

\*This document is under review, if you have any input, please email [safety@unsw.edu.au](mailto:safety@unsw.edu.au).

## HS418 Portable Electrical Equipment Inspection, Testing and Tagging Guideline

### Introduction

The purpose of this guideline is to provide a framework to assist in controlling the electrical hazards associated with plug-in type portable electrical equipment.

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### 1. Scope

This Guideline applies to all UNSW workplaces where electrical equipment is in use and is restricted to plug-in type portable electrical equipment. Electrical equipment covered by this Guideline includes:

- Electrical equipment used in a hostile environment
- Electrical equipment used in a non-hostile environment
- Portable and handheld appliances, e.g., power tools
- Extension leads, IEC cables and power boards
- Portable Residual Current Devices (RCDs)

This Guideline does not address electrical equipment in the following categories:

- Electrical equipment used in construction work. This equipment is subject to the requirements of the Workcover Code of Practice - Electrical practices for construction work.
- Electrical equipment that has been serviced or repaired which could affect the electrical safety of the equipment. This equipment must be tested in accordance with AS/NZS 5762 prior to be placed back into service.

This Guideline does not cover electrical work that must be undertaken by a licensed electrician. Such work includes:

- Replacement of faulty GPO's
- Wiring and repair of electrical switchboards
- Disassembly of electrical equipment to facilitate inspection or repair

This guideline does not apply to:

- electrical equipment installed at a height of 2.5m above ground (no reasonable chance of a person

- touching such equipment)
- electrical equipment that has to be dismantled before it can be tested
- hard wired fixed equipment or stationary equipment
- medical electrical equipment (covered by AS/NZS 3551)

## 2. Managing risks of electrical equipment

Employers have a duty of care to ensure that employees and visitors to the workplace are safe from injury and risks to health. Therefore, any safety risks surrounding electrical hazards must be managed in accordance with the requirements of the NSW *Work Health and Safety Act 2011* and *Work Health and Safety Regulation 2011*.

A systematic risk management approach must be applied to eliminate or control the risk of electrical hazards. A range of control measures can be implemented including:

- routine visual checks;
- regular inspection;
- maintenance;
- repair;
- replacement;
- use of residual current devices (RCDs);
- and, where warranted, testing of identified electrical equipment.

## 3. Tag and Testing

No. Clause 150(1) of the WHS Regulation only requires testing and tagging of those items of electrical equipment that are supplied with electricity through an electrical socket outlet and are used in construction and demolition sites or in higher-risk operating conditions. These are conditions that are likely to result in damage to the equipment or a reduction in its expected life span.

### Environments that require testing

- In clause 150 of the Regulation, the environments that require testing include those which expose the equipment to moisture, heat, vibration, mechanical damage, corrosive chemicals or dust. Examples include wet or dusty areas, outdoors, workplaces that use corrosive substances, commercial kitchens and manufacturing environments.
- Note that due to the nature of the work conducted in some laboratories and workshops, they may be considered a higher-risk operating environment. Assessment of your workplace should be carried out to determine if it is considered a higher-risk operating environment under the WHS Regulation.

### Requirements for serviced or repaired electrical equipment

- Electrical equipment that has been serviced or repaired which could have affected electrical safety must be inspected, tested and tagged prior to the equipment being placed back into service. In addition, any electrical equipment that has been bought second-hand must be tested before its first use.

### Who can inspect and test electrical equipment?

The inspection and testing of electrical equipment must be done by a 'competent person' as defined in the *WHS Regulation 2011*.

A 'competent person' must be:

- A licensed or registered electrician, or
  - A licensed electrical inspector, or
  - A person who has completed a structured training course and been assessed as competent in the use of appliance testers and the visual inspection of electrical equipment.
- Regardless of who does the work the person must be authorised by the employer and must be adequately trained and instructed to do the work. Moreover, the person authorising the work must make sure that the inspection and testing program is appropriate and adequate for the needs of the workplace.
  - Some electrical inspection and testing tasks require a degree of technical expertise and interpretation of results and therefore can only be carried out by appropriately qualified personnel, such as a licensed electrician or electrical inspector
  - If in doubt, the person authorising the inspection and testing program must obtain advice from a person qualified in electrical matters, an electrician, electrical contractor or specialist testing provider.



## 4. Visual and Physical Inspections

AS/NZS 3760:2010 requires the following equipment checks be made by visual and physical inspection of all equipment:

- a. Check for obvious damage, defects, or modifications in the equipment and its accessories, connectors, plugs or cord extension sockets; and for discoloration that may indicate exposure to excessive heat, chemicals or moisture.
- b. Check that flexible cords are effectively anchored to equipment, plugs, connectors and cord extension sockets;

**NOTE** – This inspection, including flexing and straining at points of entry and clamping points by the application of reasonable combination of push/pull and rotary movements, may detect broken strands or loose connections.

- c. Check for damage to flexible cords to ensure that:
  - I. The inner cores of flexible cords are not exposed or twisted
  - II. The external sheaths are not cut, abraded, twisted, or damaged to such an extent that the **insulation** of the inner cores is visible, and
  - III. Unprotected conductors or the use of banding **insulation** tape are not in evidence.

**NOTE** –

- (1) Carefully running the flexible cord through the hand will often detect internal damage such as twisted conductors or broken core filling.
  - (2) Connecting the plugs/cord extension sockets of **cord extension sets** together helps to confirm that the terminals have not spread. 14
- d. For **Electrical Portable Outlet Devices (EPODs)**, check that the warning indicating the maximum load to be connected to the device is intact and legible.
  - e. Check that any operating controls are in good working order i.e., that they are secure, aligned and appropriately identified.
  - f. Check that covers, guards, and the like are secured and working in the manner intended by the manufacturer or supplier.
  - g. Check that ventilation inlets and exhausts are unobstructed.
  - h. The pins of insulated pin plugs should be inspected for damage to the **insulation** of the pins, and, if fitted, the shroud on cord extension sockets should be inspected for damage.
  - i. Check that the current rating of the plug is consistent with the current rating of the equipment.

### Testing

Testing of earthing continuity, insulation, portable isolating transformers, operation of RCDs, polarity of rewirable plugs, portable generators, arch welders with exposed terminals, portable inverters and Class 1 equipment must be carried out by a competent person following the requirements of: AS/NZS 3760:2010. Tables 1 and 2 in this standard specify the leakage current limits and insulation resistance limits for such testing.

### Action for non-compliant equipment

Equipment that fails the inspection or testing must be appropriately labelled and withdrawn from service. A Danger Tag system can be used to indicate that the equipment requires remedial action. The equipment must be isolated in such a manner that it cannot be used until repaired (e.g., locked out, locked away).

### Tags

Equipment that passes the inspection and testing must be fitted with tags that are durable, legible, non-reusable, non-metallic and may be colour coded. The date on which the test was performed must be indicated. In addition, the name of the person (company) who performed the test as well the date of next test must be indicated. Reference should also be made to AS3760.

### Requirements for NEW electrical equipment

- The supplier of new electrical equipment is deemed responsible for the electrical safety of the equipment in accordance with the principles of safe design and manufacture.
- It is therefore not necessary for an employer to test new equipment before its first use, but a 'competent person' should still visually inspect the equipment to ensure no damage has occurred during shipment or commissioning.



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- Following the inspection, the new equipment that has been assessed as requiring future testing be fitted with a tag stating that the equipment is 'new to service', and the date of entry into service. This action sets a baseline date to work with for future electrical inspection and testing activities.

### Requirements for stationary electrical equipment

Stationary or fixed equipment connected by a fixed cable or flexible cord which is not flexed in normal use or exposed to damage, nor is in a higher-risk operating environment, is not normally considered to represent a hazard sufficient to warrant routine in-service electrical safety testing. Subject to the outcome of a risk assessment, the testing of such equipment is not normally required.

- *fixed equipment* is equipment that is fastened to a support, secured in position or otherwise due to its size and mass located in a specific location
- *stationary equipment* is equipment having a mass exceeding 18 kg and not provided with carrying handle(s).

Where flexible cable or cord is flexed on equipment that is moved only for restocking, maintenance, or cleaning, in-service testing is required. It is sufficient to conduct only a visual inspection and earth test on such fixed or stationary equipment.

### Examples of electrical equipment that should be inspected, tested, and tagged

- Some electrical equipment may be used in a situation that poses a risk to the operator due to the nature of its location and the type of use.
- If a risk assessment shows there is a risk to employees and others, the employer should ensure the equipment is inspected, tested and tagged.

The categories in the following table list plug-in type electrical equipment that is commonly used in higher-risk operating environments and does require regular inspection and testing and provides examples of the types of electrical equipment.

CATEGORY OF EQUIPMENT	EXAMPLES OF ELECTRICAL EQUIPMENT TO BE TESTED
Handheld electrical equipment	<ul style="list-style-type: none"> <li>• Handheld power tools</li> <li>• Hairdryers</li> <li>• Kitchen appliances</li> <li>• Laboratory equipment</li> </ul>
Portable electrical equipment moved while in operation	<ul style="list-style-type: none"> <li>• Floor polishers</li> <li>• Vacuum cleaners</li> <li>• Portable lighting equipment</li> </ul>
Electrical equipment that is moved between operations in such a manner that could damage the flexible supply lead	<ul style="list-style-type: none"> <li>• Portable electronic whiteboards, overhead projectors</li> <li>• Laptop computers</li> <li>• Electrical plant used in factory type environments</li> <li>• Welding machines</li> <li>• Extension cords</li> <li>• Power boards</li> </ul>
Electrical equipment that is used in a higher-risk operating environment where damage to the equipment or the electricity supply to that equipment could occur such as in wet or dusty conditions.	<ul style="list-style-type: none"> <li>• Electrical equipment used in wet or dusty areas</li> <li>• Electrical equipment used outdoors, in kitchens,</li> <li>• Laboratories (chemical damage)</li> <li>• Certain factory-type environments</li> </ul>



## Requirements for desktop computers and office electrical equipment

Not all electrical equipment requires regular testing. In some situations, electrical equipment such as desktop computers and stationary office equipment does not present a risk to their operators. This is due to:

- the permanent nature of their location
- the working environment in which the equipment is used.

In cases like these, a risk assessment should be carried out in accordance with the risk management provisions of the *WHS Regulation 2011*. The assessment should determine whether desktop computers and other similar stationary office equipment - warrant regular testing and tagging.

## Personal, Leased or Hired Equipment

The electrical inspection, testing and tagging requirements outlined in this guideline also apply to personal, leased or hired electrical equipment used in a UNSW hostile operating environment. If a staff member, student, or visitor refuses to allow testing, the equipment must be removed from the workplace. If any personal, leased or hired equipment fails the tests the owner must be notified before any further action is undertaken. Testing must not damage any personal, leased or hired equipment. Student laptops used in a non-hostile environment e.g., classrooms, library, public eating areas do not require testing and tagging.

## Record Keeping

The following records are required for the electrical testing and tagging program:

1. A list of all equipment
2. A record of formal inspection and tests
3. A 'repair' register
4. A record of all faulty equipment showing details of services or corrective actions

Records are to be retained for 7 years and may be stored electronically. Such records include risk assessments that establish the frequency of testing.

## Frequency of testing

A risk assessment can be used to indicate the testing frequency. However, the guide in Appendix 1 (reproduced from AS3760:2010) also provides indicative intervals.

Any equipment being returned to service after repair or servicing that could have affected the electrical safety of the equipment, should be inspected, and tested.

In addition, any secondhand equipment should undergo electrical inspection and testing before it goes into service.

## 5. Acknowledgements

[Work Health and Safety Act 2011 \(nsw.gov.au\)](http://nsw.gov.au)

[Work Health and Safety Regulation 2017 \(nsw.gov.au\)](http://nsw.gov.au)

[List of codes of practice | SafeWork NSW](#)

## Appendix A: Definitions

### Responsible Person

The Responsible Person is considered to be the person who has the legal responsibility for implementing a safe system of work.

### Voltage

Voltage is defined as differences of potential, normally existing between conductors and between conductors and earth as follows:

- (a) Extra-low voltage (ELV) - not exceeding 50 V a.c. or 120 V ripple free d.c;
- (b) Low voltage (LV) - exceeding extra-low voltage, but not exceeding 1000 V a.c. or 1500 V d.c;
- (c) High voltage (HV) - exceeding low voltage.

### Competent Person

A Competent Person is one who the Responsible Person ensures possesses the necessary practical theoretical skills, acquired through training, qualification, experience, or a combination of these, to correctly undertake the tasks described in this Guideline. A Competent Person is not required to be a registered or licensed electrical practitioner.



Note: Any area of the University may decide that a person designated to do electrical testing requires documented electrical qualifications.

#### **Construction site**

For the purposes of this Guideline only, a construction site is defined as an operating environment where construction work is performed.

#### **Electrical equipment**

In this Guideline electrical equipment (or article) means plug-in type portable electrical equipment.

#### **Flexible supply lead**

A flexible cable or cord which supplies voltage to electrical equipment. It has one end connected to a plug with pins designed to engage with a socket outlet (GPO), and the other end either:

- (a) connected to terminals within the equipment; or,
- (b) fitted with a connector designed to engage with an appliance inlet fitted to the equipment.

#### **GPO**

General Power Outlet

#### **Hostile operating environment**

A workplace where the electrical equipment or flexible supply cord is subject to operating conditions that are likely to result in damage to the equipment. This includes an operating environment that may: cause mechanical damage to the item of equipment; or expose the item of equipment to moisture, heat, vibration, corrosive substances, or dust.

#### **Non-hostile operating environment**

A workplace that is dry, clean, well organised and free of operating conditions that are likely to result in damage to electrical equipment or the flexible supply cord. For example: an office, retail shop, telecentre, classrooms, etc.

#### **Portable appliance tester**

A device capable of performing the required tests described in this Guideline.

*Note: There is a range of PATs available from electrical retailers. UNSW cannot recommend any particular brand or model as each School / Work Unit's requirements may vary.*

#### **Personal, leased or hired electrical equipment**

Electrical equipment not purchased or owned by UNSW but used in a UNSW workplace. Such equipment may include but is not limited to, laptop computers; heaters; fans; handheld power tools; audio equipment; kitchen appliances; and electronic test equipment.

#### **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 specified conditions. RCDs are classified according to their rated residual current as follows:

- (a) Type I: < 10 mA
- (b) Type II: >10mA<30mA
- (c) Type III: >30mA < 300mA without selective tripping time delay
- (d) Type IV: >30mA < 300mA with selective tripping time delay

To evaluate which RCD, you made need in a particular situation consult AS/NZS 3190: Approval and test specification - Residual current devices. Only Type I and Type II are suitable for personal protection in the event of a current flow to earth.

## **Appendix B: Version Control**

<b>Version</b>	<b>Authorised by</b>	<b>Approval Date</b>	<b>Effective Date</b>	<b>Sections modified</b>
1.0	Director, Human Resources	3/6/2005	3/6/2005	Original Version
2.0	Director, Human Resources	1/11/2006	1/1/2006	Revised format, correction for legislative change



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2.1	Director, Human Resources	28/2/2008	28/2/2008	Correction to establish the requirement to test all new electrical equipment regardless of location and use
2.2	Director, Human Resources	19/3/2013	19/3/2013	Updated in accordance with WHS legislation 2011 Updated Branding Logo in accordance with UNSW Branding Guidelines. Modified the document identifier from OHS to HS in accordance with WHS legislation review
2.3	Director, UNSW Safety and Sustainability	30 April 2014	30 April 2014	Reviewed for administrative updates
2.4	Director, UNSW Safety and Sustainability	30 March 2016	30 March 2016	Reviewed for administrative updates
3.0	Director, Risk & Safety Management	8 August 2022	8 August 2022	Reviewed for administrative updates, template updated and removed from Governance

#### Updates to this document

Any suggestions, recommendations or updates to this document should be emailed to [safety@unsw.edu.au](mailto:safety@unsw.edu.au) with the email header stating *GUIDELINES UPDATE HS418*.

