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Corporate Standard

Electrical Safety (PTW Version)

HB# 560790

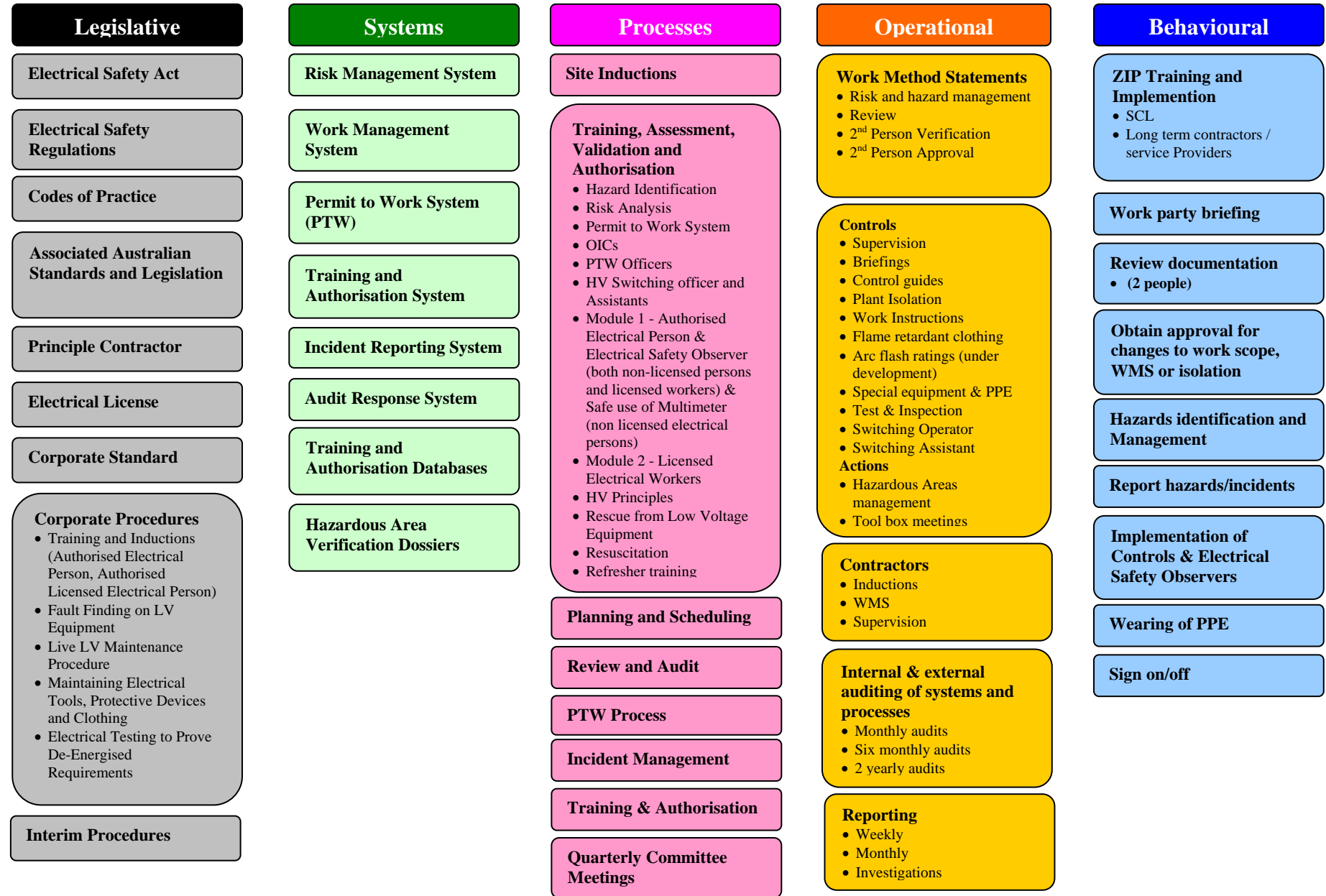
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Functional Flowchart



Objective

To provide a corporate standard that clearly outlines SCL's procedure for managing hazards relating to the performance of electrical work, live electrical work and the competency requirements of those personnel supervising, performing and acting as observers with respect to electrical work activities.

Scope

All electrical work activities performed at an SCL operated and/or maintained site.

Note: Precedence in this document has been given to whichever State legislation is superior on a subject or issue.

Definitions

Authorisation Zone: The documented zone in which an authorised electrical person or instructed person may operate a crane or operating plant to have direct contact with an insulated low voltage line. An Electrical Safety Observer is required for this task.

Authorised Electrical Person: A person with the knowledge and skills enabling that person to perform work on or near a low voltage exposed live part. Authorised Electrical Persons must successfully complete and be current in the following training modules: HS073 Authorised Electrical Persons and Electrical Safety Observers, HS069 Rescue from Low Voltage Equipment and HS026 Resuscitation.

Authorised Licensed Electrical Worker: A person who is the holder of a Queensland electrical workers license (or equivalent). Authorised Licensed Electrical Workers must successfully complete and be current in the following training modules: HS073 Authorised Electrical Persons and Electrical Safety Observers, HS074 Specific Requirements for Electrical Work, HS069 Rescue from Low Voltage Equipment and Resuscitation.

Competent: Having acquired the knowledge and skills enabling that person to perform the task required, in a safe and effective manner.

Construction work: work to erect, construct, extend, alter, convert, fit out, commission, renovate, repair, refurbish, disassemble or decommission a structure or part of a structure; or
(a) work connected with site preparation, excavation and landscaping for work mentioned in paragraph (a); or
(b) the assembly or installation of prefabricated components to form a structure, or part of a structure, for work mentioned in paragraph (a); or
(c) the disassembly of prefabricated components for work mentioned in paragraph (a) that, immediately before the disassembly, formed a structure or part of a structure; or
(d) a prescribed activity that is asbestos removal work or demolition work.

Dangerous Electrical Event: The coming into existence of circumstances in which a person is not electrically safe if the circumstances involve high voltage equipment or if the person had been at a particular place at a particular time and would not have been electrically safe or an event that involves significant property damage caused by electricity or a person performs electrical work they are not authorised to perform or a person performs electrical work that is not safe or discovery of equipment that is not correctly marked. (*Summary by SCL of Sect 12 of the QLD Electrical Safety Act 2002*)

De-energised: Separated from all sources of electricity supply but not necessarily isolated, earthed or out of commission.

Electricity Entity: Is the term given to a participant in the electricity industry in Queensland, they can be one of the following:

- + + ■ Generation Entity (SCL is a Generation Entity)
- + ■ Transmission Entity
- Distribution Entity
- Retail Entity.

+ **Electrical Equipment:** Any apparatus, appliance, cable, conductor, fitting, insulator, material, meter or wire:

- + ■ Used for controlling, generating, supplying, transforming or transmitting electricity at a voltage greater than extra low voltage;
- Operated by electricity at a voltage greater than extra low voltage;
- That is or forms part of, a cathodic protection system.

Electrical Installation: A group of items of electrical equipment where the items are permanently electrically connected together and the items don't include items that are works of an entity.

(Summary by SCL of Sect 15 of the QLD Electrical Safety Act 2002)

Electrical Installation Work: Is electrical work associated with an electrical installation, but does not include the following electrical work:

- (a) testing, repairing or maintaining electrical equipment included in the electrical installation;
- (b) electric line work associated with the electrical installation.

Examples of electrical installation work -

- installing or altering wiring or fixed appliances in a building
- installing or altering a switchboard

Electrical Risk: The risk to a person of death, shock or injury caused by electricity or originating from electricity.

1. The risk to property of damage caused by a cathodic protection system or loss or damage caused by electricity or originating from electricity.

(Summary by SCL of Sect 10 (1) of the QLD Electrical Safety Act 2002)

Electrical Safety Observer: A person specifically assigned the duty of observing and warning against unsafe approach to equipment, exposed energised conductors and other potential hazards.

Electrical Work: The manufacturing, constructing, installing, testing (*other than that defined in section* "Performing Electrical Work Without a Licence" refer to s57 of the Electrical Safety Regulations 2002, maintaining, repairing, altering, removing, or replacing of electrical equipment. *(Summary by SCL of Sect 18 of the QLD Electrical Safety Act 2002)*

Electrically Safe: Free from electrical risk. *(Summary by SCL of Sect 10 (2) of the QLD Electrical Safety Act 2002)*

Electrical Safety Observer Zone: The zone around live electric overhead lines where a possibility exists that part of operating plant or the person operating the plant could enter the exclusion zone of the live overhead lines.

ESO: Electrical Safety Office – Queensland.

Exclusion Zone: A designated area surrounding an electrical part or line which has conditions and restrictions for entering. *(Summary by SCL of Pg 56 Code of Practice Working - Near Exposed Live Parts - QLD Electrical Safety Act 2002)*

Exposed Live Parts: A live part is considered exposed if it is able to be contacted by a standard test finger. It is not considered exposed if approach is prevented by a barrier or by insulation that is adequate for the voltage concerned.

Extra Low Voltage: Voltage of 50V or less AC RMS, or 120V or less ripple-free DC “(QLD Electrical Safety Act 2002. schedule 2)”.

ELV: Extra Low Voltage

Free from Electrical Risk: For a person or property, the electrical risk is as low as reasonably achievable having regard to likelihood of harm and the severity of harm. (Summary by SCL of Sect 10 (4) of the QLD Electrical Safety Act 2002)

Hazardous Area: An area in which an explosive atmosphere is present or may be expected to be present, in quantities that require special precautions for the construction, installation and use of electrical equipment.

Hazardous Area Verification Dossier (HAVD): A register of all electrical equipment and electrical work performed in the classified hazardous area.

High Voltage: Voltage exceeding 1000 volts AC or 1500 volts ripple-free DC “(QLD Electrical Safety Act 2002. schedule 2)”.

High Fault Current for Live Extra Low Voltage: Current equal to or exceeding 1000Amps

HV: High Voltage

Instructed person: A person acting under the supervision of an Authorised Electrical Person

Isolated: Separated from all possible sources of electrical energy by the opening of switches, withdrawal of circuit breakers, removal of fuses, links, connections and the like and rendered incapable of being energised unintentionally.

Live Electrical Work: Electrical work performed in circumstances in which some or all of the electrical equipment, the subject of the electrical work, is energised.

Live Part: A conductor or conductive part intended to be energised in normal use, including a neutral conductor and conductive parts connected to a neutral conductor.

Note: A Multiple Earthed Neutral (MEN) connection and the neutral bar at which an MEN connection is made is not considered a live part.

Low Voltage: Voltage exceeding 50 volts AC or 120 volts ripple-free DC but not exceeding 1000 volts AC or 1500 volts ripple-free DC “(QLD Electrical Safety Act 2002. schedule 2)”.

LV: Low Voltage

Manufacturing work: Manufacturing work is that which includes fabrication, assembly, installation, maintenance, manufacturing, refurbishment or repair.

OIC: The **Officer In Charge** is the person who is responsible for the work being done and the safety of the work party and all personnel accessing the work area. The *PTW* form describes the boundaries of the plant covered by their responsibilities. The OIC carries the responsibility for the *PTW* once issued and surrenders the *PTW* on completion of the work.

PPE: Personal protective equipment

PPE Zone: The area totalling 500mm in any direction from live exposed parts within which an SCL Authorised Electrical Person has approval to perform work using PPE control measures.

PTW: A *PTW* (**Permit To Work**) is an official permission or authorisation, on the prescribed site specific form, giving approval for work to be completed on specified plant or equipment under the control of an *OIC*.

PTW Officer: The *PTW* Officer is an Authorised Person who has successfully completed all appropriate site specific training and is deemed *competent* to isolate the plant and issue a *PTW* allowing work to safely proceed, then on return close the *PTW* and restore the plant.

RPE: Registered Professional Engineer.

SCL: Stanwell Corporation Limited

Serious Electrical Incident: An incident where a person has been killed by electricity or is treated or under the supervision of a doctor after receiving an electric shock or a person has received a shock from electricity at high voltage. (*Summary by SCL of Sect 11 of the QLD Electrical Safety Act 2002*)

Standard Test Finger: A device used to determine minimum clearances around electrical parts as per the dimensions set out in the IEC Standard 61010.

Temporary supply test leads: A lead used for the purposes of electrically test running a piece of equipment, prior to it being permanently connected. The test lead would comprise a male plug on one end and either cable lugs, bare conductors or alligator clips on the other.

Test Before Touching: A test to ensure that an electrical part is de-energized. This test must be performed by an electrical worker before working on or near an electrical part that has been isolated to allow electrical work to take place.

Untrained Person: A person who is neither an Authorised Electrical Person nor an Instructed Person for the electrical part.

Works of an Entity: The electrical equipment and electric line associated equipment controlled by an entity to generate, transform, transmit or supply electricity.

Responsibilities

Corporate Electrical Safety Advisor:

- Maintain the currency and accuracy of the Electrical Safety Corporate Standard reflective of legislative and corporate change

- + + Station/Site Manager:
 - Monitor the implementation of the Electrical Safety Corporate Standard.
 - Allocate responsibilities and resources to ensure specific practices/procedures are developed to satisfy the Corporate Standard.
- + Employee and contractors:
 - Comply at all times with the requirements specified within this Corporate Standard for Electrical Safety.
 - Comply with any specific procedures.

Hazard Management

In relation to electrical hazards, SCL has implemented a safe system to control risks to health and safety arising from hazards and issues such as, but not limited to:

- Exposure to live parts;
- Overhead lines;
- Requirement for a Safety Observer
- Arc flash

Risk Assessment for Electrical Work

Electrical hazards are to be assessed and managed as per a work method statement for the relevant work activity.

Refer to sect 12(1)(j) of the Electrical Safety Regulations 2002

There is to be a Electrical Safety Observer observing the performance of the electrical work unless—

(i) the work involves testing electrical equipment; and

(ii) the risk assessment prepared under paragraph (b) does not show there is a high risk to electrical safety in performing the testing of the electrical equipment.

Example for subparagraph (ii)—

If a risk assessment does not show there is a high risk to electrical safety in performing the testing of the polarity of an installed outlet, a Electrical Safety Observer is not required to observe the performance of the work.

Authorisations To Perform Electrical Work

Electrical Worker's Licence

Electrical work must be performed by a person who is authorised by SCL and holds an appropriate electrical workers licence for the work to be performed.

A person who holds an electrical workers licence and is employed to perform or supervise electrical work must notify their employer in writing of changes to the status of their licence within 14 days of the change.

SCL will keep an electronic register of SCL licensed workers that includes details of the holders full name, electrical workers licence number, electrical contractors licence number (if applicable), the type of work the licence is endorsed for, status history, place of issue, expiry date and the date the licence holders details were added to the register or updated.

Electrical work may be performed without a licence under certain circumstances, these exceptions are dictated by legislation. Refer to *section* "Performing Electrical Work Without a Licence" in this standard.

- + + SCL will recognise electrical licence equivalents as set out in Schedule 1 of the Queensland Electrical Safety Regulations. These licence equivalents are limited to Australian states/territories and New Zealand.
- + The performance or supervision of electrical work is to be in accordance with conditions or restrictions that apply to the licence.
- + SCL Electrical Contractor's Licence
- + SCL is to hold and maintain an electrical contractor's licence if its employees perform electrical work for persons or organisations other than SCL owned and maintained electrical installations.

Authorised Person for an (Electrical Part)

Is to be known under the SCL system as an "Authorised Electrical Person".

SCL is to conduct an authorisation process via training and assessment to ensure the person has the technical knowledge and skill to do work that involves contact with or being near to a live electrical part. A person does not have to be a licensed electrical worker to become an Authorised Electrical Person.

On successful completion of training and assessment, final authorisation will be given by the person in control of electrical equipment on the site.

The authorisation means that the person can perform tasks (tasks that are not electrical work) on or near exposed live parts.

Personnel must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training [HB# 550996](#) before exposure to live electrical parts.

Authorisation permits either individual or a range of the following activities for a person:

- Reset TOLs
- Test & Prove De-energised on low voltage circuits
- Low voltage isolations
- Fault finding on low voltage circuits
- High voltage isolation that do not involve switching
- Transformer bay entry
- Entry within PPE zone for low voltage (eg. LV cabinets and cubicles etc.)

Note: This authorisation does not allow entry into a high voltage exclusion zone

Instructed Person

An Instructed Person is a person acting under the supervision of an Authorised Electrical Person.

Untrained Person for an Electrical Part

An untrained person for an electrical part is not permitted to enter an exclusion zone (to perform work or otherwise) or PPE Zone for a live electrical part or overhead line whether it is high or low voltage. Exclusion zones also apply to operating mobile plant and driving vehicles near live electrical equipment. Exclusion zones for electrical parts and lines are set out in the tables in Attachment 2.

Apprentices

Electrical apprentices are not to work unsupervised during the course of their apprenticeship. Supervision of apprentices is to be conducted by an Authorised Licensed Electrical Worker for the work to be performed. The level of supervision may vary depending on the competence of the apprentice, the type of work to be performed and the training provided. Guidelines on supervision are provided in Attachment 3 – Apprentice Supervision Guidelines.

Apprentices in the first 6 months of their apprenticeship are not to work in the immediate vicinity of live exposed high voltage parts and where there is a risk that the apprentice could contact a live low voltage exposed part. This is performing the role of Electrical Safety Observer.

Apprentices must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training [HB# 550996](#) before exposure to live electrical parts.

Electrical Engineers

Electrical engineers are permitted to perform or supervise electrical work in practising their profession as an engineer. They are not allowed to perform work that requires an electrical workers licence unless they are the holder of one.

Electrical Engineers intending to perform electrical work must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training [HB# 550996](#) before exposure to live electrical parts.

Restricted Electrical Licences

The holder of a restricted electrical licence can perform electrical work associated with their trade or calling, subject to the restrictions and conditions endorsed on their licence. Restricted electrical licence holders are not authorised to perform installation work.

If an SCL employee who does not hold an electrical workers licence has a requirement to perform electrical work and is supported by a sound business case, then SCL will support that person in obtaining a restricted electrical licence endorsed for the work to be performed.

Restricted Electrical License holders intending to perform electrical work must complete:

- Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training [HB# 550996](#) before exposure to live electrical parts; and
- Module 2 (HS074) – Authorised Electrical Worker [HB# 550998](#)

Electrical Safety Observers

Electrical Safety Observers have the following responsibilities:

- Continuously observe safety procedures are carried out by personnel working in a potentially hazardous situation
- Give warnings when necessary to prevent inadvertent contact with energised electrical equipment,
- Provide assistance in the case of emergency
- Remain at the work site at all times while a potential hazard exists
- Not be distracted by or undertake other duties
- Know where all isolation points are located and how to operate them for the work being performed.

In addition, Electrical Safety Observers are to receive specific instructions in their duties from the Authorised Licenced Electrical Worker on each occasion.

Electrical Safety Observers are to be:

- Briefed by the Authorised Licenced Electrical Worker of any potential risks associated with the work to be performed.
- Familiarised in isolation techniques by the Authorised Licenced Electrical Worker
- Competent in rescue from live low voltage equipment
- Competent in resuscitation techniques
- Competent to help with the task they are to observe.

Note: An electrical workers licence is not mandatory.

Electrical Safety Observers must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training [HB# 550996](#) before exposure to live electrical parts; and

As a guide, tasks where an Electrical Safety Observer is required are listed below. This is not a complete list and each task should be assessed before work commences:

- Fault finding on low voltage electrical installations or equipment that is energised and the worker is using only a multimeter or test equipment.
- Testing of low voltage electrical equipment that introduces an energy source (voltage or current) i.e. bench testing equipment.
- Testing of high voltage electrical equipment that introduces an energy source (voltage or current), including meggering, injection testing, dielectric loss angle (DLA) etc.
- Live low voltage electrical maintenance work that is to be done without isolating plant.

Persons in Control of Electrical Equipment

Across SCL, the Site Managers are the persons in control of electrical equipment at their respective sites. Site Managers are:

- Responsible for approving actions on site that fall outside the scope of this Corporate Standard and related Procedures.
- To take advice from appropriate technical advisors when making decisions about electrical work and electrical plant issues.
- To give authorisation to any person who will be working on or near live electrical equipment.

Person in Control of Electrical Work

When performing electrical work under an PTW where more than one electrical worker is required on the job, each electrical worker is responsible to:

- Ensure electrical safety is maintained for the work they perform
- Ensure that the completed electrical work is tested and certified safe to connect to a source of electricity.

Performing Electrical Work Without a Licence

There are some tasks that can be performed by persons who do not hold an electrical licence but have competence in a specific area (Refer to Electrical Safety Regulation s57). The following are examples of work that can be performed by an Authorised Electrical Person who does not hold an electrical licence:

- Testing of the works of an electricity entity;
- Testing of electrical equipment if the testing does not interfere with the integrity of the equipment, (Using a multi-meter to measure voltage);
- Testing of electrical equipment that has an inbuilt test facility, (e.g. portable outlet boards with RCD protection)

HV Switching Officer and Assistant for High Voltage Switching

During electrical switching a “HV Switching Assistant” is required to assist the Switching Officer with the isolation tasks, which include ensuring that a rigorous process of confirming the apparatus and operation to be performed for each step is correct.

HV Switching Officers and HV Switching Assistants are to be trained, competent and authorised in the following:

- HS073 - Module 1 - Authorised Electrical Persons and Electrical Safety Observers [HB# 550996](#)
- HS074 - Module 2 - Specific Requirements for Electrical Work [HB# 550998](#)
- HS026 - Resuscitation [HB#551028](#)
- HS069 - Rescue from live switchgear [HB#550991](#)
- HS075 - High Voltage Isolation and Access principles [HB# 550999](#)

Electrical Work Requirements

Basic Requirements

At SCL electrical work is split into three functional areas. These are:

- Performing electrical work or working near live parts
- Plant isolation involving electrical equipment
- Testing and proving De-energised.

Flow charts are provided in Attachment 4 to assist in the planning and performance of these functions.

Low Voltage Live Work

Live low voltage work may only be undertaken if:

- It is necessary in the interests of safety for the work to be performed with the electrical equipment energised
- A supply of electricity is necessary for the proper performance of the electrical work
- There is no reasonable alternative to performing the electrical work by live work methods.

Live Electrical Maintenance Work Control Guide

A Live Electrical Maintenance Work Control Guide will be used for all live electrical maintenance work on low voltage equipment. This Control Guide requires verification by an RPE Electrical or a Senior Electrical person with a minimum of 10 years operating industrial experience. Final sign off must be obtained by the Site Manager.

The Live Electrical Maintenance Work Control Guide details the following conditions that must be in place before commencing work:

- The person performing the work is following a safe system of work, (SCL Permit to Work system)
- The person performing the work is authorised by SCL to perform the work
- Tools and test equipment being used are appropriate and have been maintained and tested
- Appropriate PPE is being worn
- A safe work area has been identified and maintained during the work
- An Electrical Safety Observer is observing the performance of the electrical work unless
 - (i) the work involves testing electrical equipment (which includes testing to prove de-energised); and
 - (ii) the work method statement does not show there is a high risk to electrical safety in performing the testing of the electrical equipment.
 - Example for subparagraph (ii).
If a risk assessment does not show there is a high risk to electrical safety in performing the testing of the polarity of an installed outlet, an Electrical Safety Observer is not required to observe the performance of the work.
- All isolation points for the equipment being worked on are identified, signed and is able to be operated immediately.
- Where an isolation point is not in close proximity, an additional Electrical Safety Observer is to be used to operate the isolation point immediately.

Live low voltage work may only be performed in the rain if it is an emergency and approval has been given by the site manager after a work method statement has been completed. See section on "Wet Weather Work" below.

Fault Finding and Testing to Prove De-energised

These are considered to be "live" work if the person performing the work enters the PPE Zone of any exposed live parts. Separate procedures exist for these types of work.

Refer to:

Corporate Procedure 'Fault Finding on Low Voltage HB# [560792](#) ; and

Corporate Procedure 'Electrical Testing to Prove De-energised Requirements' HB# [560793](#)

Fault finding on circuits may only be performed by Authorised Electrical Persons (Electrical Apprentices and Electrical Engineers) and Authorised Licensed Electrical Workers.

Live High Voltage Work

Live high voltage work is NOT to be performed by SCL employees. Experts will be contracted to perform all live high voltage work at SCL.

Wet Weather Work

Authorisation to perform live or potentially live work in the rain can only be given by the relevant site manager. When completing the PTW planning process, special consideration for the wet weather is to be given when deciding which controls to implement. In general, authorisation for the work will not be given unless:

- It can be determined that the risk of harm to the worker in doing the work is low
- It is emergency work such as switching to prevent injury to persons or damage to plant.

Extra Low Voltage (ELV)

ELV circuits and equipment can be hazardous in certain situations. When planning work, hazards associated with ELV equipment are to be identified and controlled as part of the Work Method Statement.

Potentially Fatal Test Currents

When testing electrical equipment using a device that produces a potentially fatal test current effective control measures are to be implemented to ensure contact with exposed parts does not occur. These control measures are to be documented as part of the Work Method Statement. A potentially fatal test current is defined as being 10mA or greater alternating current or 30mA or greater direct current.

Work on Electrical Equipment by Overseas Specialists

Where overseas specialists are required to be present for electrical work activities, the following guide is to be adopted.

- All plant will be fully isolated following SCL's Permit to Work Procedure
- Isolations will be tested & checked by an SCL PTW Officer and OIC
- All work will occur under an PTW with a Stanwell OIC (Authorised Licensed Electrical Worker) providing supervision and direction where required
- The work is not to involve exposure to or near live electrical components by the overseas person
- All work carried out will require a Work Method Statement as part of a contractor's Health and Safety plan, which is reviewed by a SCL Health and Safety Advisor / Electrical specialist
- All tools and equipment will be tested, fit for purpose and calibrated to NATA standard where applicable
- All work carried out by the contractor/s will follow a standard work procedure, developed by the contractor/s over many years with similarities to our own plants.
- A large quantity of work might be regarded as mechanical in nature on electrical machines. The specialists may be trained in servicing specific items of equipment rather than licensed in a broader trade.
- All electrical plant testing where applicable is to be performed by a Authorised Licensed Electrical Person using procedures approved by a RPE prior to the plants return to service.

Working Near Exposed Parts

Work on Electrical Parts within a PPE Zone

Only Authorised Electrical Persons are to perform work or enter within a PPE zone (500mm) on low voltage electrical parts. This includes parts that have been isolated and not yet proven de-energised.

If testing to prove de-energised or fault finding, the following procedures are to be used:

- Corporate procedure for Test and Prove De-Energised HB# [560793](#); and
- Corporate procedure for Fault Finding on LV Equipment HB# [560792](#)

Fault finding on circuits may only be performed by Authorised Electrical Persons (Electrical Apprentices and Electrical Engineers) and Authorised Licensed Electrical Workers.

Only Authorised Licensed Electrical Workers are to perform electrical maintenance work on or near live exposed LV parts. Use of a Live Electrical Maintenance Control Guide HB# [560791](#) is required.

Low Voltage Rescue Kit

When performing work on or near live electrical equipment, a fully equipped low voltage rescue kit is to be at or near the work site. The items in the test kit are to be within the test due date and have passed routine serviceability tests prior to commencing work, (e.g. the insulating gloves must pass an air pressure test).

Specific Overhead Line Considerations

Overhead lines, as with other electrical equipment, have exclusion zones around (refer below) them depending on the voltage that the conductor is carrying. When operating mobile plant around overhead lines these zones are not to be breached.

When using cranes or working from elevated work platforms (EWP) there are three types of zones to be aware of when selecting adequate control measures. These are:

- Authorisation zones
- Electrical Safety Observer zones
- Exclusion zones (these are set out in Attachment 2 of this standard).

For detailed information on these zones refer to the Code of Practice for Working Near Exposed Live Parts.

The Electrical Safety Observer must not be in an EWP when live work is being performed. Where harnesses are to be used when working at heights, they are permitted to have exposed metal parts as long as there is a layer of clothing between them and bare skin, and they are not likely to come into contact with the live equipment in such a way that they could short out live parts.

Specific Underground and In-situ Electrical Considerations

When installing, repairing or altering underground cable systems, the following is to be considered before commencing underground work:

- A Work Method Statement and Excavation and Digging Control Guide must be completed if digging to a depth greater than 150mm
- Isolating existing cables in the vicinity of a new underground cable run before digging
- Placing insulating barriers over earthed metal equipment such as nearby underground water pipes if there are any exposed cables or parts that may be live
- Using a Electrical Safety Observer when performing electrical work in an excavation.

Access to High Voltage Equipment

The following must be in place prior to accessing high voltage equipment:

- Electrical Safety Observer
- Placing a barrier / rope / tape around the work area
- Placement of Safety Warning Signs:
 - "Live High Voltage Equipment"
 - "Live High Voltage Equipment Above"
 - "Equipment Isolated for PTW".

For high voltage equipment, SCL is to comply with the intent of the HVIA (High Voltage Isolation and Access) Procedures * from the various states of Australia.

+ + Isolation Requirements

+ General

All electrical equipment and conductors are to be regarded as energised until isolated and proved de-energised. Work is not to be performed on or near isolated electrical equipment until:

- +
 - The electrical equipment and all of its energy sources and isolation points have been positively identified;
 - The electrical equipment has been isolated from all sources of supply and discharged where necessary
- +
 - All isolation points are locked;
 - A safety sign (tag) is attached to all isolation points;
 - The electrical equipment and conductors have been proven de-energised,;
 - A safe work area is identified and controlled; and
 - The Licensed Electrical Worker has tested before touching.

For specific plant isolation information relating to the following, refer Attachment 5:

- Isolation of LV and HV Single Feed Circuits
- Isolation of LV and HV Circuits:
 - To allow access to driven machinery;
 - To allow access to normally energised circuits for electrical work.

Isolating

The electrical equipment to be worked on is to be isolated from all sources of supply by:

- Opening switches or isolators; or
- Removing fuses or links; or
- Opening circuit breakers; or
- Removal of circuit connections.

Isolation of equipment for electrical work is to be carried out by an Authorised Electrical Person or Licensed Electrical Worker as described in Attachment 5. Attachment 4 illustrates specific requirements.

Authorised Electrical Persons are to have knowledge and understanding, at the site they are authorised, for the following:

- Site electrical equipment/plant;
- Site electrical systems;
- Plant isolation principles;
- Hazards associated with electrical equipment/plant.

Specifics of the plant isolation system are documented in the Corporate Procedure Safe Access to Plant and Equipment (PTW) HB# [559896](#).

Locking Isolation Points

When performing electrical work on low and high voltage circuits and equipment, all sources of low and high voltage are to be locked. Where equipment is unable to be locked it is to be secured to prevent inadvertent operation. This equipment is to be modified at the earliest possible convenience to allow locking.

Securing devices can be used to ensure that the isolation points, when in the open position, require a deliberate action to engage or disengage them. These securing devices are to have the facility to allow a padlock to be applied. When isolating and locking electrical equipment, it may be necessary to place locks with metal parts on isolation point equipment. Where this is the case the PTW Officer is to consider controls to ensure contact between live parts and metal objects don't occur.

Proving De-energised

General

- (i) All electrical conductors, unless proven de-energised, are to be treated as energised. Any voltage tests used to prove de-energisation are to be conducted between all conductors and between all conductors and a proven earth. Voltage detectors used to prove de-energisation, are to be tested for correct operation immediately before use and again immediately after use to confirm that the detector is still working.

Only persons who have successfully completed assessment in HS073 – Module 1 - Authorised Electrical Persons and Electrical Safety Observers - Proving de-energised procedures and the use of voltage detectors can perform tests to prove de-energised.

- (ii) In each case the person testing is to ensure that the tests to prove de-energised are conclusive and the relevant Isolation Guide and/or switching sheet is signed off.
- (iii) The testing procedure for proving de-energised is contained within HB# [560793](#) – Corporate Procedure ‘Electrical Testing to Prove De-energised Requirements’

Low Voltage

- (i) Tests to prove de-energised must be performed by an Authorised Electrical Person. Test requirements are to be:
 - At the load side of the isolation point equipment, by the PTW Officer
 - At the electrical equipment to be worked on, a test is to be conducted by the Licensed Electrical Worker before commencing work and at the start of each new shift or day.
- (ii) Special cases to be considered include:
 - Testing to prove at the isolation point is not required if there is a clear visible break. This will occur in situations where a fuse wedge is removed or a link is opened. These isolation points still require locking and the test to prove de-energised at the electrical part is still required
 - Where fixed equipment is connected via a plug and socket arrangement, testing the equipment to prove it's de-energised is not required when the plug is removed from the socket. The plug is to be locked by a device to prevent it being plugged back in while the OIC requires the plant to be isolated under the PTW Isolation Guide.

High Voltage

- (i) Tests to prove de-energised must be performed by a competent person (i.e. a person who has successfully completed a high voltage Switching Officers course). Test requirements are to be:
 - At each isolation point prior to applying operator earths, by the Switching Officer
 - At the electrical equipment. The Licensed Electrical Worker must ensure there is a visible earth connected between the plant to be worked on and all sources of high voltage supply.
- (ii) Plant isolations are to be provided with a visible break so that any energisation, lightning or switching surge will not cross the isolation point. Where a particular device does not allow a visible break, special testing or earthing facilities are to be provided.

Earthing and Short Circuiting

General

- (i) When performing electrical work on high voltage circuits, the circuit is to be tested and proven de-energised immediately before earths are applied.
- (ii) If the circuit being worked on has more than one active conductor all active conductors are to be shorted together and connected to earth. Application of portable earthing devices can only be performed by a Authorised Licensed Electrical Worker. Closing earth switches onto a high voltage circuit can be performed by a competent person (i.e. a person who has successfully completed a high voltage Switching Officers course and Module 1 (HS073) – Authorised Electrical Person [HB# 550996](#)).

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(iii)Earths are to be applied if access is required within the exclusion zone for a worker. Earths are to be placed as close as practical and within sight of the work party.

(iv)All earths are to be applied under the direction or control of the Isolation Guide.

Single Feed High Voltage Circuits

Earthing of the following motor circuits:

- Stanwell Power Station:

- Units 1 to 4 - A & B Induced Draught Fan Motors
- Units 1 to 4 - A & B Forced Draught Fan Motors
- Units 1 to 4 - A & B Primary Air Fan Motors
- Units 1 to 4 - A & B & C Boiler Feed Pump Motors
- Units 1 to 4 - A & B Condense Extraction Pump Motor
- Units 1 to 4 - Cooling Water Pump Motor
- R2 Conveyor Motor.

may be done without first testing to prove de-energised. The act of testing to prove de-energised introduces a hazard where the HV Switching Officer is required to work within the exclusion zone for exposed live high voltage parts. In these cases an earth switch may be closed if the following criteria are met:

- There is a mechanical interlock between the circuit breaker and the earth switch allowing the earth switch to be closed only if the circuit breaker is racked out;
- The circuit breaker provides a visible break (i.e. racked out);
- The earth switch is a fault making earth switch.

High Voltage Circuits with More than One Feed

For high voltage circuits where there is more than one point of supply, testing to prove de-energised must be undertaken prior to earthing.

Locking Operator Earth Points

When isolating HV equipment for electrical work, all operator earth points are to be locked in the closed position for an earth switch or when attached if it is a portable earthing device.

Operator earths are applied to limit rise in potential and located to operate protection devices in event of inadvertent energisation. Operator earths are to be applied or removed under the direction of the Isolation Guide.

Working Earths

Working earths are additional earths placed under the direction of the OIC. Working earths are to be applied where operator earths are not visible at the work area to limit the rise in potential. Placement and removal is to be recorded on the "Working Earths and Abnormalities Schedule" within the Isolation Guide and the Isolation Guide Restoration Procedure is not to be commenced until all working earths are removed.

Electrical Testing under an Isolation

When electrical equipment is isolated under an PTW and an additional source of supply (i.e. temporary supply for testing or injection testing) is to be introduced to the equipment then the PTW is to be suspended (Refer to Corporate Procedure Safe Access to Plant and Equipment (PTW) HB# [559896](#)).

If the electrical equipment is removed from situ and is to be tested in a controlled environment i.e. designated barricaded area, the above procedure is not required.

When electrical testing involves the introduction of an additional source of supply, the requirements outlined in Corporate Procedure 'Fault Finding on Low Voltage Electrical Equipment' HB# [560792](#) are to be followed.

+ + Testing For Safety

- + Refer to corporate procedure "Maintaining Electrical Tools, Protective Devices and Clothing" HB# [560794](#)

Testing of Electrical Equipment

+ New portable LV equipment supplied to SCL

- +
 - This relates to new portable equipment supplied via flexible lead and plug.
 - This equipment is to be tested and tagged prior to connection to supply.
 - Where supply is via an appliance lead, the appliance/tool (eg. Desktop PC), the lead is to be tested and tagged separately to the appliance.
 - This test is to be performed prior to connection to supply.

When electrical work has been performed:

When electrical work has been performed on a piece of equipment, the equipment is to be tested to ensure that it is safe before:

- Performing any operational testing i.e. motor direction test runs;
- Recommissioning the plant;
- Reconnecting to a supply of electricity;
- Initial connection to a supply of electricity;
- A high voltage audit is conducted, if it is a high voltage installation that is not part of entity works (Queensland).

New fixed plug-in LV equipment

- This relates to LV equipment that is fixed in the plant/office but is supplied via a flexible lead (with or without a plug).
- This test is to be performed prior to connection to supply.

Certificate of Testing and Safety

Tests and inspections to ensure electrical safety must be completed for all electrical work performed on SCL owned fixed electrical equipment. If the electrical work is carried out by an electrical contractor, the contractor is to provide the certificate. If the work is carried out by a licensed electrical SCL or labour hire worker, that the Authorised Licensed Electrical Worker is to record all test results on an Electrical Safety and Test Report as listed below from within Microsoft WORD:

- PTW > File > New > Electrical Safety and Test Report Post Maintenance;
- PTW > File > New > Electrical Safety and Test Report New Installation;

Each Electrical Safety and Test Report is to have the associated PTW number recorded on it.

Completed Electrical Safety and Test Reports **must** be filed with the associated completed PTW forms and a copy filed as per site requirements.

Safety Tests to be Performed

Two categories of safety testing are applicable:

- New equipment installation testing
- Testing after performing maintenance work that alters the integrity of the circuit.

Note: The specific test requirements are listed below and are based on AS/NZS 3000:2007 and electricity supply industry practice.

| New equipment installation tests | Post plant maintenance tests |
|----------------------------------|--------------------------------|
| Continuity of the earth system | Continuity of the earth system |
| Insulation resistance | Insulation resistance |
| Polarity | Polarity |
| Correct circuit connections | Correct circuit connections |
| Fault loop impedance | |
| Protection tests | |
| Equipment operation tests | |
| RCD tests | |
| | |

Minimum Test Results

Continuity of the Earth System

The resistance of protective earthing conductors is to be low enough to permit the passage of current necessary to operate the circuit protective device if there is a fault between live parts and earth. The resistance of the main earthing conductor in an electrical installation is not to be more than 0.5 Ω .

Insulation resistance

The insulation resistance between live and earthed parts of an electrical installation or parts thereof is to be not less than 1M Ω . This value may be reduced to 0.01 M Ω for sheathed heating elements of appliances.

Polarity

Proof that all active, neutral and protective earthing conductors in the electrical installation are correctly connected so that:

- There is no transposition of conductors that could result in the equipment becoming unsafe when connected to supply;
- Switches do not operate independently in the neutral or earthing conductor.

Correct Circuit Connections

Proof that all active, neutral and protective earthing conductors in the electrical installation are correctly connected so that there is:

- No short circuit between conductors;
- No transposition of conductors that could result in the earthing system and any exposed conductive parts becoming energised;
- No interconnection between different circuits.

Fault Loop Impedance

The fault loop impedance measured will allow sufficient current to flow in a fault loop to cause the protective device to operate within the specified time. Values of fault loop impedances are calculated using appendix B of AS/NZS 3000:2007 and manufacturer's data on the circuit protective device. Consult with an electrical engineer if unsure how to calculate these values.

Protection Relay Tests

Prove relay/s operate in accordance with specified design parameters.

Control Equipment Operation Tests

Control equipment is to operate as per design requirements. Equipment tests for each new plant are to be devised for the particular equipment installed. The following list is a guide to tests but is not an exhaustive list:

- Local and remote start – correct operation;
- Local lock stop – correct operation;
- Electrical interlocks – correct operation;
- Mechanical interlocks – operation;
- Control circuit breaker – disconnects supply;
- Auxiliary contacts open and close with contactor operation as per design.

RCD Tests

Residual current devices are to operate within the parameters below:

- Type I 40mS with a 10mA A.C RMS test current, or
- Type II 300mS with a 30mA A.C RMS test current.

Test Equipment Requirements

1. General

Test equipment, including leads and probes, are to be appropriately rated for the tests being performed. The equipment must be suitable for use on the highest voltage and available fault current levels likely to be encountered in accordance with its operating instructions. Terminals of test equipment are to be shrouded and all other test sockets on measuring instruments are to be designed so as to prevent inadvertent contact with an energized socket or conductor when the equipment is in use.

Instruments used for measuring insulation resistance are to have an incorporated discharge function.

Temporary supply test leads are to be used only under the following conditions:

- When they are clearly labelled “To be used only by Authorised Licensed Electrical Workers”.
- When in use the electrical supply circuit must be protected by a residual current device.

Test equipment must be tested and maintained as per corporate procedure “Maintaining Electrical Tools, Protective Devices and Clothing” HB# [560794](#).

2. Condition

Testing equipment must be in good condition and working order, clean and have no cracked or broken insulation. Particular care is to be taken to maintain the condition of the insulation on leads, probes and clips of test equipment.

3. Accuracy

Instruments such as multi-meters, RCD performance testers, earth loop impedance testers, voltage testers, insulation resistance testers and similar instruments are to be regularly tested (12 monthly) for accuracy of operation. Records of the tests are to be maintained at each SCL site.

Instruments used for measuring insulation resistance are to be able to maintain their terminal voltage within +20%, -10% of the nominal open-circuit voltage, when measuring resistance of 1MΩ on the 500V range or 10MΩ on the 1000V range.

For continuity tests the instrument is to have an accuracy of 5% full scale deflection or better.

4. Suitability

Testing equipment is to pose no danger of exposure of personnel to an electrical hazard or damage to electrical equipment during testing. Test probes and other equipment are to be designed and selected so that they cannot inadvertently short circuit between live conductors or live conductors and earth. Testing devices are to be provided with suitable fuse protection. Test equipment, where used in hazardous areas, is to be designed and clearly marked as being suitable for use in such locations.

Multi-meter test leads are to be Category III rated with type A probes.

5. Proof Of Operation

Test equipment used for detecting an energised voltage source is to be tested on a known source to prove that it is functioning correctly immediately before the test and after the test has taken place.

PPE for Electrical Work

1. General

Items of personnel protective equipment worn by workers while performing live electrical work activities must not contain metal materials that come into direct contact with the unprotected skin of the worker.

For information on testing and maintaining PPE for electrical work refer to Corporate Procedure 'Maintaining Electrical Tools, Protective Devices and Clothing' HB# [560794](#).

For additional information with respect to general, non-electrical specific PPE, refer to Corporate Procedure for Personal Protective Equipment HB# [562508](#).

2. Clothing

De-energised electrical work activities - Flame resistant clothing, (100% cotton clothing), that covers the whole body (neck to wrists and ankles) must be worn by all personnel.

Flame retardant clothing that covers the whole body (neck to wrists and ankles) is to be worn by personnel involved with the following electrical work activities:

- Work within the PPE zone (500mm of exposed live source) for low voltage equipment;
- Work within the exclusion zone for high voltage equipment and lines.

Note: Electrical Safety Observers are required to wear flame retardant clothing.

Flame retardant clothing must have non-metallic fasteners or fasteners protected by a layer of the same material as that of the garment on both the top and underside of the fasteners.

Based on assessed risk, combinations of flame retardant clothing may be necessary to minimise the risk of exposure.

3. Insulating Gloves

Insulated gloves for electrical work are to comply with the requirements of AS2225.

Insulated gloves for working on low voltage equipment are to be rated to the highest voltage expected when performing the task.

Insulated gloves used for indirect contact with high voltage equipment such as performing switching operations on HV equipment and high voltage test to prove de-energised are to be Class"0" or 1000 volts working.

4. Safety Footwear

Safety shoes/boots that are worn when performing live electrical work are to comply with the requirements of AS2210.2.

The shoes/boots selected are to have minimal synthetic material in their construction and are to have a full leather upper.

The shoes/boots must be in good condition and are not to have any exposed metal such as steel toe-caps.

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5. Face Shields

Face shields used for live electrical work are to cover the full face.

+ + Face shield for electrical work are to have no exposed metal parts.

+ Must have an electrical rating appropriate for the work being undertaken.

+ 6. Hoods

+ Hoods are to be worn as per the work method statement requirements.

Tools for Electrical Work

Insulated hand tools used in the performance of live low voltage electrical work are to be insulated to a minimum of 1000 volts AC.

Insulated mats for electrical work are to be selected in accordance with AS/NZS 2978:1995. Class A and B mats can be used in switch rooms. Class A mats are only to be used for outdoor electrical work and where surfaces are uneven.

Safety harnesses and safety belts used for electrical work are to be selected, used and maintained as per Corporate Standard for Falls and Falling Objects [HB# 560737](#).

Harnesses, safety belts and fall arrest equipment used when performing live electrical work must be worn over any protective clothing and controls are to be implemented to avoid metal parts coming into contact with electrical equipment.

Low voltage rescue kits are to contain, as a minimum, the following items:

- Insulated crook;
- 1000 volt rated insulating gloves;
- "Isolate Here in Emergency" sign.
- Fire blanket
- Burns dressing
- Torch.

Ladders and step ladders that are metallic, wire reinforced or otherwise conductive are not to be used on or near live electrical equipment.

Ladders and step ladders are to be selected, used and maintained as per Corporate Standard for Portable Ladders HB# [559144](#).

Metal **ladders** are not to be used by workers where an electrical hazard exists, and where any ladder is required to be used in the vicinity of overhead powerlines it is not to enter the exclusion zone(s) for the powerlines.

Tools for electrical work are to be tested and maintained as per Corporate Procedure for Maintaining Electrical Tools, Protective Devices and Clothing HB# [560794](#).

Electrical Incidents and Events

1. Rescue from Low Voltage Equipment

The principles/steps for rescuing a victim from live low voltage equipment after receiving an electric shock or other injuries are:

- Call for help as soon as possible
- Assess the scene for danger before trying to assist the victim. Avoid becoming another victim

Note 1 - In the event that the location is remote and some distance from the ambulance service (e.g. Kareeya Power Station):

- Consult with the '000' emergency operator as to the medical urgency to determine if initial emergency transportation other than by ambulance is recommended e.g. by SCL vehicle;
- If transporting by SCL vehicle, as a minimum, the driver and a first aider are to accompany the worker. If required by '000', an Ambulance may still be dispatched to intercept the SCL vehicle enroute to continue transportation to a doctor (Hospital) for examination and/or treatment as required and a doctor's final medical clearance.

Note 2: where an ambulance (equipped with an ECG) is already located on site e.g. during a SPS major outage:

- The worker is to be taken immediately to the site based Ambulance Officer for examination
- Site based Ambulance Officer is to arrange for an additional ambulance to be dispatched to site
- Site Ambulance Officer conducts initial examination, including conducting an ECG
- Even with an initial medical 'all clear' from the site based Ambulance Officer, patient is still to be transported by ambulance to doctor (Hospital) for further precautionary examination and/or treatment as required and a doctor's final medical clearance.

Site Management representative to accompany patient to doctor (Hospital), in separate vehicle, provide support as required, obtain final clearance from doctor (documented if possible), and, upon doctor's medical clearance, escort worker to home/work.

Ensure timely notification of appropriate Stanwell Management (site and corporate) as per Corporate Procedure for Hazard and Incident Reporting [HB# 796990](#) and [Statutory and Regulatory Reporting requirements](#).

5. Investigation

All incidents and events caused by electricity are to be investigated. Investigations are to be conducted by an investigator who has sound knowledge of electrical principles and practices or can consult closely during the investigation with a person who has this knowledge. "Serious electrical incidents" and "dangerous electrical events" are also normally investigated by a representative from Workplace Health and Safety Queensland.

6. Reporting Requirements

Internal Incident Reporting

All electrical incidents / hazards are to be reported as per the Corporate Procedure for Hazard and Incident Reporting [HB# 796990](#).

External Reporting

For statutory specific reporting obligations to the Regulatory Authority, refer to Corporate Procedure for Hazard and Incident Reporting [HB# 796990](#) and [Statutory and Regulatory Reporting requirements](#).

7. Recording of Incidents and Events

If an incident is reported to the ESO a record of the incident is to be made and kept for a minimum of five (5) years.

Entity Works

1. An entity has an obligation to ensure its works are electrically safe and operated in a way that is electrically safe.

- + + 2. The works of an entity are to incorporate an earthing and protection system capable of:
 - + ■ Reliable passage of fault current
 - + ■ Reliable operation of circuit protection devices
 - + ■ Safe step, touch and transfer potentials for all electrical equipment
 - + ■ Appropriate coordination with earthing and protection systems of other entities.
- + 3. Generator high voltage circuit breakers are to be disarmed as soon as possible after a generator is taken off line or tripped off line. The generator circuit breakers are to be re-armed just prior to synchronisation.

Electrical Installations

An electrical installation for SCL means any electrical equipment that is not considered to be the 'works of an entity'. This includes equipment that is part of an office, workshop, store or laboratory.

For SCL, electrical equipment that may be considered part of 'works of an entity', where SCL are a Generation Entity, includes equipment that is used to generate electricity.

1. A licensed electrical worker who performs work on an electrical installation is to ensure any electrical work performed complies with the AS 3000:2007 Wiring rules.
2. An employer who employs licensed electrical workers to perform electrical work on installations is to ensure that any work they perform is in accordance with AS 3000:2007.
3. If an electrical contractor performs electrical work on an installation, the contractor is to supply a certificate to certify that the electrical equipment that was worked upon is electrically safe.
4. The certificate must have the following information as a minimum:
 - The name and address of the person/company for whom the work was performed
 - A description of the electrical equipment that was tested
 - The date that the equipment was tested
 - The electrical contractor's licence number.
5. An electrical installation on which electrical work has been performed is not to be connected to a source of electricity unless the person who performed the work is authorised under an Act to perform the work and it has been tested to ensure the installation is electrically safe and complies with the wiring rules and any other standard that applies.
6. Electrical work performed on a construction site or where construction work is performed on a production site is to be in accordance with AS 3000:2007 Wiring rules and any particular requirements of AS 3012:2003 Electrical installations – Construction and demolition sites.
7. Double adaptors and piggy back plugs are prohibited for manufacturing work.
8. All 240 volt general purpose outlets at SCL sites must be RCD protected.
9. If a portable generator is to be used as a temporary supply, the means of connection is to be as per AS2790:1989 Electricity generating sets – Transportable. Particular care, as per manufacturer requirements, is also to be given to the method of earthing.
10. Portable tools and equipment, cord extension sets and flexible cables must :
 - Not be located where they are likely to suffer damage
 - Be protected against damage inclusive of damage by a liquid.

- + + 11. Transportable huts:
 - + ▪ When connected via temporary wiring, are to comply with the requirements of AS/NZS 3001:2001 Electrical Installations – Relocatable premises and their site installations
 - + ▪ When connected via fixed wiring, are to comply with the requirements of AS/NZS 3000:2007 Wiring rules.
 - + ▪ In addition to the dot points above if the transportable hut is being used in conjunction with construction work it must comply with the requirements of AS 3012:2003 Electrical installations – Construction and demolition sites.

High Voltage Installations

1. When electrical installation work is performed on high voltage, it must not be connected to a source of electricity unless:
 - It has been inspected by an accredited auditor who confirms that it is electrically safe
 - It complies with relevant Australian Standards and legislation.
2. These requirements do not apply to high voltage installations that form part of the works of an electrical entity.

Overhead Lines

1. Overhead line clearances from the ground, over roadways and other structures are to be maintained in accordance with particular State Regulations.
2. Warning signs are to be installed for overhead lines on SCL assets to alert workers to the hazard.
3. Where overhead lines cross roadways within the boundaries of SCL assets, height indicators or signage are to be installed to warn operators of vehicles of the hazard.
4. The integrity of the insulation of overhead lines and connections is to be maintained where contact with the line is likely, (e.g. near the point of attachment or where it passes over roofs or other structures).
5. Trees and other vegetation near overhead lines are to be trimmed to prevent contact with the line.
6. Disconnected overhead lines are to be dismantled as soon as possible after disconnection or, if required in the future, be maintained so that they are electrically and mechanically safe.

Hazardous Areas

1. Refer to Corporate Standard for Hazardous Areas HB# [625195](#).
2. Each site that contains classified Hazardous Areas must maintain a HAVD.
3. When electrical installation work is performed in a hazardous area, it is not to be connected to a source of electricity unless it has been inspected by an accredited auditor who confirms that it is electrically safe and complies with relevant standards.
4. Classification of hazardous areas is in accordance with AS 2340 parts 1, 2 & 3.
5. Selection of electrical equipment for use in hazardous areas is to comply with the requirements specified in AS 2381 series.

6. Installation of electrical equipment in a hazardous area must comply with the requirements specified in AS 2381 series.
7. Workers performing electrical work within a classified hazardous area are to be hazardous area certified. Certification is in accordance with the competencies listed in the HS072 - Hazardous Area Training for Electrical Workers Rationale HB# [550995](#).
8. Inspections of all electrical equipment in a hazardous area must be inspected at least once every four (4) years. Copies of inspection reports must be included in the HAVD.
9. A **Hot Work Control Guide** must be used for any electrical work performed within a classified hazardous area refer to Corporate Standard for Hot Work HB# [560724](#).
10. Current plant hazardous area classification drawings must be used to identify the extent of the hazardous area.
11. Only authorised electrical persons who are hazardous area qualified are to perform fault finding tasks on hazardous area plant.
12. A hazardous area inspection must be completed at the completion of the work if the hazardous area installation has been altered in any way. The completed inspection sheet must be added to the site hazardous area verification dossier.
13. Hazardous Area Documentation for electrical work

A Hazardous Area Maintenance and Repair Report must be used and completed (consulted as part of the planning) for all electrical work in a hazardous area that requires the installation to be altered in any way. This document and other Hazardous Area documentation for electrical work in hazardous areas is located in WORD templates in:

SCL Templates > AOM Stanwell Power Station (STA);

- Hazardous Area Checksheet Equipment in Combustible Dust Areas
- Hazardous Area Checksheet Flameproof Ex d
- Hazardous Area Checksheet Increased Safety Ex e
- Hazardous Area Checksheet Intrinsically Safe Ex i
- Hazardous Area Checksheet Non-sparking Ex n

Removal Of Out Of Service Equipment

1. Electrical equipment that has been decommissioned must be made electrically safe. This can be achieved by disconnecting cabling at the source of supply and at the equipment. Disconnected cables must have all bare parts covered with a suitable insulating material such that they cannot contact nearby live parts and become re-energised.
2. Disconnected cables must be physically removed from the switchboard they were connected into and tagged so as to identify location of the other end.

++ Training and Competency

- + 1. SCL has developed a range of training courses that are designed to achieve a high standard of electrical safety for SCL employees and contractors who perform work on SCL assets. In addition, an SCL worker may have to attend training provided by external training organisations. Details of all training and assessment can be found in the corporate Safety Training Attendance document HB# [560126](#).
- + 2. Below is a brief description of the courses conducted for electrical safety of SCL employees and contractors :
 - HS073 – Module 1 - Authorised Electrical Persons and Electrical Safety Observers HB# [550996](#)
 - HS074 – Module 2 - Specific Requirements for Electrical Work HB# [550998](#)
 - HS069 - Rescue from LV equipment – Outlines the techniques for rescuing personnel from low voltage equipment
 - HS026 - Resuscitation – Details basic CPR techniques HB# [551028](#)
 - HS075 – High Voltage Access and Isolation Principles HB# [550999](#) – Authorisation course for a person to become a Switching Officer or HV Switching Assistant.
 - HS072 - Hazardous area electrical course – Certifies the trainee to install and maintain electrical equipment in hazardous areas HB# [550995](#)

Licensed Electrical workers intending to perform electrical work must complete:

- Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training HB# [550996](#) before exposure to live electrical parts; and
- Module 2 (HS074) – Authorised Electrical Worker HB# [550998](#)

Apprentices must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training HB# [550996](#) before exposure to live electrical parts.

Electrical Engineers intending to perform electrical work must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training HB# [550996](#) before exposure to live electrical parts.

Restricted Electrical License holders intending to perform electrical work must complete:

- Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training HB# [550996](#) before exposure to live electrical parts; and
- Module 2 (HS074) – Authorised Electrical Worker HB# [550998](#)

Electrical Safety Observers must complete Module 1 (HS073) – Authorised Electrical Persons and Electrical Safety Observer training before exposure to live electrical parts.

HV Switching Officers and HV Switching Assistants are to be trained, competent and authorised in the following:

- HS073 - Module 1 - Authorised Electrical Persons and Electrical Safety Observers HB# [550996](#)
- HS074— Module 2 - Specific Requirements for Electrical Work HB# [550998](#)
- HS026 - Resuscitation HB# [551028](#)
- HS069 - Rescue from live switchgear HB# [550991](#)
- HS075 - High Voltage Isolation and Access Principles HB# [550999](#)

Record Keeping

1. Records of inspections and results for electrical equipment, investigation reports and ESO notifications are to be retained for at least five (5) years.

+ + Review

- + This corporate standard will be reviewed every three years or as necessary due to changes in legislation.

+ Links and References

- + QLD Electrical Safety Act, Regulations and Codes of Practice 2002

AS/NZS 2210.1:1994 Occupational protective footwear – Guide to selection, care and use.
AS/NZS 2225:1994 Insulating gloves for electrical purposes
AS/NZS 2978:1995 Insulating mats for electrical purposes
AS/NZS 3000:2007 Wiring Rules
AS/NZS 3001:2001 Electrical Installations – Relocatable premises and their site installations.
AS/NZS 3012:2003 Electrical installations – Construction and demolition sites
AS/NZS 3100:2002 Approval and test specification – General requirements for electrical equipment
AS/NZS 3760:2003 In-service safety inspection and testing of electrical equipment
AS/NZS 4836:2001 Safe working on low voltage electrical installations
AS/NZS 4761.1: 2003 Competencies for working with electrical equipment for hazardous areas
AS/NZS 2340 Classification of hazardous areas.
AS/NZS 2381 Electrical equipment for explosive atmospheres – selection, installation and maintenance.
AS2790:1989 Electricity generating sets –Transportable
HB 301:2001 Electrical Installations – Designing to the wiring rules
AS/NZS 1892.5:2000 Portable ladders – Selection, safe use and care
American Standard NFPA 70: National Electrical Code.

HB# [560126](#): Safety Training Attendance
HB# [559896](#): Corporate Procedure Safe Access to Plant and Equipment (PTW)
HB# [560737](#): Falls and Falling Objects
HB# [560792](#): Fault Finding on Low Voltage Electrical Equipment
HB# [560793](#): Electrical Testing to Prove **De-energised** Requirements
HB# [560794](#): Maintaining Electrical Tools, Protective Devices & Clothing
HB# [560791](#): Live Electrical Maintenance Work – Control Guide
HB# [560724](#): Hot Work
HB# [559896](#): Corporate Procedure Safe Access to Plant and Equipment (PTW)
HB# [559144](#): Portable Ladders
HB# [551028](#): HS026 - Resuscitation
HB# [550991](#): HS069 - Rescue from live switchgear
HB# [625195](#): Hazardous Areas
HB# [623734](#): Hazardous Areas Awareness Training
HB# [551042](#): HS043 – Hazardous Area Awareness Training Rationale
HB# [550995](#): HS072 - Hazardous Area Training for Electrical Workers training Rationale
HB# [551027](#): HS021 – HEHI Hot Work Training Rationale

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- + +
- + HB# [550996](#): HS073 - Module 1 – PTW Requirement and Procedures for Authorised Electrical Person and Electrical Safety Observer (inc. Safe Use of Multimeter) - **Training Rationale**
- HB# [579295](#): HS073 - Module 1 – PTW Requirement and Procedures for Authorised Electrical Person and Electrical Safety Observer (inc. Safe Use of Multimeter) - **Presentation**
- + HB# [579294](#): HS073 - Module 1 – PTW Requirement and Procedures for Authorised Electrical Person and Electrical Safety Observer (inc. Safe Use of Multimeter) - **Participants Notes**
- HB# [646258](#): HS073 - Module 1 – PTW Requirement and Procedures for Authorised Electrical Person and Electrical Safety Observer (inc. Safe Use of Multimeter) – **Training Validation**
- HB# [646394](#): HS073 - Module 1 – PTW Requirement and Procedures for Authorised Electrical Person and Electrical Safety Observer (inc. Safe Use of Multimeter) – **Safe of Multimeter Competency Validation Sheet**
- HB# [550998](#): HS074 - Module 2 – PTW Specific Requirements for Electrical Work - Training Rationale
- HB# [521408](#): HS074 - Module 2 – PTW Specific Requirements for Electrical Work - **Presentation**
- HB# [521411](#): HS074 - Module 2 – PTW Specific Requirements for Electrical Work - **Participant's notes**
- HB# [645559](#): HS074 - Module 2 – PTW Specific Requirements for Electrical Work - **Training Validation**
- HB# [550999](#): HS075 - High Voltage Isolation and Access Principles

PTW Power Distribution Competency Validation Sheet - Can be found via WORD > PTW > Training > Training Validation > Electrical > OIC & PTW Officer Power Distribution

Electrical Safety and Test Report Post Maintenance - Can be found via WORD > PTW > File > New

Electrical Safety and Test Report New Installation - Can be found via WORD > PTW > File > New

+ + Attachments

- + Attachment 1: Training and Authorisation Requirements
- Attachment 2: Exclusion Zones
- + Attachment 3: Apprentice Supervision Guidelines
- + Attachment 4: Electrical Work Requirements Summary
- + Attachment 5: Specific Electrical Isolation Steps
- Attachment 6: Electrical Safety Audit Checklist
- Attachment 7: Recording of Electrical Licence Details Form
- Attachment 8: Amendment History

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Attachment 1: Training and Authorisation Requirements

Table 1 – Electrical Training Overview

| Who is Required to do Module | Authorised Electrical Persons, Licensed Electrical Workers, Electrical Safety Observers Use of Multi Meter for Testing LV circuits | Licensed Electrical Workers | HV Switching Officers and HV Switching Assistants | Other Training Related to Electrical Work |
|----------------------------------|--|---|--|---|
| Name of Module | HS073 - MODULE 1 Requirements and Procedures for Authorised Electrical Persons & Electrical Safety Observers. | HS074 - MODULE 2 Specific Requirements for Electrical Work | HS075 –Switching Operator Assistant’s Course | HS043 - Hazardous Area Awareness Training Rationale HS069 - Low voltage switchboard rescue HS026 - Resuscitation HS072 - Hazardous Area Training for Electrical Workers Training Rationale PTW |
| Summary of Module Content | <ul style="list-style-type: none"> ▪ Basic facts about electricity ▪ Effects of electricity on the human body ▪ ESA & ESR requirements ▪ Electrical plant familiarisation ▪ Electrical plant hazards ▪ Exclusion zones ▪ PPE and PPE zone ▪ Specific electrical plant isolation & locking ▪ Testing to prove de-energised ▪ Use of Electrical Safety Observers ▪ Electrical Safety Observer responsibilities ▪ Tools & Equipment ▪ Signs, tags & barricades ▪ SCL standards and procedures ▪ Emergency procedures ▪ Incident & event reporting ▪ Authorisations for work | <ul style="list-style-type: none"> ▪ Working on live equipment ▪ Live electrical maintenance work control guide ▪ High fault currents ▪ Unfinished work ▪ LEP responsibilities ▪ Testing required on completion of work ▪ Limitations when fault finding ▪ De-commissioned equipment ▪ Supervising apprentices | <ul style="list-style-type: none"> ▪ HVIA procedures ▪ Interface with other entities | HS069 - Low voltage switchboard rescue HS026 - Resuscitation HS072 - Hazardous Area PTW |

Table 2: Authorisation Guide

| SCL Authorisation Level | Untrained | SCL Electrical Safety Observer | SCL Authorised Electrical Person (Includes Instructed Person) | SCL Authorised Licensed Electrical Worker |
|---|---|--|--|--|
| Electrical Training | | MODULE 1 | MODULE 1 | MODULE 2 |
| Limits | No electrical work No Electrical Safety Observer authorisation | - Observes electrical work - Checks for hazards - Performs no work | - Allows access to plant - Perform limited electrical tasks as per specific authorisation - Exemptions under legislation | - Allows access to plant - Perform electrical work |
| Who | | - Any trained and authorised person by SCL | - PTW Officers - Licensed Electrical personnel - Electrical Engineer limited to the work directly required by the role. - Electrical apprentice - Any other person that requires this as part of their role including Contractors | - Licensed Electrical Trade - Restricted Electrical licensed |
| Examples of Tasks based on Role, authorisation and training | | - Observe the safety of persons performing electrical tasks when working within an electrical PPE zone | - Electrical safety observer - Perform LV isolations - Test to Prove De-energised on LV systems - Reset TOLs - Transformer Bay Entry - Fault finding on LV circuits (electrical personnel) - HV Single feed isolations and does not include physical plant switching and test to prove de-energised. - Entry within PPE Zone for LV cabinets etc. | - Electrical Work - HV Switching (as authorised by SCL) - Fault finding on LV circuits |

General Guide to Electrical Fitter and Electrical Mechanic Competencies.

What electrical fitter licence authorises

Subject to particular conditions or restrictions included in the licence, an electrical fitter licence authorises the holder to perform all electrical equipment work.

Example of what the holder of an electrical fitter licence may do—

- electrical work, whether in a workshop or on site, of building, manufacturing, fitting, assembling, erecting, operating, testing or repairing electrical equipment

What electrical mechanic licence authorises

Subject to particular conditions or restrictions included in the licence, an electrical mechanic licence authorises the holder to perform all electrical work.

Examples of what the holder of an electrical mechanic licence may do—

- installing or changing an electrical installation or electric line
- maintaining, repairing, or connecting to a source of electricity, an item of electrical equipment

Attachment 2: Exclusion Zones

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Exclusion zone tables:

- The exclusion zone for a person for an electrical part, or for operating plant or a vehicle for an electrical part, means the distance from the part stated for the person, plant or vehicle in the following tables.

| Exclusion Zones for Exposed Parts | | | | | | | |
|---|--------------------------|---|--|---|--|--|------|
| Nominal phase to phase voltage of exposed part | Exposed Parts | | Operating Plant Operated by | | Vehicle Operation by | | |
| | Untrained person (mm) | Authorised person or instructed person (mm) | Untrained person for the exposed part (mm) | Authorised or instructed person for the exposed part, with Electrical Safety Observer or another safe system (mm) | Untrained person for the exposed part (mm) | Authorised person or instructed person for the exposed part (mm) | |
| Low voltage (with consultation with person in control of exposed part) | 1000 | No exclusion zone prescribed | 3000 | 1000 | 600 | 600 | |
| Low voltage (without consultation with person in control of exposed part) | 3000 | | | | | | |
| Above low voltage, up to 33kV (with consultation with person in control of exposed part) | 2000 | 700 | 6000 | 1200 | 900 | 700 | |
| Above low voltage, up to 33kV (without consultation with person in control of exposed part) | 3000 | | | | | | |
| Above 33kV up to 50kV | | | | | | | 750 |
| Above 50kV up to 66kV | | | | | | | 1000 |
| Above 66kV up to 110kV | | | | 1800 | | | |
| Above 110kV up to 132kV | | | | | 2100 | 1200 | |
| Above 132kV up to 220kV | 4500 | 1800 | 6000 | 2400 | 2900 | 1800 | |
| Above 220kV up to 275kV | 5000 | 2300 | | 3000 | | 2300 | |
| Above 275kV up to 330kV | 6000 | 3000 | 8000 | 3700 | 3400 | 3000 | |
| Above 330kV up to 400kV | | 3300 | | 4000 | | 3300 | |
| Above 400kV up to 500kV | | 3900 | | 4600 | | 3900 | |
| Nominal pole to pole earth dc voltage of exposed part | Exposed Parts (as above) | | Operating Plant Operated by (as above) | | Vehicle Operation by (as above) | | |
| +/- 25kV | 3000 | 700 | 3000 | 1200 | 900 | 700 | |
| +/- 85kV | | 1000 | | 1800 | | 1000 | |
| +/- 150kV | | 1200 | | | | 1200 | |
| +/- 270kV | 4500 | 1800 | 6000 | 2400 | 2900 | 1800 | |
| +/- 350kV | 5000 | 2500 | | 3200 | | 2500 | |
| +/- 400kV | 6000 | 2900 | | 3600 | | 2900 | |

For applying the tables the information listed below, applies:

- For a person, the person includes any article of clothing worn by the person, and any conductive object the person is holding or carrying.
- For operating plant, the operating plant includes anything the operating plant is handling.
- Where operating plant is used without a Electrical Safety Observer or another safe system, the person (be they authorised or instructed) is to be taken as being an untrained person, unless:
 - the operating plant is fitted with a device capable of stopping the operation of the plant immediately when the plant is at the exclusion zone for an authorised/instructed person for the electrical part and checks are undertaken to ensure that this device is operating properly and set for at least the correct exclusion zone distances,
 - there is in place a safe system of work for the use of the operating plant, and this system provides for persons and property, the same or greater level of electrical safety than the level of electrical safety that could be provided with a Electrical Safety Observer, and
 - The safe system of work has been developed in consultation with persons who are broadly representative of industrial organisations of employees whose members commonly operate plant of the plant's type.
- For a vehicle, the vehicle includes anything the vehicle is carrying or otherwise handling.
- A vehicle does not include reference to an aircraft, or a vehicle that is operating plant.

| Exclusion Zones for Low Voltage Overhead Insulated Electric Lines | | | | | | |
|---|------------------------------|---|---|--|---|---|
| Low voltage overhead insulated electric line | Electric Line | | Operating Plant Operated by | | Vehicle Operation by | |
| | Untrained person (mm) | Authorised person or instructed person (mm) | Untrained person for the electric line (mm) | Authorised or instructed person for the electric line, with Electrical Safety Observer or another safe system (mm) | Untrained person for the electric line (mm) | Authorised person or instructed person for the electric line (mm) |
| With consultation with, and with insulation verified by, an authorised person for the electric line | No exclusion zone prescribed | No exclusion zone prescribed | 1000 | No exclusion zone prescribed | 300 | No exclusion zone prescribed |
| Without consultation with, and without insulation verified by, an authorised person for the electric line | 3000 | | 3000 | | 600 | 600 |

| Exclusion Zones for High Voltage Overhead Insulated Electric Lines | | | | | | |
|--|--------------------------|---|---|--|---|---|
| Nominal phase to phase voltage of high voltage overhead insulated electric line | Electric Line | | Operating Plant Operated by | | Vehicle Operation by | |
| | Untrained person (mm) | Authorised person or instructed person (mm) | Untrained person for the electric line (mm) | Authorised or instructed person for the electric line, with Electrical Safety Observer or another safe system (mm) | Untrained person for the electric line (mm) | Authorised person or instructed person for the electric line (mm) |
| Above low voltage , up to 33kV (with consultation with person in control of the electric line) | 2000 | 700 | 3000 | 700 | 900 | 700 |
| Above low voltage , up to 33kV (without consultation with person in control of the electric line) | 3000 | | | | | |
| Above 33kV up to 50 kV | | 750 | | 750 | | |
| Above 50kV up to 66 kV | | 1000 | | 1000 | 2100 | 750 |
| | | | | | 1000 | 1000 |
| Nominal pole to earth dc voltage of electric line | Electric Line (as above) | | Operating Plant Operated by (as above) | | Vehicle Operation by (as above) | |
| +/- 25kV | 3000 | 700 | 3000 | 700 | 900 | 700 |
| +/- 85kV | | 1000 | | 1000 | 2100 | 1000 |

Attachment 3: Apprentice Supervision Guidelines

Table 1 – Table of Guidelines

| Activity Description | Level of Supervision |
|---|--|
| Cable Tray Installation Tray & Duct, Ladder, Tray Suspension Brackets, Fixings. | First Year Direct Second Year General Third Year General Fourth Year Broad |
| Conduit Installation Conduit, Conduit Fittings, (J/Boxes, Bends, Etc). | First Year Direct Second Year General Third Year General Fourth Year Broad |
| Rough-In Light and Power Catenaries Wire/Fixings, Building Wire, TPS Cables & Ties, Plug Bases. Stud Brackets, TPS Cable Dressing (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year General Third Year General Fourth Year Broad |
| Sub-main Installation Cable Pulling, Fixings. (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year General Third Year General Fourth Year Broad |
| Mains Installation Cable Pulling, Main Earth, Main Earth Electrode, Fixings. Bus duct. (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year General Third Year General Fourth Year Broad |
| Distribution Board Installation Install Switchboard, Lugs, Glands, All Terminations (Including Sub Circuits), Fixings, Service Pillars, Take Off Boxes. (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year Direct Third Year General Fourth Year General |
| Main Switchboard Installation Install Switchboard, Lugs, Glands, All Terminations (Including Sub Circuits), Fixings. (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year Direct Third Year General Fourth Year General |
| Light Fitting and Bake Light Installation Lights, Fixings, Supports, Trunking, Suspensions, Tubes & Lamps, Socket Outlets, Switch Plugs, Mounting Blocks, Plaster Brackets. (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year General Third Year General Fourth Year Broad |
| Testing Testing Of Installation For Compliance, Labeling, Preparation Of D/B Legends (Not Accessible To Contact With Electricity Supply) | First Year Direct Second Year Direct Third Year Direct Fourth Year General |
| Fault Finding (Accessible to contact with electricity supply) During the fault finding process, the supervising Authorised Licenced Electrical Worker must demonstrate to the apprentice the correct procedures for fault finding. The apprentice in the immediate presence of the supervising Authorised Licenced Electrical Worker can then carry out fault finding tasks. | First Year Not Permissible Second Year Direct Third Year Direct Fourth Year Direct |
| Test to Prove De-energised for an isolation Apprentices can perform test to prove de-energised under the supervision of an Authorised Licenced Electrical Worker for training purposes. Testing to prove de-energized is a function of the plant isolations procedure and sign off can only be done by authorized persons. | First Year Not Permissible Second Year Not Permissible Third Year Not Permissible Fourth Year Not Permissible |
| Test Before Touching After a Permit To Work has been issued, the supervising Authorised Licenced Electrical Worker is to ensure the apprentice carries out the testing procedures to confirm the equipment to be worked on has been de-energized before work commences. | First Year Not Permissible In First Six Months Then Direct. Second Year Direct Third Year Direct Fourth Year Direct |

| Activity Description | Level of Supervision |
|--|---|
| Electrical Safety Observer 1. Fault finding on low voltage electrical installations or equipment that is energised. 2. Testing of low voltage electrical equipment that introduces an energy source (voltage or current) such as bench testing equipment. Live low voltage electrical maintenance work that is to be done without a plant isolation. Testing of high voltage electrical equipment that introduces an energy source (voltage or current), including injection testing, dielectric loss angle (DLA), etc.* The apprentice must be able to demonstrate competence in performing the required tasks before performing the Electrical Safety Observer role for the task. They must also complete the relevant Electrical Safety Observer training and authorization. | First Year Not Permissible Second Year Not Permissible* Third Year Permissible* Fourth Year Permissible* |
| Live Maintenance Work Performing electrical work on low voltage equipment that is energized. The equipment is being altered in some way by the use of tools. | First Year Not Permissible Second Year Not Permissible Third Year Not Permissible Fourth Year Direct |

Table 2 – Description of Terms

| Term | Description |
|--|--|
| Direct Supervision | This means the Authorised Licenced Electrical Worker is to work with the apprentice, constantly reviewing the work practices and standard of the apprentice's work. The Authorised Licenced Electrical Worker shall be readily available in the immediate area, within audible range (earshot) and where possible within visual contact of the apprentice. |
| General Supervision | This means the apprentice does not require constant attendance of the on site supervising Authorised Licenced Electrical Worker but requires face to face contact on site during the day with the supervising Authorised Licenced Electrical Worker to check on the work being performed and to provide the apprentice with additional instructions and assistance. As part of General Supervision, the supervising Authorised Licenced Electrical Worker shall provide the apprentice with instruction and direction for the tasks being performed with progressive checks and tests being made during the work being undertaken |
| Broad Supervision | This means the apprentice does not require constant attendance of the on site supervising Authorised Licenced Electrical Worker but requires face to face contact with the supervising Authorised Licenced Electrical Worker on site to check on the apprentice and the work being carried out by the apprentice. As part of Broad Supervision, the supervising Authorised Licenced Electrical Worker shall provide the apprentice with instruction and direction for the tasks being performed with checks and tests being made prior to commissioning and/or energizing of circuit(s) and or apparatus/equipment. |
| Accessible to contact with electricity supply | This means that the person is in a position where they can personally make contact with live electrical equipment and wiring including making contact via tools or conductive material with live electrical components. |
| Application of these guidelines | The above guidelines have been developed to assist Authorised Licenced Electrical Workers and others in providing supervision to electrical apprentices during their on the job training. The guidelines reflect the intent of "effective supervision" as defined in electrical safety legislation. |
| Not covered by these guidelines | The Occupational Health and Safety Acts place a duty on employers to provide such supervision to employees as necessary to enable the employees to perform their work in a manner that is safe and without risks to health. The use of the above guidelines in no way removes or limits the employer's duty under Occupational Health and Safety legislation. |

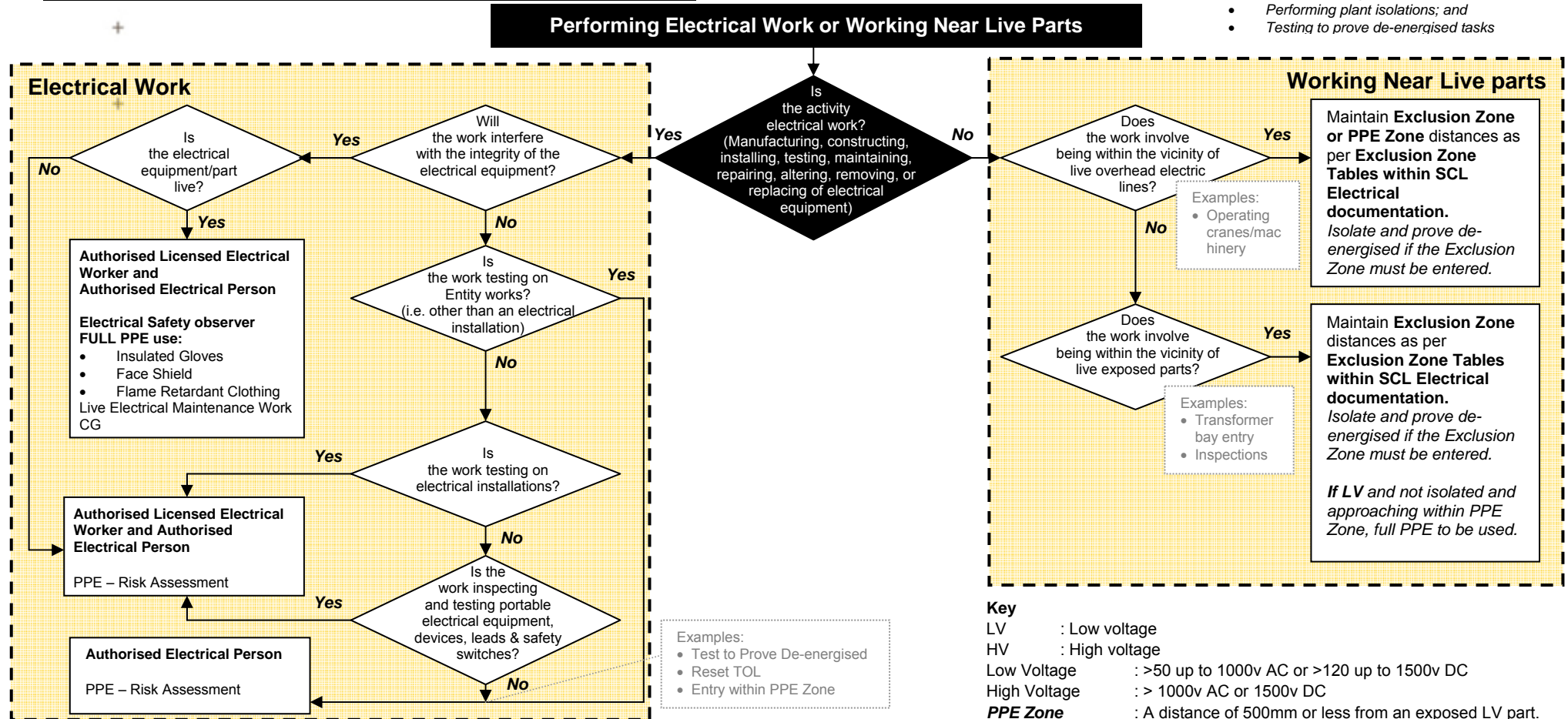
Amd Date 22/11/06

Attachment 4 : Electrical Work Requirements Summary

Chart 1 – Electrical Work or Working where there are Electrical Hazards

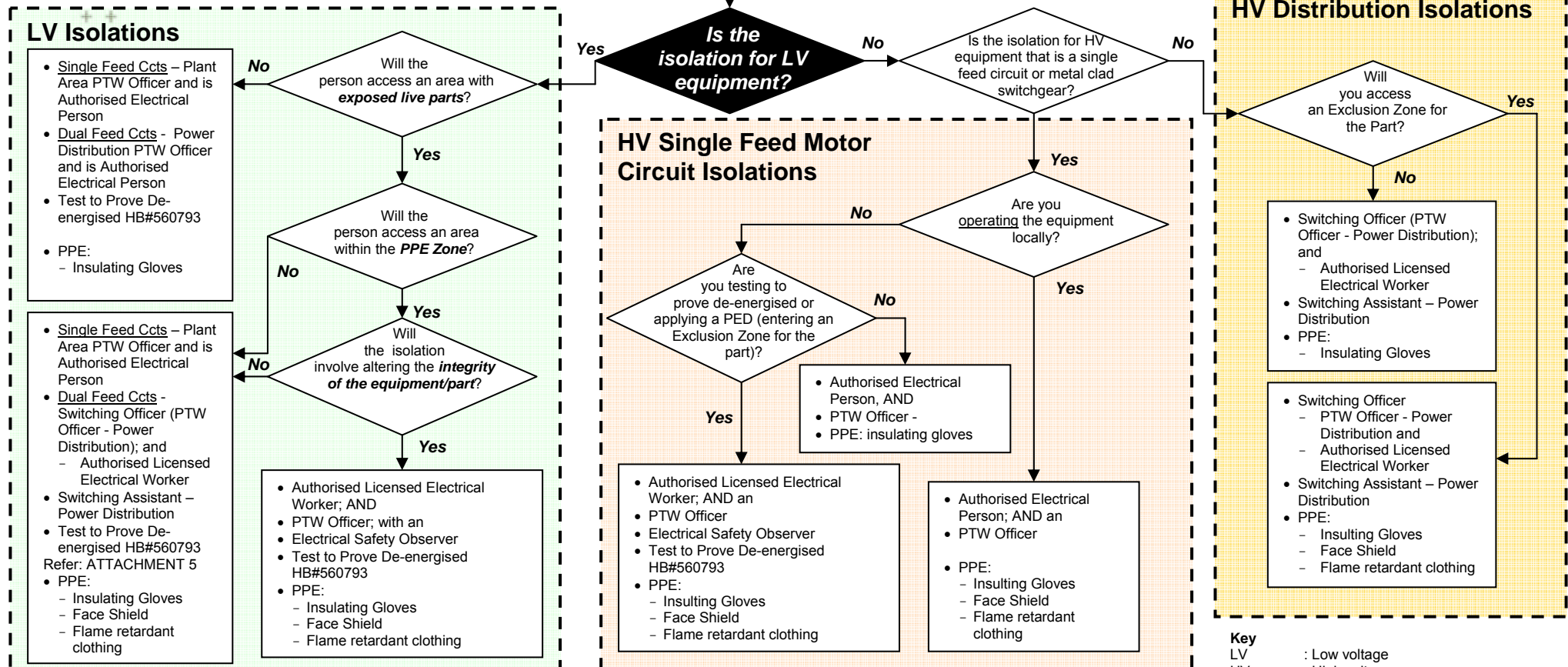
Note: Refer to the following flow charts for activities that are:

- Performing plant isolations; and
- Testing to prove de-energised tasks



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Chart 2 – Plant Isolations Involving Electrical Equipment



Note: Testing to Prove De-energised refers to HB#560793:

- Testing performed as part of verifying each isolation step; and
- Testing performed at the end of the isolation process to verify that the electrical equipment/part is de-energised and electrically safe to work on.

Key

LV : Low voltage

HV : High voltage

Low Voltage : >50 up to 1000v AC or >120 up to 1500v DC

High Voltage : > 1000v AC or 1500v DC

PPE Zone : A distance of 500mm or less from an exposed LV part.

Attachment 5: Specific Electrical Isolation Steps

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Isolation of 415v and HV Single Feed Circuits

- + The purpose of this section is to standardise the practice of isolation of electrical switchgear to ensure a safe and adequate isolation. This section applies to all isolations involving the operation of 415V and HV switchgear where there is only one point of supply (eg. Motor feeds). ***If there is more than one point of supply (dual feeds) a Switching Sheet is required.***

Isolation of Circuits

There are two main types of isolation:

- a) Isolation to allow access to the driven machinery for non-electrical work.
- b) Isolation to allow access to the normally energised plant for **electrical work**.

Low Voltage:

- a) Isolation of LV circuits to allow access to driven machinery

1. Alternative A - No access to switchgear internals

- The isolation here uses the contactor as a secondary isolation point as a backup to the main isolator. The control circuit is isolated (via the Lock Stop) to prevent the contactor from being energised.
- Although the contactor cannot by itself be regarded as sufficient isolation, it will provide a second contingency in the event of an undetected failure of the isolator.
- The isolation is proven by operating the local motor start pushbutton.
- This alternative shall only be used when the Local Start / Lock Stop station is tested regularly. i.e. at least once every four years.

Isolation Steps

1. Control Selector Switch – Select Off.
2. 415V Power Circuit Breaker or Isolator - Open and attach Danger Tag and lock.
3. Control Selector Switch – Select Motor
4. Operate the Local Start Button and test that the drive does not start.
5. Local Lockout Stop – Operated and attach Danger Tag.

2. Alternative B - Requires Testing for **De-energisation**

- This isolation requires access to the switchgear internals to test for **de-energisation**. The test for **de-energisation** must be performed by an **Authorised Electrical Person**.
- This alternative must be used when the Local Start / Lock Stop station is not tested regularly. i.e. at least once every four years and may be used instead of Alternative A if the **OIC** prefers this method.

Isolation Steps

1. Control Selector Switch – Select Off.
2. 415V Power Circuit Breaker or Isolator – Open.
3. Test for de-energisation on load side of 415V Power Circuit Breaker or Isolator.
4. 415V Power Circuit Breaker or Isolator – Attach Danger Tag and lock.

b) Isolation of LV Circuits to allow access to normally energised circuits for electrical work

- **Isolation of LV Circuits to allow access to normally energised circuits for electrical work**
- The isolation points are disabled, locked and a Danger Tag attached by the **PTW Officer**. An **Authorised Electrical Person** shall test for **de-energisation** on the load side of the isolation points, then sign the Isolating Guide Step to indicate that the step has been completed.
- The **Authorised Licensed Electrical Worker** should always check the isolation and test for **de-energisation** at the piece of plant before commencing any work.

Isolation Points

1. Control Supply Circuit Breaker – Open, attach Lock Dog, padlock and Danger Tag
2. Control Selector Switch – Select Off
3. 415V Power Circuit Breaker or Isolator – Open, attach padlock and Danger Tag.

Testing Points

At the Switchboard by an **Authorised Electrical Person** during the isolation:

1. Load side of power Isolator.
2. Load side of control circuit breaker.
3. By the **OIC or Authorised Licensed Electrical Worker**:
 - Motor terminals if access is required.

High Voltage:

- a) Isolation of HV circuits to allow access to driven machinery

Isolation Points

1. Circuit Breaker – Check Open
2. Control Selector Switch – Select Off.
3. Circuit Breaker – Check Open then Rack Out and attach Danger Tag and lock.

- b) Isolation of HV circuits to allow access to normally energised circuits for electrical work

- In addition to isolation from supply to permit access to HV circuits, they must be earthed at the switchboard and proven **de-energised** at the work location. Danger Tags shall be attached to all isolation and earthing points.

Isolation Points

1. Control Selector Switch – Select Off
2. Circuit Breaker – Check Open then Rack Out, apply padlock to parrot beak and attach Danger Tag to padlock.
3. Control Circuit Breaker – Select Off, apply Lock Dog and padlock. Place Danger Tag on padlock.

Earthing

1. Check that the circuit breaker is locked in the racked out position.
2. Close the Earth Switch. Apply padlock to Earth Switch locking mechanism. Remove the small earth switch key and attach Danger Tag and small key to padlock.

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Attachment 6: Recording of Electrical Licence Details Form

The information below is required to be added to site induction forms to enable the capture of the status of electrical licenses.

The *Electrical Safety Act 2002* requires Stanwell Corporation Limited to keep a register containing certain information regarding electrical licenses held by employees.

Holders of electrical work licences engaged to perform or supervise electrical work for Stanwell must notify Stanwell in writing of a change in their licence status within 14 days of the change happening. Stanwell must update the licence register within 7 days of notification of a change.

Please complete the table below relating to any electrical licences you currently hold.

Note: Where more than one (1) licence type is listed on the same licence document, please place the same licence number against each licence type below.

Site Induction Data Table

| License Type | Licence # | Expiry Date | State |
|---|-----------|-------------|-------|
| <input type="checkbox"/> Electrical Fitter & Mechanic Licence | | | |
| <input type="checkbox"/> Electrical Mechanic Licence | | | |
| <input type="checkbox"/> Electrical Lineperson Licence | | | |
| <input type="checkbox"/> Electrical Fitter licence | | | |
| <input type="checkbox"/> Electrical Jointer Licence | | | |
| <input type="checkbox"/> Electrical Contractor Licence | | | |
| <input type="checkbox"/> Restricted Electrical Work Licence | | | |
| <input type="checkbox"/> Electrical Work training permit | | | |
| (Other, please specify) | | | |
| (Other, please specify) | | | |

Note: Where multiple licences appear on the same licence document but are not listed above, please list each licence type and enter the same licence number against each.

Please detail any changes/limitations in the status of your Licence/s and include the date on which this status changed. (Changes include the suspension, cancellation, surrender, expiration, non renewal, amendment of authorised work or activities or conditions or restrictions, renewal, reinstatement).

| | |
|--|--|
| | |
|--|--|

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Attachment 7: Electrical Safety Audit Checklist

Page 1 of 7

 SCL Site: _____ Date: ____ / ____ / ____ Conducted By: _____ Position: _____
(Print First & Last Names)

| Item | Status | | Action Required | Responsible Person | Completed (Insert Date & Initials) |
|--|------------------------------|-----------------------------|-----------------|--------------------|------------------------------------|
| General Controls | | | | | |
| PTWs & Live Electrical Maintenance Control Guides for all live electrical maintenance work on low voltage equipment completed and filed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Low voltage rescue kits are available and contain the following equipment: | | | | | |
| ▪ insulated crook? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ 1000 volt rated insulating gloves? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ "Isolate Here in Emergency" sign? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ fire blanket? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ burns dressing? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Torch? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| System in place to ensure low voltage rescue kit equipment and mats are tested annually? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Low voltage rescue kit marked with manufacturer' name and test date due and for "LV Only"? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Flame retardant clothing has been issued and has been recorded on their personal issue card? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Electrically rated face shields have been issued? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |

| Item | Status | | Action Required | Responsible Person | Completed (Insert Date & Initials) |
|---|------------------------------|-----------------------------|-----------------|--------------------|------------------------------------|
| | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Electrical workers can access latest version of drawings? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Insulated hand tools are available? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Barriers available for live work? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Testing & Safety | | | | | |
| Electrical Safety and Test Reports from contractors who perform electrical work on SCL owned fixed equipment are filed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Electrical Safety and Test Reports from SCL workers who perform electrical work on SCL owned fixed equipment are filed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Testing to Prove De-energised | | | | | |
| Verification of tests to prove de-energised recorded within Plant Isolation Control Guides and filed with PTWs? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Test Equipment | | | | | |
| Instruments used for measuring insulation resistance have incorporated discharge function? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Test equipment such as Multi meters, RCD performance testers, earth-loop impedance testers, voltage testers, insulation resistance testers and similar instruments, tested at 12-monthly intervals (minimum)? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Test equipment for low voltage circuitry tested to 1000 volts AC and 1500 volts DC? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Calibration of testing equipment undertaken at 12-monthly intervals (minimum)? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Testing instruments for continuity tests have accuracy of 5% full scale deflection or better? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |

| Item | Status | | Action Required | Responsible Person | Completed (Insert Date & Initials) |
|---|------------------------------|-----------------------------|-----------------|--------------------|------------------------------------|
| Multi-meter test leads are Category III rated with type A probes? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Testing instruments used for electrical work are on the 'Approved' Electrical Test Equipment Register? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Each testing instrument has a durable sticker affixed to it to indicate it has been tested and calibrated? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| PPE | | | | | |
| All items of PPE and clothing used for electrical work are free from metal materials? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Insulated gloves are tested 6 monthly and are marked with working voltage rating? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Insulated gloves used for indirect contact with high voltage equipment are Class 0? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Face shields for live electrical work cover full face and have no metal parts? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Personnel have been given instructions on how to clean flame retardant clothing? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| PPE stored away from heat, chemicals, moisture and mechanical damage? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Tools | | | | | |
| Tools used for performing live low voltage electrical work & fault finding are insulated to minimum of 1000 volts AC? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Insulated mats are 'Class A' rated to 650 volts (minimum), are tested six monthly? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Insulated mats are marked with the following: | | | | | |
| ▪ Classification/voltage rating? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Re-test date? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |

| Item | Status | | Action Required | Responsible Person | Completed (Insert Date & Initials) |
|--|------------------------------|-----------------------------|-----------------|--------------------|------------------------------------|
| | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Tools (continued) | | | | | |
| Portable electrical tools are marked with their working voltage limit? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Portable electrical tools and equipment within current testing dates and tagged? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Portable electrical equipment fitted with appropriate guarding? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Insulation, earth continuity and operational tests of portable electrical equipment carried out in accordance with 560794 ? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Suitable method of communicating the following established: | | | | | |
| <ul style="list-style-type: none"> ▪ Notice that scheduled inspection & testing of portable equipment is to occur and when? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| <ul style="list-style-type: none"> ▪ Which equipment is required to be inspected and tested? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Training & Competency | | | | | |
| Persons undertaking work on or near live parts trained as "Authorised Electrical Persons" in accordance with this Corporate Standard? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Workers who work on or near live electrical equipment have received training in low voltage switchboard rescue and cardio pulmonary resuscitation? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Workers who perform Electrical Safety Observer duties have received training in low voltage switchboard rescue and cardio pulmonary resuscitation? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |

| Item | Status | | | Action Required | Responsible Person | Completed (Insert Date & Initials) |
|--|------------------------------|-----------------------------|-----------------------------|-----------------|--------------------|------------------------------------|
| Incident Recording | | | | | | |
| All dangerous and serious electrical incidents are reported to external authorities? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | | |
| All electrical incidents are investigated and reports filed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | | |
| Electrical Installations | | | | | | |
| All 240 volt general purpose outlets are RCD protected? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | | |
| Portable generators in accordance with AS 2790:1989? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | NA <input type="checkbox"/> | | | |
| Overhead Lines | | | | | | |
| Warning signs installed for overhead lines displaying the height of the conductors above ground? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | | |
| Lines that cross SCL roadways have height indicators installed with exclusion zone information displayed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | NA <input type="checkbox"/> | | | |
| Trees and other vegetation near overhead lines trimmed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | NA <input type="checkbox"/> | | | |
| Hazardous Areas | | | | | | |
| Electrical installations and electrical equipment for use in hazardous areas complies with AS 2381 series? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | NA <input type="checkbox"/> | | | |
| Workers performing electrical work within hazardous areas certified in accordance with AS/NZS 4761? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | NA <input type="checkbox"/> | | | |

| Item | Status | | Action Required | Responsible Person | Completed (Insert Date & Initials) |
|---|------------------------------|-----------------------------|-----------------|--------------------|------------------------------------|
| Registers / Records | | | | | |
| Register of licensed electrical workers who undertake electrical work kept? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Register of Authorised Electrical Persons kept? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Register of all SCL owned portable electrical equipment established / maintained and contains records of the following: | | | | | |
| ▪ Formal inspections and tests? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Repairs? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Faulty equipment? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Testing results of low voltage rescue kits and insulated mats also detailed / recorded in Register? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| Register of all SCL owned electrical testing equipment established / maintained and contains records of the following: | | | | | |
| ▪ Formal inspections and tests? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Calibration? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Repairs? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| ▪ Faulty equipment? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |
| 'Approved' Electrical Test Equipment Register established / maintained in accordance this Corporate Standard.? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | | | |

Amd Date 22/11/06

Attachment 8: Amendment History

| | Act/Reg/AS Reference | Date of Change | Document Updated | Name | Checked |
|-----|---|-----------------------|-------------------------|-------------|----------------|
| 1. | s 12 (j) – ES Reg 2002 | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 2. | s 18 (2)c – 5 year records. + Added new heading “Record Keeping” and updated + “MAINTAINING ELECTRICAL TOOLS, PROTECTIVE DEVICES & CLOTHING” HB#709585 | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 3. | s 62 (1) (e,f) – Refer to Specific Underground and In-situ Electrical Considerations | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 4. | S 83, 87 –Requirements for recording info on Test Tags - ‘Testing for Safety’ – added additional information to Corporate Procedure “MAINTAINING ELECTRICAL TOOLS, PROTECTIVE DEVICES & CLOTHING” HB#709585 | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 5. | S 155 (3) – Not incorporated because this refers to consumer installations | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 6. | S158 (3) - Not incorporated because this refers to testing by a distribution entity | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 7. | S 201 – Not applicable to SCL - Applicable to Distribution Entity | Jul 07 | 20 Sep 07 | P.Cox | S.Hannay |
| 8. | Overhead lines clauses 2 and3 deleted heights and exclusion zones from overhead line signs | N/A | 20 Sep 07 | P.Cox | S.Hannay |
| 9. | Hazardous Areas – Updated | N/A | 20 Sep 07 | P.Cox | S.Hannay |
| 10. | Definition of Electrical Installation Work added | N/A | 20 Sep 07 | P.Cox | S.Hannay |
| 11. | Work on Electrical Equipment by Overseas Specialists added | N/A | 20 Sep 07 | P.Cox | S.Hannay |
| 12. | Amended charts 1 and 2 and deleted Chart 3 | | 13 Nov 07 | P.Cox | S.Hannay |
| 13. | Amended previous references to AS/NZS3000:2000 to AS/NZS3000:2007 | Nov 07 | 11 Dec 07 | S.Hannay | P.Cox |
| 14. | Removed references to other States due to sale of wind farms. | Dec 07 | 11 Dec 07 | S.Hannay | P.Cox |
| 15. | References to ATW removed to make PTW version, corrected terminology and formatting. | Jan 08 | | P.Cox | S.Hannay |
| 16. | ES and Another Regulation Amendment Regulation (N0.1) 2007 - Added recording of electrical licence details and added Attachment 6 | Mar 08 | 4 Mar 08 | P.Cox | S.Hannay |
| 17. | Updated Response to Electric Shock as per SCL Safety Instruction 2007/1 dated 17/12/07 | April 08 | 2 April 08 | P.Cox | S.Hannay |