Working with Electricity | Mirvac Minimum Requirements Reference Document

1. Purpose & Scope

This Mirvac Minimum Requirement Reference Document provides details and information in relation to managing risks associated with undertaking work on, near, or with electrical systems, equipment or tools and the installation, energisation and commissioning of electrical equipment and is in addition to the information contained in the associated [Working with Electricity Mirvac Minimum Requirements](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B1B969A46-39F4-48A1-A44A-D955C8283ADF%7D&file=Working%20with%20Electricity%20MMR.DOCX&action=default&mobileredirect=true). This MMR Reference Document is to be used as an instructional tool for Mirvac employees and should be read in conjunction with the [Working with Electricity Mirvac Minimum Requirements](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B1B969A46-39F4-48A1-A44A-D955C8283ADF%7D&file=Working%20with%20Electricity%20MMR.DOCX&action=default&mobileredirect=true).

This document applies to all workplaces under the management or control of a Mirvac entity.

Note: This document does not address electrical hazards of less than 50 volts or 50V AC or 120 V DC (i.e. extra low voltage). Individual exposures extra low voltage may be hazardous if other conditions exist such as higher hertz. These exposures should be evaluated individually to determine if special precautions are necessary.

1. Definitions

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| **Term** | **Definition** |
| Competent person | A person who has acquired, through training, qualifications or experience and has been assessed to have the knowledge and skill to do the task in a safe way |
| Electrical equipment | Equipment which consumes, converts or generates electricity. |
| Electrical installation | Electrical installation means a group of items of electrical equipment that:   * are permanently electrically connected together; and * can be supplied with electricity from the works of an electricity supply authority or from a generating source. |
| Extra low voltage | Differential voltage up to 50V AC or 120 V ripple-free DC |
| High voltage | Any voltage over 1000 volts (or 1 kilovolt) |
| Low voltage | Any voltage up to 1000 volts |
| Residual Current Device (RCD) | A device intended to isolate supply to protected circuits, socket outlets or electrical equipment in the event of a current flow to earth that exceeds a predetermined value. The RCD may be fixed or portable. |

1. Minimum Requirements

Where activities involve work on, near, or with electrical systems, equipment or tools and the installation, energisation and commissioning of electrical equipment the activity is considered a high-risk work activity.

Appropriate legislative requirements, Codes of Practice and Australian Standards must be complied with.

* 1. Planning

Elimination of the risk when working on, near, or with electrical systems, equipment or tools is the priority but if not reasonably practicable to eliminate, all effort must be made to manage and minimise risk using, wherever practicable, engineering controls or higher (on the hierarchy of control triangle – refer Appendix A).

A formal risk assessment is required, irrespective of the potential risk, to determine the best method of eliminating or reducing the potential risk.

The Risk and Opportunity Register must be utilised for pre-activity planning including the identification of all risks associated with working on, near, or with electrical systems, equipment or tools and controls to be implemented to mitigate the risks identified.

Prior to commencing work on or with electrical systems, equipment or tools, a Job Safety & Environment Analysis (JSEA) or Safe Work Method Statement (SWMS) must be prepared for that task. If the scope of work changes or the risk increases the JSEA/SWMS must be reviewed.

Note: Submission of the electrical installation design to the relevant network operator or technical safety regulator may be required before installation.

* 1. Training and Competency

Personnel who work with electricity (e.g. to install, test, commission, repair, replace or adjust electrical equipment and devices or systems) must be competent and have the required legislated certificates or licensing for the region in which they are working.

Testing and tagging of electrical equipment must be carried out by a licenced electrician.

All employees and contractors must be trained in the recognition of safe and unsafe electrical conditions.

Refer Section 6. Training and Competency of the Working With Electricity MMR.

* 1. Portable electric equipment

Portable electric equipment must be visually inspected prior to each use and the casing and cords must be free of apparent electrical shock hazards. Any damaged portable electric equipment / tool must be immediately removed from service.

Use a RCD with all portable electrically powered equipment, tools and extension leads

Portable generators must:

* comply with AS/NZS 3010 *Electrical installations - Generating sets* and be verified by a compliance plate;
* have an integrated RCD fitted during manufacture, or on models without an integral RCD, a portable RCD used as the first plug in item at the generator. Otherwise an RCD is to be retrofitted to the generator by an authorised company;
* comply with guidelines for installation, use and maintenance from the Original Equipment Manufacturer;
* be appropriately earthed.
  1. Extension cords / temporary cables

Domestic type power boards, extension leads and double adapters must not be used on construction worksites – and must be industrial rated, heavy duty sheathed types which comply with AS 3199: *Approval and Test Specification, Cord Extension Sets* and for construction and demolition sites, AS/NZS 3012: *Electrical Installations – Construction and Demolition Sites.*

Power boards or extension cords must not be piggy-backed.

Temporary electrical supply cables / extension cords must be located so they are not subjected to mechanical damage, damage by liquids or high temperature nor present tripping hazards (e.g. supported off the floor, away from access routes, not through doorways / over sharp edges). Use lead stands or insulated cable hangers to keep leads off the ground or cable protection ramps can be used.

In office situations RCD boxes are preferred - if that is not reasonably practical the power board must be fixed either vertically or to a soffit to prevent objects easily entering the pin points.

* 1. Residual Current Devices (RCD)

RCD's must be used on:

* electrical circuits;
* temporary electrical distribution boards - where an RCD is not fitted to an electrical distribution outlet a portable RCD must be used;
* general purpose outlets (GPO’s) at construction sites;
* portable generators;
* all portable electrically powered tools, equipment and extension leads.

All RCDs, including portables, must:

* comply with AS/NZS 3190: *Approval and Test Specification – Residual Current Devices*;
* be inspected, tested and tagged by a competent electrician using an RCD test instrument at intervals detailed in AS/NZS 3760: *In-service Safety Inspection and Testing of Electrical Equipment*
* and for construction sites AS/NZS 3012: *Electrical installations - Construction and demolition sites*; and
* have a rated tripping current not exceeding 300 milliseconds (mS - i.e. 0.3 seconds), at a test current of 30 milliamps (mA - i.e. 0.03 amps).
  1. Installing and working on electrical equipment

Only those with the appropriate electrical licence are to perform electrical installation and commissioning.

Do not perform installation or work on energised equipment, plant or parts (or where it has the potential to become energised); the [Isolation Lock Out Tag Out MMR](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B77443021-817D-4F52-8D8B-B4CB8496CA76%7D&file=Isolation%20Lockout%20Tagout%20MMR.DOCX&action=default&mobileredirect=true) must be used to de-energise, achieve zero energy state and secure them before work is performed.

Do not work on energised electrical equipment unless required for testing or commissioning (except High Voltage – see below). When testing or commissioning, work must not be carried out on the equipment while energised only because it is merely more convenient for the equipment to stay energised. There must be all practical effort to de-energise and achieve zero state energy. If not practicable, effective precautions must be taken to prevent contact with energised electrical parts.

Prior to placing an electrical installation (new or existing) in service it must be inspected and certified by the installing electrician or an appropriate engineer as correctly installed prior to use in accordance with relevant legislation, codes of practice and Australian standards (AS/NZS 3000 *Australian/New Zealand Wiring Rules* and AS/NZS 3017 *Electrical installations - Verification guidelines)* and any regional network operator’s service and installation requirements.

An Energisation [Commissioning](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B0AC297AE-00F0-430E-B15D-019318622B3E%7D&file=Energisation%20Commissioning%20Permit.docx&action=default&mobileredirect=true) Permit must be completed plus a Certificate of Compliance / Electrical Safety Certificate, if required by the State’s Electrical / Safety Act, and provided to the Worksite Manager or designated person.

Construction and demolition sites

* must comply with AS/NZS 3012: *Electrical Installations – Construction and Demolition Sites* in addition to AS/NZS 3000.
* Existing permanent wiring on a construction site is to be retained in accordance with AS/NZS 3000.
* Transportable construction buildings must be wired in compliance with AS/NZS 3000 and/or AS/NZS 3001:2008 *Electrical installations - Transportable structures and vehicles (including their site supplies).*
* Personnel hoists must have wiring must be supplied from a separate final sub-circuit originating from the main switchboard; and this supply must be suitably identified as being for the operation of the hoist(s).

Damaged or faulty electrical equipment, tools, appliances or installations must be taken out of service immediately and an ‘Out of Service’ tag applied.

* 1. High voltage (HV)

The relevant network operator or technical safety regulator may require:

* Submission of the HV installation design before installation;
* Commissioning test results - by a competent person / testing organisation prior to permanent supply being made;
* Certification by a professionally qualified engineer that the ‘as commissioned’ installation complies with the design and all relevant technical requirements.
* A copy of the final certification must be given to the network operator (e.g. where connected to a network).

Do not work on energised HV electrical equipment at any time - the [Isolation Lock Out Tag Out MMR](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B77443021-817D-4F52-8D8B-B4CB8496CA76%7D&file=Isolation%20Lockout%20Tagout%20MMR.DOCX&action=default&mobileredirect=true) is to be followed.

Each exposed part of a high-voltage installation is to be 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.

High Voltage Isolations must only be carried out by an Authorised Electrical Isolator, High Voltage Operator or Network Operator who is appointed and authorised to operate that particular apparatus.

Only competent electrical personnel who have appropriate training in high voltage electrical work must work on high voltage electrical equipment.

* 1. Temporary electrical supply

Temporary supply switchboards must be:

* sufficient in number, inspected before use by a competent person, located near work areas to minimise trailing cables;
* secured to prevent unauthorised access;
* securely mounted and provide protection to outlet points from the weather;
* fitted with a RCD; and
* have flexible power leads from the switchboard protected against damage from sharp edges and fed through the bottom of the switchboard.

Construction wiring must be marked with iridescent yellow tape with the words 'construction wiring' spaced at intervals not exceeding 5 m to be readily distinguishable from permanent wiring. Construction wiring should be selected according to the purpose and risk of the installation (refer AS 3012) and should not be:

* not be fixed to free standing fences that have no fixed posts (or equivalent means of support);
* be protected against mechanical damage;
* on any surface within 2.5 m of the floor or ground level
* on any surface and within 150 mm of, or attached to, scaffolding
* under a concrete ceiling slab more than 150 mm away from the juncture of the ceiling slab and a wall or beam that would otherwise provide protection
* within 150 mm of unearthed metal structures being installed as part of the construction process (e.g. sheet metal ducts and hydraulic piping)
* across the top of transportable structures, storage containers, shipping containers or the like
* across or over metallic roofs or edges
* be positioned to avoid crossing roadways or access ways where cranes, high loads or heavy machinery may travel. If this is not possible, an effective means to minimize the risk of vehicular contact with the overhead wiring system must be provided (such as insulated flagged catenary wires six metres on either side of the overhead wiring and 0.6 m below the lowest point of the overhead electrical cable). All construction wiring, including overhead type, must be insulated.
  1. Light globes and fluorescent tubes

Removal or installation of a light globes or fluorescent tubes is not considered electrical work.

Prior to the removal or installation of any light globe or fluorescent tube, the electrical supply must be isolated (energy off) and secured at the circuit breaker. Turning off the light switch is not a suitable means of isolation.

* Where reasonably practicable attach a Danger Tag to the circuit breaker together with an isolation device in accordance with the [Isolation Lock Out Tag Out MMR](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B77443021-817D-4F52-8D8B-B4CB8496CA76%7D&file=Isolation%20Lockout%20Tagout%20MMR.DOCX&action=default&mobileredirect=true).
* Where the circuit breaker type does not allow for a lockable restraint the electrical cupboard or circuit board must be locked as a secondary precaution.

For lighting appliances which are plugged into a general purpose ‘wall’ outlet power supply, removal of the power cord plug from the outlet is an acceptable method of isolation. Where access requires work at height to be carried out [Work at Height MMR](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B3D796DAD-242C-4157-AD8F-8220DF30777B%7D&file=Work%20at%20Height%20MMR.docx&action=default&mobileredirect=true) must be followed.

* 1. Personal protective equipment

Suitable PPE for electrical work, including testing and fault finding, must be worn and in good condition. The PPE must be able to withstand the energy at the point of work when working energised (insulated gloves, non-conductive footwear, nonconductive / flame retardant clothing) – and be appropriately electrically rated. Guidance on checking and calibrating testing equipment can be found in the [Plant Equipment and Tools MMR.](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7BBAEBD7BF-D122-42E4-9F20-5815D236DC1B%7D&file=Plant%2C%20Equipment%20and%20Tools%20MMR.DOCX&action=default&mobileredirect=true)

* 1. Inspection and testing

Testing and tagging of electrical equipment and RCDs must be completed in accordance with relevant legislation, codes of practice and Australian Standards – refer to Appendix B.

All portable electrical equipment, which includes equipment and appliances that are connected to the electricity supply by a flexible cord, including portable power supplies, extension cord sets and power boards, also fixed and portable RCDs must be inspected, tested and tagged as per the frequency and requirements of AS/NZS 3760: *In-service safety inspection and testing of electrical equipment* and for construction sites both AS/NZS 3760 & AS/NZS 3012 *Electrical installations - Construction and demolition sites*.

The inspection, testing and tagging must be conducted by an appropriately licenced electrician and detail recorded in the [Electrical Inspection & Testing Register](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7BCF73699E-7B52-4D69-9D0D-5912C4027CBE%7D&file=Electrical%20Inspection%20Testing%20Register.docx&action=default&mobileredirect=true) or equivalent provided by the Service Provider, and the register is kept on site until the equipment is next tested, permanently removed from site or disposed of. The register also includes any equipment that has been destroyed, lost or stolen.

Any tools and equipment that do not display a current inspection and test tag must be removed from service and an ‘Out of Service’ tag applied.

* 1. Electrical shock / incidents

If the affected person is in contact with live apparatus / equipment the electric power source must be isolated in accordance with the Emergency Isolation Processes before attempting to assist them as per the [Emergency Preparedness Management MMR](https://mirvacau.sharepoint.com/:w:/r/sites/HealthSafetyandEnvironment/_layouts/15/Doc.aspx?sourcedoc=%7B568AE5EE-A33F-4DFE-A0F4-451CBB6FE35A%7D&file=Emergency%20Preparedness%20and%20Response%20MMR.docx&action=default&mobileredirect=true). The affected persons/s must have an ECG immediately and before returning to work.

The incident scene must to be secured to prevent injury to other persons and to prevent disturbance of the area to enable further investigation.

If required notify the State Regulatory Authority

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| **Appendix B – Testing Requirements** | | | | | |
| **Periodic Verification Intervals for electrical equipment to AS/NZS 3760 [All workplaces excluding construction]** | | | | | |
| Type of environment and/or equipment | Equipment including Class l equipment, Class ll equipment, cord sets, cord extension sets and EPOD’s | Residual Current Devices (RCDs) | | | |
| Push button test – by user | | Operating time and push-button test | |
| Portable | Fixed | Portable | Fixed |
| **(a)** | **(b)** | **(c)** | (d) | (e) | (f) |
| 1. Factories, workshops, places of work or repair, manufacturing, assembly, maintenance or fabrication | 6 months | Daily, or before every use, whichever is longer | 6 months | 12 months | 12 months |
| 1. Environment where the equipment or supply flexible cord is subject to flexing in normal use OR is open to abuse OR is in a hostile environment | 12 months | 3 months | 6 months | 12 months | 12 months |
| 1. Environment where the equipment or supply cord is NOT subject to flexing in normal use and is NOT open to abuse and is NOT in a hostile environment | 5 years | 3 months | 6 months | 2 years | 2 years |
| 1. Residential type areas of: hotels, residential institutions, motels, boarding houses, halls, hostels accommodation houses and the like | 2 years | 6 months | 6 months | 2 years | 2 years |
| 1. Equipment used for commercial cleaning | 6 months | Daily, or before each use, whichever is the longer period. | N/A | 6 months | N/A |
| 1. Hire equipment: Inspection   Test and tag | Prior to hire | Including push-button test by hirer prior to hire | | N/A | N/A |
| 3 months | N/A | | 3 months | 12 months |
| 1. Repaired, serviced & 2nd hand equipment | After repair or service which could affect electrical safety, or on reintroduction to service refer to  AS/NZS 5762 *In-service safety inspection and testing - Repaired electrical equipment* | | | | |

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| Periodic verification intervals to as/nzs 3012-2010 & 3760-2010 [construction only workplaces] by state or territory | | | | | | | | | | | | | | | |
| **Electrical Item** | **ACT** | **NSW** | | **WA** | **QLD** | | | **VIC** | | | **SA** | | **Records to be retained on site by Mirvac** | | |
| Power tools, leads and other portable electrical equipment. | 3 months | 1 month OR  3 months with Risk Assessment | | 3 months | 3 months | | | 3 months | | | 3 months | | * Current tag with name of person or company who performed the test and the test or re-test date. * Electrical register of tagging including test result, plant no., date of test, testing electrician’s name, licence no., signature and any repairs undertaken. | | |
| Sub-boards | 3 months | 1 month | | 3 months | 3 months | | | 1 month | | | 3 months | | * As Power tools, leads etc. | | |
| Single unit dwellings |  | 3 months | |  |  | | |  | | |  | | * Portable plug-in equipment and flexible cords | | |
| Amenities, e.g. a/cond, microwave oven & urn. | 6 months | 3 months | | 6 months | 6 monthly  Fixed - 1 month | | | 3 months | | | 6 months | | * As Power tools, leads etc. | | |
| Push button RCD test. | Prior to use & each day in use. | Prior to use & each day in use. | | Prior to use & each day in use. | Prior to use & each day in use. | | | Prior to use & each day in use. | | | Prior to use & each day in use. | | * As Power tools, leads etc. for NSW only. | | |
| RCD performance testing (no more than 300mS @ 30mA). | 3 months | 3 months | | 3 months | 3 months  Fixed - 12 months | | | 1 month | | | 3 months | | * Electrical register of plant number, time to trip (mS), date of test, testing electrician’s name, licence no. & signature. | | |
| Construction wiring | Handover and re-testing every 6 months | Handover and re-testing every 6 months | | Handover and re-testing every 6 months | Handover and re-testing every 6 months | | | Handover and re-testing every 6 months | | | Handover and re-testing every 6 months | | * Handover Certificate of Electrical Safety (VIC only). * Evidence of re-testing after 6 months. | | |
| References | AS/NZS 3012 *Electrical Installations – Construction and Demolition Sites*.  AS/NZS 3760 *In-service Safety Inspection and Testing of Electrical Equipment* (Amenities for ACT, NSW, SA, QLD & WA) | | | | | | | | | | | | | | |
|  | ACT WorkCover Electrical Equipment Inspect Test and Tag 09.03 | NSW  Code of Practice Electrical Practices Construction Work | | WA Occupational Safety & Health Regs 1996 R3.61 &  AS/NZS 3012-2010 | | QLD  AS/NZS 3012-2010 | | | VIC Industry Standard Electrical Practices construction Sites 2002 &  AS/NZS3760-2010 | SA  WorkCover  Workplace Electrical Safety Information Sheet 5  2002 | | | Note: AS/NZS3012 requires sub-board RCD and circuit breakers (not the mains supply switch) to be secured from un-authorised access by a locked cover so that access can only be gained by a licensed electrician. In some states this requirement is strictly enforced, i.e. Victoria & New South Wales and includes amenities. | | |
| **Periodic Verification Intervals for Transportable Structures AS/NZS 3012:2010 Table 3** | | | | | | | | | | | | | | | |
| Environment | Transportable structures, Class I (earthed conductive parts) and Class II (double insulated) electrical equipment | | | | | | Residual Current Devices (RCD’s) | | | | | | | | |
| Transportable structures, fixed and transportable equipment, and construction wiring including switchboards | | Portable equipment | | | | Push button test – by user | | | | | | | Operating time (RCD Tester) | |
| Portable | | | | | Non-portable fixed | | Portable | Non-portable fixed |
| Construction and demolition sites in accordance with AS/NZS 3012:2010 clause 1.1 | 6 months | | 3 months | | | | After connection to a socket outlet or before connection of equipment, and at least once every day in use. | | | | | 1 months | | 12 months | 12 months |