

CS ENERGY PROCEDURE

ELECTRICAL SAFETY MANAGEMENT CS-OHS-31

Responsible Officer: Manager Electrical and Instrumentation & Control
 Responsible Manager: Head of Engineering
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CONVENTIONS USED IN THIS DOCUMENT

The following conventions and icons are used throughout this document to draw attention to critical information.

Note – Highlight or Emphasis



- Include short note to highlight important information.

Note – High Priority Focus



Important Note – Insert key information requiring high priority focus.

Note – Reference Priority



Refer to – XYZ external or internal reference document for further direction.

Note – Required Competency / Qualification Level



Competency Level – Insert competency / qualification level.

Note – Rule or Requirement



Requirement – Insert Business Rule or Industry Requirement

1 INTRODUCTION

1.1 Purpose

The purpose of this procedure is to be the overarching electrical safety management document providing reference to all applicable procedures.

This procedure provides guidance and information for planning and managing electrical switching, isolations and safe electrical work.

1.2 Scope

This procedure is applicable to all personnel at CS Energy owned and/or operated assets.

This procedure should be read in conjunction with CS Energy Policies, Standards and Procedures list contained in Section 11 *Legislative Compliance*.

1.3 Permit to Work Management System

This procedure also defines specific electrical isolation and electrical maintenance requirements, which forms a component of CS Energy's overarching Permit to Work management system.

1.4 PTW Manual

For additional information pertaining to the planning, administering and authorisation processes relating to isolations, refer to the PTW Manual (CS-PTW-01).

2 RESPONSIBILITIES AND ACCOUNTABILITIES

The responsibilities for persons mentioned in this procedure are outlined in the following pages. Specific roles hold specific responsibilities which must be adhered to. The responsibilities for each role are clearly defined in this section.

2.1 Electrical Worker

The electrical worker is responsible to:

- maintain and comply with the conditions applicable with their electrical work Licence issued by the Electrical Safety Office and CS Energy procedures
- test and prove de-energised before commencing electrical work
- implement the requirements of this procedure and the training provided when working in an authorised zone or in the proximity of energised exposed electrical parts or equipment
- assist in the development and implementation and of JSEAs and the requirements of the PTW is
- instruct any workers of the changes to the work and JSEA
- perform electrical work to comply with the Wiring Rules
- maintain training necessary to act as an Authorised Person and Safety Observer as required.
- arrange for the provision of a Safety Observer (Operating Plant or Electrical) for the type of work being performed
- confirm isolation points and devices are adequate, locked and signed or other precautions taken to stop the isolation point being accidentally closed prior to commencing electrical work

- use electrical safety equipment that is suitable for the type of work being performed and within calibration date and wear personal protective clothing or equipment that is suitable for the type of work being performed
- ensure any electrical work done on electrical equipment is tested (to the extent it is affected by the work), is electrically safe, and test results are recorded
- use electrical testing equipment in accordance with manufacturer's guidelines, that is fit for purpose and within the calibration date.
- comply with the PPE requirements in CS-OHS-34
- make sure that the OIC provides a certificate of testing to the site electrical supervisor or project manager.

2.2 Safety Observer - Operating Plant

The Safety Observer – Operating Plant is responsible to:

- observes the operating plant
- give warnings when necessary to prevent inadvertent contact with energised electrical equipment or entry to exclusion zones
- remain at the work site at all times when a potential hazard exists
- not be distracted by other duties
- maintain the training requirements as outlined in this procedure
- use electrical safety equipment and wear suitable personal protective clothing appropriate for the work.

2.3 Safety Observer – Electrical

The Safety Observer – Electrical is responsible to:

- continuously observe that safety procedures and control measures in the JSEA are carried out by persons working in the authorised zone or other potentially hazardous situations
- give warnings when necessary to prevent inadvertent contact with energised electrical equipment
- provide LV rescue and resuscitation in case of an emergency
- remain at the work site at all times when a potential hazard exists
- not be distracted by other duties
- maintain the training requirements as outlined in this procedure, including all awareness training for any electrical and other hazards applicable for the work
- use electrical safety equipment and wear suitable personal protective clothing appropriate for the work
- implement control measures in the event of an emergency
- have current Low Voltage Rescue and Cardiopulmonary Resuscitation training
- not be in the first 6 months of their apprenticeship.

2.4 Qualified Technical Person – Electrical Contractor Licence

The Qualified Technical Person is responsible to:

- inform the Site Management where electrical work does not comply with the conditions and restrictions included in the site electrical contractors licence

- inspect electrical work that is performed on site by CS Energy electrical workers for other parties
- maintain their qualifications necessary for an electrical work licence and electrical contractors licence
- assist in investigations and reviews any electrical safety incidents, near misses and equipment with serious defects
- sign documents about the performance of electrical work for the site for other parties
- provide a Certificate of Testing and Compliance for work performed as an electrical contractor to the persons for whom the electrical work was performed stating the electrical equipment is safe and keep a copy of the certificate for a period of 5 years.

2.5 Qualified Business Person – Electrical Contractor Licence

The Qualified Business Person is responsible to:

- ensure that the relevant insurances required for an electrical contractor licence are maintained
- ensure that work performed as part of the contractor's licence involves the Qualified Technical Person
- must be competent to perform the business aspects of performing electrical work, and
- must have completed the units of competency listed in Electrical Safety Regulation 2013 Section 7.

2.6 PTW Administrator / Delegated Authority

This role is either the PTW Administrator or a person with delegated authority by the Site Manager.

The PTW Administrator / Delegated Authority is responsible to:

- approve persons for the role of Authorised Person, Safety Observer – Operating Plant and Safety Observer – Electrical
- approve the application of a PTW for live work on energised electrical equipment with assistance from the RPEQ – Electrical and site Health & Safety
- Maintain a site training register for Licenced electrical workers, authorised persons and safety observers to include:
 - licence holder's name
 - licence number
 - class of licence
 - conditions or restrictions included in the licence
 - the licence expiry date
 - the jurisdiction in which the licence was issued if it is an external licence.

2.7 Site General Manager

The Site General Manager is responsible to:

- act as person in control in accordance with Electrical Safety Act, Section 24 Meaning of person in control of electrical equipment
- allocate enough resources to ensure the requirements of this procedure are implemented on site
- nominate suitable persons to act as RPEQ – Electrical and PTW Administrator for the site

- if CS Energy performs electrical contracting work on the site, nominate suitable persons to act as the Qualified Technical Person/ Technical Officer Electrical Compliance
- ensure that internal/external regulatory audits are conducted on the electrical safety requirements for the site
- ensure that electrical safety incidents are investigated, and actions implemented.

2.8 Head of Operations Performance

The Head of Operations Performance is responsible to:

- maintain an electrical contractor's Licence for CS Energy
- nominate at least 1 Qualified Business Person for the Electrical Licence
- ensuring all persons who are involved in the isolation and access procedures have been trained and assessed as competent to perform the roles for which they are responsible, and authorised
- maintaining a register of all authorised persons with details of any restrictions
- ensuring audits of the PTW system are carried out and ensuring that regular CCV electrical audits are conducted across site – setting up an annual CCV KPI that is reported at monthly Operations dashboard
- maintaining the Register of Authorised Personnel.

3 ELECTRICAL WORK

3.1 Introduction

CS Energy has an obligation as an employer, a person in control of electrical equipment and an Electrical Entity to ensure that:

- its business or undertaking is electrically safe
- all electrical equipment controlled by or used is electrically safe
- persons and property affected by electrical work are safe
- persons performing work involving contact with or near to exposed parts are electrically safe
- electricity Entity works are electrically safe and operated in a way that is electrically safe
- its works are inspected, tested and maintained

3.2 CS Energy Obligations

CS Energy has a specific obligation to ensure that persons, operating plant or vehicles do not come into direct contact with an electrical part, or enter an exclusion zone, unless the part is isolated in conformance with PTW procedures, or the work has been authorised in accordance with this procedure (sections of this procedure deal with testing and commissioning where direct contact may be required to perform work).



Important Note – Personnel must be authorised in writing by the Site PTW Administrator to test and prove de-energised and to perform work in an “Authorised Zone” or “Exclusion Zone.”

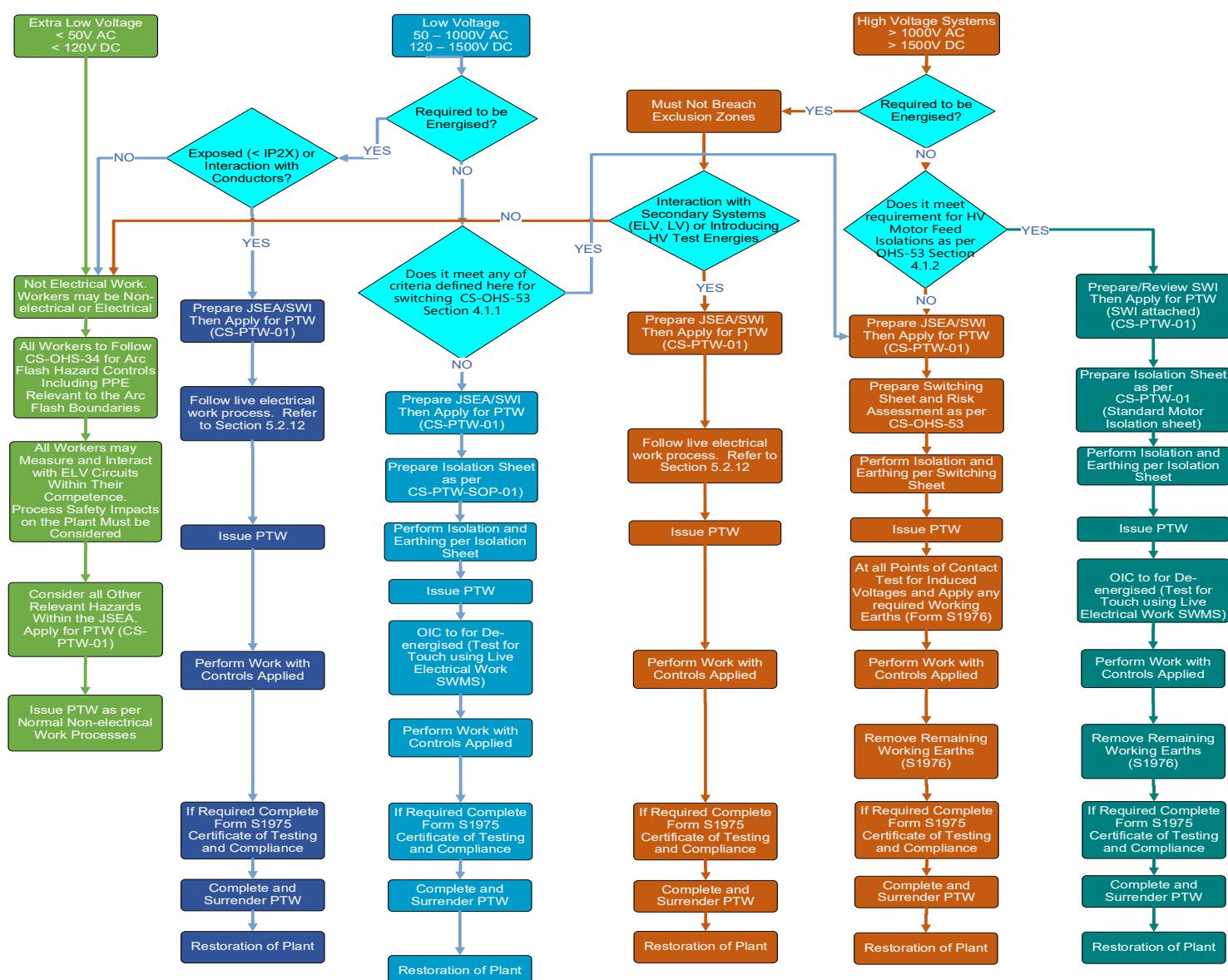
3.3 Definitions

- For clarification of the term “Authorised Zone” refer to the Section 8 Definitions.
- For clarification of the term “Exclusion Zone” refer to the Section 8 Definitions
- Authorised people for electrical work can be Licenced Electrical Workers and Electrical Engineers.
- All workers with appropriate technical competence may measure and test ELV circuits. This is not electrical work under the Act.



Important Note – All personnel are to treat any exposed part as if it is energised until it is isolated and proven not to be energised. CS Energy requires all electrical workers, including electrical engineers and electrical apprentices to implement a test for de-energised before commencing work (test before you touch).

3.4 Electrical and Non – Electrical Work Process



4 IDENTIFYING AND CONTROLLING ELECTRICAL RISKS - JSEA

4.1 Risk Assessment

4.1.1 Overview

To work on or near any electrical equipment, it is first necessary to determine whether it is safe to do so by undertaking a risk assessment in accordance with the CS Energy procedures outlined in CS-OHS-76 - Health and Safety Risk Management.

Consideration is also to be given to the consequences of electrical work that may affect not only the safety of persons at the work area but also the safety of persons who are remote from the work.

4.1.2 Assessment Participants

Where practicable the assessment should be carried out at the worksite and all workers involved in the electrical work are to be consulted, participate in the assessment and develop control measures.

The control measures shall reduce to an acceptable level any conceivable risk of any person performing the work, entering the work area, and or coming into contact with energised exposed conductors.

4.2 Pre-work Planning and JSEA Process

4.2.1 Overview

As part of pre-work planning and the JSEA process, the following types of issues are to be considered:

- the location to be worked in, whether it is in the vicinity of entity works or in the vicinity of electrical installations
- cramped working conditions, confined spaces
- multiple sources of supply including electrical back-feed through power or instrument transformers, inadvertent operation of equipment (such as the operation of control devices, standby generators and non-electrical equipment)
- damp situations, heat, work height, work environment, noise, unstable work areas, site conditions, weather conditions, organizational requirements and competency of personnel
- reference to facility drawings, electrical drawings and service drawings
- the method of work being used, whether it is via machinery, portable electrical tools or using hand tools
- prospective fault levels
- specific overhead lines, conductors or cables or equipment under tension or likely to fall
- underground and in-situ electrical cables
- removing wall sheeting during a building refurbishment
- penetrating a wall cavity or ceiling space with a hand tool or portable electric tool
- using portable electrical tools to cut piping that may contain water
- excavating on site in preparation for a new facility or building
- digging holes for the erection of fence posts
- any other activity that may require penetration into the ground or work in the vicinity of in-situ electrical installations and entity works
- voltages between phases, between phases and neutral and between phases and earth (including metalwork, damp situations, other conductive surfaces and persons nearby)

- voltages across open switch contacts, across undischarged capacitors, across the secondary terminals of transformers (including current transformers), on disconnected conductors (particularly neutrals), induced voltages, voltages between different earthing systems and voltages caused by static electricity
- in multiple earthed neutral (MEN) installations the rise in the earth potential in an installation due to a high resistance return path to the distribution neutral
- incorrect wiring connections, faulty equipment (the frame of the fault equipment may become energised)
- Voltages from other sources of supply including illegal connections, uninterruptible power supplies and motor generators
- rescheduling the work so that the electrical equipment can be de-energised
- there are additional considerations in CS-OHS-34 Electrical Safety Equipment and PPE and CS-OHS-32 - Maintenance and Testing of Entity Works, Electrical Installations and Equipment.

4.3 Awareness

Electrical workers, supervisors, safety observers, and those assisting electrical workers working on or near electrical equipment, will be trained to understand the potential hazards involved.

5 PERFORMING ELECTRICAL WORK

5.1 Competency

5.1.1 Performing Electrical Work

Persons performing electrical work must be:

- competent and authorised to work and test on CS Energy equipment
- the holder of a current electrical work licence or
- an Electrical Apprentice or an Electrical Engineer in the practice of their profession.

5.1.2 Licence Class

Licensed electricians must only perform activities permitted by the class of licence they hold.

Electrical Engineers (RPEQ) are permitted to perform electrical work where the work is part of their practice as an Electrical Engineer.

5.2 Testing to prove de-energised

5.2.1 Licence Class

Test for de-energised and effective isolation of equipment for electrical work is to be carried out by an Authorised Electrical Worker.

The OIC will verify that the isolation and de-energisation of the equipment or circuit has been accomplished. (Test before you Touch). This testing is to be completed at point of contact with the equipment, if the OIC wishes to confirm the isolation by testing in other locations of the isolated circuits, this can be completed at the OIC discretion.

The Electrical Worker shall test and prove de-energised prior to commencing work following any alteration to the Work.

5.2.2

5.2.2.1 Test to Prove De-energised

Testing to prove de-energised must be completed by authorised personnel utilising a standardised procedure and risk assessment. See flow chart in section 5.2.12.

Only those testing devices maintained in accordance with CS Energy's CS-OHS-34 Maintenance of Electrical Safety Equipment and Clothing (PPE) Procedure are to be used.

Correct operation of the testing device is to be verified immediately before and after proving de-energised.

Low voltage equipment is to be proven de-energised at the intended point(s) of contact with the conductors.

Testing to prove de-energised is to be repeated following any alteration in the PTW, or when the plant is left idle for a period of time. Further, all relevant factors, including the nature of the conductor, the nature of the isolation and the nature of the work must be taken into consideration.

5.2.2.2 Authorised Persons

Authorised Licenced Electrical Workers and Electrical Engineers (RPEQ) can be authorised to test and prove de-energised.

All workers with appropriate technical competence may measure and test ELV circuits. This is not electrical work and is not testing to prove de-energised.



Important Note – Live electrical work must not be performed unless the conditions below are satisfied and there is no practical alternative.

5.2.3 Overview

Live electrical work shall only be carried out under one or more of the following works cases and an alternate works methodology is not practicable.

The assessment of practicability must be agreed and documented by a CS Energy authorised representative.

- in the interests of health and safety, that the electrical work is carried out while the equipment is energised (e.g. emergency lighting)
- that the electrical equipment to be worked on is energised in order for the work to be carried out properly (eg. battery discharge testing)
- there is no reasonable alternative means to carrying out the work (e.g. testing for fault finding)
- the work consists of testing to prove de-energised

5.2.4 Requirements

The OIC for the work has developed a safe system of work (which includes a JSEA, a standardised Safe Work Method Statement (SWMS) or Form S1885 Live Electrical Work Checklist and PTW), in consultation with all personnel involved in the work.

An explanation is detailed within the JSEA that clarifies why it is not practicable or why there is no alternative to performing the electrical work other than by a live means.

5.2.5 Pre-Consultation

The live work is authorised to be undertaken only after consultation with the Site PTW Administrator (or person with delegated authority) and the person in control of the electrical installation, electrical equipment or entity works (the site PTW Administrator may involve the RPEQ, CS Energy's site qualified persons, site HSA or others as necessary to provide advice and review the JSEA developed to perform live work).

The S1885 form needs to be approved by the Site PTW Administrator, or the authorised delegate.

5.2.6 Qualifications

The person(s) performing the work is qualified and authorised as per the Authorised Roles matrix. in the safe work practices for the live work to be performed.

5.2.7 Testing and PPE

Testing equipment and tools appropriate for the live work to be performed have been provided, maintained and are used correctly. See CS-OHS-33 - Maintenance and Testing of Portable Electrical Equipment.

Clothing and personal protective equipment appropriate for the live work to be performed have been provided, maintained and are used correctly. See CS-OHS-34 - Electrical Safety Equipment and PPE Section 7.

5.2.8 Easily Identifiable Isolation Point

The isolation point of the electrical supply for the equipment being worked on is clearly identified and able to be easily reached without having to travel long distances or move around/over plant equipment or obstructions - this may require the use of a two-way radio with a person located at the isolation point for the circuit being worked on.

The work area is clear of obstructions and allows easy access and egress.

5.2.9 Safety Observer

There is a safety observer (electrical), observing the performance of the electrical work, unless the work involves testing electrical equipment where the testing task risk has been assessed as low and can be performed safely without the need for a safety observer.

5.2.10 Unauthorised Persons

Unauthorised persons are prevented from entering the work area by a means of barrier exclusion, signage or both.

5.2.11 High Voltage Live Testing

Live high voltage work is limited to test procedures where workers do not breach exclusion zones such as:

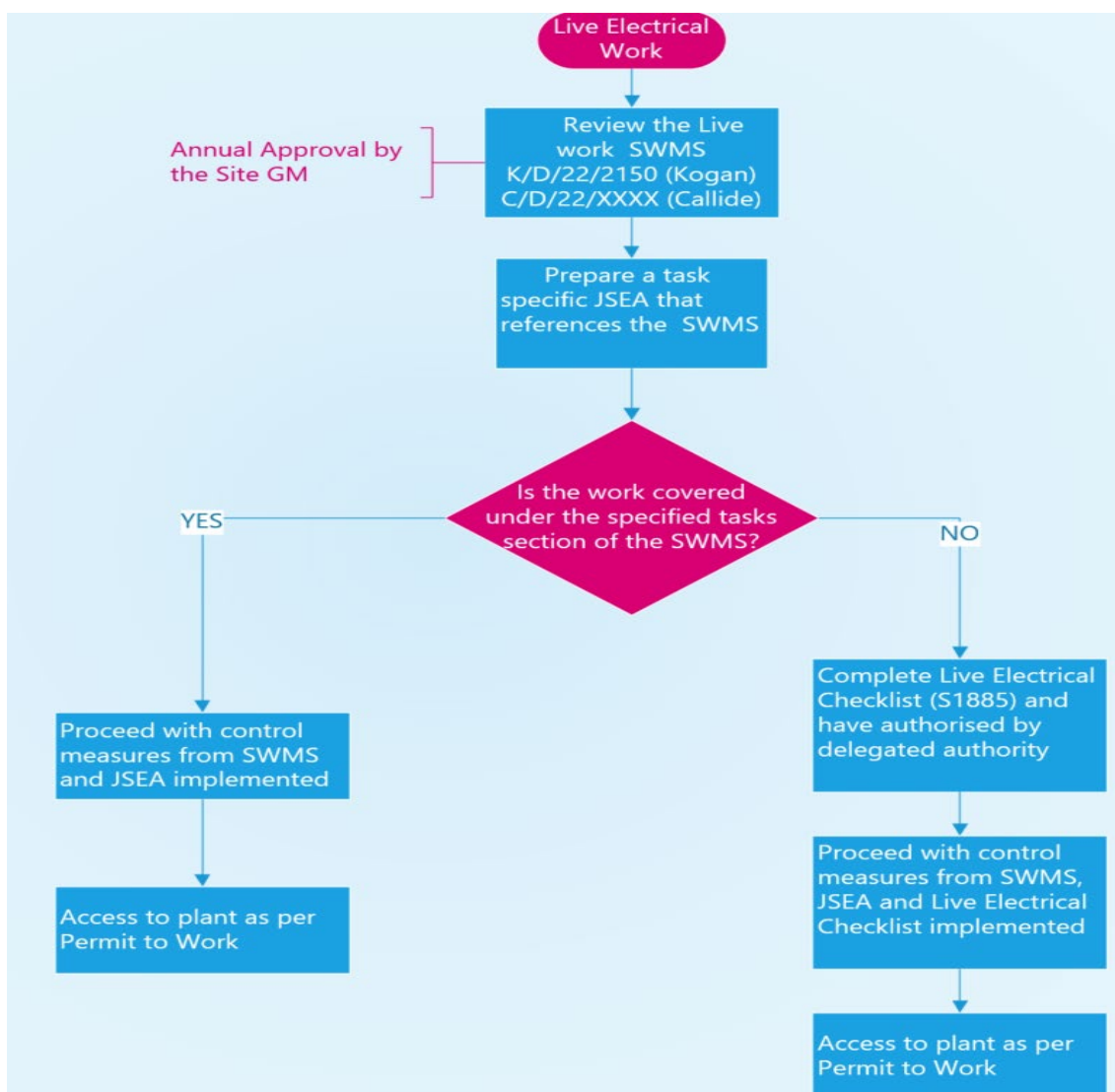
- Interacting with secondary systems (LV and ELV) including measurement and testing while the primary HV circuit is live
- Introduction of test energy to measure the integrity of insulation and conductors.
- Testing to prove de-energised



Important Note – Live work on HV is restricted to HV test procedures only.

5.2.12 Live Electrical Work Checklist

To assist in compliance with this section of the procedure a Safe Work Method Statement (SWMS) for testing to prove de-energised, fault finding, testing and other routine tasks may be used provided it includes the requirements of this section for live work as per the flowchart below.



5.2.13 Introduction of an Electrical Energy Source

Insulation testing, injection testing or the introduction of any low or high voltage test energy source into plant or equipment is considered live electrical work and requires a risk assessment to be completed and the adoption of suitable control measures.

A standardised live work SWMS may be used with an accompanying JSEA. If there is no standardised SWMS relating to the task, a JSEA and Form S1885 Live Electrical Voltage Work Checklist is to be completed prior to the introduction of the electrical energy or source.

5.3 Electrical Work Hazards

Electrical work can cover a diverse range of scenarios, from potentially explosive atmospheres, to confined spaces, to working at heights. This section provides the requirements and guidance for managing various hazards relating to electrical work.

5.3.1 Areas of Reduced Mobility

Care should be taken when working in areas of reduced mobility because of restriction of movement and the inability to readily escape from the area. Examples of areas of reduced mobility can be as follows:

- restricted areas in and around switchboards
- working on a ladder, scaffold, or elevated work platform
- working in a trench
- working in a pit or a tunnel



Refer to – CS Energy Procedures for Work at Heights (CS-PTW-HAZ-02) and Confined Spaces (CS-PTW-HAZ-03).

5.3.2 Trafficable Areas

Persons working near traffic areas, including vehicular and pedestrian, are to install barricade tape, barriers, signage and if necessary, lighting for personnel safety and protection.



Important Note – Caution should be exercised and appropriate preventative action taken when working in a passageway or narrow access area, eg where a door might be inadvertently opened or closed and propel persons into an energised electrical source, it should be restrained while work is being undertaken.

5.3.3 Illumination

Work areas shall be provided with lighting that is both adequate and suitable. Lamps should be protected against breakage. Where possible, ELV lighting should be used in trafficable areas.

5.3.4 Permit to Work System

CS Energy has a Permit to Work System (CS-PTW-01) for any work being performed on or near electrical equipment where potential hazards of injury to personnel or equipment damage exist. The permit to work system sets out the relevant conditions for access to plant and electrical equipment and for restoring operational status and other relevant matters.

5.3.5 Plant Safety System Fault

In the event that a fault develops on a plant safety system, a safety notification is to be raised in the Computerised Maintenance Management System on the defect and given a suitable priority. If the faulty component of a plant safety system is required to be altered before complete repairs can be completed, the safety system alteration shall be risk managed. Alterations to the safety system are not to affect or change the original prioritisation of the safety notification, and therefore total repair of the safety system will not be adjusted by the application of the alteration.

5.3.6 Use of Tools, Equipment or Plant with Exposed Conductive Parts

Metal items such as tape measures, rules, reinforced tape, ladders, scaffolding and guards on portable lamps, shall not be used on or near exposed energised conductors. If the use of hand tools with conductive parts is unavoidable on or near exposed energised conductors, a JSEA shall be undertaken and safe control measures implemented.

5.3.7 High Fault Current Levels

Persons working on or near energised exposed conductors of electrical equipment should be aware that fault currents (many times the rated current of the supply transformer) could flow for short times during

fault conditions. Procedures and protective safety equipment for this type of work are to be assessed as part of the JSEA developed for the work.

5.3.8 Arc Flash Risk

The risk of an arc flash should be considered for all work within the vicinity of live electrical equipment. CS Energy follows the Electrical Arc Flash Hazard Management Guideline (EAFHG) 2019 for the identification and management of arc flash hazards. The detailed requirements are specified in CS-OHS-34. In summary this means:

- Arc flash categories will be calculated in accordance with IEEE 1584 2018
- PPE selection and work practices will follow NENS 09 and consider NFPA 70E
- Switchboard sections will be clearly labelled with the arc flash category and other information required for selecting the appropriate PPE



Important Note – Where the arc flash risk is category 3 or above, the use of a safety observer (electrical) is mandatory. The safety observer (electrical) shall stand outside the arc flash boundary during work.

This may require the safety observer (electrical) to not be in the same room as the worker. Lines of sight and communication must be maintained in these circumstances.

Arcs that are produced under these conditions have the energy to cause an explosion, melt metallic switchboard cubicles, and cause severe burns and flash burns to the face and eyes and injury through impact from flying debris or dislodged components. Over current circuit protection might not operate to safeguard the worker in such circumstances.

Always consider the path of the arc flash fire ball. Wherever possible do not place your body in line with the path of the fire ball.

5.3.9 Fault Finding and Testing

The risk of electric shock or arc, blast and flash burn injuries exists when performing fault finding or testing on or near exposed energised conductors. To manage this risk the following precautions, in addition to those in Clause 3.1 shall be taken:

- use Category III or IV (to AS 4836) approved test equipment. The electrical worker shall ensure the test equipment is suitable for the application and ensures that it is selected for the appropriate operating range.
- All electrical test equipment used on CS Energy sites shall comply with Maintenance And Testing Of Portable Electrical Equipment, RCDs And Tools CS-OHS-33 Section 2.12
- complete a JSEA for the activity and use a standardized live work SWMS. Form S1885 may be required if the specific task isn't covered under the SWMS.
- check and confirm correct operation of test equipment on a known supply, before and after the test

5.3.10 Open Electrical Cubicle Controls

If:

- Cubicle doors are required to be open (by open we mean not secured so that the integrity of the board/panel is lessened); and
- A voltage source is present within the cubicle; and
- The cubicle is to be left unattended

Then the process outlined below needs to be followed:

- the cubicle needs to be clearly marked and identified
- a barrier needs to be erected to define the potential arc flash boundary (indicated on the cubicle and/or switchboard)
- if the barrier obstructs the entire walking area inside the switchroom then a sign will be also placed on the doors of the switchroom

5.3.11 Testing Plug in Equipment

When testing for faults in electrical equipment that plugs into a socket outlet rated at up to and including 20A, when it is energised, a residual current device (RCD) or an isolating transformer shall be used.

5.3.12 Opening Electrical Equipment

The risk of electric shock or arc, blast and flash burn injuries exists when performing operating work (hazards exist even if no electrical work is being performed either operating electrical equipment or operating other equipment and plant near electrical equipment.) on or near electrical equipment. To manage this risk, the following precautions shall be taken.

Identify all the hazards and environmental considerations (e.g. position of energised exposed conductors, cramped conditions, moving equipment such as cranes, elevating work platforms, hot or wet conditions and hazardous areas).

- use the appropriate equipment and PPE in accordance with installed signage and CS-OHS-34 (Arc flash/PPE selection)
 - If there is no signage giving PPE guidance, seek guidance from an electrical engineer and implement appropriate control measures.
- do not operate switches under load unless they are designed for the purpose
- ensure that all portable equipment is rated for the highest voltage of the electrical equipment and is in good condition

5.3.13 Cutting Cables or Wiring Enclosures

When carrying out work that involves cutting cables or wiring enclosures, the cables shall be treated as energised and the procedures for working on or near exposed energised conductors shall be followed until tests prove that the cable is de energised.



Important Note – The use of testers that detect an electric field surrounding an energised conductor may not be suitable for cables that are surrounded by a metallic screen, cables carrying direct current and in some other circumstances.

5.3.14 Removing Out of Service Electrical Equipment or Cables and disconnection of hazardous areas

Before removal of out of service or decommissioned electrical equipment, the equipment and cables and disconnection to hazardous area requirements shall be isolated from all sources of supply and appropriate tests made to ensure the equipment and cables are de-energised.

Where cables are not removed, each end of the cable is to be appropriately insulated (heat shrink boot), uniquely labelled (e.g. spare123 or damaged123) and cable database and any other records updated to reflect the status of the cable'

Where cables are not removed and end in hazardous areas additional termination requirements as per AS/NZS 60079.14 of unused cores are to be terminated to earth at the supply end and to be terminated in suitable electrically and hazardous area rated terminations at the hazardous area end. For intrinsically safe (Ex i) and energy-limited circuits suitable electrically rated termination at the supply non-hazardous area end is acceptable. Insulation tape alone is not permitted.

5.3.15 Precautions when Leaving Electrical Work Unfinished

Electrical workers have a responsibility to ensure that the work they are doing does not present a hazard to others at the workplace. This also means leaving the worksite in a safe state for access by others.

5.3.16 Making the Workplace Safe

Means of making the workplace safe should include the following (as required):

- terminating exposed conductors and where necessary, providing mechanical protection
- physically securing cables
- tagging and taping off cables
- where appropriate, informing relevant parties that the work is not complete
- taking any necessary precautions to ensure that equipment cannot become energised
- ensuring that switchboards are clearly and correctly labeled in relation to their status

5.3.17 Batteries and DC Systems

Accidental short-circuiting of battery terminals or connections might create substantial arcs that can cause personal injuries or ignite hazardous gases or material.

Appropriate precautions shall be taken when working on or near batteries or equipment that contains batteries.

Charging of flooded cell lead acid batteries discharges hydrogen. Therefore, the following precautions must be considered:

- use of spark proof tooling
- acid resistant PPE, including faceshield
- ensuring ventilation is operational
- continuous monitoring of LEL.

Arc flash hazards exist with DC systems. CS-OHS-34 (arc flash/PPE selection) describes arc flash categories, PPE requirements, and arc flash boundaries for DC systems.



Requirement – AS2676.1 and AS2676.2 provide guidance on safety practices during battery installation and maintenance.

5.3.18 Work Cable Inspection

As electrical lines and cables are manufactured in many ways and are often protected by a range of varying electrical conduits, thorough pre-work cable inspection and identification is to be undertaken prior to undertaking work within buildings or facilities.

5.3.19 CS Energy Excavation Procedure

Where excavation activities or the driving of items into the ground is required, CS Energy's Excavation Procedure, CS-PTW-HAZ-04 is to be implemented which includes specific controls to address underground service hazards, inclusive of the need to properly located underground electrical cables.

Cable locating devices or services are to be used to identify the location of underground or in-situ services.

5.3.20 High Voltage Line Work

The only HV live work permitted is HV testing.

In the event that live line work is required to be done, CS Energy would engage external experts (such as Powerlink), and after appropriate reviews and checks (Health and Safety, Operations and Electrical Engineering representatives as a minimum), utilise the knowledge and systems of those experts to enable the work.

5.3.21 Work on or near Exposed Energised Conductors in Switchboards or Cubicles

The risk of electric shock or arc, blast and flash burn injuries exists when performing work on or near exposed energised conductors.

To manage this risk, the following precautions shall be taken:

- Before commencing any work on or near exposed energised conductors an assessment of the associated risks shall be made.
- A JSEA is to be established for the low voltage work activity to document the risks and control measures. If the work is classed as live work, refer to section 5.2.12.
- Where a JSEA determines that isolation or the use of suitable barriers is impracticable, an electrical safety observer shall be used as a precaution against potential injury or damage.
- Any persons undertaking work on or near exposed energised conductors are to be trained as an authorised person for the work to be carried out.
- When work is to be carried out on or near exposed energised conductors, precautions shall be taken to prevent the possibility of simultaneous contact with conductors at different voltages.
- PPE that is appropriate and suitable for the task shall be worn. PPE shall be of correct fit and in good condition. Safety eyewear should be worn when working on or near exposed energised conductors.
- All work on exposed energised conductors shall be done from a stable work platform.
- When working on energised electrical equipment having earthed metal, precautions shall be taken to ensure earthing continuity is always maintained to any component part of the equipment at all times or work shall be carried out to an approved procedure.
- Work on bus tie cubicles require both sides of the tie to be fully isolated. Circuit breakers racked out and isolated to prevent being racked in may be worked on where the worker is adequately protected from arc flash hazards.
- Temporary protective earthing conductors may be required to be installed when removing electrical equipment from earthed metal, eg an electrical component part separated from its normal earthing medium. Temporary protective earthing conductors shall be rated to withstand the prospective short circuit current of the primary protection without failing.
- Particular care should be taken when removing neutral connections as test may have indicated a de-energised situation. However, when these connections are removed, a voltage may be present between conductors or between conductors and earth.
- Only conductors at the same voltage should be worked on at any one time. Insulating barriers, covers or mats shall be used in the work area between conductors of different phases or voltage or work shall be carried out to an approved procedure. The conductive path between electrical workers and conductors and between electrical workers and earth (including building materials such as concrete and steel that may be earthed) should be broken by one or more of the following methods:
 - insulating barriers, covers or mats
 - insulating tools
 - insulating gloves

- When work is left unfinished, the workplace is to be left in a safe state for access by others.
- Ensure the equipment is returned to service in its original state or that changes made have been approved.

5.3.22 High Voltage Electrical Precautions – SAHVEA Manual

Work in switchyards relating to High Voltage access is to be done in accordance with the SAHVEA Manual (Formerly HVIA) and CS-OHS-53. Workers required to prepare HV isolation sheets, isolate HV equipment in switchyards, and or perform high voltage electrical work are to be trained in accordance with the SAHVEA Manual (Queensland Electricity Entity Standard for Safe Access to High Voltage Electrical Apparatus).

5.3.23 Isolation of HV and Multiple supply LV Equipment

Procedure CS-OHS-53 is to be followed when performing work on any HV equipment. Any concessions made for single supply HV and multiple supply equipment isolation will be defined in CS-OHS-53.

5.3.24 Barricades and Signage

All barricades and signage used for restricting access during electrical maintenance and testing are to be erected in accordance with procedure CS-OHS-36.

5.3.25 Access into Switchrooms and Control Relay Rooms

All personnel who require access into these areas must be a trained, competent and authorised Electrical Worker or escorted by someone that is competent and authorised to enter these areas refer to procedure CS-OHS-63.

5.3.26 Working off Ladders

Non-conductive ladders are to be utilised for electrical work.



Refer to – CS Energy Procedure CS-OHS-52 for further guidance on the use of ladders, including maximum working height.

5.3.27 Testing and Tagging

Refer to procedure CS-OHS-33

5.3.28 SAHVEA (Formerly HVIA) Training Register

A register is to be kept of persons with SAHVEA training (Formerly HVIA) by the Site PTW Administrator or person with delegated authority from the Site Manager.

5.3.29 Supervising Electrical Work

Supervision of electrical work entails supervising the way in which electrical work is performed. Team leaders and work crew supervisors must hold an electrical work licence if they directly supervise electrical work. Where Team Leaders/Supervisors are not licenced electrical workers, any direct technical supervision required should be provided by a qualified technical person or another licenced electrical worker.

5.3.30 Supervision of Trainees and Apprentices

Electrical apprentices and trainees must be supervised by a Licenced electrical worker when performing electrical work.

Electrical Engineers (RPEQ) are permitted to supervise electrical work.

5.3.31 Testing / Return to Service

Where electrical work is performed on electrical equipment, which includes appliances, the equipment must be tested prior to connecting it to a source of electricity to ensure it is in a state of readiness for reconnection and for use for its intended purpose.

The testing of electrical equipment must be directed at ensuring that the electrical equipment, to the extent it is affected by the electrical work, is electrically safe.

5.3.32 Recording of Commissioning Test Results

The electrical worker shall record the results of testing for electrical on Form S1975. The completed form shall be presented to the OIC before surrender of the PTW.

If the work was performed by an external Electrical Contractor for CS Energy, the test certificate must be signed by a Qualified Technical Person for the Electrical Contractor Performing the work.

5.3.33 Certificate of Testing and Safety

If electrical work was performed by CS Energy for a party outside of CS Energy (eg Callide JV), a certificate of testing and safety must be completed and signed by the CS Energy Contractors Licence Qualified Technical Person. This certificate must be supplied to the person/group the work was performed for.

Test certificates are to include at least the following:

- name and address of the person for whom the work was performed,
- the electrical installation tested,
- the day the electrical installation was tested, and
- the number of the electrical contractor licence under which the electrical installation was tested.

5.3.34 Holding Time of Certificate of Testing and Safety

A certificate of testing and safety issued by CS Energy in accordance with the above point is to be maintained by CS Energy as the Licenced electrical contractor for a period not less than 5 years after it was provided or after the testing was undertaken.

5.3.35 Auditing Requirements – High Voltage and Hazardous Area Installations

Works of a Generation entity do not require auditing by an accredited auditor. This includes electrical equipment on CS Energy sites used to generate, transform, transmit or supply electricity.

Where electrical work is performed on high voltage electrical equipment that are not the works of an entity, an “accredited auditor” must inspect the work to confirm that the installation is tested, is in accordance with the wiring rules and is electrically safe.

Where electrical work is performed on hazardous area electrical equipment an “accredited auditor” must inspect the work, unless otherwise prescribed by a safe system of work in relation to hazardous areas.



Refer to – CS Energy Procedure CS-OHS-32 for Maintenance and Testing of Entity Works, electrical installations and electrical equipment.

The certificate must certify that the electrical equipment, to the extent it is affected by the electrical work, is electrically safe.

5.3.36 Electrical Safety Equipment – Maintenance and Use

Maintenance, use and testing requirements for safety equipment and testing instruments used in the performance of electrical work is addressed specifically in CS Energy's Maintenance of Electrical Safety Equipment and Clothing (PPE) Procedure, CS-OHS-34.

This procedure should be referred to for specific usage, inspection, testing and maintenance requirements.

5.4 Capacitors

5.4.1 General

When working on equipment that includes capacitors, substantial energy can be present and therefore arcs could be produced that might cause electrocution burns or electric shock or ignite gases or solid material.

Capacitors and associated circuitry shall be proved to be de-energised and fully discharged before commencing work on them and their associated circuit wiring.

This may be achieved by using and maintaining approved safe discharging devices or by following the manufacturer's instructions.

5.4.2 Voltage Tester

A voltage tester shall be used to prove that these units are discharged, immediately before performing work, because capacitors that do not have discharge devices attached might self-charge (an inherent dielectric effect of capacitors) and re-instate the full line voltage.

5.4.3 Harmful Effects of Arcing

Care should be taken against the harmful effects of arcing when applying discharging devices. Short circuiting or earthing of capacitor terminals with metal objects such as spanners or screwdrivers can result in an arc, blast and flash burn injuries and should not be attempted.

Use only approved devices.



Important Note – If a capacitor cannot be discharged, then the requirements of Live Work for work on or near exposed energised conductors applies.

5.5 Explosive Atmospheres and Hazardous Area

Explosive atmospheres and hazardous areas require special consideration, and certification.

5.5.1 Explosive Atmospheres and Hazardous Areas

The JSEA is to identify the risks and control the hazards associated with work on or near electrical equipment within hazardous areas, eg gas and fuel installations, coal handling areas and fine particle process areas.

The type of work, equipment allowed and precautions required may include the need for intrinsically safe equipment, the use of gas detectors and monitoring of the environment.

5.5.2 Training and Certification

Electrical Workers working in hazardous areas are to be trained, holding applicable Australian competences, and authorised as per the Authorised Roles Matrix.

Drawings of hazardous area classifications are to be made readily available to the electrical workers required to work in those areas.

5.5.3 EEHA Installation, Maintenance, Repair and Modification

Electrical Equipment for Hazardous Areas (EEHA) works must be installed in accordance with device Certificate of Compliance (CoC) and applicable Australian Standards.

EEHA devices requiring modification or repair not specified under the device CoC must be carried out and re-certified by an AS3800 certified workshop.

5.5.4 Potential Sources of Ignition

Electric tools, test equipment and instruments, eg mains and battery-powered appliances such as inspection hand lamps, drills, torches and test equipment.

Personal affects eg jewellery, watches, cigarette lighters, matches, and battery-operated items such as hearing aids, mobile telephones, pagers, key ring torches and transistor radios.

Clothing made from wool, wool blends, nylons (unless treated with an antistatic process) and polyvinyl materials (especially those having a nylon base). It is possible for these materials to generate an electrical spark sufficient to ignite a flammable gas or vapour mixture.

Actions such as:

- any form of welding or brazing
- use of a hacksaw
- drilling of any type
- Use of handtools (aluminium in particular)
- impact of a hammer or chisel onto concrete or metal
- rubbing or movement of plastics

5.5.5 Exceptions to Potential Sources of Ignition

Refer to the PTW:

- they are certified for use in the conditions into which they are to be taken
- the area will be made safe for use of the item through the implementation of documented control (e.g. JSEA or SWIs) and the adequacy of these controls have been approved by appropriate personnel (i.e. site Health & Safety, RPEQ or a person trained in the use of gas detectors who can confirm an explosive atmosphere does not exist).

5.6 Heights, Poles, Structures, Overhead and Underground Lines

5.6.1 Elevated Positions

Extra caution should be exercised when working on or near exposed energised overhead conductors or other energised electrical equipment in elevated positions.

In elevated positions, even a light shock can result in a fall that could prove fatal.

5.6.2 Approved PPE

Approved safety harnesses and other necessary safety equipment and PPE shall be used where appropriate. If a safety observer is necessary, the safety observer shall be competent in relevant rescue procedures.

5.6.3 Pole and Structure Testing

Poles and structures shall be tested and inspected to approved procedures to establish, as far as practicable, whether they are structurally sound for the work to be carried out without special precautions.

The testing and inspection shall be performed before climbing the poles or structures or before accessing them by means of elevating work platforms.



Important Note – The use of testers that detect an electric field surrounding an energised conductor may not be suitable for cables that are surrounded by a metallic screen, cables carrying direct current and in some other circumstances.

5.6.4 Identify the Safe Area of Work

The safe area of work for authorised zones and exclusion zones is to be identified as part of preparing the JSEA. The risk assessment for erecting barricades is to assess the proximity of other workers, duration of the work being performed and the hazards involved.

All personnel who are to work in the area shall be advised of its limits by the OIC.

5.6.5 Work on De-energised Equipment

Work on de-energised equipment shall only proceed if the equipment is isolated and any other exposed conductors in the work area are either:

- de-energised and isolated or
- separated by barriers or by distance
- for HV - de-energised, isolated and earthed

If the above requirements are not satisfied, then the work shall be done in accordance with the energised LV/HV working procedures.

5.6.6 Electrical Work within Exclusion Zones for Electrical Parts

Persons operating plant or vehicles must not enter or work within an exclusion zone of an electrical part unless:

- the electrical part is isolated from all sources of electricity
- the electrical part is tested to ensure it is, or otherwise confirmed to be, isolated from all sources of electricity and
- if the electrical part is high voltage electrical part and testing or live work is to be performed, the work meets the conditions stated in Section 4.2, or
- if the electrical part is a high voltage electrical part and any other electrical work is performed, it is earthed.

For identification of the term exclusion zone refer to the Definitions. Exclusion zone is further defined in the Code Of Practice 2020 Working near overhead and underground electric lines, Section 3 – Unsafe Distances.

If it is not practicable to test or otherwise confirm the isolation of electricity for an electrical part, entry into the area, or the work may be performed if:

- the work can be performed safely as determined by a JSEA
- detailed work instructions have been established in relation to the practice and these have been made known to those performing the activity and

- at least one of the following applies:
 - suitable barriers or earthed metal shields are installed between the person, operating plant or vehicle and the electrical part
 - the work is testing and the electrical part or the electrical equipment of which the part is a component is designed in a way requiring the work to be performed while the person, operating plant or vehicle is within the exclusion zone or
 - the work is earthing of the electrical part of the electrical equipment of which the part is a component and the earthing is performed after the electrical part or equipment has been isolated and proved to be de-energised.



Important Note – Entering within an exclusion zone requires the appropriate permit
Refer to PTW Manual CS-PTW-01

5.6.7 Specific Overhead Line Considerations

Specific overhead line hazards and controls are to be identified within a JSEA where operating plant such as the following may come into contact with overhead lines during work activities on site:

- cranes
- elevating work platforms
- earth moving equipment
- any other plant that may come into contact with overhead lines

5.6.8 Pre-Work Planning

Pre-work planning and consultation (including preparation of a JSEA) with plant operators, plant hire companies and contractors is to be undertaken by the OIC to minimise the likelihood of exclusion zones being entered and to ensure a safe system of work has been identified prior to activities commencing.

5.6.9 Plant Operation near Overhead Lines

Only authorised persons or instructed persons are to operate plant near overhead lines. To ensure this is the case where contracted parties are involved in the work, CS Energy authorised persons are to supervise the work and undertake pre-work consultation with plant operators to ensure all relevant issues are discussed and documented.

Where overhead lines are owned or operated by an external party the owner or operator must be consulted about the work.

5.6.10 Compulsory Safety Observer

A Safety Observer - Operating Plant is to be used at all times where entry into an exclusion zone is possible or where work is performed within an authorised zone.

5.6.11 Performing JSEA Process

A part of pre-work planning and performing the JSEA process the following types of issues are to be considered:

- size and dimensions of the load(s)
- the conductive nature of the operating plant or the load(s) and the likelihood of it becoming live due to induced voltages
- special precautions for the lifting of the load(s) above or over electric lines

- the method of securing the load(s)
- whether any part of the load(s) may move inadvertently during lifting and slewing
- whether unexpected movement of the operating plant may cause it to enter an exclusion zone or contact an overhead line
- whether wind factors could cause the operating plant or load to enter an exclusion zone or contact an overhead line



Refer to – Power Station specific procedures that ensure a level of safety equal to or exceeding the above requirements that may also be used as a supplement to ensure a safe system or work where overhead lines present a hazard.

5.6.12 Specific Underground and In-Situ Electrical Considerations

Specific electrical hazards and controls Form S1877 are to be identified within a JSEA where work activities on site, such as the following, may cause persons or operating plant to come into contact with electrical cables and installations:

- removing wall sheeting during a building refurbishment
- penetrating a wall cavity or ceiling space with a hand tool or portable electric tool
- using portable electrical tools to cut piping that may contain water
- excavating on site in preparation for a new facility or building
- digging holes for the erection of fence posts
- any other activity that may require penetration into the ground or work in the vicinity of in-situ electrical installations and entity works.

5.6.13 Pre-Work Planning

As part of pre work planning and JSEA processes the following types of issues are to be considered. These include:

- the location to be worked in whether it be in the vicinity of entity works or in the vicinity of electrical installations
- unauthorised persons are prevented from entering the work area by a means of barrier exclusion, signage or both
- reference to power station drawings, electrical drawings and service drawings
- the method of work being used, whether it is via machinery, portable electrical tools or by the use of hand tools.

6 ELECTRICAL INCIDENT OR EVENT

6.1 Purpose

The scene of a serious electrical incident or dangerous electrical event is not to be interfered with unless permission is granted by an Inspector from the Electrical Safety Office or similar statutory authority, or a Police Officer.

6.2 Incident Scene

Responders to a serious electrical incident or dangerous electrical event may only move equipment/items or interfere with the scene within their competence if it is necessary to:

- assist an injured person

- to remove a deceased person
- to make the site safe or minimise the risk of a further serious electrical incident or dangerous electrical event.

In the event of a serious electrical incident or dangerous electrical event, the incident is to be reported as soon as possible to the Health and Safety Business Partner.

6.3 Health and Safety Business Partner

The Health and Safety Business Partner, on behalf of CS Energy is to give notice of the incident or event to the Electrical Safety Office via the *Workplace Health and Safety Queensland – Incident/Record Report Form*. This is to be undertaken within 24 hours of the incident or event occurring or from the time the incident or event was discovered.

6.4 Fatality

If the incident or event is a serious electrical incident in which a person is killed or is a dangerous electrical event, this notification is to be undertaken by the fastest means possible, by telephone or in writing. The Police must also be contacted immediately following the incident.

6.5 Investigation Report

A record and commensurate investigation report in relation to serious electrical incidents or dangerous events are to be documented and maintained for a period of not less than 5 years when:

- the incident involves an electric shock, the casualty is to be immediately rendered first aid and
- the casualty is to be transported by ambulance to a medical provider for further treatment and monitoring.

7 TRAINING AND AUTHORISATION

In order to work safely on electrical plant, personnel must be both trained (competent) and authorised.

7.1 Competency System

For specific isolation and electrical related activities, CS Energy Power Station sites are to have a training, authorisation and competency system that authorises personnel for the following functions: Officer in Charge (OIC), High Voltage Officer in Charge (HVOIC), Permit to Work Officer (PTWO), Senior Permit to Work Officer (SPTWO), High Voltage Switching Officer, High Voltage Switching Assistant, Electrical Worker, Electrical Worker – Hazardous Areas, Authorised Person, Safety Observer – Operating Plant, Safety Observer – Electrical.

7.2 Site Criteria Authorisation

Authorisation is to be based on the site criteria and is to include the following competencies: Low Voltage Rescue and Resuscitation*, SAHVEA training (Formerly HVIA)*, Licenced Electrical Worker, Electrical Engineer, Electrical Technician, Hazardous Area (explosive atmosphere) competences*, authorised persons, Safety Observer – operating plant, Safety Observer – Electrical, site-specific plant training modules and permit to work modules.

*Australian national competency units

7.3 Refresher Training

Personnel who are authorised for a particular electrical function are to undertake refresher training as required by their licensing conditions or as per the training course specifications.

Workers required to work on high voltage equipment or in hazardous areas are to be trained to meet the required competencies for the type of work or work area. Refresher training is to be undertaken at intervals not exceeding three years to ensure their competency is maintained.

7.4 Proof of Competence

Electrical workers and contractors are to provide evidence of their competencies prior to getting authorisation to access electrical equipment, obtain Permits to Work, act as safety observers and be authorised persons for work in proximity to exposed, energised electrical conductors. Electrical contractors must also provide evidence of the “Qualified Technical Persons” capacity to sign test and compliance certificates.

7.5 Electrical Contractor Licence

7.5.1 Power Station Site General Manager

Refer to Section 2.7 Site General Manager

7.5.2 Head of Operations Performance

Refer to Section 2.8 Head of Operations Performance.

8 DEFINITIONS

Term	Definition
Authorised Person	For an electrical part, means a person who: • has enough technical knowledge and experience to do work that involves contact with, or being near to, the electrical part and • has been approved by CS Energy's Site PTW Administrator to do work that involves contact with, or being near to, electrical parts.
Authorised Zone	For an electrical part the area between the exclusion zone for an untrained and unauthorised person and that of a trained and authorised person. Refer to Schedule 2 of the Electrical Safety Regulations.
Competent Person	A person who has, through a combination of training, education and experience, the current knowledge and skill enabling that person to perform correctly a specified task. This person must also meet all the requirements under the Fit for Duty Policy and complies with the relevant training schedule provided in the associated PTW procedures for the specified task undertaken. Note: Prescriptive requirements for a person to be able to undertake a specific task may be found in relevant Australian standards, industry standards, advisory standards, industry codes of practice and other legislation as applicable.
Dangerous Electrical Event	Is any of the following: • the coming into existence of circumstances in which a person is not electrically safe, if: ○ the circumstances involve high voltage electrical equipment and ○ despite the coming into existence of the circumstances, the person does not receive a shock or injury • the coming into existence of both the following circumstances: ○ if a person had been at a particular place at a particular time, the person would not have been electrically safe, ○ the person would not have been safe because of circumstances involving high voltage electrical equipment, • an event that involves electrical equipment and in which significant property damage is caused directly by electricity or originates from electricity, • the performance of electrical work by a person not authorised under an electrical work licence to perform the work, • the performance of electrical work by a person if, as a result of the performance of the work, a person or property is not electrically safe, • the discovery by a Licenced electrical worker of electrical equipment that has not been marked as required under the Electrical Safety Act 2002.
Direct Contact	A person with an electrical part if: • the person is touching the electrical part with the person's bare hands or another bare part of the person's body, or • the person is touching a conductive object with a bare part of the person's body and the conductive object is touching the electrical part, or • an article of clothing worn by the person is touching the electrical part, or • an article of clothing worn by the person is touching a conductive object and the conductive object is touching the electrical part. • operating plant with an electrical part if: • any part of the operating plant is touching the electrical part, or • anything the operating plant is handling is touching the electrical part. • a vehicle with an electrical part if: • any part of the vehicle is touching the electrical part, or • anything being carried or otherwise handled by the vehicle is touching the electrical part.

Term	Definition
Electrical Contractor Licence	Is a licence issued by the Electrical Safety Office authorising a person to perform electrical work as part of a business or undertaking.
Electrical Line	Is a wire or conductor or associated equipment used for transmitting, transforming, or supplying electricity at a voltage greater than extra low voltage. Note: an electrical line does not include a wire or conductor directly used in converting electricity into another form of energy, or a wire conductor within the internal structure of a building
Electrical Engineer	A person who is a registered professional engineer (RPEQ) under the Queensland Professional Engineers Act 2002 and who is registered in the division of electrical engineering under that Act, or other persons who are defined as an electrical engineer by the Electrical Safety Act 2002 (QLD).
Electrical Equipment	Is 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, or - operated by electricity at a voltage greater than extra low voltage, or - that is, or that forms part of, a cathodic protection system. Note: Electrical equipment does not include any apparatus, appliance, cable, conductor, fitting, insulator, material, meter or wire forming part of a vehicle if it forms part of a unit of the vehicle that provides propulsion for the vehicle, or its source of electricity is a unit of the vehicle that provides propulsion for the vehicle.
Electrical Equipment Work	Is electrical work other than electrical installation work or electric line work.
Electrical Installation	Is a group of items of electrical equipment, that: - are permanently electrically connected together, and - do not include items that are works of an electricity entity, and - can be supplied with electricity from the works of an electricity entity or from a generating source. Note: an item of "electrical equipment" can be part of more than one electrical installation and for item one above: - an item of electrical equipment connected to electricity by a plug and socket outlet is not permanently electrically connected, and - connection achieved through using works of an electricity entity is not a consideration for in determining whether or not electrical equipment are electrically connected.
Electrical Installation Work	Is electrical work associated with an electrical installation, but does not include the following electrical work: - testing, repairing or maintaining electrical equipment included in the electrical installation or - electric line work associated with the electrical installation.
Electrical Isolation	An isolation is deemed to be initiated if any energisation, or switching surge will not cross the isolation point and the isolation point is fitted with a locking device and accompanying danger tag. Isolation of remote controls via software logic alone, is not acceptable.
Electrical Part	Means an exposed part, or an overhead insulated electric line.
Electrical Work	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. Note: the following are not 'electrical work':

Term	Definition
	• work that involves connecting electrical equipment to an electricity supply by means of a flexible cord plug and socket outlet • work on a non-electrical component of electrical equipment, if the person carrying out the work is not exposed to an electrical hazard • replacing electrical equipment or a component of electrical equipment if that task can be safely performed by a person who does not have expertise in carrying out electrical work • assembling, making, modifying or repairing electrical equipment in a workplace under the <i>Work Health and Safety Act 2011</i> that is prescribed under a regulation for this paragraph, if that is the principal manufacturing process at the workplace, and arrangements are in place, and are detailed in written form, for ensuring that: ○ the work is done safely and competently and ○ the equipment is tested to ensure compliance with relevant standards • building or repairing ducts, conduits or troughs (channels) where electrical wiring will be or is installed, if ○ the channels are not intended to be earthed and ○ wiring installed in the channels is not energised and ○ the work is done under the supervision of a person licensed to perform electrical installation work • locating or mounting electrical equipment, or fixing electrical equipment in place, if this task is not performed in relation to the connection of electrical equipment to an electricity supply • assisting a licensed electrical worker to carry out electrical work, on electrical equipment under the direct supervision of the electrical worker, if the assistance does not involve physical contact with any energised electrical equipment • carrying out electrical work, other than work on energised electrical equipment, in order to meet eligibility requirements in relation to becoming a licensed electrical worker and only if the work is prescribed under a regulation for this paragraph • building, under the supervision of an electricity entity, an overhead electric line on structures that do not already carry an energised overhead electric line • laying, cutting or sealing underground cables that are part of the works of an electricity entity before the initial connection of the cables to an electricity source • recovering underground cables that are part of the works of an electricity entity after disconnection from an electricity source • altering, repairing, maintaining or recovering an overhead electric line that is part of the works of an electricity entity, if the work is performed under the entity's supervision and— ○ if the line is not on supports supporting another electric line—the line has been isolated from an electricity source so that the closure of a switch cannot energise the section of the line where work is being done or ○ if the line is on supports supporting another electric line—both lines have been isolated from an electricity source so that the closure of a switch cannot energise the section of the line where the work is being done or an adjacent section of the other line • erecting structures for the support of electrical equipment • locating, mounting or fixing in place electrical equipment, other than— ○ making or terminating electrical connections to the equipment or ○ installing supply conductors that will connect the equipment to a supply of electricity • maintaining the structural parts of the electrical traction system on a railway, other than overhead electric lines, that forms part of the works of an electrical entity, if the work is structural work performed under a safe system of work.
Electrical Work Licence	Is a licence issued by the Electrical Safety Office authorising an individual to perform electrical work.

Term	Definition
Exclusion Zone	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 QLD ES Regulation 2013, Schedule 2.
Exposed Conductor	A conductor that can be contacted with the standard test finger, or not rated to IP2X as per AS60529.
Extra Low Voltage	Means voltage of 50V or less AC RMS, or 120V or less ripple-free DC.
Fault Finding (live)	Means work performed by electrical workers, engineers or electrical technicians to determine the causes of electrical faults in electrical equipment or installations – this may require work on energised equipment where there is no alternative to performing the fault finding other than by energised means.
High Voltage	Means voltage greater 1000V AC RMS or 1500 ripple free DC.
Live Work	Means electrical work performed in circumstances in which some or all of the electrical equipment the subject of the electrical work is energised.
Low Voltage	Means voltage greater than 50V AC RMS or 120V ripple free DC but not more than 1000V AC RMS or 1500V ripple-free DC.
OIC	Officer In Charge of works
Operator Earth	Operator Earths are earths capable of withstanding prospective fault currents. They are placed under the direction of an Isolating or Switching Sheet by a PTWO, with an isolation lock and Danger Tag/DNOB attached. They may be a designated earth switch or a portable earthing device connected to a permanent earthing point
Operating Plant	Means plant being operated for its intended purpose, unless the operation of the plant cannot materially affect the distance between the plant and any electrical part in relation to which there is a defined exclusion zone.
PTW	Permit To Work
Safety Observer - Electrical	In relation to the observing of the performance of electrical work, means a person who: • is competent & authorised 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
Safety Observer – Operating Plant	In relation to QLD ES Regulation Schedule 2 Exclusion Zone Tables, means a person who: • Authorised & 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 line.
Serious Electrical Incident	Is an incident involving electrical equipment if, in the incident: • a person is killed by electricity, or • a person receives a shock or injury from electricity, and is treated for the shock or injury by or under the supervision of a doctor, or • a person receives a shock or injury from electricity at high voltage, whether or not the person is treated for the shock or injury by or under the supervision of a doctor.
Supervise Electrical Work	Means supervise the way the electrical work is performed. Supervision of electrical work entails instructions in the way electrical work is to be completed. Any person supervising electrical work must hold an Electrical Work Licence or be an Electrical Engineer.
Works	Works of an electricity entity means the electrical equipment, and electric line associated equipment, controlled or operated by the entity to generate, transform, transmit or supply electricity.

9 REFERENCES

Reference No	Reference Title	Author
	Electrical Safety Act 2002 (Qld)	Qld Govt
	Electrical Safety Regulation 2013 (Qld)	Qld Govt
Code of Practice	Code of Practice – Working near overhead and underground electric lines 2020 (Qld)	Qld Govt
Code of Practice	Code of Practice – Works 2020 (Qld)	Qld Govt
B/D/20/5276	Queensland Electricity Entity Standard for Safe Access to High Voltage Electrical Apparatus SAHVEA (Formerly HVIA)	Qld Govt
NENS 03-2003	National Guidelines for safe access to electrical and mechanical apparatus (ESAA)	ESAA
AS 2676.1-1992	Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings - Vented cells	Standards Aust
AS 2676.2-1992	Guide to the installation, maintenance, testing and replacement of secondary batteries in buildings Part 2: Sealed cells	Standards Aust
AS 4836:2001	Safe Working on low voltage electrical installations	Standards Aust
AS 60529:2004	Degrees of protection by enclosures (IP Code)	Standards Aust
HB 187:2006	Guide to Selecting a Safe Multimeter (companion guide to AS 4836, section 7 <i>Test Equipment</i>)	Standards Aust
B/D/15/4005	NFPA 70E 2015 Standard for Electrical Safety in the Workplace	NFPA
B/D/11/19582	Procedure - CS-PTW-01 - Permit to Work (PTW) Manual	CS Energy
B/D/11/30958	Procedure - CS-OHS-32 - Maintenance and Testing of Entity Works, Electrical Installations and Equipment	CS Energy
B/D/11/30960	Procedure - CS-OHS-34 - Selection, Maintenance and Use of Electrical Safety Equipment and PPE	CS Energy
B/D/08/2855	Procedure - CS-PTW-HAZ-04 – Digging, Excavation and Building Penetration	CS Energy
B/D/11/36153	Form - S1885 - Live Electrical Work Checklist	CS Energy
B/D/12/7183	Form - S1975 – Electrical Certificate of Testing and Compliance	CS Energy

10 RECORDS MANAGEMENT

In order to maintain continual improvement, suitability, safety and effectiveness of the organisation, registered documents will be reviewed on a two-yearly basis or at intervals specified by legislative or regulatory requirements. Review of controlled documents should occur where it has been identified that there are changes in technology, legislation, standards, regulation or where experience identifies the need for alteration to the content. Registered documents should also be reviewed following an incident, change management process, modification or where directed as part of a risk assessment process. A 'review' can simply mean that it has been identified, confirmed and appropriately recorded that no changes are required and that the existing process remains the same.

Government Owned Corporations must ensure that records are retained according to accountability, legal, administrative, financial, commercial and operational requirements and expectations. In compliance with records retention and disposal, all documentation created in relation to business must be retained in line with minimum retention periods as detailed in legal retention and disposal schedules.

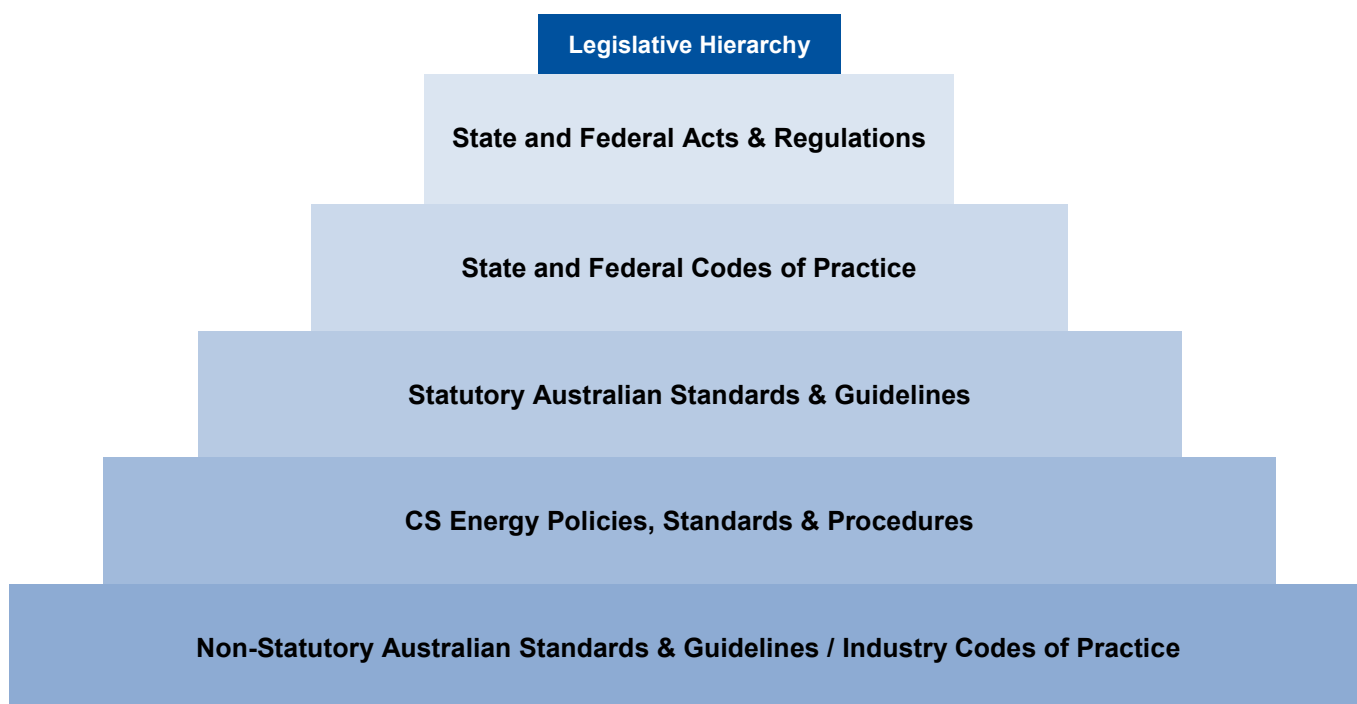
11 ATTACHMENTS

11.1 Attachment 1 - Legislative Compliance

The precedence order for standards as applied to CS Energy Policy are as follows:

1. AS/NZS 3000 Wiring Rules and its nominated *normative* standards. All standards referenced in the Queensland Electrical Safety Regulation.
2. International Standards and *Informative* Australian Standards
3. CS Energy Policies, Standards, & Procedures

11.1.1 Legislative Hierarchy



11.1.2 Precedence Order Requirements

The precedence order of normative documents, in compliance with Australian Legislative Hierarchy requirements for this document as applied to CS Energy Policy are as follows:

QLD WHS Act 2011	QLD Electrical Safety Act 2002
QLD WHS Regulation 2011	QLD Electrical Safety Regulation 2013
STATUTORY CODES OF PRACTICE – Queensland Electrical Safety Codes of Practice: - Works 2020 - Managing electrical risks in the workplace 2013 - Working near overhead and underground electric lines 2020	
STATUTORY AUSTRALIAN STANDARDS – Australian Standards applicable to the CS Energy include (but not limited to) the following: - AS/NZS 3000: 2007 Wiring Rules 2018 - AS 2067:2016 Substations and high voltage installations exceeding 1kV a.c - AS/NZS 60079(series) Explosive atmospheres Particular revision dates AS/NZS 60079.0:2012, AS/NZS 60079.14:2009, AS/NZS 60079.17:2009 - AS/NZS 61241(series) Combustible dusts Particular revision dates AS/NZS 61241.0:2005, AS/NZS 61241.14:2005	
CS Energy H&S Policy	
MANAGEMENT PROCEDURES – - CS-OHS-31 Electrical Safety Management (this document) - CS-IM-01 Learning from Incidents	
PROCEDURES – - CS-OHS-32 - Maintenance and Testing of Entity Works, Electrical Installations and Equipment - CS-OHS-33 - Maintenance and Testing of Portable Electrical Equipment, RCDS and Tools - CS-OHS-34 - Selection, Maintenance and Use of Electrical Safety Equipment and PPE - CS-OHS-36 - Barricades and Signage (03 15) - CS-OHS-50 – Personal Protective Equipment (PPE) - CS-OHS-53 – High Voltage Electrical Isolation and Access - CS-OHS-63 - Authorised Person - Entry into Switchrooms and Control Relay Rooms - CS-OHS-73 – Injury and Illness Classification - CS-OHS-76 – Health and Safety Risk Management - CS-PTW-01 - Permit to Work (PTW) Manual - CS-PTW-SOP-01 - Isolation of Non- Operational Plant by the Officer in Charge of Work (OIC) - CS-PTW-HAZ-02 - Work at heights - CS-PTW-HAZ-03 - Confined Spaces - CS-PTW-HAZ-04 – Digging, Excavation and Building Penetration	
TRAINING – - Electrical Safety Observer Induction - CS Energy Core Safety Induction (Electrical Awareness, Electrical Safety Awareness) - Arc Flash Hazard Awareness - Safety Observer - Electrical Work - Module 3 Participant Workbook - Safety Observer - Electrical Work - Module 3 - The Safety observer for operating plant training module - Electrical Worker	
FORMS AND GUIDES – - Form S1885 - Live Electrical Work Checklist - Form S1975 - Electrical Certificate of Testing and Compliance	
SAFETY MANAGEMENT FOUNDATION – - CS Energy H&S management system - Code of Conduct - Life Saver Rules - Key Safe Behaviours - JSEA and Risk Assessment training and procedures	

11.1.3 Informative Australian Standards and Industry Codes of Practice

- Queensland Electricity Entity Standard for Safe Access to High Voltage Electrical Apparatus (2015)
- NENS 03-2003 - National Guidelines for safe access to electrical and mechanical apparatus (ESAA)
- NFPA 70E 2015 Standard for Electrical Safety in the Workplace