRP) products manufactured using processes to ensure that the tubes and rods produced will meet the electrical and mechanical tests prescribed in this Standard.

1.6.39 Insulation

A non-conducting substance, which provides resistance to the passage of current, or to disruptive charges through or over the surface of the substance at the operating voltage, and to mitigate the danger of shock or injurious leakage of current.

1.6.40 Insulator tester

Portable device used to verify the electrical integrity of an insulator or an insulator string.

1.6.41 Live (alive)

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

1.6.42 Live work (live line work)

High-voltage work performed under a live work permit on or near components of electrical apparatus energized or capable of being energized to high-voltage without implementing the full protective practice of isolating, proving de-energized and earthing.

1.6.43 Live worker

A certificated person who has demonstrated competency in performing live high-voltage work and who is authorized to undertake this work.

1.6.44 Live work equipment

All tools and equipment approved and used for high-voltage live work.

1.6.45 Live work permit

A permit, issued by the network operator, to verify to a live work party that the control measures are in place on the circuit being worked on, and to authorize the work.

1.6.46 Live work rope

Synthetic rope, which is not placed within the electrical distance, and is known to have good insulating properties and is stored in a clean and dry environment to maintain this condition. This rope is not tested.

1.6.47 Live work stick (also called hot stick)

A solid or filled stick of insulating material specially designed, approved and tested for use in physically bridging the distance between the live workers and energized electrical apparatus, between the energized electrical apparatus and earth, between adjacent phases and to enable physical loads to be taken or tools to be applied.

1.6.48 Method

A fundamental technology for undertaking live work. The three methods are barehand, stick and glove and barrier.

1.6.49 Minimum approach distance (MAD)

The minimum approach distance (MAD) is the minimum air gap or summation of gaps measured between any part of the live worker and live electrical apparatus to prevent flashover and provide for worker safety.

1.6.50 Mobile plant

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

1.6.51 Near

A situation where there is a reasonable possibility of a person, either directly or through any conducting medium, coming within the relevant safe approach distances.

1.6.52 Network operator

The controller or operator of an electricity network.

1.6.53 Periodic test

A type of test made regularly on tools and equipment.

1.6.54 Personal protective equipment (PPE)

Any clothing, device, or appliance designed to be worn or held by an individual for protection against hazards [IEV 651-07-01].

1.6.55 Procedure

A collection of techniques that together enables the total job outcome to be completed.

1.6.56 Rated value

Value of a quantity used for specification purposes, established for a specified set of operating conditions of a component, device, equipment, or system [IEV 151-16-08].

1.6.57 Registered training organization (RTO)

An organization that meets the Australian Quality Training Framework Essential Standards for Registration and which allows them to deliver nationally recognized vocational education and training; they include TAFEs, private training providers and enterprises.

1.6.58 Rod

Solid rod which can be reinforced, constructed or formed from synthetic insulating material [IEV 651-02-04].

1.6.59 Rope tester

Portable device used to verify the insulation integrity of ropes used in live working.

1.6.60 Safety observer

An authorized person competent for the task and specifically assigned the duty of observing and warning against unsafe approach to electrical apparatus, or other unsafe conditions.

1.6.61 Secondary point of contact

All electrical apparatus or earth structures operating at different potentials to the primary point of contact under the glove and barrier method.

1.6.62 Self extinguishing

Relates to a property of a plastic material compounded so as to cease combustion on removal of the source that caused ignition.

1.6.63 Service provider

An organization responsible for undertaking live work.

1.6.64 Shall

Indicates that a statement is mandatory.

1.6.65 Should

Indicates a recommendation.

1.6.66 Single wire earth return (SWER)

An electrical distribution system based on single wire delivery and using the earth for return currents.

1.6.67 Support stick

Live work stick used to hold or move conductors and other electrical apparatus [IEV 651-12-12].

1.6.68 Technique

A documented fundamental live work skill or competency that enables a specific task to be completed.

1.6.69 Tube

Tube composed of synthetic insulating material, normally reinforced, the interior of which can be foam filled [IEV 651-02-05].

1.6.70 1.6.69 Universal stick (hand stick)

A live work stick manipulated by hand, used to operate on live parts at a distance [IEV 651-02-07].

1.6.71 Varying potential

A state of electrical potential of the live worker that varies in magnitude between the potential of the apparatus being worked upon, adjacent potentials and earth and is determined by their location in relation to each potential.

1.6.72 Visual inspection

A visual check made to detect defects.

1.6.73 Voltage detector

Portable device used to detect reliably the presence or the absence of the operating voltage and used to verify that the installation is ready for earthing [IEV 651-10-04].

NOTE: These devices are generally described as either capacitive types or resistive types.

1.7 RESPONSIBILITIES

1.7.1 General

All parties involved with the live work process have defined responsibilities for its safe application. This Clause outlines the minimum responsibilities.

1.7.2 Responsibilities of the network operator or service provider

The network operator or service provider undertaking live work shall meet all the requirements of this Standard, which include the following:

- (a) The selection, training and appointment of certificated and competent staff.
- (b) The preparation and review of live work manuals.
- (c) The development and auditing of a risk management process.
- (d) The provision of specific equipment designed and rated for live work.
- (e) Make available a live work manual to all live work personnel.
- (f) Have in place an effective process to regularly monitor and review all aspects of live work.
- (g) Have in place an effective process to inspect the field performance of live work. This inspection shall address safe work practices and conformance with documented techniques at intervals not exceeding 12 months.
- (h) Establish a process for the initial assessment of live workers' health to ensure their capability of safely performing their role.
- (i) Establish a process for the inspection, maintenance and testing for live work equipment.

1.7.3 Responsibilities of the person in charge of work on-site

At all live worksites, one person in the work party should be designated as the controller for that job and have the responsibility for the following:

- (a) Safely manage and supervise the working team.
- (b) Ensure individual members of the work party are authorized high-voltage live workers and have been allocated to all the various tasks required by the live work procedure including the role of the safety observer.
- (c) Ensure that all live work equipment that is to be used is within test date and is suitable for the work being performed.
- (d) Ensure a communication link with the system controller is available.
- (e) Run a worksite briefing at the start of the work.
- (f) Ensure a live permit or authority has been issued from the system controller prior to work commencing and is surrendered at the completion of the work.
- (g) Run a worksite debriefing to ensure that all difficulties encountered during the work are identified, at the completion of the work.

NOTE: This person may undertake any of the roles required by the Standard. However, if undertaking the role of the safety observer, they shall be free to assume the duties as detailed in Clause 1.7.4.

1.7.4 Safety observers

One member of the work team shall be designated as the safety observer. The safety observer's role is to observe the work, without any distraction, and alert the work team to any potentially unsafe actions or lack of compliance with approved work documentation. The safety observer has the authority to suspend work temporarily when an unsafe situation occurs.

NOTE: See Clause 5.8 for full details.

1.7.5 Team members

During all live work, all team members shall—

- (a) work in safe manner in accordance with this Standard and live work manuals;
- (b) monitor the actions of other team members for unsafe work practices;
- (c) maintain effective communication with the work team; and
- (d) have the authority to temporarily suspend the work at any time due to unsafe actions or lack of compliance with approved work procedures.

SECTION 2 RISK ASSESSMENT

2.1 GENERAL

When establishing a live work process, a formal risk assessment shall be carried out complying with AS/NZS ISO 31000:2009.

The risk assessment should identify and consider potential hazards, the risks associated with those hazards, the potential circumstances under which the risks could arise, the consequences of the risks, and the control measures that can be applied.

The purpose of the risk assessment is to ensure that live work is performed such that the overall level of risk is as low as reasonably practicable, particularly risks associated with the safety of persons.

2.2 PRE-JOB HAZARD AND RISK ASSESSMENT

Before commencing work, an on-site team discussion shall be carried out to address hazard management and work practices to—

- (a) identify hazards;
- (b) assess risks that may result because of the hazards;
- (c) decide on control measures to prevent, or minimize the level of the risks;
- (d) implement and record control measures; and
- (e) monitor and review.

Particular attention shall be given to, but not limited to—

- (i) why the work is to be done;
- (ii) what is to be accomplished;
- (iii) a discussion of how the work is to be carried out and who will do it;
- (iv) consideration of the positioning of the worker in relation to possible body movement, reach and ergonomic allowances;
- (v) the integrity of the structure, equipment, conductors etc, on which work is to be carried out;
- (vi) the integrity of the adjacent structures, equipment and spans;
- (vii) the integrity of insulation in the immediate work area;
- (viii) clearances to potential midspan hazards, particularly where conductors are to be moved during the work;
- (ix) the establishment of conductor loads and tensions;
- (x) the equipment to be used;
- (xi) site terrain conditions (stability of equipment and footing);
- (xii) livestock management (interference with the work);
- (xiii) traffic management;
- (xiv) public safety;
- (xv) potential weather conditions during the work;

- (xvi) the need to increase the ergonomic distance due to prevailing adverse site conditions;
- (xvii) the electrical protection system and the need to minimize the electrical and mechanical consequences of an electrical fault; and
- (xviii) other crews working on the same equipment, but at a different location.

If defects or hazards that are likely to cause shock or injury to persons and damage to property are identified or found during the pre-job assessment stage, the work shall not proceed until the defect or hazard has been remedied.

2.3 KNOWN HAZARDS

Where the network operator is aware of existing hazards on the network, they shall communicate this to all relevant parties.

SECTION 3 LIVE WORK PERSONNEL

3.1 SELECTION CRITERIA

The network operator or service provider shall establish a policy on the minimum acceptable standards required prior to acceptance of a live worker as a trainee in a live work method. This policy shall include the following minimum requirements:

- (a) Certificate of competency in the work currently being performed.
- (b) Demonstrated skills, knowledge and experience in relevant construction and maintenance work.
- (c) Demonstrated physical capability of performing the role.
- (d) Demonstrated personal attributes such as responsibility, maturity, concentration and the ability to work in a team on an ongoing basis.
- (e) A demonstrated commitment to comply with rules and procedures and the ability to concentrate on critical tasks.
- (f) Demonstrated safe working behaviour.

The requirements of this Clause shall also apply to the employment of live workers from other network operators or service providers.

3.2 MEDICAL ASSESSMENT

3.2.1 General

The good health of a live worker is essential to the safe operation of the live work process. The minimum requirements for health should be established as part of the live work process and live workers should meet these requirements both on appointment and while employed as a live worker.

Particular emphasis should be placed on current general physical condition, relative to the work requirements, taking into account normal physical and musculoskeletal functions, cardiovascular and respiratory systems and the functions of the senses necessary to carry out the work.

3.2.2 Initial medical assessment

Prior to employment or training as a live worker, a medical assessment shall be carried out by a qualified medical practitioner to check that the live worker can physically meet the requirements to carry out the intended work, and has no medical history or medical condition which could affect the safety of the live worker or the work team.

3.2.3 Ongoing regular medical assessment

Network operators or service providers should arrange routine medical assessments of their staff to ensure their continuing medical capability to perform their role safely.

3.3 WORKPLACE HEALTH ISSUES

Network operators or service providers shall have in place processes that address issues that may affect the physical or mental ability of the live workers to safely perform their work. This includes, but is not limited to, environmental conditions such as extreme heat, humidity, cold and work fatigue.

3.4 INITIAL TRAINING AND COMPETENCY ASSESSMENT

3.4.1 Training and assessment

Live workers undergoing live work training shall be monitored during the training program to assess their suitability for live work. This assessment shall include their understanding of the work process, their physical ability to perform work process and their responsibility, maturity, concentration and the ability to work in a team. Any live worker not meeting these requirements shall be withdrawn from training.

All training shall be carried out under the supervision of a trainer who holds a Certificate IV in Workplace Training and Assessment who is engaged by a registered training organization and is competent to deliver the module being taught.

The employee's company shall keep adequate records of training undertaken by each live worker.

The training shall provide the following:

- (a) Training to a recognized national live work training syllabus.
- (b) A thorough understanding of the principles of the live work methods and a comprehensive practical program.
- (c) Knowledge of the use and maintenance of all tools and equipment.
- (d) The practising of the required techniques on earthed or not electrically connected apparatus.
- (e) The practising of the required techniques by their application on energized apparatus.
- (f) Access to a live work manual.

On satisfactory completion of the training, the registered training provider shall issue a statement of attainment to each live worker in conformance with the requirements of the National Training Package for Transmission and Distribution (Powerline).

It is recommended that the trainee on completion of the initial training, work with experienced live workers to consolidate their training and gain experience.

3.4.2 Competency assessment

Network operators/service providers shall monitor the performance of the live worker by conducting a field assessment at least annually in accordance with Section 12 of this Standard.

Field assessments shall assess demonstrated skills and competencies against documented live work techniques and an understanding of the principles associated with live work, tools and equipments.

Field assessments shall be conducted by a person—

- (a) authorized by the network operator/service provider for live work assessment;
- (b) authorized in the technique that is being observed or audited and having comprehensive understanding and experience of the techniques being inspected;
- (c) accredited work place assessor; and
- (d) independent of the work party.

The field assessment can be performed conjointly when conducting the infield audits if the person performing this role meets both requirements.

3.4.3 Refresher training

Refresher training shall be conducted on live work principles, concepts and techniques/procedures of the method when —

- (a) techniques are found to be deficient; or
- (b) a live worker has not performed live work in a specific competency in the last twelve months.

3.5 PERSONS WORKING IN ASSOCIATION WITH LIVE WORK CREWS

Persons working with live work crews shall have an understanding of the live work techniques and be instructed in the live work task at hand.

Where plant operators do not have a formal appreciation of live work, operators shall be instructed on the procedure and safe working distances to be used prior to the commencement of work.

Plant operators with a formal appreciation of the live work should undergo annual assessment or refresher training.

Plant operators shall be directed by a nominated member of the live work team at all times.

SECTION 4 WORK DOCUMENTATION

4.1 GENERAL

To ensure its safe performance, the live work process shall be documented and effectively communicated to all staff involved.

4.2 WORK PROCEDURES AND TECHNIQUES

Work procedures and techniques shall be developed and documented for each live work outcome. These procedures and techniques shall be proven in a trial on disconnected or de-energized and earthed electrical apparatus to verify that they can be carried out reliably, safely and validated through a risk management process.

4.3 DOCUMENTATION

4.3.1 General

Documentation clearly setting out the basic steps shall be provided for each approved work technique or procedure and should—

- (a) clearly identify the work objectives or desired work outcome;
- (b) be part of a suitable document management system;
- (c) state the minimum number of live workers required;
- (d) identify relevant risk control measures; and
- (e) identify the key equipment required.

4.3.2 Live work manual

A live work manual shall be made available to each live worker and shall be available on the worksite. The manual can be either in an electronic or hard copy form.

The network operator or service provider shall ensure that their manual contains all the necessary information to enable their live workers to perform safely the task required.

The manual shall be part of a formal document management system.

This manual shall contain at least the following:

- (a) A description of safe live work principles and requirements.
- (b) A description of each live work tool, its functions, its uses and the determination of its safe working load.
- (c) A description of the various forms of insulation, their function, uses and rating.
- (d) Instructions on—
 - (i) daily checks;
 - (ii) inspections and risk management;
 - (iii) caring for the tools and equipment;
 - (iv) maintenance instructions;
 - (v) testing requirements for plant and equipment;
 - (vi) guidelines for the calculation or assessment of conductor loads;
 - (vii) a set of approved live work techniques or procedures;
 - (viii) incident or accident as defined in Clause 5.17; and
 - (ix) record keeping.

4.3.3 Live work permit

A work permit is required to establish approval for each live work job. The method of approval may be verbal exchange, hard copy or by electronic means.

For planned high-voltage, live work a request shall be made to the network operator. This shall indicate the day and time of work, crew contact details, work position and location of the work and the electrical apparatus to be worked on. This will allow the network operator to configure the system to reduce outage risks and select the most suitable protection configuration for the workers.

Before the live work permit is issued all the appropriate protection issues shall be identified and acted on. (See Clause 5.13.)

The live work permit shall be cancelled on completion of the work.

The procedure for the issue and cancellation of live work permits shall be documented. The procedure shall include a description of, and location where, the work will be carried out.

Where more than one work team is working on the same circuit but at different locations, the procedure shall ensure that all teams have cancelled their live work permits before the auto-reclose equipment is returned to normal.

4.3.4 Approved work documentation

Approved work documentation shall not be changed or disregarded on-site except as otherwise provided for in Clause 4.3.5.

4.3.5 Minor changes to work procedure on-site

Minor changes to a work procedure may be required from time to time, such as changes to tooling to fit dimensional variations on structure components. Such changes shall not compromise tool insulation, air gap distances, safe working loads or safety outcomes in any way.

Such changes shall be agreed by the entire team and documented in the risk assessment process.

4.4 RECORDS

Records and documentation are an essential part of the live work process. Training, electrical and mechanical testing (when done), live work permits and risk assessment process records are considered necessary for safety and shall be kept as formal records.

SECTION 5 SAFE WORKING PRINCIPLES

5.1 GENERAL

To ensure the safe performance of live work, the safe working principles in this Section shall be followed and no other activity that could compromise the safety of the work team shall be carried out.

5.2 WORK ON ADJACENT STRUCTURES AND SPANS

No work shall be undertaken on structures, spans or electrical apparatus adjacent to where live work is being performed (unless a coordinated live work task.)

The integrity of adjacent spans and electrical apparatus shall be checked prior to work commencing to ensure the safety of the worksite.

5.3 COMBINATION LIVE WORK AND ACCESS AUTHORITY WORK

Live work and work under an access authority shall only be conducted on the same structure providing that—

- (a) the two work methods are not undertaken simultaneously;
- (b) clear transition points shall exist between the live work and access authority work. This transition process shall be communicated to all the work party;
- (c) live work personnel who are required to work aloft and have signed on an access authority sign off the access authority before ascending to perform live work. For the access authority to remain current (open), the recipient in charge shall remain signed on the permit and shall remain on the ground;
- (d) all conductors that have been moved or repositioned are secured using the appropriate techniques and equipment; and
- (e) live work minimum approach distances are established and maintained using live work methods or equipment between the live circuit and access authority area.

If live work is undertaken on a circuit above or below a circuit under access authority and not on the same structure as the live work, isolation shall be established on that circuit between the work parties performing the access authority work and the live work.

5.4 INTEGRITY OF INSULATION

The safety and security of a live worker depends on the insulating properties of insulating materials and air. The integrity of the insulation shall be maintained at all times.

The voltage of the network at the worksite shall be clearly identified before work commences.

The crew are usually only permitted to work on one phase at a time to maintain correct insulation levels. Any exceptions to this principle are to be clearly documented in the live work manual.

NOTE: See Section 6 for full details on insulation.