

1. SCOPE

This guidance is for the use of 240 volt electrical equipment in hostile environments. In particular it is for electrical equipment that will be connected to a 240 volt power supply by a flexible cord or connecting device.

AS/NZS 3760 *In-service safety inspection and testing of electrical equipment* defines a hostile environment as:

One in which the equipment or appliance is normally subject 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.

As an example hostile environments within the University of Melbourne could include:

- laboratories;
- workshops¹;
- art and performance studios;
- surgical and treatment areas;
- commercial kitchens; and
- outside areas.

2. INTRODUCTION

There are a number of risks associated with using electrical equipment. These risks can include:

- electric shock from direct or indirect contact;
- arcing or explosion; and
- fire.

The outcome of these risks can include:

- burns associated with direct contact;
- burns associated with equipment/infrastructure fire;
- permanent muscular damage and/or death;
- death;
- nausea and vomiting;
- palpitations and heart arrhythmias;
- unconsciousness; and
- inhalation of toxic gases.

¹ For the purposes of this guidance material workshops have been included in hostile environments. Normally they are categorized separately for in-service inspection and testing of electrical equipment (refer to [Health & Safety: Electrical testing and tagging criteria](#)).

An electric shock may also lead to other related injuries. For example striking an object in the immediate environment when falling unconscious.

3. PURCHASING

When purchasing new electrical equipment for the first time ensure that a [Health & Safety: Pre-purchase risk assessment checklist](#) is completed in accordance with the [Health & Safety: Purchasing requirements](#).

It is important that the pre-purchasing process includes ensuring the electrical equipment meets relevant Australian Standards and regulatory authority requirements. A list of commonly used [Australian Standards](#) has been provided as a quick reference and includes a section on electrical.

In addition to the Australian Standards other regulatory requirements must be met. In Victoria the regulator responsible for electricity is Energy Safe Victoria. Energy Safe Victoria has determined that all electrical appliances and equipment supplied to the public must be approved by the Electrical Regulatory Authorities Council (ERAC) prior to sale.

Electrical items approved under this process are given a regulatory compliance mark or unique approval number. These markings can vary from state to state. The following is an example of a compliance mark (circled) on a portable fan heater.



To determine if an appliance is approved for use search the [Australian Certification Database](#) for approved electrical appliances.

4. COMMISSIONING ELECTRICAL EQUIPMENT

When receiving new electrical equipment ensure that it meets the requirements that were identified during pre-purchase. Refer to the [Health & Safety: Purchasing requirements](#) for more information and steps to be taken if the equipment is unsuitable or does not meet requirements.

When putting new portable electrical equipment into service for the first time (referred to as commissioning) place a commissioning tag on the electrical lead. This is usually placed near the plug end of the lead. Thereafter the portable electrical equipment can be included in the local area testing and tagging schedule as outlined in the [Health & Safety: Electrical inspection and testing requirements](#) and the [Health & Safety: Electrical testing and tagging criteria](#).

Local areas can use the template [Health & Safety: Electrical commissioning tags for new portable equipment](#) for the purpose of commissioning portable electrical equipment.

Non-portable electrical equipment that can be connected to a 240 volt power supply by a flexible cord or connecting device can also initially be tagged with the electrical commissioning tag described above. All other non-portable electrical equipment will require initial testing and tagging by a competent person.

In addition to the testing and tagging requirements the following should occur during commissioning:

- complete a risk assessment taking into account the manufacturer's requirements and safety instructions;
- complete a standard operating procedure (SOP) or other suitable safety procedure; and
- ensure that the intended area for use is suitable (discussed in Section 5).



Example of an electrical commissioning tag



Example of an electrical testing tag

Risk assessments are entered and stored into the Enterprise Risk Management System (ERMS). A University username and password is required to access ERMS via the Staff Hub or directly from web site: [Enterprise Risk Management System](#).

Hard copy risk assessment forms are available where access to ERMS is not available. These can later be transposed to ERMS. These forms include:

- [Plant risk assessment form](#)

This form is mainly used for regulated plant, but can be adapted to electrical equipment that is not regulated plant, such as powered hand tools and other hand held instruments. Refer to the [Health & Safety: Regulated plant requirements](#) for more information.

- [Task risk analysis form](#)

This form can be used when assessing specific activities associated with electrical equipment. It can be particularly useful where you have a number of hazard categories, including electrical equipment, involved with the activity.

For more information on developing risk assessments refer to [Health & Safety: Risk assessment methodology](#).

The University of Melbourne [Standard operating procedure](#) form can be used for electrical equipment. Where applicable, it can easily be modified to meet any specific additional requirements associated with the electrical equipment and/or activity.

EMERGENCY PROCEDURES

Ensure that risk assessments take into account the type of injuries and/or incidents that could result from using electrical equipment and that the local emergency procedures take these into account.

5. OPERATION

5.1 General principles

When using electrical equipment some general principles apply:

- run leads so that they will not be damaged or cause a trip hazard
- use power boards if there are not enough outlets (don't piggyback two or more double adapters)
- use power boards with built-in safety switches (double adapters are not allowed for use)
- unless specifically designed for wet areas, only use electrical appliances in dry areas
- touch electrical appliances and power points with dry hands only
- ensure the power outlet is turned off before plugging in electrical equipment
- unless otherwise stated by the manufacturer, ensure the electrical equipment is turned off prior to plugging into a power outlet
- unless otherwise stated by the manufacturer, ensure electrical equipment is turned off before unplugging from the power outlet
- check cords regularly for cracks, kinks, splints, frays or other damage prior to use
- ensure hands and fingers are kept clear of the pins on plugs when being plugged in
- ensure the electrical equipment has a commissioning tag or in-date electrical testing tag
- use the electrical equipment for its intended use only

TRAINING

The operator of electrical equipment should have the appropriate training prior to use or be under the supervision of a competent person. Refer to [*Provide health and safety training*](#) for more information.

In addition where there is a risk assessment and operating procedure they should be familiar with this prior to operation.

5.2 Specific requirements

All electrical equipment will have its own specific safety and operational requirements. It is important that risk assessments and standard operating procedures take these into account. It is equally important that operators of electrical equipment are familiar with these requirements before using the equipment for the first time. One way that operator awareness can be achieved is by familiarising them with the risk assessment and standard operating procedure.

6. STORAGE

When electrical equipment is not in use it should be safely stored or located. This includes:

- ensuring that the storage location is dry and well ventilated;
- avoiding drastic changes in temperature (the temperature range for storage is normally outlined in the manufacturer's instructions);
- protecting the equipment from dust; and
- protecting the equipment from chemicals and other harsh substances.

7. INSPECTION

Experience has shown that greater than 90% of defects are detectable by visual inspection. (AS/NZS 3760)

Therefore inspection is an important part of electrical equipment safety. This includes:

- Pre-operational checks

Undertake a visual inspection of electrical equipment prior to use. This inspection includes checking the condition of the lead and plug, and ensuring that the electrical socket appears in condition. There should also be a visual inspection of the equipment to ensure there are no signs of damage or unusual wear.

Undertake any additional pre-operational checks outlined in the standard operating procedure.

Undertake a visual inspection of the area to ensure there are no immediate hazardous conditions that could result in injury or incident. For example:

- the floor is dry and free of water
- there are no immediate combustibles or other substances (eg solvents) that could result in fire
- the activity is not near an open doorway or access point that could impact on others.

- Scheduled workplace inspections

Regular scheduled workplace inspections include the general checking of electrical equipment and appliances. These inspections should include:

- in-date testing and tagging;
- conditions of leads and plugs;
- positioning of leads;
- appropriate use of accessories such as power boards (not double adapters or piggy backing); and
- faulty equipment tagged out and not in use.

Examples of workplace inspection forms have been developed for both [laboratories](#) and [workshops](#).

For more information refer to the [Health & Safety: Workplace inspection requirements](#).

Scheduled workplace inspections are also added to a [Health & Safety: Cyclic events checklist](#).

8. MAINTENANCE

8.1 Scheduled maintenance

Where the manufacturer requires scheduled ongoing maintenance:

- engage a competent person to undertake the maintenance;
- where using a contractor, ensure there is a service agreement;
- retain the maintenance records;
- record the scheduled maintenance times on a [Health & Safety: Cyclic events checklist](#) or other relevant form, such as a [Plant register](#).

For information on plant registers refer [Health & Safety: Regulated plant requirements](#).

8.2 Ad-hoc maintenance

Ad-hoc maintenance is normally required when electrical equipment becomes faulty and requires repair. Where ad-hoc maintenance is required:

- engage a competent person to undertake the maintenance;
- where using a contractor, ensure there is a service agreement; and
- retain the maintenance records.

9. FAULTY OR UNSAFE EQUIPMENT

When electrical equipment is faulty or is unsafe to use it must be removed from service immediately following the [Health & Safety: Unsafe plant and equipment requirements](#). This can be done by anyone.

In general when someone becomes aware of faulty or unsafe equipment the procedure requires:

- turn off or de-energise plant or equipment, if safe to do so;
- make safe the plant or equipment;
- complete an [Out-of-service tag](#), ensuring that the tag describes the:
 - plant or equipment that is out of service;
 - reason the plant or equipment is out of service;
 - if applicable, conditions under which the plant or equipment can be used safely;
 - name of the person completing the tag; and
 - date;
- place the completed out-of-service tag on the plant or equipment at:
 - the point of isolation from the energy source; or
 - the main control panel; or
 - a prominent position;
- notify the supervisor/manager responsible for the plant or equipment; and
- make arrangements (directly or through the supervisor/manager) for the plant or equipment to be repaired or removed from the work area.



Example of an out-of-service tag