GENERAL ELECTRICAL SAFETY

PURPOSE AND SCOPE

The Primary Standard details the FSR controls and minimum requirements to eliminate or minimise risks from onsite electrical installation at Laing O'Rourke workplaces.

This document is Mandatory and must be achieved across all Laing O'Rourke Workplaces. Where alternative controls are implemented, these must be approved through the FSR/HSEMS Requirement Dispensation process.

1.0 FSR CONTROLS

- Live electrical work on or near (within 500mm of) exposed energised conductors is not permitted on voltages above 120vDC or 50vAC unless the work is classed as fault finding or testing.
- Electrical work must be only carried out by competent persons holding the required training and licences.
- Only competent and authorised electrical personnel may perform isolation, testing, switching, and other duties on high-voltage apparatus, in line with the network operator's rules and authority system.
- Only enable access to HV facilities where a formalised isolation and access permit system is in place, including during commissioning or after energisation.
- A High Voltage Safety Management Plan (or equivalent) is in place and adhered to when entering an energised HV facility (i.e. substation or switchyard etc.) or undertaking any works on in-service HV apparatus.
- Before accessing HV Switchboards or Gear, the Arc Flash Study and associated controls must be in place and understood by people completing the works.
- Verify that all temporary and permanent electrical installations, including construction wiring and switchboards, comply with Australian Standards through inspection and certification by a licensed electrician or authorised inspector before energisation.
- Treat all equipment and wiring as live until a competent person has verified the system is in a zero-energy state (e.g. test-for-dead).
- Identify and verify all circuits before starting work, including cable cutting or termination, using approved testing equipment, circuit tracing, and clear labelling.
- Where electrical services are exposed or at risk of mechanical damage, install appropriate protection (e.g. cable tray, ducting, conduit, concrete encasement).
- Only connect electrical tools and equipment to circuits protected by RCDs or RCBOs.
- RCDs must be tested and tagged, and function-checked using the push-button test.
- Visually inspect portable electrical tools and construction equipment before each use for damage or defects, and confirm they are tested and tagged in line with the RGBY system.
- An emergency plan is in place, equipment available, and the team are trained in the response process before undertaking electrical work.

2.0 REQUIREMENTS

- Access egress and equipment lighting meets Australian Standards.
- Access to switch rooms is controlled effectively.
- Electrical works are managed effectively.
- Work on electrical installations shall be undertaken by competent and licensed electricians in accordance with **PS General Electrical Safety** and **PS Hazardous Energy.**
- Current electrical drawings and electrical systems data are readily available.
- Commissioning procedures are readily available.
- All electrical work shall be risk assessed in accordance with **SR Risk Assessment and Safety in Design** including appropriate application of the hierarchy of controls.
- In planning for electrical works the following should be considered:
  - Compliance requirements and safe routes of temporary services both in-ground and surface mounted
  - Construction impact on electrical installations and potential hazards associated with the electrical power supply methods planned
  - Interaction between trades and any competing power requirements
  - Availability of electrical power supply, electrical plant and equipment, location of switchboards
  - Possible use of generator sets and/or minimising use of electrical equipment through battery operated alternatives
  - Clearance requirements in front of switchboards (min 1m)
  - Proximity of persons to electrical plant
  - Testing and tagging requirements
  - Rescue requirements for works where live works are unavoidable (i.e. testing and commissioning).
- Double adaptors, piggy-back units and domestic type multi-outlet devices are not permitted.
- Lighting must be placed and protected to minimise accidental damage. Where possible, lighting should be positioned at least 2.5m from the floor level. Only factory moulded fluorescent/LED flood lighting is to be used at 240 volts and a non-conducting guard must adequately protect the lamp.
- Use properly conducted flexible cords and distribute electrical leads correctly:
  - Place leads away from traffic areas to prevent them being run over and damaged
  - Protect leads from acid damage
  - Do not place or stack equipment or materials over electrical leads
  - Ensure leads do not exceed 25m in length
  - Raise leads off the ground on stands with insulated hooks.
- Temporary electrical supply for construction work must be obtained from the electrical distribution network wherever practical and always connected in accordance with the applicable jurisdiction code and/or asset owner's requirements.

- The use of portable generators must be limited to work of a short duration or one-off applications. Before using portable generators, ensure that potential hazards associated with the following are minimised:
  - Manual handling
  - Fuel usage
  - Storage
  - Engine exhaust emissions
  - Confined space
  - Noise and vibration
  - Weather
  - Radio and telecommunications interference
  - Generators over 70 KVA have arc flash signage in place.
- Welding machines must be fitted with a voltage reducing device that meets the requirement of AS 1674.2 and AS 6074.1.

2.1 RESIDUAL CURRENT DEVICES

If electricity is supplied to the equipment through a socket outlet not exceeding 20 amps, the RCD must have a tripping current that does not exceed 30 milliamps. The residual current device (RSD) must comply with AS 3190 and must be used to protect each of the following:

- Socket outlets including general purpose outlets (GPO)
- Lighting circuits
- Transportable site sheds/amenities
- Welding equipment.

This does not apply if the supply of electricity to the electrical equipment:

- Does not exceed 50 volts alternating current
- Is direct current
- Is provided through an isolating transformer that provides at least an equivalent level of protection, or
- Is provided from a non-earthed socket outlet supplied by an isolated winding portable generator that provides at least an equivalent level of protection.

RCDs must:

- Be backed up for overload and short circuit protection by a circuit breaker of adequate capacity (fuses are not permitted on final sub-circuits)
- Still be used for equipment connected to a permanent on-site supply
- Have the non-protected portion of the flexible cord before the RCD not exceeding 2m for portable RCDs.

2.2 WORKING DE-ENERGISED

Electrical work must not be carried out on electrical equipment while the equipment is energised subject to prescribed exceptions and the following circumstances. This prohibition does not apply to:

- Electrical equipment supplied by extra-low voltage unless it forms part of an electrical installation located in an area in which the atmosphere presents a risk to health and safety from fire or explosion
- Electrical equipment that is or is part of an active impressed current cathodic protection system within the meaning of AS 2832
- Automotive electrical work
- Work carried out by electricity supply authorities on the electrical equipment including line-associated equipment, controlled or operated by the authority to transform, transmit or supply electricity
- When it is necessary in the interests of health and safety that the electrical work is carried out while the equipment is energised (e.g. it may be necessary for life-saving equipment to remain energised and operating while electrical work is carried out on the equipment)
- When it is necessary that the electrical equipment to be worked on is energised for the work to be carried out properly (i.e. testing and commissioning)
- When it is necessary for the purposes of testing to ensure the equipment is energised as required by Work Health and Safety Regulation 155 and Queensland Electrical Safety Regulation 18, or
  - There is no reasonable alternative means of carrying out the work, and
  - The work meets other requirements for carrying out energised electrical work.

Before electrical work is carried out on electrical equipment the equipment is tested by a competent person to determine whether or not it is energised:

- Each exposed part is treated as energised until it is isolated and determined not to be energised, and
- Each high-voltage exposed part is earthed after being de-energised.

Electrical equipment that has been de-energised to allow for electrical work to be carried out cannot be inadvertently re-energised. A **Service Isolation Permit** and a lock-out and tag-out system must be in place. For a single source of isolation the Company Appointed, Competent Person (CA, CP) responsible for the work can isolate a single service but must attach their own personal danger lock at the isolation point. For multiple sources of energy, a lock box (where applicable) must be used for the isolations. Each person working on that equipment must sign onto the permit and attach their personal danger lock.
See **PS Hazardous Energy** for further details.

2.3 INSPECTION AND MAINTENANCE

Test temporary switchboard and RCD/earth leakage circuit breaker equipment. **Temporary Switchboard and RCD Checklist** is to be used to provide records of test for Laing O'Rourke supplied electrical protection at legislatively required intervals. The RCD must be tested (calibrated) in accordance with AS/NZS 3760 & AS/NZS 3012 for operating time at commissioning and at minimum 3 monthly intervals. A record of testing must be kept until the device is next tested or disposed.

Electrical safety shall form part of regular formal and informal site inspection regimes and where deficiencies are identified the electrical item shall be tagged out of service, the defect shall be recorded and closed out appropriately.

3.0 ROLES AND RESPONSIBILITIES

ROLE	RESPONSIBILITIES
PROJECT LEADER/ WORKPLACE MANAGER	• Appoint permit authorities and issuers in accordance with PS Permit to Work. • Undertake FSR reviews for electrical safety.
SUPERVISOR	• Ensure that electrical equipment under their control is inspected daily before use. • Ensure that a service isolation permit is in place where required.
COMPETENT AND QUALIFIED PERSONS	• Competent Person is a person who has acquired through training, qualification or experience the knowledge and skills to carry out a task. • Qualified Person is a person who holds a Licence to Perform Electrical Work as required by the relevant regulatory authority, and has had their competency verified via the application of a verification of competency (VOC) assessment process. This may occur as part of a trade qualification.

4.0 REGULATIONS, CODES AND STANDARDS

Key Regulations, Codes of Practice and Guidelines are as follows:

- Work Health and Safety Regulation: Chapter 4, Part 4.7 General Electrical Safety in Workplaces and Energised Electrical Work
- Work Health and Safety (General) Regulation 2022 WA Part 4.7 General Electrical Safety in Workplaces and Energised Electrical Work
- Electrical Safety Regulation 2013 (QLD)
- Occupational Health and Safety Regulations 2017 (VIC) 3.5.39 Electrical Plant and Electrical Hazards
- SafeWork Australia Code of Practice Managing Electrical Risks at the Workplace
- QLD Code of Practice Managing Electrical Risks in the Workplace
- NSW Code of Practice Managing Electrical Risks in the Workplace
- WA Code of Practice Safe Low Voltage Work Practices by Electricians
- VIC Electrical installations on construction sites – Industry Standard
- AS/NZS 3760 In-Service Safety Inspection and Testing of Electrical Equipment
- AS/NZS 3012 Electrical Installations – Construction and Demolition Sites
- AS 3190 Approval and test specifications – RCDs
- AS 2790 Electricity generating sets – Transportable
- AS 3008 – Electrical installations – Selection of Cables
- AS/NZS 3010 – Electrical installations – Generating sets
- AS/NZS 3017:2022 Electrical Installations – Testing and Inspection Guidelines
- AS/NZS 3000:2018 Wiring Rules.

5.0 PLANS, FORMS AND TEMPLATES

For relevant plans, forms and templates see the Laing O'Rourke HSEMS at www.lorhsems.com.

- Electrical Test and tag Register
- Temporary Switchboard and RCD Checklist
- Compliance Certification for Temporary Electrical Works