



## Electrical Equipment Inspection Testing

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### Purpose

This procedure is to be read in conjunction with OHSW Regulations, 2010, Part 2, Division 5 and AS/NZS 3100:2009, AS/NZS 3760:2010, AS/NZS 3012:2010 which outline the requirements for the conduct of in-service inspection and testing of electrical equipment to minimise risks to health and safety through its use and to meet OHSW legislative obligations. This procedure also applies to equipment owned by staff, students, contractors and visitors.

This procedure does not apply to:

- electrical equipment at a height of 2.5m or greater above the ground, floor or platform;
- equipment which would need to be dismantled to perform the inspection and tests;
- fixed or stationary electrical equipment that forms part of the electrical installation and falls within the scope of AS3000:2007 Electrical Installations (known as the AUS/NZ Wiring Rules).

When the **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 until the next available testing period. However the equipment **must be tagged** in accordance with Clause 2.4.2. AS/NZS 3760.

### Definitions

**Electrical equipment** – includes

- portable, hand held and stationary appliances, designed for connection to the low voltage supply by a flexible cord; cord extension sets and Electrical Portable Outlet Devices (EPODs) or powerboards.
- flexible cords connected to fixed equipment in hostile environments
- portable isolation transformers
- Residual Current Devices (RCDs) – portable type (PRCD), socket type outlet and fixed switchboard type
- commercial and industrial battery chargers
- portable and transportable 415v heavy duty tools, such as high pressure cleaners and concrete grinders.

**Competent person** – is a person, who the Line Manager ensures has acquired through training, qualification, experience or a combination of these, the knowledge and skill enabling that person to competently and safely perform the task of electrical testing.

**Class I equipment** – is equipment in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in that accessible conductive parts are connected to the protective earthing conductor in the fixed wiring of the



installation in such a way that accessible parts cannot become live in the event of a failure of the basic insulation.

**Class II equipment** – is equipment in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions such as double insulation or reinforced insulation are provided, there being no provision for protective earthing or reliance upon installation conditions.

**Hostile Environments** – are environments where the equipment or appliance is normally subjected to events or operating conditions that are likely to result in deterioration and or subsequent damage to equipment where electrical safety could be affected. This includes but is not limited to physical abuse, exposure to moisture, heat, cold, vibration, corrosive chemicals and dust.

**PAT** – is a portable appliance tester

**Residual current device (RCD)** – is 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 specified conditions.

### Roles and Responsibilities

Line Managers and supervisors are responsible for:

- the implementation of this procedure in their area of responsibility and accountability
- ensuring electrical equipment and RCDs are tested and tagged in accordance with AS/NZS 3760
- ensuring test registers are maintained in accordance with this procedure
- ensuring persons carrying out electrical testing and tagging in their area of responsibility and accountability are appropriately skilled and competent persons.

Staff are responsible for:

- not placing themselves or others at risk of injury
- reporting to line managers and/or supervisors, electrical equipment or RCDs that have not been tested or have expired test dates

Facilities Management Unit is responsible for:

- ensuring the testing and tagging of electrical equipment belonging to the building fabric, that is, eg fixed RCDs, audio visual equipment in common teaching areas, hand dryers in toilets, main switchboards, distribution boards etc.

A Contract Supervisor is responsible for:

- verification that a contractors electrical items have been tested (contractors may not necessarily tag their electrical equipment)

### Training and competence

An approved person, with the possible exception of an appropriately licensed electrician, must successfully complete a training course covering:

- electrical safety principles for appliances as per AS/NZS 3100:2009 Approval and test specification – General requirements for electrical equipment.
- electrical safety in-service test procedures as per AS/NZS 3760:2010 In-service safety inspection and testing of electrical equipment.

A schedule of refresher training shall be determined based on the skill level, experience and frequency of electrical testing undertaken by the approved person.

### NOTES

1. testing of RCD's located in switchboards can only be performed by a licensed electrician and with the express approval of the Facilities Management Unit.
2. testing of construction equipment (subject of AS 3012:2010) can only be performed by a licensed electrician.



Any person deemed as competent to carry out electrical testing and tagging must have the competencies required by AS/NZS 3760:2010. For the purposes of this Guideline these competencies are interpreted as the:

- knowledge and training to do a risk assessment
- knowledge and ability to carry out a visual examination of equipment
- ability to identify double insulated equipment and protectively earthed equipment
- knowledge and ability to use a Portable Appliance Tester (PAT)
- ability to carry out earthing continuity tests
- ability to carry out insulation resistance tests
- ability to test Residual Current Devices (RCD's)
- ability to document results of inspection and testing

### Procedure

All electrical equipment as defined above shall be electrically tested and tagged in accordance with the procedure and at intervals specified in Appendix 1 and AS/NZS 3760 unless the testing interval has been varied by the completion of a risk assessment. The in-service safety inspection and testing of electrical equipment is only to be conducted by personnel who are competent to test electrical equipment.

#### 1. Inspection

1. Ensure that the equipment to be tested is not connected to the local electricity supply.
2. Conduct a visual and physical inspections looking for
  - obvious damage or defects in the accessories, connectors, plugs or sockets.
  - discoloration that may indicate exposure to heat, chemicals or moisture.
  - ensuring that flexible cords are effectively anchored to equipment, plugs and sockets.
  - damage to flexible cords:
    - the inner cores of flexible supply cords are not exposed or twisted;
    - the external sheaths are not cut, abraded, twisted, or damaged to such an extent that the inner cores are visible; and
    - unprotected conductors or insulation tape are not in evidence.
  - power boards, that the warning label indicating the maximum load to be connected to the device is intact and legible.
  - controls are in good working order, i.e. they are secure, aligned and appropriately identified.
  - covers, guards and shield etc are secured in the manner intended by the manufacturer or supplier.
  - ventilation inlets and exhausts are unobstructed.

#### 2. Testing

The purpose of testing is to detect the unobservable faults not found by the visual inspection process. It is preferred that insulation resistance tests are performed where practical.

##### 2.1 Leakage Testing

If electrical equipment is to be energised to close or operate a switching device, then a leakage test shall be performed. Many power tools and most modern office equipment use membrane type on/off electronic switches. These appliances must be powered up to get past the electronic or magnetic switches. AS3760 states that under these circumstances:

- a Class 1 item requires an earth leakage test to be conducted with a pass/fail limit of 5mA, and
- a Class 2 item requires a leakage test to be conducted with a pass/fail limit of 1 mA.

If using a Portable Appliance Tester (PAT) then it must incorporate or be used in conjunction with a power-on leakage current measurement facility (Refer to AS3760, Appendix B2.1 Leakage current). When performing the direct reading meter in the protective earth conductor of the electrical equipment under test, this test should be performed with caution as the protective earth conductor may be live and present a risk of electric shock. Usually this method is performed by authorised (trained) appliance service personnel.



**WARNING:** Portable Appliance Testers must be regularly checked for capability to perform power on leakage current tests.

### 2.2 Class 1: Earthed Equipment

Earth Resistance is to be measured with a test current in excess of 10 Amperes to ensure that the earth circuit is capable of sustaining a fault current long enough so that the protecting component, (fuse, circuit breaker etc.), has sufficient time to react.

### 2.3 New Equipment

New equipment is deemed the supplier's responsibility for ensuring the initial electrical integrity of the item purchased. It is not necessary to inspect or test the new equipment when it is placed in-service. However, it is the responsibility of the line manager to ensure that the item is tagged indicating the next test date.

## 3. Action resulting from inspection and testing

Non-compliant equipment - where inspection or testing identifies equipment which fails to comply the equipment shall be –

- a. withdrawn from service immediately, have a label attached to it warning against further use; and
- b. sent for repair, disposal or destruction.

Compliant equipment shall be fitted with a tag which should be colour coded to identify the period in which the test was done and shall include:

- o the name of the person or company who made the inspection or carried out the test or maintenance
- o the test, inspection or maintenance date
- o a re-test date if required

## 4. Equipment out of service

It is known that some work areas place electrical equipment out of service and place into storage (otherwise known as mothballing) as the equipment is only used seasonally or infrequently. In this case, the equipment must be fitted with an out of service tag (as per the Energy Isolation Tags and Lock Off procedure) and placed into a locked store room or similar. When the item is placed back in-service the out of service tag is to be removed and the item is only required to be retested and tagged if the test date has expired, if there is no test tag on the equipment, then it must be retested.

## 5. Contractors

Contractors shall not use electrical equipment on University workplaces unless testing of their electrical equipment has been carried out in accordance with AS/NZS 3760. The relevant Line Manager or the contract supervisor may request from the contractor, from time to time verification that all electrical items that are used as part of the contract have been tested.

## 6. Disposal of Electrical Equipment

If electrical equipment is sold or given away an up to date risk assessment must be provided informing the new owner of the equipment of the residual risks or the faults when using the equipment, a signed copy of the risk assessment must be kept for a period of not less than five years. If an item is disposed of by any other means then the electrical item must be decommissioned and rendered inoperative.

## Record Keeping

Records of inspections and testing are to be maintained by Line Managers in accordance with the Electrical Equipment Register (form [OHSW25](#)) and the Residual Current Devices Register (form [OHSW26](#)) attached to this procedure unless an external electrical testing provider is used, then certificates of currency should be retained on file. The external provider shall be required to provide a copy of all test results which are to include test date and due re-test date. Records of formal inspections, tests and repairs are to be retained for a period of not less than seven years. Records of inspection and testing to be maintained include a:

- register of all electrical equipment
- record of formal inspection and tests
- repair register



### Performance Measures

- All personnel testing electrical equipment meet the competency criteria outlined in the procedure.
- All registers are current and/or certificates of currency are maintained.
- All equipment is tagged indicating the date tested and the next test date.

### Documents/Forms

[OHSW 25 – Electrical Equipment Register](#)

[OHSW 26 – Residual Current Devices Register](#)

### References

[University OHSW&IM Policy](#)

[University OHSW Strategic Plan 2009 - 2011 \(PDF 158kb\)](#)

[OHSW & Injury Management System \(PDF 128kb\)](#)

[Occupational Health Safety and Welfare Act 1986](#)

[Occupational Health, Safety & Welfare Regulations, 2010](#)

[AS/NZS 4801: 2001 Occupational Health and Safety Management Systems – General guidelines on principles, systems and supporting techniques.](#)

[AS 4801: 2001 Occupational Health and Safety Management Systems – Specification with guidance for use.](#)

[AS/NZS 3760: 2010 In-service safety inspection and testing of electrical equipment. - \[Appendix 1\]\(#\) \(pdf 21kb\)](#)