Electrical Safety Procedure

SEQ-PR-014

Document Revision Control

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ISO 45001 OH&S management system
ISO 14001 Environmental management system
ISO 9001 Quality management system

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1. Scope

The scope of this procedure is to assist in ensuring the health and safety of Haslin personnel, its subcontractors, and others affected by Haslin operations, by providing direction on the use of portable mains operated electrical equipment; battery powered electrical equipment, site power requirements, residual current devices (RCDs), and the requirements of associated testing and tagging requirements.

These procedures do not apply to fixed electrical equipment, except in the case of site workbenches containing general power outlets, or the testing for compliance of electrical equipment prior to commissioning.

2. Application

This Procedure is to be applied to installations associated with portable mains operated electrical equipment, use of residual current devices and the associated testing and tagging of this equipment, and pre-commissioning activities, are to be implemented in Haslin Constructions workplaces.

3. Definitions

Competent person:	A competent person is a person authorised to undertake specific types of electrical work. The Haslin Project/Site Manager/Engineer issues the authorisation by employing a person to undertake these duties. A competent person for the purposes of this Procedure shall be: • A qualified and licensed electrician; or • An electronics technician who through training, qualification and experience, has acquired the necessary knowledge, licence/qualification and skill to complete In-Service Safety Inspections and Testing of Electrical Equipment (AS/NZS 3760); or • Such other person who, through training, qualification and experience can demonstrate that he or she has acquired the necessary knowledge, licence/qualification, and skill to complete In-Service Safety Inspections and Testing of Electrical Equipment (AS/NZS 3760)
Double insulated:	Electrical equipment in which none of the metal parts requires protective earthing due to the provision of double or reinforced insulation. This equipment is identified by the words 'double insulated' or marked with the concentric squares symbol.
Electrical Equipment:	Any appliance, wire, fitting, cable, conduit, meter, insulator, apparatus, material or other electrical equipment intended or designed for use in, or for the purposes of, or for connection to, any electrical installation.
Extra Low Voltage	Electrical voltage that does not exceed 50 Volts AC, or 120 Volts ripple free DC
Fixed Equipment:	Equipment that is defined in AS/NZS 3000 as either: • Fixed Appliance (clause 1.4.7). An appliance, which is fastened to a support or otherwise secured in a specific location. • Stationary Appliance (clause 1.4.10). Either a fixed appliance or an appliance, having a mass exceeding 18kg and not provided with a carry handle. • Fixed Wiring (clause 1.4.93). A system of wiring in which cables are fixed or supported in position in accordance with the appropriate requirements of AS/NZS 3000
High Voltage	Any electrical service that exceeds 1000 Volts AC (Alternating Current) or 1500 Volts DC (Direct Current)

Live Part	A conductor or conductive part intended to be energised in normal use, including a neutral conductor and conductive parts connected to a neutral conductor
Low Voltage	Any electrical voltage between 50 Volts AC and 1000 Volts AC, or 120 Volts non-ripple DC and 1500 Volts DC
Procore	Haslin Constructions' cloud-based project management software

4. References

- *WHS Act 2011* (NSW)
- *WHS Act 2011* (QLD)
- *WHS Regulations 2017* (NSW)
- *WHS Regulation 2011* (QLD)
- *Electrical Safety Act 2005* (NSW)
- *Electrical Safety Act 2002* (QLD)
- *Electrical Safety Regulation 2013* (QLD)
- AS/NZS 3000:2018 Wiring Rules and amendments
- AS/NZS 3760 – In Service Safety Inspection and Testing of Electrical Equipment.
- AS/NZS 3012:2019 Electrical installation – Construction and Demolition Sites
- *Gas and Electricity (Consumer Safety) Act 2017* (NSW)
- *Gas and Electricity (Consumer Safety) Regulation 2018* (NSW)
- Energy NSW - Service and Installation Rules of New South Wales
- Code of Practice Managing electrical risks in the workplace 2019 (NSW)Electrical Safety code of practice 2021 – Managing electrical risks in the workplace (QLD)
- Electrical Safety Code of Practice 2020 - Works (QLD)

5. Legal Requirements

- *WHS Act 2011 (NSW)*
- *WHS Act 2011 (QLD)*
- *WHS Regulations 2017 (NSW)*
- *WHS Regulation 2011 (QLD)*
- *Electrical Safety Act 2005 (NSW)*
- *Electrical Safety Act 2002 (QLD)*
- *Electrical Safety Regulation 2013 (QLD)*
- *QLD Electrical Safety Regulation Part 3 General Risk Management*
- *AS/NZS 3000 Australian/New Zealand Wiring Rules*
- *AS/NZS 3012:2019 Electrical Installations – Construction and Demolition Sites*
- *AS/NZS 3760 – In Service Safety Inspection and Testing of Electrical Equipment.*

6. Procedure

6.1. Electrical Safety

6.1.1. General

The construction industry is an environment where electrical equipment under normal use conditions is subject to:

- *Moisture*
- *Heat*
- *Dust*
- *Vibration*
- *Corrosive substances*

Other factors may also be likely to lead to excessive wear and/or damage of equipment. These need to be considered on a site-specific basis. As a rule, all construction work is by definition carried out in a hostile environment. As such, Haslin requires all electrical equipment to be carefully inspected before it is put to use to prevent potential failure and risks to person's health and safety. At all times, care must be taken to prevent any contact between electrical devices, plant, and equipment, and water.

Equipment, tools, and any other electrical devices shall not be used on Haslin sites unless the items conform to AS/NZS 3280 Essential safety requirements of electrical equipment.

6.1.2. Electrical Safety in Construction

During normal construction activities, there may be times where works are required to be performed in the vicinity of live electrical services. At a construction site, there may be existing electrical services still in operation providing power to essential functions, concealed temporary power supplies to construction power switchboards, or permanent new electrical services becoming live during the construction process. In these situations, there are instances where holes may need to be cut or drilled through floors, walls or ceilings, or excavation may be required.

In addition to electrical, other services such as hydraulic, communications, and structural items or members may be embedded within floors, walls, or ceilings, that may be affected by cutting, drilling, or excavation activities.

Before conducting any cutting, drilling, or excavation activities, the location of the penetration must be assessed by consulting construction drawings, as built drawings, survey plans, and Before You Dig Australia data.

If no existing or new services, or structural components are found to be present, works may continue.

If existing services are indicated on drawings or plans, or from visual inspection, the responsible engineer must complete SEQ-FM-093 Penetration Permit, or SEQ-FM-047 Permit to Excavate as applicable (refer to Section 6.2 of SEQ-PR-013 Excavation Procedure), and have it approved by the Project Manager before any works commence.

Excavation activities that will affect the zone of influence of electrical power poles must be completed in accordance with SEQ-PR-011 Excavation Procedure, and SEQ-PR-040 Temporary Works Procedure.

As working around or near electricity is considered a high-risk activity, an approved Safe Work Method Statement clearly detailing the works must be in place before any works commence.

6.2. Electrical Equipment Safety

6.2.1. Haslin Owned Construction Electrical Equipment

Before commencing any site work when using any Haslin owned corded electrical equipment, such as grinders, drills, electric hammers, vacuum cleaners, portable RCD's (Residual Current Devices), power leads, light stands etc. a physical inspection of the equipment is to be performed, before connecting it to an electrical source, to ensure the equipment is in a fit state to use for its intended purpose. Should the equipment be found to be damaged or defective in any way, it is to be immediately removed from service, and the Site Manager notified. Common defects that would require electrical equipment to be removed from service are:

- Cuts in, or crushed section/s of, the equipment's power supply lead
- Damaged electrical plug or pins
- Damaged (cracked/broken sections) casing of the equipment
- Motor ventilation ports covered/obstructed by a unremovable substance
- Bent rotating drive shaft
- Broken glass panels on lights
- Missing safety guards
- Damaged, faulty, or missing automatic cut off switch

6.2.2. Hired Electrical Equipment

Hired electrical equipment must be supplied to Haslin fit for purpose for its intended use, and must have been inspected by the hire organisation before being provided to Haslin. The equipment must also have been tested to be electrically sound and safe for use within the nominated timeframe, as directed by AS3760 In-service Safety Inspection and Testing of Electrical Equipment.

Before hired electrical equipment is put to use on any Haslin site, it must be inspected to ensure it is:

- Fit for use; and
- Is fitted with a current electrical test tag, and RCD (residual current device) as applicable to the equipment type. If the hired electrical equipment is found to be damaged or faulty, or is not fitted with a current electrical test tag or applicable RCD, it shall be removed from service and returned to the hiring organisation at the next available opportunity.

6.2.3. Working with Electrical Devices

The following list describes precautions to be taken when working with electrical devices in accordance with current Regulations and Codes of Practice:

- Wear insulated/rubber soled safety boots, to assist with isolating electrical current or voltage;
- Ensure that all plugs and sockets are the non-wireable [moulded] or the transparent type, else remove device from use until replacement can be carried out;
- Ensure that any switchboard is fitted with overcurrent breaker and an earth leakage device [residual current device] rated at 30mA before use, even if this is supplied by another contractor or the Client;
- Ensure that any portable outlet device you intend to utilise on a construction site is fitted with an overload protective device and an earth leakage device. If not, then you may only connect portable power tools into the outlets. You are not permitted to plug an extension cord into the outlets;
- On multi-storey construction projects, do not run extension cords from one floor to the next;
- Extension cords, which are running across a trafficable area [vehicles and pedestrian access ways], must be suspended at a height not less than 2.5 metres using lead stands or insulated hangers. Where this is not practical, mechanical protection measures must be applied to protect the lead against damage;
- Where extension cords are running in the vicinity of wet areas, or potential wet areas, the plugs must be of the screw-in [or shrouded] type, which are water-proof, and rated to IP56;
- On single-phase extension leads, check the plug type [10Amp or 15Amp] and stencil imprint on the cable to identify its rating. In the absence of specific information to the contrary, assume that any 10Amp extension cord has a conductor size of 1.0mm2;

6.3. Fixed Residual Current Devices (RCD)

Fixed RCD's on construction sites are installed in electrical distribution boards, such as those found in permanent and temporary buildings, or in temporary switchboards that provide power to an area of a construction site (see Section 6.5.1). This type of RCD provides protection for individual or groups of electrical circuits. Fixed RCD's provide the highest level of protection as they protect all the wiring and socket outlets on a circuit, and any connected appliances.

6.4. Portable Residual Current Devices (RCD)

Portable Residual Current Devices are to be used in all maintenance and construction operations where the fixed RCD protection mentioned in Section 6.3 cannot be supplied or guaranteed. In these instances, it is mandatory that a portable RCD be placed immediately at the socket-outlet and any appliance or extension cord and appliance arrangement then be connected to the portable RCD.

Where, for technical reasons, equipment will not operate satisfactorily with an RCD in the mains circuit, then an equivalent or better level of safety is to be provided. In these circumstances, a level of protective safety is to be provided which is at least the same as would have been provided had an RCD been used. A safety isolating transformer may be suitable in such cases. Where any doubt exists, it should not be assumed that the socket-outlets (power points) in a circuit are protected by an RCD. In such cases, a portable RCD is to be connected to the socket outlet, which other electrical items such as power extension leads or tools etc. are then connected to.

6.5. Power Extension Leads

General Requirements

- Power extension leads must be purchased as complete units;
- Assembling extension leads from separate components is NOT allowed;

- All power extension leads must be tested and tagged by an appropriately qualified person before being used on Haslin sites;
- Daisy chaining multiple leads is prohibited.

Construction and Design

- Use heavy duty, brightly coloured cables, e.g. yellow or red, for hostile environments where damage may occur;
- Leads exposed to long term sunlight must be made from UV stabilised materials, typically blue in colour.

Length and Rating

- Power extension leads must not exceed the maximum lengths shown in Table 1;
- If longer lengths are needed, consult the Site Manager or Project Manager to arrange a portable or fixed generator as a power supply solution.

Table 1: Maximum length of Cord Extension Sets

Maximum length of Cord Extension Sets		
Rating	**Conductor Size**	**Maximum Length**
10 Amps	1.0mm^2	25 metres
10 Amps	1.5 mm^2	35 metres
10 Amps	2.5 mm^2	60 metres
10 Amps	4.0 mm^2	100 metres
15 Amps	1.5 mm^2	25 metres
15 Amps	2.5 mm^2	40 metres
15 Amps	4.0 mm^2	65 metres
20 Amps	2.5 mm^2	30 metres
20 Amps	4.0 mm^2	50 metres

*These ratings were extracted from Workcover NSW "Electrical Practices for Construction Work" 2007.

Electrical Safety Risks of Excessive Lead Lengths

Exceeding recommended extension lead lengths increased voltage drop, which may:

- Burn out motors in electrical devices;
- Cause electrical fires or short circuits;
- Electrocute operators;
- Overload circuits, tripping breakers and causing power loss.

Height Clearance for Flexible Extension Cords

Flexible power extension leads must:

- Be suspended on hangers or stands to keep work areas and passageways clear;
- Maintain a clearance of at least 2.5 metres in areas where personnel work;
- For vehicle access ways, be suspended 2 metres higher than the tallest expected vehicle and protected within metallic conduit if crossing pathways;
- Not be allowed to come into contact with water at the connection points (plug ends).

6.5.1. Generators

Two types of generator are commonly used on Haslin construction sites:

- Transportable generators up to 25kVA – for works requiring electrical power far away from a power source

- Stationary generators 25kVA and above – for powering site compounds where an electrical supply is no available

The following must be implemented when using either type of generator:

- Use the generator in accordance with the manufacturer's instructions
- Locate the generator in a well-ventilated area, away from buildings and open windows
- Correctly earth the generator
- Test the generator's RCD before connecting any tool, equipment, or other device
- Turn off the generator when refuelling
- Protect the generator from any form of damage

6.5.2. Portable Socket Outlet Assemblies

Portable Socket Outlet Assemblies (PSOA) may be used on construction sites where additional electrical capacity is required at the work front for several electrical devices or tools.

PSOA's must:

- Comply with AS/NZS 3190 and be of class H (should be marked with these requirements)
- Have an overload protective device, RCD and plugs intended for connection of low-voltage socket-outlet
- Be equipped with a flexible cable feeding the PSOA which must be the heavy-duty sheathed type not longer than two metres

6.5.3. Auxiliary Socket Outlet

Auxiliary socket outlet devices may be used on a construction site to provide electricity to multiple electrical devices or tools, provided that the ASO is:

- of robust construction to withstand mechanical damage and have a minimum IP23 rating
- located at a height of 1.2 to two metres above the floor level and be securely mounted to a fixed structure or a structure designed for that purpose
- supplied by an RCD protected circuit at the switchboard it originates from
- provided by a clearly marked 'isolating switch' that controls the incoming supply. Incoming supply cable must have a minimum cross-sectional area of 4mm2
- provided by means to relieve strain on plug and socket outlets of flexible cables.

6.5.4. Temporary Construction Switchboard

Temporary construction switchboards may be used to provide a fixed RCD protected power supply to an area of a construction site where multiple workers require power to complete their work.

Temporary switchboards are connected to a main power supply and contain multiple fixed RCD protected socket outlets.

Temporary switchboards must:

- be of robust construction to withstand mechanical damage and have a minimum IP23 rating

- be hardwired to a main electrical source using electrical cable (not a power extension lead) by a licenced electrical contractor (refer Section 6.7);
- be readily accessible and must be protected from damage during the course of the construction or demolition work;
- be mounted on a pole, post, wall, floor or other structure of stable and free-standing design that takes into account any external forces that may be exerted on the switchboard;
- be marked with the source of the supply and where it originates from.

6.5.5. Electrical Portable Outlet Devices

Electrical Portable Outlet Devices (EPODs), also known as domestic type power boards are only to be used within office workspaces, and must be connected to an RCD protected electrical supply.

6.5.6. Battery Powered Tools

The use of battery powered, rather than mains powered (e.g., 240 V), tools and equipment significantly reduces the risk of electric shock occurring. Where possible it is recommended to utilise battery powered tools over electrically powered tools. Battery powered tool chargers must be tested and tagged in accordance with Section 6.6 Testing and Tagging.

6.5.7. Portable Mains Operated Power Tools

All portable mains operated power tools shall be protected by an RCD. Where possible these power tools should be double insulated.

6.5.8. Workbenches

Fixed equipment mounted to workbenches, that are connected to the mains supply via a flexible lead with a standard three pin 10Amp plug, shall be connected to a separate overload/RCD protected socket-outlet per piece of equipment.

6.5.9. Maintenance and Repair of Mains Powered Electrical/Electronic Equipment

Where personnel are required to carry out maintenance and repair of mains operated equipment at Haslin sites, the Site Manager shall ensure that they are competent to carry out the work and are appropriately licensed in the State or Territory in which the work is to be carried out. All work on electrical equipment which needs repair or maintenance must be completed in accordance with Haslin's SEQ-PR-018 Isolation, Lock Out Tag Out Procedure and SEQ-FM-045 Isolation and Lockout Permit.

6.5.10. Disposals of Potentially Hazardous Electrical/Electronic Equipment

All electrical/electronic equipment that is inoperable, unrepairable, and potentially hazardous, is to be rendered permanently unusable and disposed of in an appropriate manner. These items are not to be used and are to be clearly and indelibly marked "DANGEROUS" prior to disposal.

For electronic equipment disposal solutions, contact the Environmental Manager for approved disposal organisations and facilities.

6.6. Testing and Tagging

6.6.1. Testing Intervals

All portable electrical equipment used on a Haslin site, in a hostile environment (equipment used for construction activities such as power tools, battery chargers, extension leads), must be tested and tagged by a competent person every three (3) months. All electrical equipment used on a Haslin site in a non-hostile environment (electrical equipment in offices and lunch sheds, air conditioning, EPODs, etc.) must be tested and tagged by a competent person every six (6) months at a minimum. All portable residual current devices must be tested and tagged by a competent person every three (3) months at a minimum, regardless of the environment in which they are used.

Testing of electrical tools and equipment is to be completed in accordance with Section 6.5.2.

6.6.2. Management of a Testing and Tagging Program

The Haslin Site Manager is to ensure that regular inspection, testing, and tagging of all electrical equipment is carried out. The Site Manager shall also maintain a register of all electrical equipment. Any appliance not listed in *Table 2: Electrical Equipment Types* shall be tested in accordance with the intervals as shown in *Table 2* within this procedure. The task of testing and tagging must be performed by a competent person or by an appropriately qualified electrical contractor and is to be coordinated through the Haslin Site Manager. Testing and tagging must be completed using approved test equipment.

6.6.3. Testing of Residual Current Devices

Testing of Residual Current devices is divided into two types of tests:

- The 'User Test' and;
- 'Test for Operation'.

The 'User Test' can be conducted by the user and requires no special apparatus. The 'Test for Operation' must be conducted by a competent person, using approved test instrumentation.

NOTE: The 'Test for Operation' cannot be performed for certain electrical fixtures or systems that are permanently wired (not using a 3-pin plug) into a distribution board. Examples of these items include:

- Lighting circuits
- Air conditioning units
- Hot water heaters

These types of fixtures or systems only require the 'User Test' to verify the operation of the RCD that protects their relevant electrical circuits.
Other permanently wired fixtures or systems such as general-purpose power circuits feeding socket outlets, or 3 phase outlets, are to be tested using the 'Test for Operation' method, and be conducted by a competent person.

Monthly 'User Test' push button testing of fixed RCD's in site building distribution boards or temporary switchboards, is to be recorded in the form SEQ-FM-117 RCD Pushbutton Testing Record, which is to be located next to the distribution board or temporary switchboard.

Table 2: Electrical Device Testing Frequencies

Environment	Transportable structures, Class I (earthed conductive parts) and Class II (double insulated) electrical equipment		Residual Current Devices (RCD's)			
	Transportable structures[1], fixed and transportable equipment[2] and construction wiring[3] including switchboards	Portable equipment[4]	Pushbutton test (by user)		Operating time (RCD tester)	
			Portable[5]	Non-portable fixed[6]	Portable[5, 7]	Non-portable fixed[6]
Construction and demolition sites in accordance with Clause 1.1* of AS 3012:2019	6 months	3 months	After connection to a socket or before connection of equipment, and at least once every day in use	1 month	3 months	12 months

Notes:

1. In New Zealand, verification (inspection and testing) intervals for transportable structures do not apply.
2. Transportable structures and fixed and transportable electrical equipment.
3. Construction wiring including switchboards.
4. Portable equipment – appliances, flexible cords, cord extension sets, PSOA's, generators, inverters excluding hire equipment.
5. Portable RCD includes RCD's on portable equipment, or RCD's associated with portable generators or RCD protected inverters.
6. RCD's operation times are to be in accordance with the table in Section 6.3.3.1.
7. Includes connection between generator winding and equipotential bonding system.

A record of all tests is to be maintained within the applicable project workspace in Procore.

6.6.3.1. RCD Operation Times

The 'Test for Operation' test for RCD's shall be conducted in accordance with AS/NZS3760 at the frequencies as described in Table 2, to comply with the following required trip times:

Table 3: RCD Maximum Tripping Times

RCD Type	**Test Current** a.c milli Amps	**Maximum Tripping Time** milliseconds

Type I	10	40
Type II	30	300

6.6.4. Testing and Tagging of Portable Mains Operated Electrical Equipment

All new Portable Mains Operated Electrical Equipment can be assumed to have been tested and certified prior to sale, since it is the responsibility of the manufacturer to carry out the testing in accordance with AS/NZS 3760:2010. New equipment shall be entered into the Electrical Equipment Register prior to use and tested 3 monthly thereafter.

6.6.5. Testing and Tagging of Computer Equipment

Computer equipment can be assumed to have been tested and certified prior to purchase, as it is the responsibility of the manufacturer to carry out the testing. For computers that are upgraded which involved replacing the case or power supply unit, the computer must be tested and re-tagged prior to re-entering service. For computers used in site offices, testing is to be carried out once every 6 months.

6.6.6. Repaired Equipment

All equipment subject to electrical repairs must be fully tested and tagged before released for use. Only technically qualified persons, such as electricians and holders of a restricted electrical licence may dismantle electrical equipment and carry out electrical repairs.

6.6.7. Equipment not Requiring Tagging

Client-supplied switchboards, fixed wire lighting systems / festoon lighting and fixed or permanent wiring does not require tagging.

6.6.8. Testing and tagging of Test & Measurement Equipment

Test and measurement equipment can be assumed to have been tested and certified prior to purchase, since it is the responsibility of the manufacturer to carry out the resting in accordance with AS/NZS 3760:2010. During any subsequent testing care should be taken to ensure that the manufacturers' recommendations are complied with when performing insulation testing of the equipment.

6.6.9. Documenting Testing and Tagging

The use of an Electrical Testing Register covering all electrical construction equipment and devices is mandatory as per applicable WHS Regulations.

Where the testing and tagging activities are carried out by a contractor, the contractor may be servicing multiple sites, and accordingly keep the register on them. However, the register must be provided to Haslin as proof of compliance with WHS Regulations.

The Electrical Testing Register is to be stored within the applicable project workspace in Procore, and shall include all Haslin electrical equipment, and all electrical hire equipment and devices. All registers as well as maintenance documents shall be maintained as safety records for a period not less than seven [7] years.

6.7. Electrical Supplies to Construction Sites

All electrical works, including the energisation of services, are to be completed, in accordance with the requirements of AS/NZS3000:2018 and AS/NZS3012, by a licenced electrical contractor, and using tools, testing equipment, and PPE that:

- Are suitable for the work;
- Have been properly tested, and;
- Are maintained in good working order

In accordance with AS/NZS 3012 Electrical Installations – Construction and Demolition Sites, construction wiring must be supplied from:

- Electricity distributor's main;

- Existing switchboard in the permanent installation of the premises;
- Low voltage generator complying with AS 2790 and installed in accordance with AS3010; or
- Inverter complying with the requirements of AS/NZS 4763.

Construction wiring (Construction and demolition wiring) means wiring systems installed to provide electrical supply for construction and demolition work, and is not intended to form part of the permanent electrical installation. The term includes:

- consumer mains and sub-mains supplying site switchboards
- sub-mains to site facilities in which electricity is used, such as sheds, amenities or transportable structures
- final sub-circuits connected at circuit-breakers on a site switchboard, supplying plant, construction equipment such as temporary construction lighting, auxiliary socket-outlet panels, hoists, cranes, and personnel lifts.

Construction wiring does not include flexible extension cords or flexible cables used to connect portable plug-in electrical equipment or luminaries to a socket outlet.

Electrical systems installed for use during construction works must be:

- Consistent with the requirements of AS/NZS 3012:2019, including:
    - Marked with iridescent yellow tape with the words 'construction wiring' spaced at intervals not more than 5 metres apart;
    - Be labelled to clearly identify where each Distribution Board supply originates from;
    - Inspected and certified as correctly installed prior to use in accordance with relevant legislation, codes of practice and Australian Standards;
    - Accompanied by a Certificate of Compliance for Electrical Works (CoCEW)

Where switchboards, distribution boards, or electrical enclosures are located outside without cover, they must be rated to a minimum Ingress Protection (IP) rating of IPX2. The conformance label will appear similar to one of the following images:

NOTE: At any time should the electrical installation for construction/demolition works be modified to relocate a power outlet, or add a light switch, or add a circuit or fixture, for example, the installation is required to be reinspected, tested, and certified with a new CoCEW by a licenced electrical contractor – refer to Section 6.6.3.

6.7.1. RCD Protection of Final Subcircuits

All final sub-circuits of construction wiring must be protected at the switchboard where the sub-circuits originate from by a residual current device (RCD), with a maximum rated residual current of 30mA, that operates in all live (active and neutral) conductors.
All appliances, luminaries and other electrical equipment must be supplied from an RCD protected circuit that is fixed at the switchboard or incorporated into the socket-outlet or incorporated into a portable socket-outlet assembly.
Where a construction work supply is obtained from a permanent power supply, downstream electrical equipment is to be protected by an RCD located in accordance with one of the following:

- At the switchboard at the origin of the final sub-circuit supplying electrical equipment
- Incorporated into the socket-outlet supplying the electrical equipment
- Incorporated into a portable socket outlet assembly arranged for connection to a socket outlet either directly or by means of a flexible extension cord of maximum length of 2m and a plug.

Note: *This provision allows for minor construction work to be carried out using existing permanent socket outlets at the place of work. When work of extended duration or increased scope is carried out, arrangements should be made to have separate temporary construction wiring installed that conforms to the requirements of Section 6.2.4.*

6.7.2. Risk Assessment of the Proposed Work

Before beginning the installation of any electrical supplies for construction or demolition purposes, a documented risk assessment (SWMS) must:

- Be completed by a competent person, and must detail all hazards related to the works, as well as listing the controls necessary to mitigate each identified hazard;
- Be reviewed and understood by the persons completing the work;
- Be acknowledged by the persons supervising and conducting the work by signing onto the risk assessment;
- Be approved to implement by the person in control of the electrical works;

Once the works have started, the controls nominated in the risk assessment are to be monitored for effectiveness by using SEQ-CL-009 Task Inspection Checklist, completed in the Procore Inspections tool.

Each risk assessment must also be reviewed by the persons supervising and conducting the work monthly to ensure the nominated controls are both implemented correctly and are effective.

6.7.3. Maintenance of Electrical Services

Before conducting maintenance activities on any electrical service, the person in control of the electrical works must:

- Have an approved SMWS specific to the works in place;
- Ensure all works are conducted by a licenced electrician;
- Have tested each service to be maintained to prove each service is not live or energised;
- Ensure that each service to be maintained cannot be inadvertently energised while the maintenance work is being performed;
- Before re-energising the system, test each service or component that was worked on to prove it is safe to re-enter into service;
- Document all tests and their results and retain the records for a minimum of 7 years;
- Provide the workplace manager with a new CoCEW (Certificate of Compliance for Electrical Works) for the works.

6.8. Working Near Energised Electrical Equipment and Services

For project activities that require personnel to perform work near energised electrical plant, equipment, or overhead power lines, the safety control measures detailed in Section 6.9 and 6.10, as applicable to the voltage of the plant, equipment, or service, must be in place before any works commence.

Working on or near energised electrical equipment shall only be authorised by the Project Manager if:

- It is necessary in the interests of health and safety that the work is carried out on or near the electrical equipment while the equipment is energised; or
- It is necessary that the electrical equipment is energised in order for the work to be carried out properly; or
- It is necessary for testing the electrical equipment; or
- There is no reasonable alternative means of carrying out the work.

Conductive materials must not be used when working near live electrical equipment, unless a documented risk assessment reduces the applicable risks to an acceptable level. The Project Manager must provide their approval before works may commence.

Excavation activities that will affect the zone of influence of electrical power poles must be completed in accordance with SEQ-PR-011 Excavation Procedure, and SEQ-PR-040 Temporary Works Procedure.

6.8.1. Electrical Arc Flash Hazards

Arc Flash hazards can prevent serious risks to workers when equipment is or becomes electrically energised. Follow switching procedures and adhere to the arc flash guidelines provided in the electrical design. If not available seek further information from qualified electricians, designers and suppliers of equipment. Always complete a risk assessment and wear appropriate PPE.

Arc flash risks can be caused in equipment such as switchboards and distribution boards in construction sites by:

- Switching activities

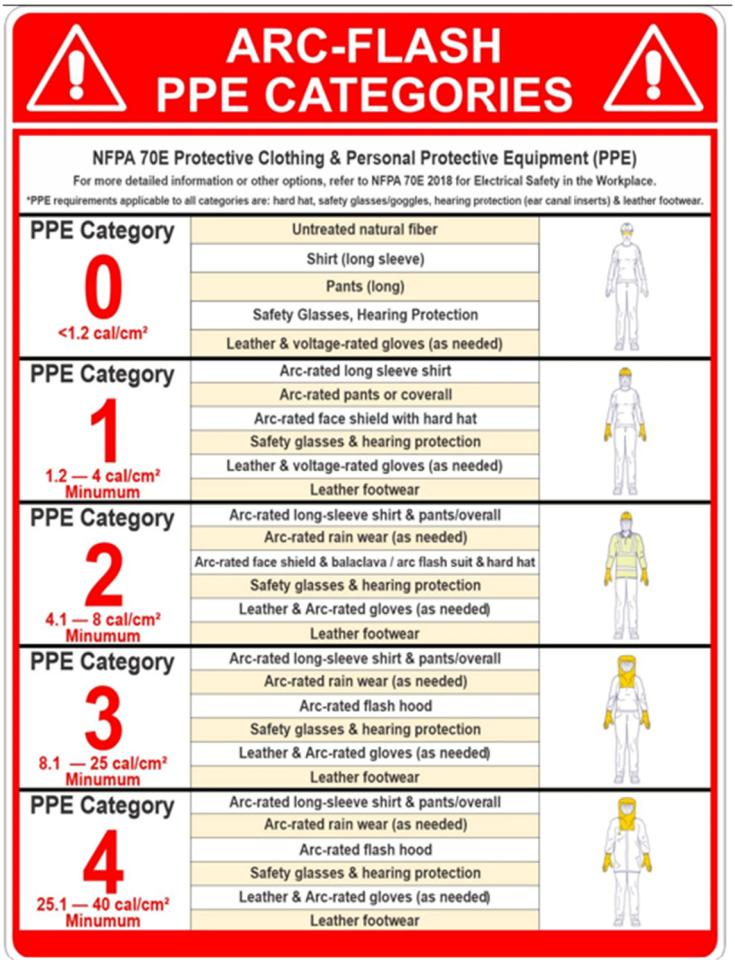
- Overvoltage events
- Degraded or old faulty electrical equipment failing
- Water ingress causing contact between live parts
- Tools dropped into live electrical switchboards causing contact between live parts

While electrical switchboards are equipped with arc flash containment protection, it is important that personnel are aware of the risks of arc flash events, and the safety requirements when working around or near energised electrical switchboards and distribution boards on a construction site. Wherever possible, a minimum distance of 1 metre away from live electrical switchboards should be maintained, preferably controlled with flagging. If this is not possible, a SWMS containing hazard controls for working near live electrical switchboards must be developed. Only correctly trained and licenced persons may work on or operate electrical installations.

6.8.2. Arc Flash Equipment

Arc flash rated PPE is to be worn when working on or near high current installations over 100A as required of AS4836 Safe Working On or Near Low Voltage Electrical Installations.

The below chart describes PPE that must be worn when working near live electrical parts for different scenarios. The level of protective clothing required increases with the risk of arc flash occurring and the level of injury potential. The table on the following page defines categories 0 to 4.



PPE Category	Definition
0	Untreated cotton clothing
1	Arc-rated long sleeve shirt, Arc-rated pants or overalls, Arc-rated face shield with hard hat' Safety glasses, Hearing protection, Leather & voltage rated gloves (as needed), Leather work shoes

2	Arc-rated long sleeve shirt, Arc-rated pants or overalls, Arc-rated face shield & balaclava or Arc flash suit with hard hat, Safety glasses, Hearing protection, Leather & voltage rated gloves (as needed), Leather work shoes
3	Arc-rated long sleeve jacket, Arc-rated pants, Arc-rated flash hood with hard hat, Safety glasses, Hearing protection, Leather & voltage rated gloves (as needed), Leather work shoes
4	Arc-rated long sleeve jacket, Arc-rated pants, Arc-rated flash hood with hard hat, Safety glasses, Hearing protection, Leather & voltage rated gloves (as needed), Leather work shoes

Arc flash equipment (PPE) must be kept clean and in fit for purpose condition to maintain its protective properties. Arc flash equipment that is damaged, or torn, must be disposed of and not used for arc flash work.

6.9. Work Near Energised Low Voltage Equipment, Services, and Overhead Power Lines

When work is required to be performed near energised low voltage plant, equipment, or overhead power lines, or where that plant or equipment cannot be isolated, work shall not commence until the following actions have been completed:

- A documented risk assessment (Safe Work Method Statement) for the works is developed by the work group and approved by the Project Manager;
- A low voltage emergency rescue plan has been developed and approved by the Project Manager;
- A compliant low voltage rescue kit is easily accessible at the place of the work if required;
- The qualifications of those persons on safety observation, isolation, and LV rescue duties have been verified as appropriate for their role in the work;
- A prestart meeting specific to the works has been conducted;
- Personnel have been appropriately trained;
- Personnel are equipped with the correct PPE;
- Consultation with, and approval from, the low voltage asset owner;
- A work location inspection is completed to confirm:
    - All covers and guards around moving and rotating parts are securely attached
    - All covers, access panels, and doors are securely attached or locked preventing unauthorised access to live electrical parts
    - The area being worked in is clear of obstructions for entry and exit
    - Isolation points for electrical plant and equipment are marked on an isolation plan, are freely accessible, clearly labelled, and able to be operated quickly

When working near energised low voltage equipment, Safe Approach Distances (SADs) must be adhered to. Refer to SEQ-FM-065 Overhead Powerlines Permit for control measures.

All records associated with low voltage proximity works shall be maintained within Procore, for a period of not less than 2 years.

6.10. Work Near Energised High Voltage Equipment, Services, or Overhead Powerlines

Work conducted near High Voltage Equipment or services must be only commenced following the completion of:

- A documented risk assessment (Safe Work Method Statement) for the works developed by the work group and approved by the Project Manager;
- A high voltage emergency rescue plan has been developed and approved by the Project Manager;
- Verification of appropriate qualifications of persons isolating services, and operating equipment, and safety observing;
- A prestart meeting specific to the works;
- SEQ-FM-046 High Voltage Work Permit
- Appropriate training of personnel;
- Personnel are equipped with the correct PPE;
- Consultation with, and approval from, the High Voltage asset owner
- Isolation points for electrical plant and equipment are marked on an isolation plan, are freely accessible, clearly labelled, and able to be operated quickly

When working near energised high voltage equipment, Safe Approach Distances (SADs) must be adhered to. Refer to SEQ-FM-046 High Voltage Electrical Work Permit for control measures.

All records associated with high voltage works shall be maintained within Procore, for a period of not less than 2 years.

6.11. Safe Approach Distances (SADs) for Exposed Live Parts or Conductors

Contact with energised electrical parts or services can expose workers to health and safety risks including death, electric shock or other injury caused directly or indirectly by electricity. An electric shock can also occur without direct contact with electric parts. A close approach to live conductors may allow a 'flashover' to occur. The risk of flashover increases as the line voltage increases.

The below table details Safe Approach Distances for Low Voltage and High Voltage electrical services for untrained persons.

Voltage	Approach Distance (metres)
Up to 132 kV AC	3
132kV AC to 330kV AC	6
330kV and above	8

Refer to SEQ-FM-065 Work Near Overhead Powerlines Permit for additional Safe Approach Distance requirements.

6.12. No Live Electrical Work

Live electrical work on Haslin sites is not permitted under any circumstance.

6.13. Isolation Lock Out and Tag Out Activities

All isolation, Lock Out & Tag Out functions for maintenance, testing, and pre-commissioning activities shall be conducted in accordance with SEQ-PR-018 Lock Out Tag Out Procedure, and SEQ-PR-082 Energisation or Commissioning Procedure, as appropriate to the work being performed.

7. Training

All employees are required to complete Hazard Identification, Risk Assessment and Control training, delivered through Employment Hero.

Nominated persons at each Haslin site will be provided training for the following:

- HLTAID011 Provide First Aid
- HLTAID009 Provide Cardiopulmonary Resuscitation
- UETDRRF004 - Perform rescue from a live LV panel (where required)
- UETDREL006 – Work Safely in the Vicinity of Live Electrical Apparatus as a Non-Electrical Worker (where required)

8. Relevant Documents

SEQ-CL-009 Task Inspection (Procore Inspections Tool)
SEQ-FM-045 Isolation and Lockout Permit
SEQ-FM-046 High Voltage Electrical Work Permit
SEQ-FM-047 Permit to Excavate
SEQ-FM-065 Overhead Powerlines Permit
SEQ-FM-093 Penetration Permit
SEQ-FM-117 RCD Pushbutton Testing Record
SEQ-PR-013 Excavation Procedure
SEQ-PR-018 Isolation, Lock Out Tag Out Procedure
SEQ-PR-082 Energisation and Commissioning Procedure