



Collie Battery Energy Storage Project Electrical Isolation and Tag Out Procedure

Document ID: 201074-SE-PRO-0002

Authority

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History

Revision	Date	Amended By (Name)	Details of Amendment
0.0	07/05/2024	Mike Bentley	Site Specific Document

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1 Purpose

The purpose of this procedure is to describe the electrical isolation and tag-out process used by SCEE Electrical Pty Ltd..

2 Scope

These instructions cover basic safety principles applicable to Workers working on or in the vicinity of electrical apparatus which is (or is being) energised or has been taken out of service by the client or the company.

They may be elaborated and supplemented by site instructions which, except for special circumstances, shall not relax the principles herein. This procedure does not include identification and isolation of energy sources other than electrical.

3 Definitions

Term	Explanation
Worker	A person carrying out work in any capacity for SCEE, including employees and subcontractors
High Voltage	Voltages above 1000V ac or 1500V dc
Mains supply/Low Voltage	Voltages above 50V ac or 120V dc, below 1000V ac or 1500V dc
Extra Low Voltage	Voltages below 50V ac or 120V dc
Electrical Isolation	The process of disconnecting electrical equipment from all sources of supply by the operation of isolators, isolating links or fuses and/or connections and the use of test equipment to verify the effectiveness of the disconnection

4 Responsibilities

Role	Responsibility
Project Manager / Operations Manager	Ensure isolation and tagging procedures are implemented across the scope of their operations. Ensure personnel are trained and aware of their responsibilities regarding isolation and tagging.
Supervisors	Ensure hazard and risk assessments are conducted prior to the commencement of work and identify isolation and tagging requirements. Ensure all personnel within their control are trained and inducted to the requirements of JHA and isolation/ tagging requirements. Provide appropriate supervision and monitoring of activities to ensure correct implementation of isolation processes. Investigate any breaches of tagging processes as a significant event.
Workers	Participate in hazard and risk assessments. Attend all pre start meetings as required. Execute all work activities as per JHA, work permits and procedural requirements. Ensure all personal tags are applied and maintained as required.

5 Flowchart

N/A

6 Procedure

The below is to be read in conjunction with [SCEE's 5 Star Commitment Procedure SCEE-BS-HS-PRO-0027](#). The intention of performing electrical isolation is to eliminate, injuries and events arising when working with electrical equipment.

Refer: [SCEE's 5 Star Commitment Procedure SCEE-BS-HS-PRO-0027](#)

6.1 Voltage

The voltages generally encountered on our projects are as described in [AS/NZS 3000:2007](#)

Extra Low Voltage	Not exceeding 50V a.c. or 120V d.c.
Low Voltage	Exceeding E.L.V. but not exceeding 1000V a.c. or 1500V d.c.
High Voltage	Exceeding low voltage

Be aware of working on conductors live at these voltages. There have been more electrical fatalities throughout Australia from low voltage shocks than from contact with high voltage conductors. Even voltages below 50volts can cause shocks and be hazardous to susceptible people such as those who have breathing or heart conditions

Refer: [AS/NZS 3000:2018](#)

6.2 General Rules

You must always regard conductors, switchgear and electrical apparatus as being "live" until you have proved them to be dead by means of approved test equipment. Test equipment must be proved to be in good working order immediately before and after use.

You must not work on live mains, switchgear and/or apparatus.

Where it is impracticable to isolate the supply on Extra Low Voltage equipment and working live becomes the only option available, approval of work will involve a separate process with a task specific risk assessment attached, and is to be approved by the Project Manager. It will usually involve getting necessary client approval in order to verify procedure is adequate and the work method is approved for site. The process shall be controlled via a safe work method statement. In all circumstances use of the hierarchy of control is advised to ensure the highest level controls possible are implemented.

1st and 2nd year apprentices are not permitted to work on live equipment.

No SCEE personnel are to work on live low voltage equipment, except for fault finding work which due to its nature may only be conducted live.

Important: 1st and 2nd year apprentices are not permitted to personally carry out isolation, tagging and testing procedures. However, may be involved in the isolation, tagging and testing for training purposes under the supervision of the licensed person.

6.3 Isolation of Supplies

When a circuit or equipment has been isolated to enable work to be carried out on or adjacent to such equipment, an approved isolation lock is to be attached to the approved isolation device, danger tag attached to the lock signed and dated by the employee carrying out the isolation. If multiple persons are to work on the isolated equipment, an approved multi-lock device with individual locks and tags attached by each person shall be used.

- Danger tags and locks are to be securely fixed to the operating handle or button of the equipment so that there is no risk of their being accidentally dislodged or of an operator being able to operate the equipment without seeing the tag.
- Isolation to be checked prior to placement of locks to confirm the switch cannot be operated in any fashion.

No switch may be operated whilst a lockout device and danger tag is attached.

A lock and danger tag may only be removed by the person whose signature appears on it, except that in the circumstances where the owner of the danger tag and lock is unavailable due to leave, illness or other cause, the Authorised Person or the delegate and appropriate client authority may remove the lock and tag, but only after complying with the following conditions:

- They shall make every effort to contact the person to confirm that they are not available to remove the lock and inform the person the intention of removing lock.
- They shall acquaint themselves with the reasons for the lock and tag being attached;
- They shall carry out all necessary inspections and tests on the circuits/equipment to make certain that such may be operated without danger to person or equipment;
- They shall ensure that all persons associated with the work are informed of their action;
- Incident report shall be completed.

6.3.1 Isolation Procedure

The procedure for isolating a supply or electrical equipment consists of several operations:

1. Seek authorisation to isolate i.e. Permit or instruction.
2. Identify the relevant device and confirm device safe to be isolated i.e. not in operation. Prove the device is currently operational, test device is live.
3. Isolate the supply by switching the isolator or circuit breaker to the off position.
4. Lock it off with a lock and attach danger tag.
5. Check your test equipment to see that it is working properly i.e. test the tester on a live circuit.
6. Test for dead by confirming zero volts. Must test between all actives, from all actives to neutral, from all actives to earth and neutral to earth.
7. Re-check your test equipment to see that it is still working properly.

8. If disconnecting conductors, remove all other conductors first and leave earth to last. When re-connecting conductors, earth conductor first then other conductors.
9. Any exposed conductors are left in a safe condition i.e. insulated connectors, taped and inserted in a temporary junction box.
10. Isolation confirmed with the relevant authority.
11. Is there any associated equipment that must also be isolated?
12. After any break in work or change of conditions a re-test for dead shall be completed prior to recommencing any electrical work.

6.3.2 Working on or Near Exposed Live Circuits and Equipment

When it is impractical to isolate the supply and working live is necessary, you must report to your supervisor before commencing work and will involve a separate approval process with a specific task risk assessment attached.

6.3.3 Energising and De Energising Mains and Apparatus Involving a Neutral Conductor

When connecting and disconnecting mains and apparatus the neutral conductor must be connected first and disconnected last.

6.4 High Voltage

All High Voltage Mains and Apparatus Shall be regarded as Alive until Proven Dead

6.4.1 Minimum Safe Working Distance

Where employees work in the vicinity of exposed live high voltage mains and apparatus, personnel shall not allow any portion of their bodies or any object or tool (other than equipment issued for testing, operating or working on live voltage mains and apparatus) which they are handling to come within the minimum safe working distances from exposed live high voltage mains and apparatus.

Nominal System Voltage	Distance
Live insulated overhead power line or aerial bundled conductor line of a voltage of not more than 1,000 volts	0.5m
Live uninsulated overhead power line of a voltage of not more than 1,000 volts	1.0m
Live overhead power line whether insulated or not, of a voltage exceeding 1,000 volts but not more than 33,000 volts	3.0m
Live overhead power line whether insulated or not, of a voltage exceeding 33,000 volts	6.0m

When it is likely that an employee's body or any object which they might be carrying would come within the distance specified above, insulating screens must be erected or the exposed live high voltage mains and apparatus must be made dead and isolated and earthed. Site specific vicinity permits may be required.

6.4.2 Working on High Voltage Mains and Apparatus

Except when authority is given and special tools and equipment are provided for working on high voltage mains and apparatus, high voltage mains and apparatus must not be worked on until:

1. They have been isolated from all possible sources of supply; and
2. Danger notices have been displayed on or adjacent to all devices and controls through which the mains and apparatus may be energised; and
3. They have been proved dead; and
4. They have been earthed and short circuited; and
5. Barriers have been erected where necessary; and
6. An access permit has been issued.

Where high voltage mains and apparatus to be worked on are divided into two or more sections, the above requirement shall be observed with regard to each section.

Note: Voltage transformers as well as power transformers are a possible source of high voltage supply and must be isolated on both the high and low voltage sides.

6.4.3 Isolation of High Voltage Mains and Apparatus

Isolation of high voltage mains and apparatus from a source of supply shall be effected by making a break in the electrical circuit:

1. by means of a switch or isolators, or
2. by unbolting and removing or separating connections.

6.4.4 Proving Dead High Voltage Mains and Apparatus

Only approved devices issued for proving high voltage mains and apparatus are dead shall be used. Immediately before and immediately after use of testing equipment, for the purpose of ascertaining if high voltage mains and apparatus are dead, such equipment shall be checked to prove that the equipment is in proper working order.

Provided that if the testing equipment cannot be so checked, the high voltage mains and apparatus shall be re-checked with duplicate testing equipment.

6.4.5 Earthing and Short Circuiting High Voltage Mains and Apparatus

6.4.5.1 Mains and Apparatus other than Over Head Lines

Except as provided below, mains and apparatus to be worked on shall be earthed and short-circuited as close as possible to the site of the work.

Earthing and short-circuiting equipment shall be adequate to carry short-circuit currents which may flow and shall remain in position for the duration of the work.

EXCEPTIONS: High voltage mains and apparatus (on which work is to be carried out) need not to be short-circuited and earthed provided that:

1. The work which it is proposed to carry out:
 - a. Is work on drawn-out type equipment which has been withdrawn clear of live conductors; or
 - b. Is work on dismantling high voltage equipment of which it is impracticable to use fixed earths; or
 - c. Could not be carried out if earth leads were used; or
 - d. Is work on busbars to which it is impracticable to attach earth leads of adequate sizes; or
 - e. Involves the application of test voltages; and after that
2. After the mains and apparatus have been isolated; and immediately before the work is commenced, the conductors are momentarily connected to earth.

6.4.6 Overhead High Voltage Lines

1. Earthing and short-circuiting of a high voltage overhead line, shall be affected at a place which, is visible from the site where work is to be carried out on such line.
2. Earth Sticks are to be tagged (current). Modiewark's are to be tagged (current).
3. Such earthing and short-circuiting shall be carried out on both sides of the site.
4. Where no known permanent earthing facilities are available, earth connection shall be made by means of a metal rod not less than 13mm diameter or a metal stake of equivalent cross sectional area driven vertically into the ground to a depth not less than 60mm.
5. Except in a case of emergency involving danger to human life, a person shall not earth or short-circuit a high voltage overhead line otherwise than with equipment provided by his employer for the purpose.

6.4.7 Access Permit for Working on High Voltage Mains and Apparatus

Before any work may be carried out on high voltage mains and apparatus, an Access Permit must be issued for the mains and apparatus concerned.

NOTE: For this purpose, work of an operational nature, including the operation of switches, the opening and closing of links and the removal and replacement of fuses, shall be deemed to be work on mains and apparatus.

This procedure may be departed from only in the following special or emergency circumstances:

- When mains and apparatus have failed and supply is urgently required and temporary repairs are to be carried out under the sole charge of the authorised employee who carried out the isolation, earthing and short-circuiting of the mains and apparatus in accordance with these Safety Rules.

6.4.8 Preparation, Issue and Cancellation of Access Permits

In general, issue of Access Permits are controlled by the client, in which event, copies of the procedures are required, shall be obtained by all employees. In the absence of client procedures, the following procedures shall be followed:

6.4.9 Access Permits Shall Be Issued Only by the Supervisor

The supervisor shall enter the details of the mains and apparatus which may be worked on and shall certify that the following requirements have been carried out:

- a. Switching operations to isolate the mains and apparatus
- b. The earthing of the mains and apparatus
- c. Warning (if any) of nearby live mains and apparatus
- d. Temporary screens (if any) erected
- e. White tape barriers / hard barricading erected

The Supervisor shall then sign the Permit and enter the time and date of issue.

The person in charge of the work shall sign the Permit as the recipient and shall enter the time and date of recipient. They shall then ensure that all persons who are to work on the mains and apparatus, covered by the Permit, sign on and enter time and date before they lock on and commence work.

When the work has been completed or is stopped the person in charge shall ensure that all persons who worked on the job signed off and enter the time and date to indicate that they are aware that the safe working period has terminated. They shall then sign the Permit, enter the time and date, lock off and return the Permit to the supervisor. The supervisor shall then cancel the Permit and enter the time and date.

Before making the mains and apparatus alive, the person responsible shall ensure that all relevant access permits have been cancelled.

Immediately after the Access Permit has been cancelled, all danger notices and barriers erected for the work associated with the particular Permit shall be removed. If during the course of the work the conditions governing the issue of the Permit are to be changed, the Access Permit shall be cancelled. A new Access Permit shall then be issued if the work is required to proceed.

6.4.10 Commissioning of New High Voltage Mains and Apparatus

Before new high voltage and apparatus are energised, by the application of test voltages or otherwise, adequate precautions shall be taken to ensure that all persons who have been engaged on the work are clear of the mains and apparatus and will henceforth, regard the mains and apparatus as being alive.

6.4.11 High Voltage Cables

High voltage cables not completely covered by earthed metal sheath shall not be handled alive.

Usually, it is not possible to prove dead, earth and short-circuit metal sheathed high voltage cables close to the location where work is to be carried out on them. In these circumstances, the cable must be proved dead and earthed and short-circuited at each point of isolation, and then identified at the point where the work is to be carried out, either by an approved test or by tracing it visually.

Labels on cables or drawings must not be relied upon as a positive means of identification.

After identification, spiking of the cable should be carried out. If spiking of the cable is undesirable, the supervisor shall instruct staff of the additional precautions to be taken before the cable is opened or cut.

6.4.12 Working on Voltage Transformers

Before working on voltage transformers, other than draw-out type, isolation, earthing and short-circuiting of the high voltage windings and isolation of all secondary windings of the voltage transformer shall be carried out.

6.5 Training

Training requirements shall be identified and completed in compliance with site and client requirements for workers required to attach danger tags and locks, workers required to accept a permit and workers required to conduct isolations.

6.6 Client procedure

When a client has a requirement for SCEE to isolate and tag and lock according to the Clients procedures, an assessment should be performed to ensure that the client's procedure meets SCEE standards and requirements. Consideration shall be given to working with a different set of criteria.

7 References

Documents, both internal and external, that are referenced within the content of this procedure, including Australian and International Standards and legislation.

Document ID	Document Title
AS/NZS 3000	Electrical Installations (Wiring Rules)
SCEE-BS-HS-PRO-0027	5 Star Commitment Procedure

8 Related Documents

Related documents are those that have a relationship with this document, for example if this was the Operational Risk Management procedure related documents would include the work instruction to complete a JHA, the JHA template, Take 5 work instruction and booklet, etc.

Document ID	Document Title
SCEE-BS-HS-WIN-0008	Identification And Removal Of Redundant Cable And Equipment
SCEE-BS-HS-LIS-0007	Removal Work Pre-Start Checklist
SCEE-BS-HS-PRO-0001	JHA
SCEE-BS-RM-PRO-0002	Operational Risk
201074-SE-PER-0001	Permit to Work
201074-SE-PER-0002	Working at Height Permit
201074-SE-PER-0003	Hot Works Permit
201074-SE-PER-0004	Excavation/Penetration Permit
201074-SE-PER-0005	Confined Space Permit
201074-SE-PER-0006	High Voltage Vicinity Permit
201074-SE-PER-0007	Electrical Isolation Permit
AS/NZ 3012:2010	Electrical Installations – Construction and Demolition Sites
AS/NZ 3017:2007	Electrical Installations – Verification Guidelines
AS/NZ 3760:2010	In Service Safety Inspections and Testing of Electrical Equipment
AS/NZ 4836:2011	Safe Working on low voltage electrical isolations and equipment
	Electrical Safety Act 2002
	Electrical Safety (Codes of Practice) Notice 2013
	Electrical Safety Regulation 2013
	Electricity Act 1994
	Electricity Regulation 2006