

# Procedure: Electrical safety management

## Purpose

This procedure describes how the Australian National University (ANU) manages electrical safety in the workplace. This procedure ensures legal and other obligations of the *Work Health and Safety Act 2011* (Cth), the *Work Health and Safety Regulations 2011* (Cth) and the University's Work Health & Safety (WHS) Management System are met. This procedure is linked to the Australian National University's Work health and safety policy and is one of the Safe Work Procedures within the WHS Management System.

## Definitions

**Automatic External Defibrillator (AED)** is an automatic device used to provide an electric shock to the heart, with the intent of returning it to a normal rhythm.

**Competent Person** is a person with the necessary practical and theoretical skills (acquired through training, qualification, experience or a combination of these) to correctly perform tasks within the scope of electrical work approved by management. Management must nominate the person against the categories in the Competent Persons section (Table 3).

**Electrical appliance** is an electricity consuming device or apparatus (including the cord) that is connected to, or capable of being connected to the electrical installation. The term includes both electrical and electronic equipment. An electrical appliance is a sub set of electrical equipment.

**Electrical equipment** refers to any apparatus, appliance, cable, conductor, fitting, insulator, material, meter or wire that:

- is used for controlling, generating, supplying, transforming or transmitting electricity at a voltage greater than extra-low voltage; or
- is operated by electricity at a voltage greater than extra-low voltage; or
- is part of an electrical installation located in an area, in which the atmosphere presents a risk to health and safety from fire or explosion; or
- Is not part of a motor vehicle.

**Electrical installation** refers to electrical equipment (or group of items) that:

- are permanently electrically connected together; and
- can be supplied with electricity from an electricity supply authority or from a generating source.

The electrical installation is the electricity supply to a building, and includes the main switchboard; distribution switchboards, sub-switchboards and all associated fixed wiring including final sub-circuits, such as socket-outlets, isolation switches, lights, etc.

**Electrical wiring work** is the actual physical work of installing, altering, repairing, replacing or adding to the electrical installation, including the supervision of such work.

**Electrical work** refers to:

- connecting electricity supply wiring to electrical equipment or disconnecting electricity supply wiring from electrical equipment; or
- installing, removing, adding, testing, replacing, repairing, altering or maintaining electrical equipment or an electrical installation.

**Emergency procedures** are procedures established prior to an incident, containing actions to be taken in the event of an emergency. They are utilised in order to minimise the effects of an incident causing damage to people, property or the environment.

**Extra-low voltage** refers to extra low voltage (not exceeding 50 Volts Alternating Current (VAC) or 120Volt ripple free Direct Current (DC)), as defined in AS/NZS 3000: Australian/New Zealand Wiring Rules.

**Hostile operating environments** refers to environments where:

- the normal use of electrical equipment exposes the equipment to operating conditions that are 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 or dust; or
- electrical equipment is moved between different locations in circumstances where damage to the equipment or to a flexible electricity supply cord is reasonably likely

**Live part** refers to a conductor or conductive part intended to be energised in normal use. Live parts include a neutral conductor and conductive parts connected to a neutral conductor. See AS/NZS 3000: Australian/New Zealand Wiring Rules for items not considered live parts under the multiple earthed neutral

(MEN) earthing system.

**Local Area** – refers to a College, Research School or Service Division of the University.

**Low voltage** refers to an operating voltage that exceeds extra-low voltage (ELV), but not exceeding 1000V AC or 1500V DC as defined in AS/NZS 3000 Australian/New Zealand Wiring Rules.

**Residual Current Device (RCD)** is a safety switch that reduces the risk of electrocution. An RCD must have a tripping current that does not exceed 30 milliamps if electricity is supplied to the equipment through a socket outlet not exceeding 20 amps.

**Safety Observer** is a Category 1 or 2 Competent Person assigned and specifically trained on responsibilities to observe and provide warning against the unsafe approach to exposed electrical equipment, including energised (live) conductors and other potential risks.

**Safe Work Method Statement (SWMS)** refers to a hazard assessment conducted by a workgroup to:

- identify the electrical work; and
- specify hazards associated with that electrical work and risks associated with those hazards; and
- describe the measures to be implemented to control the risks; and
- describe how the risk control measures are to be implemented, monitored and reviewed.

**Worker** is defined as anyone who carries out work for the University. A worker includes staff, volunteers, contractor, students and visitors at the University.

**Workplace** is a place where work is carried out for a business or undertaking and includes any place a worker goes, or is likely to be, while at work.

## Procedure

### Scope

1. This procedure applies to the following electrical safety management requirements:

- All electrical work on the University's electrical installations. This work should also meet requirements within the [Campus Buildings Requirements Manual](#); and shall only be undertaken by a competent person assigned the appropriate category (refer Table 2).

- Electrical work undertaken at all University campuses shall comply with all relevant Commonwealth, State and Territory legislation, Codes of Practice, Australian Standards, guidance material and best practices.
- Inspection, testing and tagging of equipment.
- Work on 'live' electrical installations, equipment and appliances is to be avoided whenever practical;

2. General safety information is provided in the [ANU Brochure 'Electrical Safety – Be Safe with Electricity'](#).

## Exclusions

3. Within the University site boundaries there are commercially leased areas where private entities own and/or maintain their own electrical appliances. These entities are exempt from this procedure, however compliance with the WHS Act and Regulations 2011 (Cth) is required.

4. The following are excluded from the University's requirements under this procedure:

- all privately owned electrical appliances in short-term serviced accommodation facilities such as Judith Wright Court or University House;
- all privately owned electrical appliances in long-term accommodation, and self-contained and domestic houses or units. However, all University supplied electrical appliances in University owned residential facilities are to be inspected, tested and tagged. It is a requirement that all electrical appliances in long-term accommodation be visually inspected. It is strongly recommended that high-risk appliances (for example, heaters and cooking appliances) be tested and tagged;
- concessional areas of the University such as banks, restaurants etc., and
- electrical appliances of a temporary nature electrically assessed as part of a hire agreement.

## Responsibilities

*Dean, Director or nominated representative*

5. The College Dean, Research School or Service Division Director (or nominated representative) is responsible for:

- all non-installation electrical equipment (such as appliances, cord sets, power boards, etc.) in their building space or issued to their workers;

- ensuring a hazard management approach towards electrical safety;
- providing supervisors and management resources to manage electrical safety within their areas; and
- participating in workplace inspections.

#### *Local area responsible person*

6. The local area responsible person is responsible for:

- appointing a competent electrical contract supervisor and/or project officer to supervise and manage electrical contractors;
- nominating and authorising competent people under the categories in this procedure;
- requesting ongoing access to a sub-main board only after consultation with relevant parties (Facilities and Services (F&S), other Category competent person), conducting a hazard assessment and documenting the access protocol. The access protocol must be included inside the unlocked sub-main board;
- ensuring compliance with the University's [Campus Buildings Requirements Manual](#);
- ensuring that electrical safe work procedures are developed in consultation with workers and implemented;
- ensuring documented hazard assessments of equipment, operations, activities and locations are undertaken and that identified risks are controlled;
- managing the issue, maintenance, repairs and modifications, testing, tagging and registering of electrical appliances;
- ensuring records of electrical appliances (an electrical appliance register with test results) are maintained and accessible to workers. A register of locally designed, manufactured and certified electrical equipment must also be kept;
- ensuring clear access to and around local electrical distribution boards;
- maintaining knowledge of the location for access to an Automatic External Defibrillator (AED) when energised work is conducted;
- participating in workplace inspections, and
- immediately report all injuries, exposures, hazards or dangerous occurrences to their supervisor in accordance with the [WHS Incident](#)

[management procedure.](#)

*Staff who engage or manage electrical contractors*

7. The Contractor liaison officer shall:

- use F&S accredited electrical contractors to work on the building's electrical installation. Where this is not possible, they shall ensure the proper induction is completed and documented;
- ensure that prior to contractors commencing work, an induction process is completed formalising the University's expectations, standards, site rules and service agreements. The F&S division contractor Induction is mandatory;
- ensure that hazard management processes are followed and documented;
- record the electrical contractor(s) qualifications, licence details, training (if relevant), and/or certificate(s) of competence required for the service;
- monitor electrical contractors and services provided according to the contractual agreement;
- ensure completion of prescribed statutory and organisational documentation associated with the electrical service(s) provided. E.g. where applicable a Certificate of Electrical Safety is provided/receipted;
- ensure any sub-contracting of electrical work is documented and authorised;
- allow access to an Automatic External Defibrillator (AED) when energised work is conducted; and
- immediately report all injuries, exposures, hazards or dangerous occurrences to their supervisor in accordance with the [WHS Incident management procedure.](#)

*Research group leaders and supervisors*

8. Research group leaders and supervisors are responsible for:

- ensuring workers undertake any compulsory and recommended electrical safety training;
- ensuring documented hazard assessments of equipment, operations, activities and locations are undertaken and that identified and residual risks are controlled;
- ensuring that electrical safe work procedures are developed in consultation with workers and implemented; participating in workplace inspections; and

- immediately report all injuries, exposures, hazards or dangerous occurrences in accordance with the [WHS Incident management procedure](#).

### *Workers*

#### 9. Workers must:

- read and comply with electrical safety information and any instructions provided;
- complete all required electrical safety training;
- only use electrical appliances that have passed a visual inspection. Those items with an 'out of date or failed' test tag, danger tag or similar must not be used;
- check that electrical appliances have a current test tag attached before use;
- upon identification of equipment that is overdue for inspection, testing and tagging they must conduct a visual inspection, verify whether the appliance requires testing and report the piece of equipment to their supervisor, competent persons or management;
- ensure the equipment is set up correctly and used according to safe operating instructions or recommended practices;
- never repair, modify, or interfere with electrical equipment unless qualified to do so;
- never interfere with by-pass isolation devices, marker tags or labels on electrical equipment;
- be aware of the basic electrical safety features of their equipment;
- correctly use safety devices and maintain personal protective equipment;
- only use appropriate Electrical Portable Outlet Device (EPOD, i.e. power boards). EPODs must have overload protection and an Australian approval marking. "Low-cost" and, by implication, low quality EPODs should be avoided especially for high usage items;
- not use double adaptors and 'Piggy back' plugs;
- ensure that where travel adaptors are used they contain an Australian approval marking and have been tested and tagged; and
- immediately report all injuries, exposures, hazards or dangerous occurrences to their supervisor in accordance with the [WHS Incident management procedure](#).

### *Electrically competent persons*

10. An electrically competent person is required to:
- only undertake electrical work within the scope defined by their competent person category and approved by management;
  - not undertake electrical work outside their area of expertise without guidance from a suitably competent person;
  - maintain their professional qualifications and competency, including undertaking relevant University WHS courses;
  - maintain knowledge of current safe working procedures in relevant Australian Standards such as AS/NZS 4836 Safe working on low voltage electrical installations and AS/NZS 3760 In-service inspection and testing of electrical equipment. Category 1 competent people shall be familiar with AS/NZS 4836 Safe working on low voltage electrical installations;
  - address issues under this procedure for electrical appliances, including the issue, maintenance, repairs and modifications, testing, tagging and registering of such appliance, the safety of such appliance, and its compliance with the rules and codes of relevant regulatory bodies and Australian Standards;
  - observe safe electrical work procedures;
  - eliminate or minimise risks when working with or on electrical equipment or the electrical installation;
  - be familiar with the location of available Automatic External Defibrillators (AED);

### *Safety observers*

11. A safety observer must:
- have knowledge of the task being undertaken;
  - be competent in isolation techniques;
  - continuously observe the task (and not be distracted by other duties);
  - provide emergency assistance and perform a rescue, if needed;
  - be current and competent in rescue and Cardio Pulmonary Resuscitation (CPR) through nationally recognised training; and
  - be familiar with the location nearest Automatic External Defibrillator (AED) and its operation.



### *Contractors and sub contractors*

12. A contractor shall:

- participate in relevant university induction or training;
- be aware of the University's and local requirements, including the University's Campus Buildings Requirements Manual (when relevant);
- communicate (in the agreed manner) any WHS issues that may arise;
- immediately report to supervision every injury, exposure, hazard or dangerous incident that occurs while undertaking an activity at the University; and
- take note of WHS updates from their trade association.

### *Facilities and services*

13. The Director Facilities and Services, or their nominee, is responsible for the electrical installation in all buildings, including the provision, maintenance, repair, alterations and additions to the electrical installation, the safety of such installation, and its compliance with the rules and codes of the relevant Electrical Regulating Authority and relevant Australian Standards and codes of practice.

14. The Director, F&S or nominee shall:

- nominate competent people in accordance with the competent person categories, ensuring that their competencies meet the requirements of the task undertaken;
- monitor electrical contractors and services provided;
- ensure electrical service tasks are supervised, inspected and monitored in accordance with contractual agreements;
- ensure compliance with the University's Campus Buildings Requirements Manual;
- ensure completion of prescribed statutory and organisational documentation associated with the electrical service(s) provided, e.g. where applicable, provide a Certificate of Electrical Safety;
- ensure any sub contracting of electrical work is documented and authorised;
- ensure all Facilities and Services competent people are registered on the HRMS database;
- ensure that competent people they authorise are appropriately inducted, have the necessary competencies and experience for the nominated tasks,

- have appropriate safe systems of work; and
- take note of WHS updates provided by trade associations.

## **Unsafe electrical equipment**

15. Unsafe electrical equipment in the workplace must not be used. An unsafe appliance must be isolated from the electricity supply and not reconnected until it is repaired or tested and found to be safe, otherwise it should be permanently removed from use.

## **Electrical installation and infrastructure**

16. Only electricians with an unrestricted licence (Category 1) shall undertake work on electrical installations.

17. Main switchboards shall be locked, and access restricted to Category 1A\1B persons and unrestricted licensed electricians authorised by F&S.

18. Sub-mains boards shall be locked with similar restricted access to main boards. However, a Facilities/Operations manager may request (and be granted) ongoing access to a sub-main board only after consultation with relevant parties (Facilities and Services, other Category competent person), conducting a hazard assessment and documenting the access protocol. The access protocol must be included inside the unlocked sub-main board.

19. Any significant work on the electrical installation requires the completion of a Certificate of Electrical Safety. A Certificate of Electrical Safety (CES) is:

- required under Section 6(b) of the Australian Capital Territory Electrical Safety Act 1971, and other State regulations;
- to be completed by the electrician (Category 1A or 1B);
- to be completed when the electrical installation has been added to or modified, and within 14 days of the work being completed;
- available from the local Electrical Regulating Authority or the Asset Manager, Engineering Services, Facilities and Services, ext. 55943. Note. Completed forms are to be forwarded to the Electrical Regulating Authority, with a copy to the Asset Manager, Engineering Services, Facilities and Services; and
- not required where an electrical installation is repaired with no additions or increase in load. However evidence that the installation has been tested as per the requirements of AS/NZS 3017:2007 Electrical Installations – Verification guidelines shall be recorded and provided to the facility manager or contractor liaison officer.

20. A safe distance must be maintained from overhead and underground electrical lines. When access close to these services is required a hazard assessment must be conducted and suitable control measures put in place to protect people and minimise the risk of electrocution. Refer F&S form: [Application for clearance to excavate on property of the ANU](#).

### **Residual current devices (RCD)**

21. Residual Current Devices (RCD) are required to protect socket outlets in hostile operating environments. This includes university laboratories and workshops. An RCD is not required if:

- the supply of electricity to the electrical equipment does not exceed 50 volts alternating current (ac);
- is direct current (dc);
- is provided through an isolating transformer that provides at least an equivalent level of protection or; and
- is provided from a non-earthed socket outlet supplied by an isolated winding portable generator that provides at least an equivalent level of protection.

22. RCDs must be tested by a competent person in accordance with AS/NZS 3760 to ensure that the devices are operating effectively. A record of all testing of an RCD (other than any daily testing e.g. on a cord set) must be kept until the device is next tested or the device is permanently removed from use.

23. Laboratories with a specific requirement for non-RCD protected socket outlets should discuss their requirement with F&S, who will provide appropriate “Non RCD Protected” labels at each socket outlet. In general, all socket outlets in laboratories shall be RCD protected.

24. An RCD trip indicates a fault. The relevant Local Area must contact F&S to provide an electrician to investigate the reason for the fault.

### **Emergency stop switches**

25. Emergency stop switches that isolate the electrical supply should be installed in laboratories and workshops where practical. The emergency switches must be easily accessible and clearly labelled. Emergency stop switches shall be tested on commission and thereafter at intervals determined by Area management in consultation with F&S.

## Special electrical installations or equipment – High Voltage

26. Electrical installations or parts of installations requiring special provisions because of high voltage or the potential presence of an explosive atmosphere shall have:

- the details of the special provisions of the installation recorded by F&S; and
- the installation and the extent of the special provisions clearly labelled at the site.

27. There are some areas within the University with systems that require the operation of high voltage switching equipment. Only authorised competent person(s) (category 6B) shall work on or near high voltage equipment.

28. When working on high voltage electrical systems, there is a risk of electrical arcing even if no contact is made with the exposed, energised part. As a result, the Regulations proclaim exclusion zones. The exclusion zones may not be entered by anyone working in the vicinity.

29. If no longer required, the whole of the special electrical installation shall be converted to normal standards, the labelling removed and the change noted in the records.

## Electrical work

30. All work on electrical equipment shall only be undertaken by competent persons from Categories 1A\B, 2, 3, 5A\B.

31. Any electrical equipment failing design principles, as judged by a competent person, shall be subjected to the University's Design Certification process.

32. All in-house designed, manufactured and/or modified electrical equipment that uses or generates voltages exceeding extra low voltage (>50 Vac or >120 VDC) shall be subjected to, and approved under, the University's Design Certification process for electrical equipment before being placed into service.

33. Work on electrical equipment shall be done in compliance with relevant Australian Standards. Attention is also drawn to the University's 'General safety guidelines in the design and construction of electrical equipment.

34. Work on electrical equipment should be carried out with the power disconnected and/or the system de-energised. Where work is required on energised equipment the 'working live requirements' must be followed. The assessed risk will dictate the work procedures to be followed to minimise the risk from the hazard. Work will not be undertaken where the risk cannot be adequately controlled. Refer to the [Electrical installation hazard assessment form](#).

35. As a rule:

- electrical work on energised electrical equipment is only permitted with specific safeguards detailed in the sections below;
- before electrical work commences, the equipment must be tested by a competent person to ensure it is not energised;
- each exposed part is treated as energised until it is isolated or determined not to be energised; and
- each high-voltage exposed part must be earthed after being de-energised.

### Isolation practices

36. Isolation refers to the separation of hazardous plant and equipment from people, either by distance or by physical barrier. Isolation measures include safety lockout padlocks, lockout jaws/lockout hasp (for up to 6 padlocks) non-conductive circuit breaker lockouts etc.

37. Isolation and tagging practices communicate the risks involved with the electrical equipment or the installation. Refer to the University's [isolation and danger tagging procedure](#) for further information on isolation and danger tagging processes.

### Working live requirements

#### *Installation*

38. Electrical work on energised electrical installation must only be conducted by a competent person (category 1) who has the appropriate tools, testing equipment and personal protective equipment according to the developed and approved safe work method statement.

39. A safety observer is also required. The role of the safety observer must be discussed.

40. Electrical work on a energised installation must also adhere to the 'equipment' section below (point 42–45) and be accompanied by a signed authorisation from the Director, Facilities and Services or (nominee) on the Working on the Electrical Installation documentation. Refer to the [Electrical installation hazard assessment form](#).

41. All tools, testing equipment and other implements used shall be of an approved type in good order and visually inspected prior to use, where necessary tested and regularly maintained. Test equipment for working on energised electrical installations (live) shall meet the requirements of HB 187 and the voltage

categories of AS/NZS 61010.

### *Equipment*

42. Working on energised electrical equipment is only permitted when:
- it is in the interests of health and safety that the electrical work is carried out on the equipment while the equipment is energised. For example, it may be necessary that life-saving equipment remain energised and operating while electrical work is carried out;
  - troubleshooting by a (category 1, 2, 5) competent person;
  - it is necessary that the electrical equipment to be worked on is energised in order for the work to be carried out properly; or
  - it is necessary for the purposes of testing.
43. Electrical work on energised electrical equipment must only be conducted by a competent person (category 1, 2, 5) who has the appropriate tools, testing equipment and personal protective equipment according to the developed and approved safe work method statement. A Safety Observer is also required.
44. Before commencing electrical work on energised electrical equipment:
- all means of de-energising the installation or equipment must be considered and deemed inappropriate;
  - a hazard assessment must be conducted in relation to the proposed electrical work;
- See: [Electrical installation hazard assessment form.](#)
- where the risk of working on the energised (live) electrical equipment is assessed to be of high to extreme risk and cannot be effectively controlled, the work shall not be undertaken. If there is no reasonable alternative means of carrying out the work, sign off on the hazard assessment by the respective Dean or Director and the Supervisor and the Associate Director Work Environment Group (WEG) is required;
  - the area where the electrical work is to be carried out is clear of obstructions so as to allow for easy access and exit;
  - the point at which the electrical appliance can be disconnected or isolated from its electricity supply is; clearly labelled and marked, clear of access and egress obstructions, capable of being operated quickly and has been discussed with the safety observer.
45. Prior to work consultation with management or the person in control of the

workplace must occur and authorisation obtained. During that consultation, the following must be discussed:

- how the work is to be carried out, including the insulating practice that shall be used (footwear, clothing covering legs and arms, tools, test probes, insulating mat for conducting surfaces and floor, insulated gloves, eye protection etc.), RCDs on power tools, and minimising contact with metal parts and techniques that minimise the risk of current path through the chest;
- the safe work method statement for the work;
- prominent and appropriate warning signs and barriers used to segregate the work area;
- the location of readily accessible AEDs and their operation. A list of AEDs can be found in [List of all AEDs](#) and [the Acton campus locations](#); and
- how, when and what condition the electrical equipment will be returned to service and likely changes.

## Electrical appliances

46. Electrical appliances shall connect to the electrical installation through an approved socket outlet or through an isolation switch.

47. Power boards (Electric Portable Outlet Devices, EPODs) where used, shall incorporate a current limiting device (circuit breaker) and, where practical, be mounted with the outlets in the vertical plane and protected from mechanical, electrical or water damage.

48. Extension cords should only be used as a temporary solution and are not to be installed as fixed wiring.

49. Double adaptors and similar are NOT to be used in the University, as they have no overload protection.

50. Uninterruptable power supply (UPS) installation shall only occur after careful consideration of the benefits and risks associated with their usage. In most cases, any Residual Current Device (RCD) electric shock protection is rendered non-functional at the output of an UPS due to its uninterruptable nature. Additional RCD protection may be required on the output for RCD protection to be maintained. Different types of UPS Earth and Neutral arrangements can also affect RCD protection effectiveness. Any UPS used should be appropriately rated and shall be installed, inspected, tested, maintained and monitored according to manufacturer instructions. Ensure that, where applicable, UPSs are tested, inspected and tagged as required by this procedure.

51. Emergency stop switches on equipment shall be prominent, clearly and durably marked and immediately accessible to each operator. The stop control cannot be adversely affected by electrical or electronic circuit malfunction. Where the emergency stop is also to remove power to equipment, it must prevent a UPS re-energising the appliance. The stop control function must be of the stop and lock-off type so that the equipment cannot be restarted simply by resetting the emergency switch. The push button must be red.

### **Inspection, testing and tagging of appliances**

52. Electrical appliances shall be confirmed as safe before being plugged into an electrical socket outlet, by a competent person. To achieve this, the electrical appliances shall undergo the appropriate inspection, testing and tagging in accordance with AS/NZS 3760.

#### *Inspection*

53. (Visual) Inspection – Before each use an appliance should be inspected by the user for any abnormalities and to ensure that, if required, the appliance has a current test tag. If any unusual sign(s) exists do not connect the appliance – send for repair or testing by a competent person.

54. Where it is not practicable for the user to conduct a visual inspection before subsequent uses, then the user, supervisor and/or a competent person should determine an appropriate inspection frequency or schedule.

55. International appliances must be inspected to ensure the voltage, fuses, cables and plugs with ‘insulated pins’ meet Australian requirements. Appliances that do not meet Australian or University requirements must undergo the University Electrical Design Certification process.

56. A thorough visual inspection is also conducted by a competent person before testing.

#### *Testing*

57. In-service testing – an electrical safety test shall be conducted by a competent person:

- for appliances to be used in a hostile operating environment – before connecting the appliance to an electrical socket outlet;
- for other environments – as soon as practical;
- regularly according to – the hazard management approach given in AS\NZS 3760, or the interval determined by the competent person, or the level of



risk given in this procedure (see Appliance Risk Levels below), or the appliance's manufacturer;

- following any repair or modifications; and
- for all second-hand electrical appliances before entering it into service.

58. The following appliances do not require in-service testing:

- all electrical equipment excluded by the scope of AS/NZS 3760 In-service inspection of electrical equipment including: equipment or appliances which would need to be dismantled to perform the inspection and tests specified in the Standard equipment (such as suspended light fittings) which is at a height of 2.5 m or greater above the ground, floor or platform fixed light fittings (luminaires), electric doors, toilet fans and similar equipment considered part of the building infrastructure. These items may undergo installation tests.

59. An electrical appliance should not be used if it is required to be tested and it has not been tested according to this procedure.

60. All testing will be performed only with appropriately calibrated (according to manufacturer's specifications) test equipment. Instrumentation used for in-service testing shall comply with the requirements given in AS\NZS 3760 In-service inspection of electrical equipment. The accuracy of such instrumentation shall be routinely checked, initially and on an annual basis. Refer to [WHS monitoring and testing procedure](#) for further information on the calibration of testing equipment.

#### *Tagging (and registration)*

61. Electrical appliances tested shall be tagged and recorded within an electrical item register. The tag should include the:

- University logo;
- appliance ID number (both visual and machine readable);
- generic appliance description (e.g. power board, desk lamp, drill, instrument, etc.);
- outcome of the testing;
- last risk classification (by colour coding and retest frequency);
- last test date;
- competent person who carried out the test (name);
- next test date; and

- provision for dated inspection marks (eg similar to fire extinguisher tags).
62. Inspection or testing tags should be coloured to identify the assessed level of risk (For example, Red = high risk; Yellow = medium risk; Green = low risk; Blue = negligible risk).
63. The test information or tag must be kept until the next test or until the appliance is permanently removed from the workplace or disposed of.
64. Electrical equipment/appliance test information must be accessible to all staff, especially competent persons for use in hazard assessments.

### Appliance risk levels

65. To determine the appliance risk level, a Competent person(s) will undertake a hazard assessment that includes relevant factors such as:

- operating and storage environment e.g. fieldwork, laboratory, office, cold room;
- usage (particularly the movement of the equipment and flexing of the supply cord);
- appliance and characteristics (function, make and model);
- experiences with the appliance or equipment;
- age of the appliance or equipment;
- electrical safety knowledge of typical users; and
- previous inspection and testing results.

66. Four risk levels are used within the University as described in Table 1 below:

Table 1

| Appliance Risk Level | Common tag colour | Inspection and testing frequency and examples   |
|----------------------|-------------------|---|
| Negligible risk      | Blue              | Appliances visually inspected annually and undergo inspection testing and tagging at 5 yearly intervals. Examples might be refrigerators, air conditioners, rack mounted equipment, equipment fixed in place, equipment rarely moved (and the cord is protected from damage). |

|             |        |  |
|-------------|--------|--|
| Low risk    | Green  | Appliances visually inspected annually and undergo inspection, testing and tagging at 5 yearly intervals. Examples in non-hostile environments might include: office equipment, computers, fans, desk lamps, equipment where the cord is not subjected to movement or hazards.                       |
| Medium Risk | Yellow | Appliances visually inspected bi-monthly and undergo inspection, testing and tagging annually. Examples include: workshop tools, laboratory equipment, equipment on trolleys   |
| High risk   | Red    | Appliances that are visually inspected monthly and undergo inspection, testing and tagging 6 monthly. Examples include: equipment in hostile or wet environments, high use (frequently moved) equipment, equipment where the cord is subjected to frequent movement or hazards, fieldwork equipment. |

### Privately owned electrical appliances

67. The use of privately owned electrical appliances in Local Areas (except Halls of Residence and University House) is discouraged.

68. All non-University-owned electrical appliances must be inspected, tested and tagged according to AS\NZS 3760 In-service safety inspection and testing of electrical equipment before being used in University workplaces. The cost of testing and tagging by a competent person or external company is to be covered by the appliance owner.

69. University owned electrical appliances must be inspected, tested and tagged according to AS\NZS 3760 In-service safety inspection and testing of electrical equipment or this procedure before being used in a residence as part of 'Home based work'. The University electrical appliance should be returned to the University for re-testing when due.

## **Privately-owned electrical appliances used within the University library and lecture theatres**

70. The University has provided power outlets, protected by residual current devices, for the use of visitors. Privately-owned electrical appliances (for example, laptop computer or phone charges) may be used at these outlets provided that it complies with the appropriate Australian or international electrical manufacturing standard. The equipment must be inspected and maintained by the owner and be in a safe condition.

## **Electrical design certification**

71. Design certification is a process to confirm that equipment complies with relevant Australian safety standards. All new appliances or equipment designed or modified in the University is required to undergo the design certification process using the [electrical certification form](#).

72. Equipment designers are required to have their new designs examined by a Category 7 competent person who has successfully completed the University training course 'Australian design standards for safety in electrical work and equipment' before construction begins.

73. The following electrical appliances or equipment are required to be certified:

- all in-house newly designed and/or built electrical appliances or equipment that meets one or more of the following conditions: consumes power above extra low voltage (i.e. > 50 VAC or > 120 VDC), generates voltages above extra low voltage while delivering currents above 1 mA, generates high voltages (> 1000 VAC or > 1500 VDC);
- all repaired or modified electrical equipment, meeting one or more of the above conditions, where the work undertaken may have affected the safety of that equipment;
- all previously in-house designed equipment, meeting one or more of the above conditions, undergoing repairs or modifications;
- all electrical equipment entering the University with questionable design or manufacturing issues; and
- items forwarded by any electrical competent person for consideration;

74. Useful guidance in judging compliance with relevant Australian Standards for equipment designed in a research and teaching environment is available in the University training course "Australian design standards for safety in electrical work and equipment". Australian Standards are accessible to University staff and

students through the University's library database network.

75. Particular attention should be paid to the requirements of AS 3100 Approval and test specification – General requirements for electrical equipment. Other standards specific to the prescribed item need also be considered. For example, much of in-house designed research equipment would require consideration of AS 61010.1 Safety requirements for electrical equipment for measurement, control and laboratory use.

### **Tagging certified equipment**

76. Item certification shall be recorded and maintained in a register along with any certification documents.

77. All certified equipment will have a durable label fitted with the following information:

- University certificate number (with the format budget code # – CZZZZZ);
- description (e.g. power supply, heater controller, instrument, etc.);
- model or project number, (identity linked to the item's documentation);
- and optionally (if space permits) –
- Local Area;
- date certified;
- competent person (name and ID number of person certifying the equipment); and
- the budget code of the department where the equipment was manufactured or the records are kept.

78. Local areas are required to maintain a register that includes certification documents for appliances managed by the local area. The following information is to be recorded:

- University certificate number;
- description (eg power supply, heater controller, instrument, etc.);
- model, (identity linked to the items documentation);
- local area;
- department (owner);
- location of equipment;
- designer\Modifier (name and Department);

- description of work undertaken (brief description of the design or of the modifications in relation to the electrical safety);
- date certified; and
- competent person (name and ID number of person certifying the equipment).

## Electrical safety awareness and communication

79. Electrical safety is communicated via awareness information, induction and specialised training courses. Hazard alerts containing electrical safety information may also be distributed periodically.

### *Training*

80. Completion of training courses is a pre-requisite for many categories of competent person. Training is available within the University for:

Table 2 Electrical safety training

| Applicability  | Course   | Frequency  |
|--|--|--|
| Everyone   | Local induction  | On commencement at the University to cover general electrical safety awareness |
| All electrically competent persons                             | Cardio Pulmonary Resuscitation (CPR)   | Annual refresher (or as part of 'Perform rescue from a live LV panel and CPR') |
| Electrically competent persons, especially categories 1, 2, 4A | Electrical safety including in-service appliance testing (Includes CPR)              | Every 2 years  |
| Electrically competent persons, especially categories 7, 3     | Electrical – Australian design standards for safety in electrical work and equipment | Every 4 years  |

|  |  |                  |
|--|--|------------------|
| Safety Observers, electrically competent persons, especially categories 1, 2, 3, 5 | Isolation and resuscitation techniques (Perform rescue from a live LV panel and CPR) | Annual refresher |
| Contractors  | Facilities and Services Contractor Induction   | Every 4 years    |

81. First aid training is strongly encouraged for all electrical trades.

### Competent persons

82. Categories of Competent person and their approved scope of electrical work:

Table 3 Competent persons

| Competent person category | Description  | HRMS code | Assessment criteria  |
|---------------------------|--|-----------|--|
| 1A                        | Unrestricted licensed electrician formally inducted through Facilities and Services to work on the electrical installation, including assessing electrical equipment risk. | ELEC      | Assess by all of the below:<br>Copy of their ACT electrician's licence (and confirmed with the local regulator, Construction Occupations Registrar, Australian Capital Territory Planning and Land Authority (ACTPLA) as valid)<br>Completion of the Facilities and Services contractor induction<br>Completion of the University's Electrical Safety course, including in-service appliance testing (note: guidance is given in |

|    |   |      |   |
|----|---|------|---|
|    |   |      | <p>University's Electrical Safety training notes as per AS/NZS 3760: Clause 1.4.5 on what a competent person is expected to know for testing)</p> <p>Current resuscitation certificate by a recognised provider.</p>  |
| 1B | <p>Unrestricted licensed electrical contractor (usually the period contractor) formally inducted and contracted through Facilities and Services to work on the electrical installation.</p>   | ELCL | <p>Assess by all of the below:</p> <p>Copy of their ACT electrician's licence (and confirmed with the local regulator, Construction Occupations Registrar, Australian Capital Territory Planning and Land Authority (ACTPLA) as valid)</p> <p>Completion of the Facilities and Services contractor induction</p> <p>Current resuscitation certificate by a recognised provider.</p> |
| 2  | <p>Qualified electronics person approved by the Director (or nominee) to work on electrical equipment, to assess electrical equipment risk and to undertake routine inspection, testing, tagging and registering of electrical equipment.</p> | ELSC | <p>Assess by all of the below:</p> <p>A recognised diploma or degree in electrical\electronic engineering with more than 4 years' experience as an electrical\electronics technician\engineer or extensive experience (&gt; 6 years) as an electronics technician,</p>  |



|   |  |      |   |
|---|--|------|---|
|   |  |      | <p>Completion of the University's Electrical Safety course, including in-service appliance testing (note: guidance is given in University's Electrical Safety training notes as per AS\NZNZS 3760: Clause 1.4.5 on what a competent person is expected to know for testing)</p> <p>Current resuscitation certificate by a recognised provider</p> <p>Completion of the University course on 'Australian design standards for safety in electrical equipment'.</p> |
| 3 | <p>Trained person, approved by the Director (or nominee) to work on electrical equipment who routinely designs, modifies or repairs electrical equipment (under technical supervision of a category 1A or 2 competent person).</p> | SETP | <p>Assess by all of the below:</p> <p>Current resuscitation certificate by a recognised provider</p> <p>Completion of the University's Electrical Safety, including in-service appliance testing and evidence of extensive experience testing typical electrical equipment used in the University (Note guidance is given in AS\NZNZS 3760 Clause 1.4.5 on what a competent person is expected to know for testing)</p> <p>Completion of the</p>                  |

|    |   |      |   |
|----|---|------|---|
|    |   |      | University's course on "Australian design standards for safety in electrical work and equipment".   |
| 4A | Trained person approved by the Director (or nominee) to assess electrical equipment risk and to undertake routine inspection, testing, tagging and registering of electrical equipment.   | EAST | Assess by all of the below:<br>Completion of the University's Electrical Safety course, including in-service appliance testing and evidence of extensive experience testing typical electrical equipment used in the University (note: guidance is given in AS\NZS 3760 Clause 1.4.5 on what a competent person is expected to know for testing)<br>Current resuscitation certificate by a recognised provider<br>Completion of the Facilities and Services contractor induction. |
| 4B | Testing contractor (usually the period contractor) or one approved by the Director (or nominee) to assess electrical equipment risk and to undertake routine inspection, testing, tagging and registering of electrical equipment.  |      |   |
| 5A | Tradesperson holding a restricted electrical licence (air conditioning mechanic, plumber, mechanical fitter, electrical fitter) formally inducted by Facilities and Services or approved by a Director (or nominee) to disconnect\reconnect electrical equipment to the electrical installation according to the specific | RELE | Assess by all of the below:<br>Copy of their ACT restricted electrician's licence (and confirmed with the local regulator, Construction Occupations Registrar, Australian Capital Territory Planning and Land Authority (ACTPLA) as valid)<br>Completion of the Facilities and Services contractor  |

|    |   |      |   |
|----|---|------|---|
|    | conditions of their restricted electrical licence.  |      | induction<br>Current resuscitation certificate by a recognised provider.  |
| 5B | Trades contractor holding a restricted electrical licence (e.g. air conditioning mechanic, plumber, mechanical fitter, electrical fitter) usually the period contractor or one approved by the Director (or nominee) to disconnect\reconnect electrical equipment to the electrical installation according to the specific conditions of their restricted electrical licence. |      |   |
| 6A | Unrestricted licensed electrician who has received formal induction and authorisation through Facilities and Services to access ACTEW/AGL electrical sub-stations on University grounds.  | ESAA | Assess by all of the below:<br>Copy of their ACT electrician's licence (and confirmed with the local regulator, Construction Occupations Registrar, Australian Capital Territory Planning and Land Authority (ACTPLA) as valid)<br>Current ACTEW/AGL Certificate in 'Substation and switch station entry and awareness' training<br>Current resuscitation certificate by a recognised provider. |
| 6B | Qualified person certified and formally inducted  | OHVE | Assess by all of the below:<br>Copy of their ACT  |

|   |   |      |   |
|---|---|------|---|
|   | <p>through Facilities and Services to operate High Voltage power equipment in accordance with the terms and conditions of the certifying authority.</p>   |      | <p>electrician's licence (and confirmed with the local regulator, Construction Occupations Registrar, Australian Capital Territory Planning and Land Authority (ACTPLA) as valid), and\or a recognised diploma or degree in electrical\electronic engineering with more than 4 years' experience as an electrical\electronics technician\engineer or extensive experience (&gt; 6 years) as an electronics technician</p> <p>Copy of their Statement of Attendance at a recognised training provider e.g. (Energy Australia or Country Energy)</p> <p>Current resuscitation certificate by a recognised provider.</p> |
| 7 | <p>A Category 1A or Category 2 Competent Person approved by the Director (or nominee) to Certify electrical equipment.</p> <p>Comprehensive knowledge of relevant electrical safety design standards together with considerable experience in their practical implementation.</p> <p>Local Areas lacking suitable</p> | EDSC | <p>Assess by all of the below:</p> <p>Copy of their ACT electrician's licence (and confirmed with the local regulator, Construction Occupations Registrar, Australian Capital Territory Planning and Land Authority (ACTPLA) as valid), and\or a recognised diploma or degree in electrical\electronic</p>  |

|   |   |      |   |
|---|---|------|---|
|   | competent persons may contract certification from other category 7 persons on campus. |      | <p>engineering with more than 4 years' experience as an electrical\electronics technician\engineer or extensive experience (&gt; 6 years) as an electronics technician</p> <p>Current resuscitation certificate by a recognised provider</p> <p>Completion of the University's course on 'Australian design standards for safety in electrical work and equipment'.</p> |
| 8 | Safety Observer   | ELVR | A Category 1 or 2 person competent in Low Voltage Rescue – i.e. a current certificate in Isolation and resuscitation techniques (perform rescue from a live LV panel and CPR).  |

## Workplace Inspections

83. Regular self-assessments of electrical safety contribute to ongoing electrical safety awareness and improvements. The workplace inspection program is designed to be implemented locally through the WHS Committee members and competent persons. Refer to the University WHS audit and [WHS inspection and monitoring](#) procedures.

84. F&S shall undertake audits of electrical installations.

85. Electrical appliances found to be sub-standard shall be tagged and removed from service, and upgraded to the appropriate standard as soon as reasonably practicable

86. Any sub-standard processes shall be reported to the Work Environment Group and raised within the electrical safety advisory group for action.

## Incident reporting

87. All workers shall report incidents and hazards immediately to their Supervisor and via the Workplace safety incident and hazard reporting tool as per the [WHS incident management procedure](#).

88. The appliance or installation should also immediately be removed from use and tagged as Out of service until the hazard has been rectified and then re-commissioned in accordance with this and the [isolation and danger tagging procedure](#).

89. Where a serious incident has occurred it is important that the incident scene is preserved and must not be disturbed for any reason following the emergency response.

## Sources

| Legal and other requirements   |
|--|
| <i>Work Health And Safety Act 2011(Cth)</i>  |
| <i>Work Health And Safety Regulations 2011(Cth)</i>  |
| <i>Safe Work Australia – Managing Electrical Risk in the Workplace – Code of Practice</i>  |
| <i>AS 61010.1:2003 (R2016) <a href="#">Safety requirements for electrical equipment for measurement, control and laboratory use – General requirements (IEC61010-1:2001,MOD)</a></i> |
| <i>AS/NZS 4386 4836.2011 <a href="#">Safe working on or near low-voltage electrical installations and equipment</a></i>  |
| <i>AS/NZS 3760:2010 <a href="#">In-service safety inspection and testing of electrical equipment</a></i>   |
| <i>AS/NZS 3017:2007 <a href="#">Electrical Installations – Verification guidelines</a></i>   |

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