

LA TROBE UNIVERSITY

ELECTRICAL SAFETY PROCEDURES

1. PURPOSE

Electrical accidents can occur when electricity is present in faulty wiring and equipment or when poor work practices are followed. Accidents involving electricity can lead to burns and tissue damage and in some cases, cardiac arrest and death when the body forms part of the electric circuit. Electric shock can be very unsettling to the victim even if there is no apparent injury.

Other possible consequences of electrical accidents are fire and explosion (as sparking can be a source of ignition) and damage to equipment. Many of the accidents can be traced back to faults such as unearthed equipment, frayed or broken insulation or practices such as inappropriate work on live equipment.

The purpose of this document is to raise awareness of the general principles of electrical safety and to ensure that, as far as practical, electrical powered equipment is in safe working order, that is tested on a regular basis to ensure its ongoing safety, and safe working practices are followed for electrical work across the University.

2. DEFINITIONS

Applied Part

An Applied Part is a part of a medical electrical equipment which in normal use:

- (a) Necessarily comes into physical contact with the patient for the equipment to perform its function; or
- (b) Can be brought into contact with the patient; or
- (c) Needs to be touched by the patient

Applied parts are classified into Type CF, Type BF or Type B. Conductors which provide an electrical pathway between the applied part and the patient are known as patient connections.

Class 1 Equipment.

Equipment in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution, in that conductive accessible parts are connected to the protective earthing conductor in the fixed wiring of the installation in such a way that those accessible parts can not become live in the event of a failure of the basic insulation.

Class 11 Equipment

Equipment in which protection against electric shock does not rely on basic insulation only, but in which an extra layer of insulation is provided.

Competent Person

A person who the employer ensures has the necessary practical and theoretical skills, acquired through training, qualification, experience or a combination of these, to correctly undertake the tasks of electrical testing and tagging.

Cord Set

An assembly of a plug intended for connection to a mains outlet socket, a sheather flexible cord and a cord extension socket, or appliance connector.

Fixed Equipment

Equipment which is fastened to a support, secured in position or otherwise, due to its size and mass located in a specific location.

Flexible cable

A flexible cable or cord, for supply purposes, which has one end connected to a plug with pins designed to engage with a socket outlet, and the other end connected to terminals within the equipment.

Hire

A hire situation is created when the hirer provides electrical equipment, to a person or entity external to the organisation, which passes out of the control of the hirer.

Isolation transformer

Provide a supply of electricity which is not earthed and consequently if a person contacts a live connection and earth, current will not flow through the person to earth.

Low voltage equipment

Where appropriate, low voltage or battery powered equipment can provide additional protection. Low voltage equipment will have a special plug, which can only be connected to its power supply. However, some low voltage equipment may have alternative means of supply, for example mains power and batteries.

Medical Electrical Equipment

Medical electrical equipment is any instrument, apparatus or appliance, including software, whether used alone or in combination which is provided with not more than one connection to a particular supply mains and is intended to diagnose, treat or monitor a patient under medical supervision and which makes physical or electrical contact with the patient, or transfers energy to or from the patient, or detects such energy transfer to or from the patient.

New Equipment

When equipment is new, the supplier is deemed responsible for the initial electrical safety of the new equipment. New equipment need not be inspected or tested, but the owner or responsible person shall ensure that it is labelled with the date of purchase.

Portable equipment

Equipment which is moved while in operation, or an appliance which can be easily moved from one place to another while connected to a supply.

Power boards

A device other than a cord set, having a single means of connection to a low voltage supply and one or more outlets facilities. It may incorporate a reeling or coiling arrangement.

Residual Current Device (RCD)

A mechanical switching device designed to make, carry and break currents under normal service conditions and to cause the opening of the contacts when the residual current attains a given value under specific conditions.

Tagging

Once equipment is inspected and tested compliant equipment is fitted with a durable, non-reusable, non-metallic tag. The tag may be colour coded and should include the name of the person, or company performing the tests, the test or inspection date and may include a re-test date.

Testing

Process undertaken to detect the unobservable faults not found by the visual inspection process, and forms an integral part of the inspection/testing process.

3. RESPONSIBILITY

Deans, Heads of Schools, Divisional Managers or Colleges are responsible for ensuring that there is a program to manage the risks associated with electricity.

4. PROCEDURE**4.1 GENERAL ELECTRICAL SAFETY GUIDELINES**

- Do not locate equipment next to water taps or sinks unless it is designed to do so.
- Ensure that power boards and not double adaptors are used for extra power requirements.
- Regularly inspect equipment-leads, casings and plugs for damage and wear and tear.
- Do not locate equipment in potentially explosive atmospheres.
- Do not locate flammable liquids or solids near equipment where a spark may occur.

4.2 MANAGING ELECTRICAL HAZARDS.

Where there is a significant risk of electric shock due to either the nature of the equipment (e.g. electro medical equipment, equipment containing liquids) or work practices (e.g. electronic repair workshops) Residual Current Devices (RCD) s should be installed. Consideration should also be given to installing isolation transformers or the use of low voltage equipment.

4.3 EQUIPMENT TESTING AND TAGGING.

All in-service electrical equipment is required to be routinely inspected tested and tagged by a competent person.

4.3.1 Visual Inspection

In service testing requires a physical inspection of all electrical equipment for:

- Obvious damage or defects in accessories, connectors, plugs of extension outlet sockets; and discolouration that may indicate exposure to heat, chemicals or moisture.
- That flexible cables are anchored to equipment, plugs and cord extensions
- That inner core of flexible supply cords are not exposed or twisted.
- That flexible cords should be in good condition i.e. check for cuts, abrasions or damage to areas
- External components are not damaged (these may form part of the insulation)
- Power and extension cords are anchored and separated from other hazards such as liquids or mechanical action
- Covers, guards, controls, alarms or mechanical safety features are in good working order.
- Ensure that power outlets, power boards and double adaptors are not over-loaded and that the cords are kept away from traffic areas. Double adaptors pose special problems and their use is strongly discouraged.

4.3.2 Testing

For information the following recommended testing schedule of in service electrical equipment, based on Table 4 of the Australian Standard AS/NZS 3760 is included.

Environment	Class 1	Class 11	Powerboards/cords
Workshops	6 mths	12 mths	6 mths
Where flexible cord subject to flexing in normal use.	12 mths	12 mths	12 mths
Where flexible cord subject is NOT subject to flexing use.	5 years	5 years	5 year
Residential areas	2 years	2 years	2 years
Hire equipment	Prior to hire		Prior to hire
Repaired, serviced and second hand	After repair or on re introduction to area		

Registers of tested equipment should be maintained within the department

Where RCDs are installed the testing Schedule is;

Environment	Push-button tests by user		Operating time & push- button test	
	Portable	Fixed	Portable	Fixed
Workshops	Daily or before every use.	6 mth	12 mth	12 mth
Where flexible cord subject to flexing in normal use.	3 mths	6mth	12 mths	12 mths
Where flexible cord subject is NOT subject to flexing use	3 mth	6mth	2 year	2 year
Residential areas	6 mth	6 mth	2 year	2 year
Hire equipment	Prior to hire		n/a	
Repaired, serviced and second hand	After repair or on re introduction to area			

Please note that operating time and push–button tests are undertaken by LTU Building and Grounds Division.

4.4 NON-COMPLIANT EQUIPMENT

Equipment that is faulty or damaged or otherwise does not comply with testing shall be removed from service and tagged with a danger tag i.e. out of service tag, immediately and sent for repair or disposal. If disposed of, it must be clearly labelled and rendered incapable of being connected to mains supply.

4.5. DESIGN / HIRING OF EQUIPMENT

Equipment designed or constructed within the University must be designed and constructed in accordance with relevant standards. It is also recommended that advice be obtained from the University Insurance Office beforehand, as the liability exposure of the University (to the end user) may be sufficiently great as to affect the viability of the project.

Electrical equipment, which is lent for hire or loan, must be visually checked before each hire and regularly tested in accordance with AS 3760.

All work on electrical equipment, including construction or modifications must only be performed by a competent person. There are strict licensing requirements, which apply to equipment connected to a mains supply and all work on portable equipment must only be performed by a licensed electrician or person who can demonstrate the necessary competence to carry out the work.

Internal, non-visual or earthing equipment checks must only be conducted by a competent person and in accordance with the manufacturer's specifications.

4.6 MEDICAL ELECTRICAL EQUIPMENT

General requirements for medical electrical equipment

Because of the electrical connection between persons and medical electrical equipment, greater care is required to ensure the equipment meets appropriate safety standards and that testing and use of the equipment conforms to acceptable practices.

Medical electrical equipment normally refers to equipment used for the diagnosis, treatment or monitoring of patients, however the use of such equipment in non-patient applications in University teaching and research shall conform to the same technical management and certification requirements. The main requirements are that:

- The equipment is designed, constructed and certified according to relevant standards
- The equipment is safe for use during its intended purpose and that the equipment is not used for any purpose other than for which it is designed.
- The setup and use of the equipment does not reduce or impair any safety features
- There is a quality assurance program in place in all areas where such equipment is used which includes testing and certification according to relevant standards
- There is an equipment fault and failure recognition program to ensure non-compliant equipment is withdrawn from use until it is repaired

Acceptance Certification and Testing

The Australian Standards listed below apply to medical electrical equipment. Although these Standards are not mandatory, they are the guiding documents for the management of medical electrical equipment at La Trobe University. Schools or departments purchasing or acquiring medical electrical equipment must ensure the following:

- a) The equipment has been tested and certified to the requirements of AS/NZS3200 before first use. It is recommended this requirement be a condition of purchase and the supplier be required to arrange testing and certification. Testing to AS/NZS3200 can be arranged via a competent

testing company once the equipment is received. If the IEC documentation is available to the tester then a certificate of conformance can be arranged to bridge the gap between the IEC and the AS/NZS standards, otherwise full testing to AS/NZS 3200 will be required. This requirement also applies to equipment designed and constructed within the University.

- b) All applied parts associated with the equipment must be classified and marked with the classification and be appropriate for the equipment and tasks being undertaken. It is recommended that Type B (unprotected) applied parts not be used unless a risk assessment determines the risk to be low.
- c) The equipment must undergo acceptance testing on receipt. Acceptance testing must only be performed by a person competent to perform the testing and guidance on testing is contained in AS/NZS 3551.
- d) Any other equipment connected to the device must be connected in such a way that the safety features of the device are not compromised. For example, applied parts must only be connected to devices tested and certified to AS/NZS 3200 and not to data logging equipment. A higher level of safety may also be achieved by connecting the devices and associated equipment to a power outlet protected by either a residual current device (safety switch) or an isolation transformer.
- e) The equipment must be tested regularly in accordance with AS/NZS 3551. The frequency of testing will depend on the nature of the equipment and information provided by the supplier, although the maximum interval between tests must not exceed 12 months. Testing must only be undertaken by a competent person and there are several commercial firms which offer these services.
- f) A quality assurance program must be in place in all areas in which medical electrical equipment is used. As part of the program, Safe Operating Procedures must be developed for each device (or class of devices for each particular area).

Registration with the Therapeutic Goods Administration Office

The Therapeutic Goods Act defines a medical device as:

“Any instrument, apparatus, appliance, material or other article whether used alone or in combination, and including the software necessary for its proper application) is intended to be used for human beings for the purposes of one or more of the following:

- *Diagnosis, prevention, monitoring, treatment or alleviation of disease,*
- *Diagnosis, monitoring, treatment, alleviation of or compensation for an injury or handicap,*
- *Investigation, replacement or modification of the anatomy or of a physiological process,*
- *Control of conception*

And does not achieve its principal intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means; or an accessory to such an instrument, apparatus, appliance, material or other article”.

Medical electrical devices intended for use under the above definition are subject to the regulatory requirements of the Therapeutic Goods Act. All persons purchasing or acquiring such equipment must ensure the equipment is registered or listed on the Australian register of Therapeutic Goods (ARTG) before it is imported or acquired.

The Therapeutic Goods Act is administered by the Medical Devices Information Unit of the Office of Devices, Blood and Tissues of the Therapeutic Goods Administration (TGA). Further information regarding legal obligations are available on the TGA's website.

4.7 DISCONNECTION AND RESTORATION OF POWER SUPPLY

Access to switch boards at the University is restricted to registered electricians authorised by Buildings and Grounds. No live work should be undertaken on any switchboards without prior approval from the Manager Electrical Systems, Bundoora, or Building and Grounds at the Bendigo Campus.

When there is a need to disconnect power to any area, the authorised person disconnecting the power will endeavour to notify all affected staff at the earliest opportunity, providing at least 24 hours notice of the disruption to supply. The switchboard door must remain locked and tagged until work has been completed in order to prevent the accidental restoration of the power supply while work is in progress.

5 DOCUMENTATION

Nil

6. REFERENCES

AS/NZ 3760 In service safety inspection and testing of electrical equipment.
Electrical Safety Act 1998.
LTU Incident and Hazard Reporting Procedure
AS/NZ 3200- Medical electrical equipment-General requirements for safety.

This procedure replaces the Electrical Safety Procedure issued April 1993. The Executive OHS Committee approved this procedure at its meeting on 6 March 2006