

# Business Procedure

## Electrical Safety Standard

**Document Number – ASM-STD-ENG-03**

This document applies to the following sites:

<b>All Sites</b>	<input type="checkbox"/>				
<b>Rockhampton Office</b>	<input checked="" type="checkbox"/>	<b>Brisbane Office</b>	<input checked="" type="checkbox"/>	<b>Tarong Site</b>	<input checked="" type="checkbox"/>
<b>Barron Gorge Hydro PS</b>	<input checked="" type="checkbox"/>	<b>Kareeya Hydro PS</b>	<input checked="" type="checkbox"/>	<b>Mica Creek PS</b>	<input checked="" type="checkbox"/>
<b>Koombooloomba Hydro PS</b>	<input checked="" type="checkbox"/>	<b>Swanbank PS</b>	<input checked="" type="checkbox"/>	<b>Mackay Gas Turbine</b>	<input checked="" type="checkbox"/>
<b>Wivenhoe Small Hydro PS</b>	<input checked="" type="checkbox"/>	<b>Stanwell PS</b>	<input checked="" type="checkbox"/>	<b>Meandu Mine</b>	<input type="checkbox"/>

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## 1.0 Purpose

To provide a corporate standard that clearly outlines Stanwell Corporation Limited's requirements and processes for managing all aspects of electrical safety, including competency requirements for those personnel supervising, performing electrical work or acting as safety observers.

## 2.0 Scope

This procedure applies to all electrical work on electrical equipment greater than extra low voltage, on Stanwell Corporation Limited (SCL) generation sites. This applies to all SCL employees, contractors, apprentices, trainees, students, vendor representatives, visitors and volunteers.

It applies for the duration of the generation operations, including the decommissioning and disposal phases of generation assets.

It does not apply to SCL Mining sites, or SCL sites supporting mining or exploration.

It does not apply to electrical work performed by building maintenance contractors at SCL Corporate Offices not located on generation sites. It also does not apply to electrical installations on Generation sites still under control of a Principal Contractor.

Note: Where Qld State legislation, Code of practice or Australian Standard is superior, this takes precedence over this procedure.

## 3.0 Authorisations and Licencing

### 3.1 Responsibilities

Obligations for all roles involving electrical work are outlined in the Electrical Safety Act 2002. These are to be adhered to at all SCL generation sites.

### 3.2 Authorisations to perform electrical work

**All electrical work must be completed in accordance with relevant Qld legislation, Codes of practice, Australian Standards and SCL procedures.**

All licenced electrical work must be carried out by licenced electrical workers or competent electrical personnel as prescribed in the Electrical Safety Act and who have been authorised to perform electrical work on SCL sites.

Competent personnel may include Electrical Engineers, Electrical Apprentices, Electrical Trainee and Students. Work is limited to the requirements of their profession or calling.

#### Authorised Positions within SCL

Authorised Licenced Electrical Worker (ALEW)

Authorised Electrical Person (AEP) (Engineers, Apprentices, Trainees and Students)

Authorised Non Electrical Person (ANEP) (Isolation Officer, Safety Observer)

**See Appendix 1**

There must be a process at each SCL site to maintain employee competence, with scheduled recertification/refresher periods. The intent of recertification is to ensure that personnel authorised under this procedure maintain currency with changes to Legislation, Codes of practice, Australian Standards and SCL procedures.

The current recertification periods are:

- |   |         |
|---|---------|
| 1. Qld Electrical Licence   | 5 Years |
| 2. Hazardous Areas qualifications   | 3 Years |
| 3. <i>Electrical Workers and Electrical Safety Observer</i><br>(Resuscitation and LV rescue)    | 1 Year  |
| 4. Electrical Induction for SCL Licenced Electrical Workers<br>and Competent Electrical Persons | 5 Years |
| 5. Electrical Induction for SCL Non Electrical Persons  | 3 Years |
| 6. Contractors Licenced Electrical Workers and Non Electrical Persons                           | 3 Years |

It is a requirement in Queensland that any workers required to perform, or help in performing, electrical work that they are competent in rescue and resuscitation.

All contractor recertification/refreshers are to be managed within their own internal processes.

**Training Persons**

Training persons in their first six months of apprenticeship or training program must not work in the immediate vicinity of a live high voltage exposed part or where there is risk of contact with Low voltage exposed parts.

Training persons will be appropriately supervised at all times by a licenced electrical worker. Guidelines to assist with appropriate supervision is provided in **Appendix 2**

Training Persons in their 3rd or 4th Years assisting with Hazardous Areas electrical work must hold a certificate of completion for Electrical Equipment for Hazardous Areas Training.

**3.3 Training and Competency**

**There will be a process to develop and manage electrical safety training and verification of competence at all sites.**

- There will be a process to ensure that all electrical workers are recruited with the necessary licences and competencies.
- A site register of electrical workers and copies of all licences and competencies will be retained.
- Electrical safety training and recertification will be provided to all SCL authorised positions under this procedure.
- Contractors will manage their own statutory compliance training in-house.
- All Training records must be retained on file as per relevant legislation.
- Licences, training records and competency verification by contractors must be readily available for auditing purposes.
- There will be a system in place to train and authorise personnel in LV switchboard rescue and resuscitation.

## 4.0 Electrical Work

### 4.1 Energised Electrical Work

**Energised electrical work will not be undertaken until all other options are exhausted. There will be a process for energised electrical work, at all SCL sites. At SCL sites when working on energised LV equipment, the ‘Energised Electrical Work’ process is to be followed at all times. Refer to corporate procedure ASM-PROC-ENG-MAN-9**

Work on energised equipment is permitted in the following circumstances:

- It is necessary in the interests of health and safety that the electrical work is carried out on the equipment while the equipment is energised; or
- It is necessary that the electrical equipment to be worked on is energised in order for the work to be carried out properly; or
- It is necessary for the purposes of testing required under section 15 of the regulations (test to prove de-energised)
- There is no reasonable alternative means of carrying out the work

‘Energised Electrical Work’ can include:

- Testing to prove de-energised LV and HV
- Energised fault finding and testing on LV equipment
- Workshop bench testing.(connecting test supplies, fault finding and equipment testing i.e. insulation resistance, temporary supplies)
- Polarity Testing, Phase rotation testing and Fault loop impedance testing where fit for purpose plug in testing devices are not used.
- LV and HV equipment testing, after it has been Isolated or Not Electrically Connected (Hipot, DLA, PD, IR)
- Maintenance on LV energised electrical equipment (Generator brush gear, Motor/Eddy Current Coupling brush gear, Battery banks, Replacement or repair of electrical equipment)
- Work on de-energised equipment that encroaches within 500mm of exposed conductive parts. (Referenced by AS/NZS 4836 Safe working on or near low-voltage electrical installations and equipment)

Fault finding should always be performed with equipment de-energised, before progressing to energised work.

LV Energised Electrical Work will be approved with the use of an energised Electrical Work SWMS that has been verified and authorised.

No energised HV electrical maintenance is allowed on SCL entity equipment, by SCL employees. Energised HV electrical maintenance on SCL overhead distribution equipment shall only be performed by authorised and competent external Live Line specialists.

### 4.2 Verification

**All electrical work, and electrical installations require verification to prove it is ‘electrically safe’ before return to service, in accordance with relevant Legislation and Australian standards.**

- There must be a process to independently review, register and retain results of all completed test certificates and test results.
- A Certificate of Testing and Compliance must be completed by the Electrical Contractor and provided to SCL.
- A Testing & Verification form detailing the test results will be completed for all electrical work.

### 4.3 Audits

**There must be a process of scheduling electrical safety audits at each site, to ensure compliance is maintained with this Electrical Safety Standard.**

- All sites will have a process to conduct High Voltage (HV) and Hazardous Area (HA) audits.
- All audits will be completed by competent electrical personnel with auditing qualifications or equivalent experience.
- High Voltage (HV) Audits must be completed for all work on HV electrical equipment prior to connection to a source of supply and in accordance with site HV audit processes.

- Hazardous Areas (HA) Audits must be completed for all work on HA electrical equipment, except where compliant faulty equipment is replaced with like for like equipment. Audits will be completed in accordance with site HA audit processes. All completed audits are to be added to the HAVD.

#### 4.4 Work by OEM

**All SCL sites will have a process for OEM's to be authorised to perform specialist electrical work without an electrical licence.**

- Any OEM (who is recognised as holding the necessary expertise with our plant and equipment or with similarities to our own plant and equipment) may have overseas trained specialists who service specific items of equipment, who do not hold recognised Qld electrical trade qualifications.
- Work will be limited to plant and equipment that is Not Electrically Connected to a source of supply.

#### 4.5 Arc Flash

**All power systems are to be designed, operated and maintained to protect personnel from arc flash hazards, in accordance with relevant legislation and codes.**

- Where practical electrical equipment at each location where an arc flash hazard exists must be labelled. Labelling must identify the incident energy, arc flash protection boundary and category of PPE to be worn.
- Each site must have an arc flash hazard management procedure and PPE guide.
- Each site must also have current arc flash hazard assessment data available, where practical prospective fault current levels will be represented diagrammatically in electronic or hardcopy media.
- A process must be in place to review and update the arc flash hazard assessment data and labelling, after power systems upgrades or power system changes.
- Power systems must be designed and configured to minimise the incident energy level to as low as reasonably practical.
- Where the incident energy is  $>40\text{cal/cm}^2$ , work shall only be performed when risk assessment and controls has lowered the risk to an acceptable level. This may also include the need to isolate, where controls can not reduce the risk. Where practical, engineering solutions should be considered to permanently reduce the incident energy levels.
- For equipment that has no isolation point (e.g. DC battery systems), and which may have high incident energy levels a risk assessment shall be completed. The risk assessment must take into account the equipment can not be isolated during an arc flash event and suitable controls must be in place to mitigate the risk.
- Authorised personnel must be trained in arc flash hazards and the correct use of arc flash PPE.

### 5.0 Safe Work Procedures

#### 5.1 General

*There must be a process detailing the SCL risk assessment method to manage hazardous Electrical tasks.*

*Equipment specific and job risk assessments must be developed for all electrical work. The use of generic risk assessment templates as a guide is recommended provided they have been reviewed and authorised.*

*Safe work procedures/work instructions must be developed and maintained for all work that involves electrical hazards.*

#### 5.2 Exclusion Zones

**All personnel must work through the hierarchy of controls to choose the control that most effectively eliminates or minimises the risk of working near energised electrical parts, so far as is reasonably practical. This may involve a single measure or a combination of two or more different controls.**

- All sites are to manage Exclusion Zones for HV & LV Overhead and Underground electric lines in accordance with Electrical Safety Regulation (ESR) 2013 Schedule 2 and Codes of Practice.
- All sites are to manage Exclusion Zones for HV equipment in accordance with ESR 2013 Schedule 2.
- When using Administrative controls on LV equipment (i.e. Exclusion Zone), all sites will reference AS/NZS 4836 and/or ESR 2013 Schedule 2.
- Exclusion Zones must be established for all overhead electric lines and the clearances defined.
- A system must be in place that identifies the height of overhead electric lines and maximum heights for mobile equipment working or passing underneath.
- All work with cranes in close proximity to overhead electric lines must identify exclusion zone distances on the working copy of the risk assessment. The risk assessment must include the use of a Safety Observer.
- All crane operators and rigging personnel must be trained/or instructed in the hazards of working in proximity to overhead or underground electric lines and equipment.
- Excavation permit to work procedures must include the marking and identifying of buried cables.
- Authorised personnel entry within HV equipment exclusion zones is prohibited unless equipment has been isolated and earthed.
- Only authorised personnel are permitted to work within a LV exclusion zone.

### 5.3 EMF Hazards

**There must be a process to manage EMF hazards at each site. Each site will have an EMF management procedure, to address the following:**

- An EMF hazards register
- Signage to identify EMF hazard areas
- Controls to minimise exposure.
- Plant arrangement drawings with EMF zoning where practical.
- Training to authorise personnel to work where EMF hazards exist.
- Restrictions for personnel with medical conditions affected by EMF
- EMF; review requirement for retesting no later than every 10 years, or after plant modifications that alter the EMF zoning.

### 5.4 Electrical Incidents, Injury and Reporting

**There will be a system in place to identify report and investigate all electrical incidents.**

- All electrical incidents will be reported, using the SCL incident reporting processes.
- All sites will have a detailed procedure to manage response to electric shock.
- There will be a tool to assist with determination of a 'Serious electrical incident' and 'Dangerous electrical event' - T-2145 – Notifiable Incidents Checklist
- All 'Serious electrical incidents' and 'Dangerous electrical events' will be reported to the regulator, by the fastest means possible.

### 5.5 Hazardous Areas (HA)

**There will be a process at each generation site to maintain compliance with Hazardous equipment legislation, Codes and Australian Standards. All sites will comply with the SCL HA management procedure. Refer to Corporate Strategy for Management of Hazardous Areas ASM-PROC-STG-MAN-05.**

- Each site must have a HAVD, and a process to maintain the HAVD.
- Classification of each HA, and HA Zoning must be included in the HAVD.
- Each site must have a register of all HA equipment installed in HA.
- There will be a schedule in place to inspect, maintain and test electrical equipment in Hazardous Areas.
- There will be a process to audit electrical work in Hazardous Areas.
- There will be a process whereby any equipment that is electrically unsafe is disconnected, or isolated, from its electricity supply and is not reconnected until it is repaired or tested and found to be safe, or is replaced or permanently removed from service.
- There will be a process for training to authorise personnel to perform electrical work within a Hazardous Area, in accordance with relevant Australian Standards.
- There must be a process to maintain HA compliance.

## 6.0 Electrical Isolation and Access

**SCL Electrical equipment will be isolated in accordance with SCL Isolation and Access procedures.**

- All electrical equipment ISOLATED for electrical access must be verified as de-energised in accordance with SCL procedures, before work commences Refer Corporate Test to Prove De-energised Procedure ASM-PROC-ENG-MAN-10.
- Generic isolation templates, Isolation procedures, and standard risk assessments are to be utilised wherever possible.
- Work on energised LV equipment will be in accordance with SCL energised electrical work process.
- All electrical isolation points will be locked. The use of locking devices during the isolation will not introduce additional hazards. Where isolation points do not have facilities for locking, then another approved means of securing the isolation point must be provided.
- Each site will have a process for High Voltage Isolation and Access (HVIA), training, authorisation, and recertification.
- Equipment with multiple LV sources of supply will be isolated in accordance with SCL HVIA principles and procedures.
- There will be a process to ensure that all personnel in the various Isolation and access roles will be trained, authorised and recertified.
- Each site will have a process that allows safe access to switchboard bus sections for maintenance.

## 7.0 Electrical Equipment

### 7.1 Portable Electrical Equipment and RCD's

**All sites will have systems in place to manage Portable Electrical Equipment, to comply with Electrical Safety Regulation 2013, Codes of Practice and Australian Standards. Refer to Corporate Procedure for Testing and Tagging of Portable Appliances ASM-PROC-ENG-MAN-15.**

- Portable electrical equipment and RCD's must be maintained in a 'fit for purpose' condition.
- There must be site processes to ensure that suitable equipment is purchased, registered for use on site, maintained, and removed from service for repair or replacement when defective.
- A register of all portable electrical equipment and RCD's is to be maintained, and items are to be tested periodically in accordance with the relevant Legislation, Australian standards and SCL procedures.
- Welder outputs are to be protected by Hazard Reduction Devices (e.g. Voltage Reduction Device or hand piece trigger switch) in accordance with relevant Australian Standards.
- All welders are to be electrically tested periodically, in accordance with relevant Australian Standards
- Residual Current Devices (RCD's) shall be installed on all socket outlet final subcircuits with a rated current not exceeding 20A, in accordance with AS/NZS 3000
- RCD's shall be installed on all new or altered lighting circuits, including circuits where known hazards exist, in accordance with AS/NZS 3000
- RCD's shall be tested periodically in accordance with relevant Australian Standards.

### 7.2 Electrical Testing, Tools and Trade Equipment

**All sites will have systems in place to manage Electrical Testing, Tools and Trade Equipment, to comply with Electrical Safety Regulation 2013, Codes of Practice and Australian Standards.**

- Equipment must be maintained in a 'fit for purpose' condition.
- There must be site processes to ensure that suitable equipment is purchased, registered for use on site, maintained, and removed from service for repair or replacement when defective.
- A register of all equipment is to be maintained, and items are to be tested periodically in accordance with the relevant legislation and standards.

- There will be a process to ensure that all personnel who are required to use equipment will be trained, authorised and recertified.
- As a minimum testing will be performed in line with the periods stated within **Appendix 3**; Electrical Testing and Safety Equipment Routine Inspection Table.

### 7.3 Personnel Protective Equipment (PPE) and Safety Equipment

**All sites will have systems in place to comply with Electrical Safety Regulation 2013, Codes of Practice and Australian Standards.**

- Where no Arc Flash risk is present the minimum standard for electrical clothing is Hi Visibility 100% cotton shirt and pants or overalls and includes any coats or jackets. Electrical workers will not wear synthetic clothing unless it has an appropriate Arc Flash rating and designed for Electrical Arc Flash use.
- Equipment must be maintained in a 'fit for purpose' condition at all times.
- There must be site processes to ensure that suitable equipment is purchased, registered for use on site, maintained, and removed from service for repair or replacement when defective.
- A register of all equipment is to be maintained, and items are to be tested periodically in accordance with the relevant Australian standards.
- There will be a process to ensure that all personnel who are required to use equipment will be trained, authorised and recertified.

### 7.4 Fixed Electrical Equipment

**There will be processes in place to install, operate, maintain and test electrical equipment, to comply with the ESR 2013, Codes and Australian Standards:**

- All modifications and plant changes will follow the Plant Change Management process and be approved prior to making the changes.
- All equipment will be labelled in accordance with equipment register standards.
- All fixed electrical equipment access will be made inaccessible to unauthorised personnel by guarding, and use of special tools.
- All switchboards with exposed live parts will be made inaccessible by, using a tool, key or mechanical interlocking device to prevent unauthorised access. Covers will be securely fixed in place by bolts, screws or other methods as designed.
- Switchboards will have shadowing denoting bus configuration, wherever practical.
- HV equipment must display appropriate warning labels denoting High Voltage.
- There will be a process to restrict access to electrical switchrooms and transformer bays to authorised personnel only.
- All transformer bays with exposed energised equipment will be locked.
- There will be a schedule in place to ensure that Protection systems are periodically inspected, tested and maintained, including backup protection schemes. Frequency of testing will be dependant on plant history, code recommendations and experience.
- Integrity of the power systems protection scheme must be confirmed by periodic functional tests.
- There will be a process to ensure that protective relay setting reviews are included in power systems installations and modifications.
- There will be a process to document protective relay settings and a change management process.
- Protection relay trip events must be documented and checks made to confirm that protection has operated as designed. When trips have subjected circuit protective devices to fault currents and where practical fault clearing time and fault level data is to be recorded and retained.
- There will be a schedule in place to ensure that overhead lines and surrounds are inspected periodically, maintained and tested.
- There will be a schedule in place to ensure that underground earthing systems are inspected periodically, tested and maintained to confirm it meets original design.
- Site excavation processes will be used, when performing excavation around underground electric cables, to ensure that exclusion zones are maintained.
- There will be a process whereby any equipment that is electrically unsafe is disconnected, or isolated, from its electricity supply and is not reconnected until it is repaired or tested and found to be safe, or is replaced or permanently removed from service.



## 7.5 Cathodic Protection Systems.

**Where Cathodic Protection Systems are installed there will be processes in place to install, register, operate, maintain and test cathodic protection systems, to comply with the ESR 2013, Codes and relevant Australian Standards:**

- Cathodic Protection systems will be designed and installed in accordance with AS2832.1 and current legislation.
- Cathodic protection systems must be tested in accordance with Australian standards and legislation prior to operation.
- Registerable systems must not be operated unless currently registered and operated in accordance with the conditions of registration.
- Further testing of systems during registration and operation must be performed as required by legislation and Australian standards.
- Records must be kept for 10 years where the cathodic protection system is an impressed current system or has an anode mass of more than 25kg.

## 7.6 Generator Sets and Temporary Supplies

**Sites will have a process to install, test and maintain generator sets, to comply with the ESR 2013, Codes and Australian Standards: Refer to Corporate Procedure for Welders, Generators and Temporary Supplies ASM-PROC-ENG-MAN-11.**

- Where Generator sets and Temporary supplies are connected to existing electrical systems they will follow the Plant Change Management process and be approved prior to connection.
- There will be a process to ensure that generator sets and temporary supplies are installed and verified in accordance with relevant Australian Standards.
- Equipment must be maintained in a 'fit for purpose' condition at all times while it is in service.
- There must be site processes to ensure that suitable equipment is hired.
- There must be a process whereby equipment is removed from service for repair or replacement when defective.
- There must be a process to ensure that all equipment removed from service and decommissioned is in accordance with relevant Australian Standards.
- Equipment in service shall be tested periodically in accordance with relevant Australian Standards.

## 7.7 Decommissioned Equipment

**There will be a process in place, to comply with the following:**

- Decommissioned equipment must be electrically disconnected from all sources of supply, cabling made electrically safe and equipment made inoperable in accordance with site electrical and isolation decommissioning procedures.
- Wherever practical, decommissioned equipment shall be removed from site and disposed of.
- All relevant electrical documentation will be updated, including the equipment register.

## 7.8 Electrical documentation

**There will be a process to ensure that the necessary documentation for each job is completed and retained.**

All associated electrical documentation required for design, installation, commissioning, operation and maintenance, overhaul and refurbishment; decommissioning and disposal will be maintained and kept current. There will be site procedures to register, update and record electrical documentation.

Examples include (but are not limited to):

- Construction drawings
- Commissioning documentation

- 'As Built' drawings
- Underground services drawings
- Relay Setting Requirements (RSR's)
- Arc Flash Hazard Analysis
- Fault Levels Analysis
- Single Line Diagrams
- Schematic Diagrams
- Cable Schedules
- Termination Schedules
- General Arrangement Drawings
- Logic Diagrams
- Process and Instrumentation Diagrams (P&ID's)
- Instrumentation Loop Diagrams
- Calibration Sheets
- Maintenance Results Sheets
- Inspection and Test Plans (ITP's)
- HV Audit forms
- Hazardous Areas Audit forms
- Hazardous Areas Verification Dossier (HAVD)
- Electrical Installation/Equipment Verification Forms
- Safe Work System Documentation
- Risk Assessments
- Business Procedures
- Maintenance Procedures
- Operating Procedures
- Maintenance and Operating Manuals

## 8.0 Occupational Health and Safety Requirements

Throughout this procedure, the highest possible safety standards must be practised at all times.

- Compliance with Qld Electrical Safety Act 2002 and Regulation 2013
- Compliance with Qld Work Health and Safety Act 2011 and Regulation 2011
- Codes of Practice
- Australian Standards

All electrical work or other work that has associated electrical hazards requires a hazard and risk assessment to be completed before work is commenced. The SCL hazard and risk management processes must be followed.

## 9.0 Environmental Requirements

Throughout this procedure, the highest possible environmental standards must be practised at all times.

All relevant Statutory Environmental Regulations must be adhered to.

Compliance with the Environmental Protection Act 1994 and Regulation 2008.

## 10.0 Review and Consultation (Prior to Approval)

This Document is required to be reviewed, as a minimum, every 3 year/s

The content of this document will be checked and consulted on by the Corporate Electrical Safety Committee after each review.

## 11.0 Communication Plan (After Approval)

Sites will be advised about changes to this procedure through a site wide Health and Safety advice and/or through the GenNet safety communication page.

Corporate Electrical Safety Committee site representatives will feed back to relevant site personnel.

## 12.0 References (Including Information Services)

Source	Reference
<b>Legislation &amp; Codes</b>	<ul style="list-style-type: none"> <li>• <a href="#">QLD Electrical Safety Act 2002</a></li> <li>• <a href="#">QLD Electrical Safety Regulation 2013</a></li> <li>• <a href="#">QLD Work Health and Safety Act 2011</a></li> <li>• <a href="#">QLD Work Health and Safety Regulation 2011</a></li> <li>• <a href="#">COP – How to manage work health and safety risks 2011</a></li> <li>• <a href="#">COP – Works 2010</a></li> <li>• <a href="#">COP - Managing Electrical Risks in the Workplace 2013</a></li> <li>• <a href="#">COP - Working near Overhead and Underground Electric Lines 2010</a></li> </ul>
<b>Australian Standards</b>	<ul style="list-style-type: none"> <li>• AS/NZS 3000: 2007 Wiring Rules</li> <li>• AS/NZS 3012: 2010 Construction &amp; Demolition Sites</li> <li>• AS/NZS 3017: 2007 Verification Guidelines</li> <li>• AS/NZS 3010: 2005 Generating Sets</li> <li>• AS/NZS 3760: 2010 Testing of Portable Equipment</li> <li>• AS/NZS 4836: 2011 Safe working on or near LV electrical installations &amp; equipment</li> <li>• AS/NZS 3800: 2012 Electrical equipment for explosive atmospheres - Repair and Overhaul</li> <li>• IEC 60079.19 Ed. 3.0: 2010 Explosive atmospheres - Part 19: Equipment repair, overhaul and reclamation</li> <li>• AS/NZS 61241.0: 2005 Electrical apparatus for use in the presence of combustible dust Part 0: General requirements</li> <li>• AS/NZS 60079.0: 2012 Explosive Atmospheres General Requirements</li> <li>• AS/NZS 60079.10.1: 2009 Classification of explosive gas</li> <li>• AS/NZS 60079.10.2: 2011 Classification of explosive dust</li> <li>• AS/NZS 60079.14: 2009 Explosive atmospheres Part 14: Electrical installations design, selection and erection</li> <li>• AS/NZS 60079.17: 2009 Explosive Atmospheres Inspection and Testing</li> <li>• AS/NZS 60079.25: 2011 Explosive Atmospheres Intrinsically Safe Systems.</li> <li>• AS/NZS 4761.1: 2008 Competencies for working with electrical equipment for hazardous areas (EEHA) Part 1: Competency Standards</li> <li>• AS/NZS 4761.2: 2008 Competencies for working with electrical equipment for hazardous areas (EEHA) Part 2: Guide to assessing competency</li> <li>• AS/NZS 1674.2: 2007 Safety in Welding and Allied Processes, Part II – Electrical</li> <li>• AS/NZS 2790: 1989 Electricity generating sets-Transportable(up to 25kW)</li> <li>• AS/NZS 2067: 2008 Substations and High Voltage Installations</li> <li>• AS/NZS IEC/TR 61000.2.7: 2009 Electromagnetic compatibility (EMC) - Environment - Low frequency magnetic fields in various environments</li> <li>• AS/NZS 60479.1: 2010 Effects of current on human beings and livestock, Part 1: General aspects</li> </ul>
<b>Business Standard</b>	<ul style="list-style-type: none"> <li>• GOV-POL-37 – Business Resilience and Risk Management 16/120876</li> <li>• GOV-PROC-37 - Risk Management Framework 13/575645</li> <li>• GOV-STD-11 - Risk Evaluation Matrix 13/561047</li> <li>• <a href="#">EARS - EARS webpage</a></li> <li>• GOV-PROC-46 - Event Management 15/61091</li> <li>• HB619258 - Authority to Work Standard – Legacy Stanwell 13/1325442</li> </ul>

<b>Business Procedure</b>	<ul style="list-style-type: none"> <li>• CS-PTW-01 - Permit To Work Manual - Legacy CS Energy 13/1013481</li> <li>• HB619259 - Authority to Work Procedure – Legacy Stanwell 13/1325444</li> <li>• CORP-PTW-01 - Permit To Work Manual – Legacy Tarong 13/561514</li> <li>• ASM-PROC-ENG-MAN-12 – Welding Machines, Generators and Temporary Supplies</li> <li>• ASM-PROC-ENG-MAN-11 - HV &amp; LV Switching Procedure</li> <li>• ASM-PROC-ENG-MAN-09 - Energised Electrical Work Procedure 15/21178</li> <li>• ASM-PROC-ENG-MAN-10 - Test to Prove De-energised Procedure 15/41404</li> <li>• ASM-PROC-ENG-MAN-15 – Testing of Portable Electrical Equipment and RCDs 14/6829</li> <li>• ASM-PROC-ENG-MAN-17 - Elect Safety Management – Swanbank &amp; Mica Creek 13/1013344</li> <li>• ASM-PROC-MTC-MAN-03 – Performance of Electrical Work (Tarong) 13/561276</li> </ul>
<b>Stay Safes</b>	<ul style="list-style-type: none"> <li>• ASM-PROC-ENG-MAN-12A – Welding Machines, Generators and Temporary Supplies</li> <li>• ASM-PROC-ENG-MAN-11A - HV &amp; LV Switching Procedure</li> <li>• ASM-PROC-ENG-MAN-09A - Energised Electrical Work Procedure 15/21180</li> <li>• ASM-PROC-ENG-MAN-10A - Test to Prove De-energised Procedure 15/41392</li> <li>• ASM-PROC-ENG-MAN-15A – Testing of Portable Electrical Equipment and RCDs</li> </ul>
<b>External Business Procedure</b>	<ul style="list-style-type: none"> <li>• <a href="#">Powerlink, Energex and Ergon High Voltage Isolation and Access Manual (Orange Book)</a></li> </ul>
<b>Forms</b>	<ul style="list-style-type: none"> <li>• T-1897 - Event Notification Form 13/575558</li> <li>• T-2145 - Electrical Incident Notifiable Decision Tool 13/576515</li> <li>• T-2803 - Test and Verification form 14/120860</li> <li>• T-2823 - Energised Elect Work SWMS Stanwell, Barron and Kareeya Sites 15/34200</li> <li>• T-2808 - Energised Elect Work SWMS Tarong, Swanbank &amp; Mica Creek 15/34197</li> </ul>
<b>Electrical Training</b>	<ul style="list-style-type: none"> <li>• HS210 – Electrical Safety Induction Training for Non - Electrical Persons and Safety Observers</li> <li>• HS211 – Electrical Safety Induction Training for Electrical Workers and Non-Electrical Plant Operations Personnel</li> <li>• HS147 - Test to Prove De-energised for Non Electrical Workers</li> </ul>

## 13.0 Definitions

TERM	MEANING
<b>Arc Flash</b>	Arc Flash is the result of a rapid release of energy due to an arcing fault between a phase bus bar and another phase bus bar, neutral or a ground. During an arc fault the air is the conductor. As a consequence, a person in proximity to such an arc flash can be injured. This rapid release of energy can be accompanied by a blast.
<b>Arc Flash Protection Boundary</b>	An approach limit at a distance from live parts that are uninsulated or exposed within which a person could receive a curable second degree burn. (IEEE1584:2002 Clause 3.13).
<b>Arc Rated Clothing</b>	Clothing that may be made from synthetic inherently fire retardant materials and that has an ATPV rating.
<b>ATPV</b>	Arc Thermal Performance Value. A reported value from electric arc testing. This value is presented in calories per square centimetre (cal/cm <sup>2</sup> ) and represents the maximum capability for arc-flash protection of a particular garment, fabric or item of arc flash hazard management PPE
<b>Authorisation Zone</b>	The zone between the untrained and authorised radius, as per the Electrical Safety Regulation Schedule 2

TERM	MEANING
<b>Authorised Personnel</b>	Term used to include any worker approved by SCL, who undertakes electrical role(s), or work around electrical hazards on SCL sites
<b>Authorised Person, for an electric line, means a person who</b>	<p>(a) has enough technical knowledge and experience to do work that involves contact with, or being near to, the electric line; and</p> <p>(b) has been approved by the person in control of the electric line to do work that involves contact with, or being near to, the electric line, or is authorised to act for the person in control of the electric line</p>
<b>Barrier:</b>	A part providing basic protection from any usual direction of access. (AS3000:2007)
<b>Basic Protection</b>	Protection against dangers that may arise from direct contact with live parts. (AS3000:2007)
<b>Competent</b>	In relation to a task, means a person who has acquired, through training, qualifications, experience or a combination of these, the knowledge and skill to carry out the task. (see Electrical Safety Regulation 2013 Schedule 9)
<b>Construction work</b>	Work carried out in connection with the construction, alteration, conversion, fitting-out, commissioning, renovation, repair, maintenance, refurbishment, demolition, decommissioning or dismantling of a structure. (WHS Regulation S289)
<b>Dangerous Electrical Event</b>	<p>is any of the following—</p> <p>(a) the coming into existence of circumstances in which a person is not electrically safe, if—</p> <p>(i) the circumstances involve high voltage electrical equipment; <u>and</u></p> <p>(ii) despite the coming into existence of the circumstances, the person does not receive a shock or injury;</p> <p>(b) the coming into existence <u>of both</u> of the following circumstances—</p> <p>(i) if a person had been at a particular place at a particular time, the person would not have been electrically safe;</p> <p>(ii) the person would not have been electrically safe because of circumstances involving high voltage electrical equipment;</p> <p>(c) an event that involves electrical equipment <u>and</u> in which <u>significant property damage</u> is caused directly by electricity or originates from electricity;</p> <p>(d) the <u>performance of electrical work by a person not authorised under an electrical work licence to perform the work</u>;</p> <p>(e) the performance of electrical work by a person if, <u>as a result of the performance of the work</u>, a person or property is not electrically safe;</p> <p>(f) the discovery by a licensed electrical worker of <u>electrical equipment that has not been marked as required</u> under this Act (Electrical Safety Act 2002 section 12)</p>
<b>De-energised</b>	Separated from all sources of electricity supply but not necessarily isolated, earthed, discharged or out of commission.
<b>Direct Contact</b>	Contact with a conductor or conductive part that is live in normal service. (AS3000:2007)
<b>Direct Supervision</b>	Supervision occurs at all times on a direct and constant basis
<b>D.L.A.</b>	Dielectric loss angle tests, also called dissipation factor, power factor or tan delta testing is a diagnostic method of testing HV electrical equipment to determine the quality of the equipment insulation.
<b>Eddy Current Coupling</b>	An eddy current coupling (ECC) drive is a device used to convert constant speed rotation input into adjustable speed output. A typical drive consists of two concentrically rotating members (input & output) separated by a small fixed air gap.
<b>Electricity Entity</b>	<p>Is the term given to a participant in the electricity industry in Queensland, they can be one of the following:</p> <ul style="list-style-type: none"> <li>▪ Generation Entity (SCL is a Generation Entity)</li> <li>▪ Transmission Entity</li> <li>▪ Distribution Entity</li> </ul>

TERM	MEANING
<b>Electrical Engineer</b>	Electrical Engineer is defined by the Electrical Safety Act 2002 in schedule 2 - Dictionary
<b>Electrical Equipment</b>	<p>Any apparatus, appliance, cable, conductor, fitting, insulator, material, meter or wire [ESA s14]:</p> <ul style="list-style-type: none"> <li>▪ Used for controlling, generating, supplying, transforming or transmitting electricity at a voltage greater than extra low voltage; or</li> <li>▪ Operated by electricity at a voltage greater than extra low voltage; or</li> <li>▪ Is part of an electrical installation located in an area in which the atmosphere presents a risk to health and safety from fire or explosion or, Is, or is part of, a cathodic protection system</li> </ul>
<b>Electrical Installation</b>	<p>A group of items of electrical equipment that are permanently electrically connected together; and can be supplied with electricity from the works of an electricity entity or from a generating source; and do not include items that are works of an electricity entity.</p> <p><i>(Summary by SCL of Sect 15 of the QLD Electrical Safety Act 2002)</i></p>
<b>Electrical Installation Work</b>	<p>Is electrical work associated with an electrical installation, but does not include the following electrical work:</p> <p>(a) testing, repairing or maintaining electrical equipment included in the electrical installation;</p> <p>(b) electric line work associated with the electrical installation.</p> <p><i>Examples of electrical installation work -</i></p> <ul style="list-style-type: none"> <li>• installing or altering wiring or fixed appliances in a building</li> <li>• installing or altering a switchboard</li> </ul> <p><i>(Section 19 of the ESA 2002)</i></p>
<b>Electrical Line</b>	<p>(1) An electric line is a wire or conductor or associated equipment used for transmitting, transforming, or supplying electricity at a voltage greater than extra low voltage.</p> <p><i>(Section 16 of Qld Electrical Safety Act 2002)</i></p>
<b>Electrical Risk</b>	<p>Means in relation to a person, the risk to a person of death, shock or injury caused directly by electricity or originating from electricity, or</p> <p>In relation to property, the risk to the property of damage caused by a cathodic protection system or loss or damage caused directly by electricity or originating from electricity.</p> <p><i>(Summary by SCL of Sect 10 (1) of the QLD Electrical Safety Act 2002)</i></p>
<b>Safety Observer</b>	<p>Generally, for electrical work, means a person who is competent to implement control measures in an emergency, and to rescue and resuscitate a worker who is carrying out the work, if necessary, and has been assessed in the previous 1 year as competent to rescue and resuscitate a person.</p> <p>For the operation of operating plant, means a person who observes the operating plant and advises the operator of the operating plant if it is likely that the operating plant will come within an exclusion zone for the operating plant for an overhead electric line</p>
<b>Electrical Test and Safety Equipment</b>	<p>Electrical test equipment are items used to verify electrical work is fit for purpose, prior to connection/reconnection to supply (i.e. insulation resistance meters, multimeters, tong testers etc.). Electrical safety equipment are items used to provide protection to electrical workers when working with electrical hazards (i.e. rescue kit, insulating mat etc.)</p>
<b>Electrical Tools and Trade Equipment</b>	<p>Electrical tools and trade equipment are insulated items used in the performance of energised electrical work (i.e. insulated hand tools, insulated ladders etc.)</p>

TERM	MEANING
<b>Electrical Work</b>	Connecting electricity supply wiring to electrical equipment or disconnecting electricity supply wiring from electrical equipment; or Manufacturing, constructing, installing, removing, adding, testing, replacing, repairing, altering or maintaining electrical equipment or an electrical installation. <i>Examples of electrical work:</i> <ul style="list-style-type: none"> <li>• <i>Installing low voltage wiring in a building;</i></li> <li>• <i>Installing electrical equipment into an installation coupler or interconnector;</i></li> <li>• <i>Replacing a low voltage electrical component of a washing machine;</i></li> <li>• <i>Maintaining an electricity entity's overhead distribution system.</i></li> </ul> <i>(Examples of what is not electrical work – refer to Sect 18 of the QLD Electrical Safety Act 2002)</i>
<b>Electrically Safe</b>	Free from electrical risk. <i>(Summary by SCL of Sect 10 (2) of the QLD Electrical Safety Act 2002)</i>
<b>Electrical Safety Observer Zone</b>	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
<b>Enclosure</b>	A part providing an appropriate degree of protection of equipment against external influences and against contact with live parts. <i>(AS3000:2007)</i>
<b>Energised Electrical Work</b>	Electrical work where the LV electrical supply to the equipment or installation is not isolated (e.g. Test and Prove De-energised, Fault Finding, Electrical testing, Verification, Recommissioning, Testing using potentially lethal currents, exposed energised conductors in the vicinity of electrical work )
<b>ESO</b>	Electrical Safety Office – Queensland
<b>Exclusion Zone</b>	For a person, operating plant or vehicle for an overhead electric line, means the distance from the line stated for the person, plant or vehicle in ESR schedule 2
<b>Exposed Conductive Parts</b>	Includes electrical equipment that can be touched by the standard test finger as specified in AS/NZS 3100 and is not live, but can become live if basic insulation fails. The term includes reinforced concrete work or reinforced concrete parts but excludes minor fastenings, wood pole identification discs and street lights
<b>Extra Low Voltage (ELV)</b>	Voltage of 50V or less AC RMS, or 120V or less ripple-free DC <i>“(QLD Electrical Safety Act 2002. schedule 2)”</i>
<b>Fault Finding</b>	The process of taking measurements or carrying out tests on electrical installations and equipment to locate faults or prove operability. It may also include the process of applying testing instruments or devices to various parts of the electrical installation and equipment to determine how the electrical installation and equipment is operating
<b>Free from Electrical Risk</b>	For a person or property, means that electrical risk to the person or property has been eliminated, so far as is reasonably practicable; or If it is not reasonably practicable to eliminate electrical risk to the person or property, the risk has been minimised so far as is reasonably practicable. (see ESA section 10)
<b>Hazardous Area</b>	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.
<b>Hazardous Area Verification Dossier (HAVD)</b>	A register of all electrical equipment and electrical work performed in the classified hazardous area
<b>High Voltage (HV)</b>	Voltage exceeding 1000 volts AC or 1500 volts ripple-free DC <i>“(QLD Electrical Safety Act 2002. schedule 2)”</i>

TERM	MEANING
<b>High Fault Current for Live Extra Low Voltage</b>	Current equal to or exceeding 1000Amps
<b>Hipot</b>	Hipot is an abbreviation for high potential. It is a HV test performed to confirm reliability of an electrical insulation system. The test is typically a go/no-go test and can cause premature failures in older equipment.
<b>Instructed person</b>	For an electric line, means a person who is acting under the supervision of an authorised person for the electric line
<b>Isolated</b>	Means disconnected from all possible sources of electricity supply and rendered incapable of being made energised without premeditated and deliberate action.
<b>Insulated</b>	Separated from adjacent conducting material by a non-conducting substance or airspace permanently providing resistance to the passage of current, or to disruptive discharges through or over the surface of the substance or space at the operating voltage, and, to obviate danger of shock or injurious leakage of current. (AS3000:2007)
<b>I.R.</b>	The insulation resistance (IR) test (also commonly known as a Megger) is a spot insulation test which uses an applied DC voltage to measure insulation resistance in either k $\Omega$ , M $\Omega$ or G $\Omega$ . The measured resistance is intended to indicate the condition of the insulation or dielectric between two conductive parts, where the higher the resistance, the better the condition of the insulation.
<b>Lethal Current</b>	AS60479.1 5.3 <i>Threshold of Let go</i> is defined as 10mA. This is the upper threshold where a human can release from an electric current. 10mA has been used to define what is a lethal current at all SCL sites. <i>Note: AS60479.1 5.5 Threshold of Ventricular Fibrillation</i> is defined as 40mA (and this is used to define a lethal current in the HVIA Orange Book), however this has not been used. Note also that when testing circuits involving lethal currents, there are no RCD's, and therefore no protection from lethal current
<b>License exemptions</b>	A person is not required to hold an electrical licence for the purpose of the following. (a) performance or supervision of electrical work for the purpose of installing or repairing telecommunications cabling; (b) performance or supervision of electrical work in practising the person's profession as an electrical engineer; (c) performance or supervision of remote rural installation work; (d) performance or supervision of electrical work as part of the testing of electrical equipment that the person is authorised to do under a regulation; (e) performance, as an apprentice, of electrical work in a calling that requires the apprentice to perform electrical work; (f) performance, as a trainee, of electrical work in a calling that requires the trainee to perform electrical work of a type prescribed under a regulation; (g) performance, as a student, of electrical work as part of training under the supervision of teaching staff at— (i) a university; or (ii) a college, school or similar institution conducted or approved by a department of the State or of the Commonwealth.
<b>Live Part</b>	A conductor or conductive part intended to be energised in normal use, including a neutral conductor and conductive parts connected to a neutral conductor. <i>Note: A Multiple Earthed Neutral (MEN) connection and the neutral bar at which an MEN connection is made is not considered a live part.</i>



TERM	MEANING
<b>Low Voltage (LV)</b>	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
<b>Manufacturing work</b>	Manufacturing work means that work of assembly, disassembly, fabrication, installation, maintenance, manufacturing, refurbishment or repair, but does not include amusement work, construction work or rural industry work.
<b>Multiple Sources of Supply</b>	Where two or more sources of supply at the same voltage are present. They will normally be identified as a primary and secondary source, either of which can supply the electrical equipment by auto or manually changeover.
<b>Nominal Voltage</b>	The value of the voltage by which the electrical installation or part of the electrical installation is designated and identified e.g. the nominal voltage is not the float or boost voltage of the battery charger
<b>Not Electrically Connected</b>	Electrical apparatus disconnected from all sources of supply by the removal or absence of conductors, appropriate to the voltage and insulating medium and, not able to be energised by switching and identified in accordance with an approved procedure (HVIA Orange Book definition).
<b>OEM</b>	Original equipment manufacturer.
<b>On or near</b>	A situation where an electrical worker is working on or near exposed energised conductors or live conductive parts and there is a reasonable possibility that the electrical worker’s body, or any conducting medium the electrical worker may be carrying or touching during the course of the work, may come closer to the exposed energised conductors or live conductive parts than 500mm. The term ‘on or near exposed energised conductors or live conductive parts’ does not apply if the uninsulated and energised part is safely and securely shielded by design, or segregated and protected with barricades or insulated shrouding or insulating material to prevent inadvertent or direct contact. (AS/NZS 4836:2011 Clause 1.6.23)
<b>P.D.</b>	Partial Discharge is an electrical discharge or spark that bridges a small portion of the insulation between two conducting electrodes. Partial Discharge activity can occur at any point in the insulation system, where the electric field strength exceeds the breakdown strength of that portion of the insulating material.
<b>PPE</b>	Personal protective equipment
<b>PPE Zone</b>	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.
<b>RCD</b>	Residual Current Device ( Earth Leakage Circuit Breaker)
<b>RPEQ</b>	Registered Professional Engineer Queensland
<b>SCL</b>	Stanwell Corporation Limited
<b>SCL ‘Specified’ Service Work &amp; Office Work.</b>	<b>Specified’ Service Work &amp; Office Work:</b> Is an Environment where the equipment or supply flexible cord is used only within an SCL specified Service Work or Office Work Environment where all general purpose outlets are protected by an approved safety switch.
<b>Serious Electrical Incident:</b>	is an incident involving electrical equipment if, in the incident [ESA s11] - (a) a person is killed by electricity; <u>or</u> (b) a person receives a shock or injury from electricity, <u>and</u> is treated for the shock or injury by or under the supervision of a doctor; <u>or</u> (c) a person receives a shock <u>or</u> injury from electricity at <u>high voltage</u> , <u>whether or not</u> the person is treated for the shock or injury by or under the supervision of a doctor.
<b>Standard Test Finger</b>	A device used to determine minimum clearances around electrical parts as per the dimensions set out in the IEC Standard 61010
<b>Switchgear</b>	Equipment for controlling the distribution of electrical energy, or for controlling or protecting circuits, machines, transformers, or other equipment. (AS3000:2007)

TERM	MEANING
<b>Temporary supply test leads</b>	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.
<b>Testing</b>	The use of test instruments or test equipment by a competent person
<b>Test Before Touching</b>	A test to ensure that an electrical part is de-energized. This test must be performed by an Authorised person before working on or near an electrical part that has been isolated to allow electrical work to take place.
<b>Untrained Person</b>	For an electric line, means a person who is not an authorised person or an instructed person for the electrical line.
<b>Verification/Verified</b>	Electrical Testing to verify installation or equipment is 'electrically safe' prior to supply connection/reconnection.
<b>VRD</b>	Voltage Reduction Device (installed on welding machines)
<b>Works of an Entity</b>	The electrical equipment and electric line associated equipment, controlled or operated by an entity to generate, transform, transmit or supply electricity.

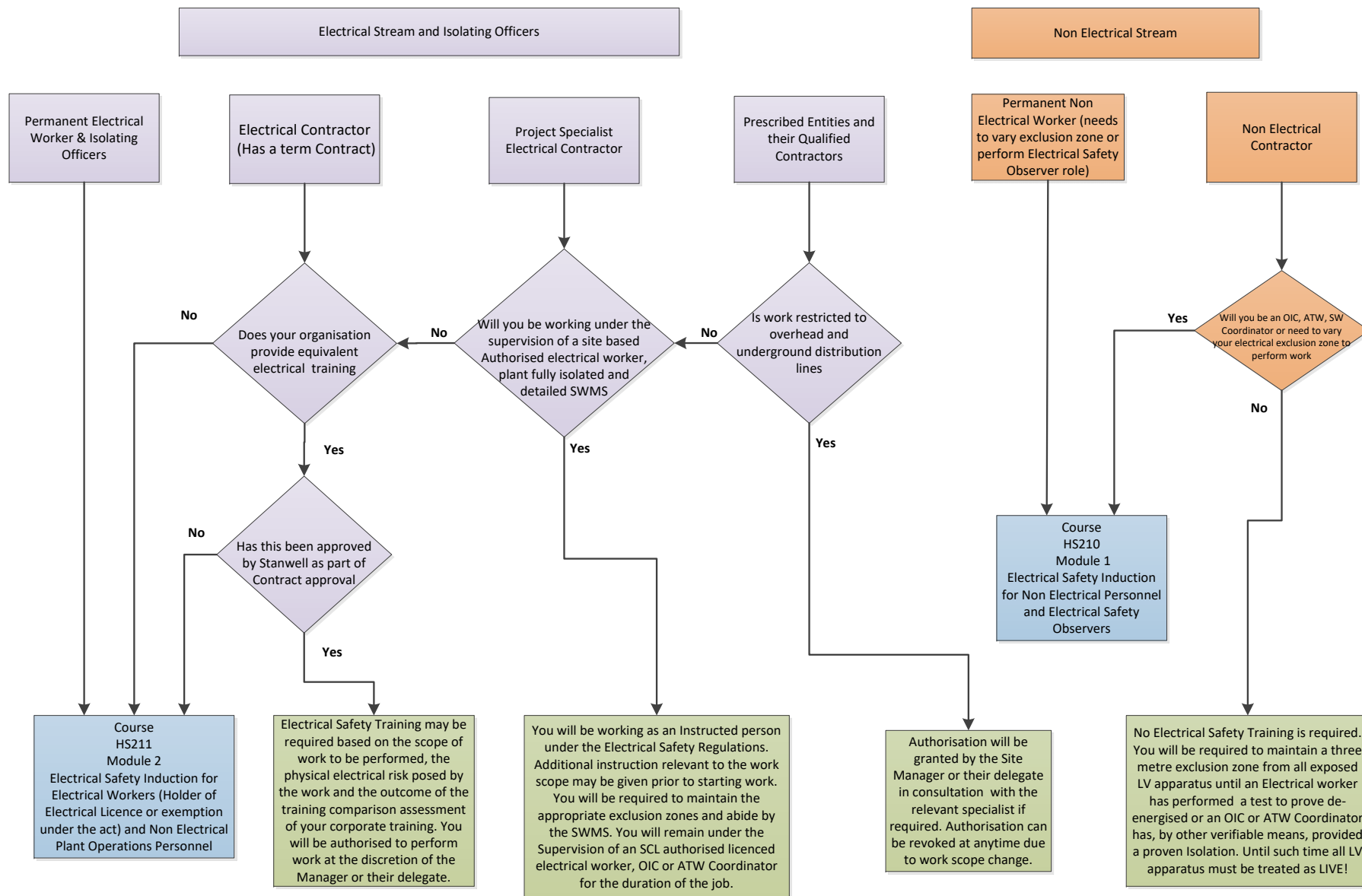
## 14.0 Revision History

Rev. No.	Rev. Date	Revision Description	Author	Endorse/Check	Approved By
0	30.03.2015	Created	Dave Lavender	Peter Cox / Jason Cole / David Janes	Trevor Hooper
1	3/12/2015	Updated to include new section on Cathodic Protection Systems, removed highlighting, added reference to new Electrical Safety Induction Modules, added new electrical consolidated procedures, added trim numbers to controlled documents, added years to Australian Standards.	Dave Lavender	Jason Cole, Dave Janes, Peter Hoerlein	Trevor Hooper
2	31.08.2016	Included Appendix 3 Electrical Testing and Safety Equipment routine inspection table, fixed broken links to Electrical Safety Codes of Practice, included Contractor training refresher period, added Energised Electrical Work authorisation clarification, other grammatical and minor wording changes. Section 7.3 Included instruction about synthetic clothing.	Dave Lavender	Peter Cox, David Janes, Peter Hoerlein,	Michael Joy

## 15.0 Appendices

### 15.1 Appendix 1 Electrical Authorisation Guide

SCL Authorisation Level	Untrained Person for Electrical Part/Electric Lines (Not Authorised)	Prescribed Entity under the Act and their Authorised and approved contractors. (will be classed as authorised licensed electrical workers for specific work))	Instructed Person for an Electrical Part (Not Authorised) New employees and Specialist contractors that perform specific tasks on isolated equipment usually for short periods of time.	Authorised Non Electrical Person (ANEP) (Requires to vary their exclusion Zone to perform their role) and Authorised Electrical Safety Observer.	Authorised SCL Isolation Officer/Permit to Work Officer or Plant Operator. (ALEW & ANEP) (Requires to vary their exclusion Zone to perform their role)	Authorised Licenced Electrical Worker (ALEW) and Authorised Electrical person (AEP) with license exemption (Holder of an electrical licence or exemption under the Act)
Limits	<ul style="list-style-type: none"> <li>➤ No Electrical work</li> <li>➤ No Electrical Safety observer authorisation</li> <li>➤ No authorisation to vary exclusion zone.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Perform maintenance and repair to overhead and underground electric lines.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Perform work on or near isolated electrical equipment under the Supervision of an SCL Authorised person.</li> <li>➤ No Electrical Safety observer authorisation</li> <li>➤ No authorisation to vary exclusion zone unless under instruction from an SCL authorised Licensed Electrical worker.(ALEW)</li> </ul>	<ul style="list-style-type: none"> <li>➤ No Electrical work.</li> <li>➤ Assisting Licenced Electrical Workers on de-energised equipment.</li> <li>➤ Checking of Isolations</li> <li>➤ Check for Electrical Hazards</li> <li>➤ Performing non electrical work near exposed electrical lines and equipment.</li> <li>➤ Observe the safety of persons performing electrical work.</li> <li>➤ Observe the safety of operating plant when operating near exclusion zones.</li> <li>➤ Entry within arc flash protection boundary</li> </ul>	<ul style="list-style-type: none"> <li>➤ Perform Isolations.</li> <li>➤ Verify/Check Isolations.</li> <li>➤ Reset Protection</li> <li>➤ Perform Test to Prove De-energised.</li> <li>➤ Observer role.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Performance of electrical work within class of licence or exemption.</li> </ul>
Who	<ul style="list-style-type: none"> <li>➤ Any person who is not an Authorised Person or an Instructed person for the Electrical Part/Electric Line</li> </ul>	<ul style="list-style-type: none"> <li>➤ Prescribed Entities under the Electrical Safety Act.</li> <li>➤ Contractors approved and authorised by the prescribed entity to work on their overhead and electric underground line network.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Specialist Contractors who are not Untrained or Authorised Person for the Electrical Part.</li> <li>➤ New employees who are licenced electrical workers that have not been authorised.</li> <li>➤ Electrical workers assistant that has not been authorised.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Mechanical Workers including contractors.</li> <li>➤ Chemists.</li> <li>➤ Superintendents/Supervisory.</li> <li>➤ Ground Maintenance contractors.</li> <li>➤ ATW Coordinators</li> <li>➤ Isolation Checkers</li> <li>➤ OIC</li> <li>➤ Others who may need to vary their exclusion zone as part of their role.</li> <li>➤ Persons required to perform an Electrical safety observer role.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Isolation Officers</li> <li>➤ Plant Operators</li> <li>➤ Maintainer Operators</li> <li>➤ Permit to Work Officers</li> <li>➤ ATW Isolation Officer</li> <li>➤ SW Isolation Officer</li> </ul>	<ul style="list-style-type: none"> <li>➤ Licenced Electrical Worker</li> <li>➤ Restricted Electrical Licence.</li> <li>➤ Electrical Engineer</li> <li>➤ Electrical Apprentice</li> <li>➤ Electrical Trainee</li> <li>➤ Electrical Student</li> </ul>
Examples of Tasks	<ul style="list-style-type: none"> <li>➤ Nil</li> </ul>	<ul style="list-style-type: none"> <li>➤ Maintain and repair the prescribed entities assets on SCL property.</li> <li>➤ Maintain and repair SCL overhead and underground lines when contracted by SCL.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Licenced Electrical Worker performing electrical work while under the Supervision on an SCL Authorised Licenced Electrical Worker.(ALEW)</li> <li>➤ Non Electrical worker performing work while under the Supervision on an SCL Authorised Licenced Electrical Worker. (ALEW)</li> <li>➤ Specialist contractor performing licenced Electrical Work. examples: protection relay testing, Generator / Transformer / motor testing, Diverter switch maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Vary exclusion zone as an OIC, ATW, SW Isolation Checker /Coordinator or permit holder to confirm isolation steps on permit</li> <li>➤ Vary exclusion zone to access LV cubicles.</li> <li>➤ Assisting Licenced Electrical Workers to perform electrical work under supervision on de-energised equipment.</li> <li>➤ Entry within arc flash protection boundary.</li> <li>➤ Vary exclusion zone to perform ground maintenance.</li> <li>➤ Vary exclusion zone to enter transformer bays.</li> <li>➤ Observe the safety of persons performing electrical work.</li> <li>➤ Observe the safety of operating plant when operating near exclusion zones.</li> <li>➤ Other tasks where varying exclusion is required.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Vary exclusion zone to access HV cubicles</li> <li>➤ Vary exclusion zone to reset protection devices</li> <li>➤ Vary Exclusion zone when authorised to Perform LV isolations</li> <li>➤ Vary Exclusion zone when authorised to Perform HV isolations</li> <li>➤ LV test to prove de-energised with further training.</li> <li>➤ Vary exclusion zone to enter transformer bays.</li> <li>➤ Safety Observer</li> </ul>	<ul style="list-style-type: none"> <li>➤ Electrical Work</li> <li>➤ HV Testing</li> <li>➤ EEHA Work</li> <li>➤ Safety Observer</li> <li>➤ Test to prove de-energised</li> <li>➤ Transformer Bay Entry</li> </ul>
Module No	Nil	Nil will be authorised by the site manager on production of adequate training records as per the SCL corporate procedure.	Work task specific overview/WMS/JSEA	Module 1 HS210 Electrical Safety Induction for Non Electrical Personnel and Electrical Safety Observers	Module 2 HS211 Electrical Safety Induction for Electrical Workers and Non Electrical Plant Operations Personnel	Module 2 HS211 Electrical Safety Induction for Electrical Workers and Non Electrical Plant Operations Personnel



## 15.2 Appendix 2 Apprentice Supervision

Training Person	
Activity Description	Level of Supervision
<b>Cable Tray Installation</b> Tray & duct, ladder, tray suspension brackets, fixings.	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Conduit Installation</b> Conduit, conduit fittings, (J/boxes, bends etc).	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Install Wiring System</b> Catenaries wire/fixings, building wire, TPS cables & ties, plug bases, stud brackets, TPS cable dressing, control cables, power cables, SWA, circular PVC, cable pulling, fixings	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Mains Installation</b> Cable pulling, main earth, main earth electrode, fixings, bus duct.	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Distribution Board Installation</b> Install switchboard, temporary boards, lugs, glands, all terminations (including sub circuits), fixings, service pillars, take off boxes.	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Main Switchboard Installation</b> Install switchboard, lugs, glands, all terminations (including sub circuits), fixing.	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>General Power &amp; Light Fitting Installation</b> Lights, fixings, supports, trunking, suspensions, tubes & lamps, socket outlets, switch plugs, mounting blocks/boxes, plaster brackets.	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Extra Low Voltage</b> Electrical fault finding work on plant with voltages less than 50V AC or less than 120V DC.	<b>First year</b> Direct <b>Second year</b> General <b>Third year</b> General <b>Fourth year</b> Broad
<b>Extra Low Voltage – high fault currents</b> Electrical fault finding work on plant with voltages less than 50V AC and 120V DC.	<b>First year</b> Direct <b>Second year</b> Direct <b>Third year</b> General <b>Fourth year</b> Broad
<b>High Voltage</b> Greater than 1000V AC and 1500V DC (Isolated only)	<b>First year</b> Direct <b>Second year</b> Direct <b>Third year</b> Direct <b>Fourth year</b> General

Training Person	
Activity Description	Level of Supervision
<p><b>Test To Prove De-Energised</b></p> <p>After a Safe Work Isolation has been issued and <b>after SWS Test to Prove De-energised has been completed</b>, the supervising electrician is to ensure that the apprentice carries out the testing procedures to confirm the equipment to be worked on has been de-energised before work commences.</p> <p>(Apprentices can perform <b>test and prove de-energised</b> under the supervision of an electrician for training purposes.)</p>	<p><b>First year</b></p> <p>0-6 months Not Permissible 6-12 months Direct</p> <p><b>Second year</b> Direct</p> <p><b>Third year</b> General</p> <p><b>Fourth year</b> Broad</p>
<p><b>Test and Tag</b></p> <p>There is no requirement to be licenced, to perform test and tag. Electrical Apprentices competence level will be determined by the supervising licenced electrical worker or line supervisor</p>	<p><b>First year</b> Direct</p> <p><b>Second year</b> Direct</p> <p><b>Third year</b> General</p> <p><b>Fourth year</b> Broad</p>

**Safety Note: the Electrical Apprentice must have completed six months continuous work as an electrical apprentice from the commencement date of the apprenticeship, before assisting a licenced electrical worker with any energised electrical work activities.**

Activity Description – Energised Electrical Work	Level of Supervision
<p><b>Energised Electrical LV Maintenance Work</b></p> <p>Performing electrical work on low voltage equipment that is energised. The equipment is being altered in some way by the use of tools. Must be authorised by SCL and have constant supervision by the electrical worker.</p>	<p><b>First year</b> Direct from 6 Months</p> <p><b>Second year</b> Direct</p> <p><b>Third year</b> Direct</p> <p><b>Fourth year</b> Direct</p>
<p><b>Fault Finding</b></p> <p><b>Low Voltage</b></p> <p>During the fault finding process, the supervising electrician must demonstrate to the apprentice the correct procedures for fault finding. The apprentice in the immediate presence of the supervising electrician can then carry out fault finding tasks.</p>	<p><b>First year</b></p> <p>0-6 months Not Permitted 6-12 months Direct</p> <p><b>Second year</b> Direct</p> <p><b>Third year</b> Direct</p> <p><b>Fourth year</b> General</p>
<p><b>Testing and Verification</b></p> <p><b>(Visual Inspection, Earth Continuity and Re resistance, Insulation Resistance, Correct Circuit Connections, Polarity, Fault Loop Impedance, RCD Operation and Testing)</b></p> <p>Testing of installation for compliance, labelling, preparation of D/B legends.</p>	<p><b>First year</b></p> <p>0-6 months Not Permitted 6-12 months Direct</p> <p><b>Second year</b> Direct</p> <p><b>Third year</b> Direct</p> <p><b>Fourth year</b> General</p>
<p><b>Test to Prove De-energised for a Safe Work Isolation</b></p> <p>Testing to prove de-energised is a function of the plant isolation procedure and sign off can only be performed by an authorised person under the Safe Work System.</p>	<p><b>First year</b> Not Permitted</p> <p><b>Second year</b> Not Permitted</p> <p><b>Third year</b> Not Permitted</p> <p><b>Fourth year</b> Only when authorised under Safe Work System</p>
<p><b>Safety Observer</b></p> <p><b>Note: when performing the role of a safety observer, no other electrical work tasks are allowed.</b></p>	<p><b>First year</b></p> <p>0-6 months Not Permitted 6-12 months Direct</p> <p><b>Second year</b> Permitted</p> <p><b>Third year</b> Permitted</p> <p><b>Fourth year</b> Permitted</p>

**Note: Work in Hazardous Areas requires HA qualifications. The minimum pre-requisite to obtain a HA qualification is Cert III Trade.**

**Note: A Training person may complete the HA training in their 3<sup>rd</sup> or 4<sup>th</sup> year but will not receive a qualification until completing their Cert III.**

**The electrical apprentice must be supervised by a HA qualified licenced electrical worker.**

Activity Description – Hazardous Areas		Level of Supervision	
<b>Electrical Installation, Maintenance and Inspections.</b> Must have HA national accredited training completed. (Can only be completed in 3 & 4 Year).		<b>First year</b> Not Permitted <b>Second year</b> Not Permitted <b>Third year</b> Direct <b>Fourth year</b> Direct	
<b>Fault Finding - Low Voltage</b> During the fault finding process, the supervising electrician must demonstrate to the apprentice the correct procedures for fault finding. The apprentice in the immediate presence of the supervising electrician can then carry out fault finding tasks. Must have HA national accredited training completed. (Can only be completed in 3 & 4 Year).		<b>First year</b> Not Permitted <b>Second year</b> Not Permitted <b>Third year</b> Direct <b>Fourth year</b> Direct	
<b>Testing and Verification of HA installation</b> Must have HA national accredited training completed. (Can only be completed in 3 & 4 Year).		<b>First year</b> Not Permitted <b>Second year</b> Not Permitted <b>Third year</b> Direct <b>Fourth year</b> Direct	
Term	Description		
<b>Direct Supervision</b>	This means the licensed electrical worker is to work with the training person, constantly reviewing the work practices and standard of the training persons work. The electrician shall be readily available in the immediate area, within audible range (earshot) and where possible within visual contact of the apprentice.		
<b>General Supervision</b>	This means the training person does not require constant attendance of the on-site supervising licensed electrical worker but requires face-to-face contact on site during the day with the supervising electrician to check on the work being performed and to provide the training person with additional instructions and assistance.		
<b>Broad Supervision</b>	This means the training person does not require constant attendance of the on-site supervising licensed electrical worker but requires face-to-face contact with the supervising electrical worker on site to check on the training person and the work being carried out by the training person.  As part of Broad Supervision, the supervising licensed 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 energising of circuit(s) and/or apparatus / equipment.		

### 15.3 Appendix 3 Electrical Testing and Safety Equipment Routine Inspection Table

Equipment	Routine Inspection/Test Frequency	Applicable Standards	Notes
Digital Multimeters Safety Check	Prior to performing Test to Prove De-energised	No mandated tests other than for Test to Prove De-energised	Check leads, Check meter condition including calibration date, Check Voltage before and after testing circuit.
Digital Multimeters Calibration	12 Months	AS 61010.1 Not Specified. AS 3017 Regular Testing NATA Recommends 12 monthly	Testing may need to be performed more regularly when process measurements are of a critical nature or meter is used in a harsh environment.
Low Ohms Meters (Ductors)	12 Months	AS 61010.1 Not Specified. AS 3017 Regular Testing NATA Recommends 12 monthly	
Insulation Resistance Meters (Meggers)	12 Months	AS 61010.1 Not Specified. AS 3017 Regular Testing NATA Recommends 12 monthly	
Other Electrical Test Instruments	12 Months	AS 61010.1 Not Specified. AS 3017 Regular Testing NATA Recommends 12 monthly	
HV Detectors & Integral Sticks	6 Months	IEC61243-1, IEC61243-2, IEC61243-3 Not Specified No Australian Standard/Manufacturers recommendations 6 months.	Given the importance of the equipment and the varying outside environments they are used in, recommend staying with 6 months.
High Voltage Live Work Sticks	12 Months Dry Test 24 Months Wet Test	AS 5804.3 Recommends 12 and 24 months	
Low Voltage Energised Electrical Work Tools	12 months	IEC 60900 Recommends 12 monthly No Australian Standard	Electrical Workers Code for Test Equipment 1997, Recommends 6 months
LV Rescue Kits	6 months	Manufacturer recommendation 6 months No Australian Standard	
Electrical Gloves	6 Months	AS 2225 Not Stated IEC 60903 Recommends < 6 months ASTM D120 Not Specified	Electrical Workers Code for Test Equipment 1997, Recommends 6 months
Low Voltage Insulating Mats and Covers	6 Months	AS 2978 Recommends 6 months AS 4202 Not Specified ASTM D1048 Not Specified	AS 5804.3 Recommends 6 months
Portable Earthing Devices	12 Months	IEC61230 IEC standard advises that Business needs to decide on own testing frequency No Australian Standard	Electrical Workers Code for Test Equipment 1997, Recommends 6 months.
Remote operated cable spiking equipment	6 Months	No Australian Standard	Electrical Workers Code for Test Equipment 1997, Recommends 6 months