

Monash University Procedure

Procedure Title	Electrical Safety Procedure
Parent Policy	OHS Policy
Date Effective	September 2019
Review Date	September 2022
Procedure Owner	Manager, OH&S
Category	Operational
Version Number	1.1
Content Enquiries	Bernadette.hayman@monash.edu
Scope	<p>This procedure applies to the staff, students, contractors and visitors of Monash University.</p> <p>Australian campuses only are covered by the certification to OHS AS 18001 and AS 4801.</p>
Purpose	<p>This procedure details the requirements for ensuring electrical safety for all electrical equipment and installations used:</p> <ul style="list-style-type: none"> • On campuses (including residences) and sites under the management and control of Monash University; • As part of University-sanctioned activities by staff and students of Monash University, contractors, visitors, hire companies or any other person or associated agency.

Contents

1. Abbreviations	3
2. Definitions	3
3. Risk Management	4
3.1 Managing Incidences Of Electric Shock.....	4
4. Licensed Electrical Work Safety Requirements	4
4.1 Conducting Electrical Work	4
4.2 High Voltage Installations.....	5
4.3 Electrical Installation Work And Certificates Of Electrical Safety	5
5. General Electrical Safety Requirements	5
5.1 Inspection, Testing And Tagging.....	5
5.2 Electrical Isolation And Lock Out/Tag Out (Loto).....	6
5.3 Residual Current Devices (Rcds).....	6
6. Specific Electrical Devices	7
6.1 Double Adaptors	7
6.2 Epods (Power Boards).....	7
6.3 Extension Leads	7
6.4 Fan Heaters.....	7
6.5 Power Inverters, Uninterruptible Power Supplies (Ups) And Generators	7
7. Responsibility For Implementation	8
7.1 Head Of Academic/Administrative Unit:	8
7.2 Safety Officers:	8
7.3 Supervisors:.....	8
7.4 Buildings And Property Division:	8
7.5 Electrical Contractors And Workers:.....	9
8. Tools	9
9. Records	9
10. Document History	10
11. Appendix 1	11
12. Appendix 2	12

1. Abbreviations

BPD	Buildings and Property Division
COES	Certificate Of Electrical Safety
EPOD	Electrical Portable Outlet Device
ESV	Energy Safe Victoria
MUOHSC	Monash Occupational Health & Safety Committee
OHS	Occupational Health and Safety
OH&S	Monash Occupational Health and Safety
S.A.R.A.H	Safety and Risk Analysis Hub
RCD	Residual Current Device

2. Definitions

A comprehensive list of definitions is provided in the [Definitions tool](#). Definitions specific to this procedure are provided below.

Electrical Equipment: Any appliance, wire, fitting, cable, conduit or apparatus that generates, uses, conveys or controls (or that is intended to generate, use, convey or control) electricity.

Electrical Installation: Electrical equipment that is fixed or to be fixed in, on, under or over any land;

Electrical Portable Outlet Device (EPOD): a device having a single means of connection to an electrical supply with one or more outlet facilities (sockets) and (excluding double-adaptors).

Electrical Work: Work on fixed electrical installation/s or items that may include:

- Electrical connection work - connecting or disconnecting electrical equipment to or from a supply of electricity;
- Electrical equipment work - repair, alteration or maintenance of electrical equipment;
- Electrical inspection work - testing, inspection or certification of electrical equipment;
- Electrical installation work - installation, alteration, repair or maintenance of an electrical installation.

Electrical Worker: A person with appropriate knowledge, competence and skill that has licensed qualifications to complete electrical work.

Extra-low Voltage: voltage that does not exceed 50 volts alternating current or 120 volts ripple-free direct current.

Low Voltage: voltage that exceeds extra-low voltage and does not exceed 1000 volts alternating current or 1500 volts direct current.

High Voltage: voltage that exceeds low voltage.

Plant: Plant is a general term defined in the Occupational Health and Safety Act 2004 that encompasses any machinery, equipment, appliance, implement, tool and any associated components, fittings or connections required for operation.

Residual Current Device (RCD): a device, often referred to as a 'safety switch', 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.

3. Risk Management

Electrical hazards present a significant risk to Monash University staff, students, stakeholders and contractors. Though some areas (workshops, laboratories, etc.) and work tasks (research, maintenance and construction activities, etc.) may have a higher risk factor, all electrical hazards require evaluation and risk mitigation to prevent harm.

Specific electrical hazards and risk controls are not documented in this procedure due to the manner in which they can arise and the scope and complexity of work tasks completed throughout Monash University. The Safe Work Australia document '[Code of Practice: Managing Electrical Risks in the Workplace](#)' (2016) can provide areas and staff with management and control of work activities with additional information related to identifying and managing electrical risks.

3.1 Managing incidences of electric shock

All electrical incidents and injuries must be reported immediately, directly to the area supervisor, local Safety Officer and Monash OH&S.

- If safe to do so, the item of plant or the area that resulted in the injury should be managed to prevent access/use or isolated from its electrical supply to prevent further harm.
- The area and any associated items must remain undisturbed until an initial investigation conducted in consultation with Monash OH&S determines if the injury requires notification to regulatory authorities.
- If the electrical shock or injury constitutes a WorkSafe notifiable incident, Monash OH&S will coordinate the reporting process and engage any additional authorities (such as Energy Safe Victoria) in consultation with the areas management.
- As electrical shocks can have a delayed or latent impact on health and the cardiovascular system, any persons that have received an electric shock should be encouraged to seek medical aid for assessment of potential effects on their heart; and
- All incidents must be reported in S.A.R.A.H. and an investigation completed in accordance with the [Monash University Hazard and Incident Reporting, Investigation and Recording Procedure](#).

4. Licensed Electrical Work Safety Requirements

4.1 Conducting Electrical Work

Electrical work derived from or related to an electrical installation is not to be undertaken on Monash University premises except by an appropriately licensed electrical worker (such as an Electrician or other competent persons/contractors holding an electrical license registered with [Energy Safe Victoria](#)). Electrical workers must be registered and inducted through Buildings and Property Division (BPD) via a Building Engineering Information Management System ([BEIMS](#)) request.

- Due to previous incidents of staff receiving electric shocks and falls from height, the changing of light globes and lamps is considered electrical work and must be coordinated through BEIMS.
- Before commencing any electrical work, the hazards associated with the work must be identified, and documented in the form of a [SWMS](#) or other risk management strategy.
- The documented risk management approach must detail the actions to be taken or controls required to be implemented to eliminate or minimise electrical safety risks.

- The risk management documentation must be obtained from the engaged electrical worker and reviewed to consider the specific work activity, the suitability of controls to reduce risk exposure to the electrical worker and any specific considerations related to stakeholders directly or indirectly involved with the work tasks.
- In some instances, electrical work may require the completion and approval of other high risk [work permits](#), including work in confined spaces, excavation and hot work.

4.2 High Voltage Installations

Certain areas, infrastructure and plant within Monash University are connected to high voltage electrical supplies, presenting significantly greater safety risks. High voltage electrical work is coordinated by the Monash University High Voltage Responsible Officer and is only permitted by approved High Voltage Operators that employ electrical workers with competencies and licenses specific to high voltage electrical work.

- Areas, infrastructure and plant within Monash University that are connected to high voltage electrical supplies are identifiable by signage and warning placards. Additional information can be obtained from BPD (Services).

4.3 Electrical Installation Work and Certificates of Electrical Safety

All electrical installation work on Monash University owned or leased properties must be accompanied by a Certificate of Electrical Safety (COES), issued by the electrical worker who completed the task. For major construction works all parts of the electrical installation must be inspected (no self-certification) and a COES issued by an independent and qualified electrical inspector.

Electrical installation work is only permitted if the electrical worker or contractor conducting the work is authorised and agrees to issue a COES. An electrical installation, or any part thereof, that has been constructed, altered, added to or repaired must not be put into service until:

- The installation has been tested and the electrical contractor has verified that the alteration, addition, repair or any other completed work does not impair the safety and integrity of any existing electrical installation.
- The work completed is compliant with AS/NZS 3000:2018, Electrical Installations and adheres to the legislative requirements noted in the Electricity Safety Act 1998 and Electricity Safety (Installations) Regulations 2009, administered by Energy Safe Victoria.
- The COES has been issued. Some electrical installation work must be inspected by an Energy Safe Victoria licensed electrical safety inspector before the COES can be finalised. The electrical worker undertaking the installation must advise if an inspection is required and coordinate the inspection in consultation with BPD.

5. General Electrical Safety Requirements

5.1 Inspection, Testing and Tagging

The inspection, testing and tagging of portable equipment or items connected to an electrical supply via a flexible cable or connecting plug top/device is a mandatory requirement for all plant and electrical cords used throughout Monash University. This includes contractors' and personal items used for work purposes by staff, students and visitors.

- Inspection, testing and tagging activities must be conducted in accordance with the requirements of AS/NZS 3760:2010 In-service Safety Inspection and Testing of Electrical Equipment.
- Inspection, testing and tagging activities are only permitted by persons holding appropriate qualifications and using calibrated test equipment. This may be through an area's trained staff member/s with qualifications, knowledge, competence and test equipment, via a BEIMS request submitted to BPD or via engagement of an appropriate contractor.

- The frequency of inspection, testing and tagging activities must adhere to the requirements of AS/NZS 3760:2010 In-service Safety Inspection and Testing of Electrical Equipment. Additional information and further guidance is outlined in Appendix 1.
- The inspection, testing and tagging of work items brought in by contractors and personal items used for work purposes by staff, students and visitors is the responsibility and at the expense of the owner.
- Hired plant items and electrical equipment must be inspected by staff or representatives of the area hiring the items to ensure valid inspection, testing and tagging has been completed and the items are safe for use. Any items found to have outdated or missing tags are prohibited from use and must be returned to the hiring agent for rectification.
- Equipment faults, damage and hazards can occur between tests, despite the attached tag being within a valid test period. Any electrical equipment with plugs or cords visually identified with the following faults should be discontinued and isolated from use according to the [Monash University Isolation of Plant Procedure](#).
 - Cuts, fraying, heavy scuffing;
 - Damage to plug, bent pins, taped leads;
 - Coloured wires are visible; or
 - Signs of overheating such as burn marks or staining on the plug.
- New and unused 'out of the box' electrical equipment entering into service for the first time but not tested and tagged should be inspected for any damage or safety concerns and have a 'new to service' tag applied that includes the dates of entry into service and when the first electrical safety test is due.

5.2 Electrical isolation and Lock Out/Tag Out (LOTO)

Lock Out/Tag Out (LOTO) is the process of isolation and safe removal of hazardous energy sources to prevent the possibility of inadvertent energising of systems and plant. LOTO is achieved by the use of isolation devices, locks and tags to ensure the safe management and removal of hazardous energy, including during electrical work activities, inspection, maintenance, commissioning, decommissioning and repair of plant.

All electrical work and management of electrical hazards must be completed in accordance with LOTO procedures. For specific requirements including roles and responsibilities, please see the [Monash University Isolation of Plant Procedure](#).

5.3 Residual Current Devices (RCDs)

Residual Current Devices (RCDs) switch off the supply of electricity to plant and/or infrastructure by monitoring earth leakage current. These devices protect users that may unintentionally come in contact with electricity and preventing the current from passing through the user to earth.

- New electrical installations require the implementation of RCDs and must adhere to Section K – Electrical, of the Monash University [Monash Design & Construction Standards](#).
- In existing buildings, a BIEMS request can be lodged to verify if RCDs are installed as part of the areas infrastructure or to determine if new or portable RCDs are required;
- Where practicable, appropriate in-line RCDs should be fixed to portable plant items to minimise additional electrical hazards associated with the device. For additional specific information related to RCDs in higher-risk workplaces, please see Appendix 2.
- RCDs are subject to the installation, testing and tagging requirements detailed in AS/NZS 3760:2010 In-service Safety Inspection and Testing of Electrical Equipment. For additional information, please see Appendix 1.

6. Specific Electrical Devices

The following specific electrical items require additional consideration by users due to their risk potential and previous incidents of injury caused to Monash University stakeholders. Items of plant (including those purchased from overseas suppliers) that use or require electricity must comply with applicable Australia Standards, including AS/NZS 3000:2018 Electrical Installations.

6.1 Double/Travel Adaptors and Plug Tops

- Double adaptors are not permitted at Monash University and should be removed and replaced with EPODs (power boards) fitted with overload protection devices.
- Travel adaptors are not permitted for permanent use on plant and devices owned by Monash University. These items must be wired with appropriate Australian plug tops for use on 240VAC general purpose outlets (GPOs).
- All plug tops should be inspected to ensure they have insulated active and neutral pins.

6.2 EPODs (power boards)

- EPODs are only permitted if they have overload protection. Home-made or modified EPODs are illegal throughout Australia and pose additional risk of electrical shock, electrocution and fire.
- An EPOD integral to an electrical appliance or rack shall be fixed by the use of secure fittings in such a way that the face is in the vertical plane in a location that is not susceptible to mechanical or water damage. Where possible the cord should be securely fixed to reduce the weight on the EPOD electrical junction.
- Each EPOD must be plugged into a separate GPOs to prevent circuit overload.

6.3 Extension Leads

- Extension leads are only suitable for temporary applications. Where practicable, for longer term applications a new GPO should be installed.
- Extension leads should be placed away from trafficable areas to minimise pedestrian trip hazards. Covers and/or tape should be used to ensure trip hazards are minimised.
- In areas such as construction sites, workshops or laboratories where extension leads may be subject to increased wear, accidental damage, the movement of items and plant over the lead, exposure to UV radiation (including sunlight) and moisture, screened (armoured) extension leads and IP rated plugs on the lead and appliances should be investigated and implemented for use.

6.4 Fan Heaters

- Fan forced coil heaters pose a high fire risk, have relatively exposed elements that trap dust/debris, can cause injury and burns and are not energy efficient. These types of heaters are banned from use across Monash University. Convective panel heaters or oil column heaters that do not have any exposed elements are an approved alternative for use in buildings or areas that have insufficient heating.

6.5 Power Inverters, Uninterruptible Power Supplies (UPS) and Generators

- UPS systems and generators can expose users to unbeknown electrical hazards due to the various available configurations and the manner in which they are operated. These items require additional risk evaluation and management to ensure their use and operation (including interaction with building infrastructure such as fixed RCDs) is considered and understood.
- Consideration must also be given to systems (laboratory and research apparatus) and plant connected through a Power Inverter, UPS or Generator. Operational hazards and risks associated with maintaining power via the UPS, inverter or generator in the event of infrastructure power failure must be evaluated and risk assessed, and where required, safety protocols developed and implemented deemed.

- Implementation of these devices should be completed in consultation with an electrician or qualified electrical tradespersons. The [Monash Instrumentation Facility](#) provides services related to engineering and technical expertise and can be engaged to assist areas with the evaluation, assessment and implementation of UPS systems, inverters and generators.

7. Responsibility for Implementation

A comprehensive list of OHS responsibilities is provided in the document [OHS Roles, Committees and Responsibilities Procedure](#). A summary of the specific responsibilities relevant to the Electrical Safety Procedure is provided below.

7.1 Head of Academic/Administrative Unit:

- Ensure the requirements of this procedure are educated to staff and implemented throughout their areas of management and control;
- Make arrangements for the provision of all required items noted and in accordance with section 4, General Safety Requirements of this procedure;
- Ensure electrical risk management within their area adheres to the requirements of the [Monash University OHS Procedures](#) and is consistent with the inherent electrical risks resulting from work tasks the area and its staff members, stakeholders, students and contractors are exposed to; and
- Ensure any items of plant (including those purchased from overseas suppliers) that use or require electricity comply with applicable Australia Standards, including AS/NZS 3000:2018 Electrical Installations.

7.2 Safety Officers:

- Respond to any electrical related safety hazards promptly;
- Monitor the implementation of the inspection, testing and tagging of electrical plant items in their area and the general management of electrical risks;
- Take appropriate actions via hazard and incident reporting processes in S.A.R.A.H. to rectify any electrical safety concerns or issues;
- Ensure any incidents of electrical shocks or injury are reported and assist/encourage any persons that have received an electric shock to seek medical aid for assessment of potential effects on the heart; and
- Engage with BPD (Services) for electrical safety items associated with Monash University infrastructure, property or maintenance and Monash OH&S for additional electrical safety and risk management assistance.

7.3 Supervisors:

- Evaluate and appropriately manage the electrical safety risks associated with work or activities under their management and control, and the work of those they are supervising;
- If required, seek further assistance related to electrical risk management associated with their work and the work of those they are supervising from Monash OH&S or other suitable persons with subject matter expertise; and
- Ensure the management of items noted in Section 5, Specific Electrical Devices associated with their work and the work of those they are supervising.

7.4 Buildings and Property Division:

- Ensure electrical workers or contractors completing licensed electrical work hold appropriate licenses and competencies issued by Energy Safe Victoria;

- Obtain safety documentation (SWMS, etc.), review and monitor the work of electrical workers or contractors;
- Manage and control high voltage installations and areas throughout Monash University; and
- Coordinate and monitor the completion of all inspection and testing work as part of electrical installations.

7.5 **Electrical Contractors and Workers:**

- Have appropriate licenses and competencies issued by Energy Safe Victoria for the work they are undertaking on Monash University owned or leased properties;
- If required under legislation or at the request of Monash University, provide or arrange for a COES for electrical installation work completed on Monash University owned or leased properties;
- Provide operating and maintenance manuals as part of work associated with new installations and equipment in accordance with the Monash Design & Construction Standards; and
- Refer to Monash Design & Construction Standards for As-Built drawing requirements.

8. Tools

- [Safe Work Australia \(2012\) – Electrical Risks at the Workplace Fact Sheet](#)

9. Records

For OHS Records document retention please refer to:
[Monash University OHS Records Management Procedure](#)

Status	New
Approval Body	Monash University OHS Committee
Legislation Mandating Compliance	Occupational Health and Safety Act 2004 (Vic) Occupational Health and Safety Regulations 2017 (Vic) Electricity Safety Act 1998 (Vic) Electricity Safety (Installations) Regulations 2009 (VIC)
Related Policies	OHS Policy
Related Documents	<p>Australian and International Standards</p> <p>AS/NZS 3000:2018 Electrical Installations</p> <p>AS/NZS 3017:2007 Electrical installations - Verification guidelines</p> <p>AS/NZS 3760:2010 In-service Safety Inspection and Testing of Electrical Equipment</p> <p>AS/NZS 4763:2011 Safety of portable inverters</p> <p>AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment</p> <p>Monash OHS documents</p> <p>OHS Records Management Procedure</p> <p>Isolation of Plant Procedure</p> <p>OHS Roles, Committees and Responsibilities Procedure</p> <p>OHS Risk Management</p> <p>Other Monash University documents</p> <p>Monash Design & Construction Standards</p>

10. Document History

Version	Date of Issue	Changes made to document
1.0	September 2019	Procedure - Electrical Safety, consolidating the following documents: <ul style="list-style-type: none"> - Electrical Safety: Installation and Removal of Electrical Equipment Procedures (Australia only) - Electrical Safety: Purchase and Use of Portable Electrical Equipment Procedures (Australia only) - Electrical Safety: Inspection, Testing, Tagging and Repair of Electrical Equipment - OHS Information Sheet No. 32: Electrical Safety - OHS Information Sheet No. 33: Inspection, Testing, Tagging & Repair of Electrical Equipment
1.1	January 2020	Minor formatting changes and updates of hyperlinks

11. Appendix 1

Electrical items must be inspected and tested at intervals not exceeding those identified in the below table and before being used after any repair or servicing that could have affected electrical safety.

The frequency of testing relates directly to the environment in which the plant item is used, associated hazards and the degree of abuse to which the equipment is typically exposed. Any variance to test frequency for specific plant items should be based on a documented risk assessment and in consultation with the electrician or licensed tester.

<u>Type of environment and/or equipment</u>	Interval between inspection and tests		
	<u>Equipment including Class I and Class II equipment, cord sets, cord extension sets and EPODs</u>	RCDs	
		<u>Push button test by user</u> (Portable/Fixed)	<u>Operating time and push button test</u> (Portable/Fixed)
1. Factories, workshops, places of manufacturing, assembly, maintenance or fabrication	6 months	Daily, or before every use, whichever is the longer / 6 months	12 / 12 months
2. 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 / 6 months	12 / 12 months
3. 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 / 6 months	2 / 2 years
4. Residential type areas of hotels, residential institutions, motels, boarding houses, halls, hostels, accommodation houses , and the like	2 years	6 / 6 months	2 / 2 years
5. Equipment used for commercial cleaning	6 months	Daily, or before every use, whichever is the longer / N/A	6 months / NA
6. <u>Hire equipment</u> Inspection	Prior to hire	Including push-button test by <u>hirer</u> prior to <u>hire</u>	N/A / N/A
	3 months	N/A	3 / 12 months
Test and tag			
7. Repaired, serviced and second hand equipment	After any repair or service that could affect electrical safety, or on reintroduction to service		

- A hostile environment is one that exposes plant items to events or operating conditions likely to result in damage to the equipment or a reduction in its expected life span. This includes, but is not limited to mechanical damage, exposure to moisture, heat, vibration, corrosive chemicals and dust.
- The actual sub-environment in which the equipment is located determines the interval between inspection and tests - a computer with a supply cord not subject to flexing in normal use, within a non-hostile environment in an office space that is situated in a workshop or laboratory would attract a test/inspection of 5 years.
- Regulatory authorities, other standards, workplace safety requirements and/or manufacturer's instructions may specify other intervals appropriate to particular industries or specific types of equipment.
- Unique experimental equipment or bespoke plant designed or manufactured for research purposes must follow a testing regime and frequency based on a documented risk assessment determined by the work area.

12. Appendix 2

The Safe Work Australia document '[Code of Practice: Managing Electrical Risks in the Workplace](#)' (2016) provides an excellent resource for information related to RCD types, their operation, classes of RCDs and their use for assisting with reducing electrical risks. Generally, RCDs should be used or installed on portable plant items when:

- The operating conditions that the plant item is exposed to is likely to result in damage to the equipment or a reduction in its expected life span, including conditions that involve exposure to moisture, heat, vibration, mechanical damage, corrosive chemicals, etc.;
- The item is frequently moved during its normal use or transported between different locations in circumstances where damage to the equipment or its flexible electricity supply cord is reasonably likely;
- The item forms part of, or is used in connection with an amusement device.

Common examples of plant items requiring RCDs include:

- Hand-held plant items including corded drills, saws, hair dryers and electric knives;
- Items that are moved while in operation, such as jackhammers, electric lawn mowers, vacuum cleaners, floor polishers and extension cords; and
- Items that are moved between jobs or work areas in ways that could result in damage to the item, including electric welders, electric cement mixers, portable bench saws and extension cords.

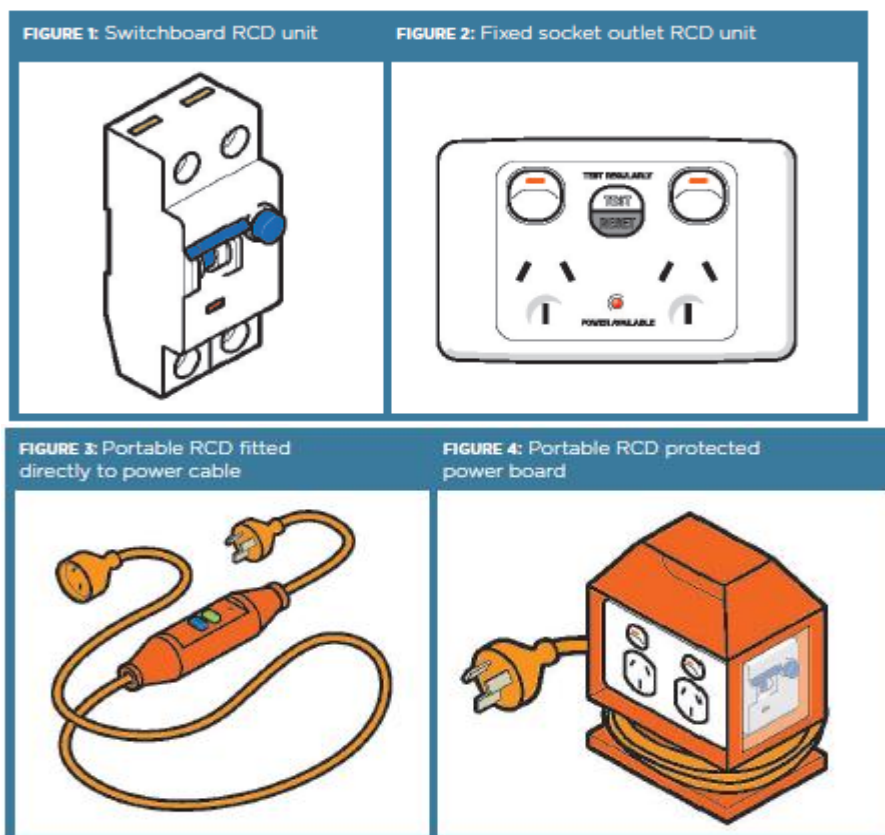


Image 1: Examples of fixed and portable RCDs. For additional information, please see the Safe Work Australia document '[Code of Practice: Managing Electrical Risks in the Workplace](#)' (2016).