



Procedure: Hand and power tool safety

Purpose

The purpose of this procedure is to define the requirements for hand and power tool safety to control the risk of injury at the Australian National University (University) to ensure compliance with the *Work Health and Safety Act 2011 (Cth)*, *Work Health and Safety Regulations, 2011 (Cth)*, and the University's Work Health & Safety (WHS) Management System. 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

De-contactor is a plug and socket arrangement which, by design, allows a piece of equipment to be isolated by unplugging the plug from the socket.

Double adaptor is a multi-outlet device which does not incorporate any type of overload protection.

Earth leakage circuit breaker (ELCB) see Residual Current Device.

Extension lead is a cord with which temporary power can be taken to another area of plant for equipment use. They are only to be used for providing short term power.

Extra low voltage (ELV) is voltage less than 50 volts AC or less than 120 Volts DC.

Local area refers to a College, Research School, or Services Area of the University.

Piggy back plugs are socket type devices which allow another plug to connect into them without offering overload protection.

Pneumatic tools are hand tools powered by compressed air and include buffers, nailing and stapling guns, grinders, drills, jack hammers, chipping hammers, riveting guns, sanders, and wrenches.

Portable outlet is a multi-outlet device that incorporates overload protection.

Powder actuated tools (PATs) commonly referred to as explosive power tools are used to fasten construction materials to concrete, steel or brick and consist of the tool, a fastener, and an explosive charge.

Residual current device (RCD) is a switch that operates when 30mA leakage current to earth (short) is detected.

Voltage reducing device (VRD) is a device that reduces the open circuit voltage of a welding machine to a safer level (below 35Volts DC and 25 volts AC).

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

Procedure

Scope

1. This procedure applies to any University owned and operated hand power tools. Such items are considered a piece of plant and equipment as defined in the [Plant and equipment safety management procedure](#).

Hand held battery powered tools

2. Hand held battery powered tools are used widely at the University and in industry and are becoming more common than power tools which can be plugged into a wall socket (240 Volt electrical tools).

3. Battery powered tools are often perceived as being less dangerous to use than traditional 240 V tools, but this is not the case and the power and torque ratios are often very high and capable of inflicting serious harm with 18V and 24V power packs.

4. Hand held battery powered tools are a very suitable control in reducing risk levels from repetitive over use and strain injuries of traditional hand tools and should be considered where possible. The replacement of hand tools with powered hand tools requires a hazard assessment to ensure no additional hazards are added to the task i.e. an electrical appliance introduced into an intrinsically safe confined space environment or a wet environment.

5. Powered hand tools are considered an item of plant and are discussed in the Code of Practice: [Hazardous Manual Task \(Cth\)](#).

6. The minimum expectations and work practices for battery operated power tools include but are not limited to the worker:

- substituting 240 volt electrical tools and equipment with battery or pneumatic operation when possible;
- being trained in the proper use and care of the specific tool;
- inspecting power tools for any damage prior to each use and report any damage to immediate supervisor;
- ensuring all guarding, is in place prior to each use;
- following the Safe Operating Procedure and all instructions provided in the owner's manual for the tool;

- ensuring no repairs are made in the field. Even minor repairs should not be attempted and all repairs are only to be made by competent persons; and
- isolating a damaged power tool with a danger tag / out of service tag if the power tool, or battery pack or charger is defective.

7. The minimum expectations of the worker in respect to the care and maintenance of batteries, battery packs and chargers is to:

- only recharge with the manufacturer specific battery and charger and follow all manufactures' instructions during charging and use;
- only to be used in dry workshops or environments;
- never charge batteries in lunch rooms or offices where potential gas discharge from battery charging can affect safety;
- when a battery pack is not in use, keep it away from other metal objects that can make a connection from one terminal to another. A battery cap cover (if available) should be used when the battery is not in use because shorting the battery terminals may cause burns or a fire; and
- dispose of damaged or non-functioning batteries according to the ANU Recycling and waste management practices.

Portable electrical outlets

8. All portable outlets will have a current electrical test tag attached prior to use and will be inspected before each use by the worker using the outlet.

9. All portable outlets used at the University will incorporate individual switch outlets and overload protection.

10. Portable outlets used in office environments must be, as a minimum, described in AS/NZS 3105 and not used outside of an office environment.

11. Portable outlets used in plant environment must be, as a minimum, described in AS/NZS 3439.4 and the electrical lead must be heavy duty insulation incorporating braided earth shield.

12. Outlets must be protected by a 30mA RCD and will be tested each day while in service, and before each use by means of the in-built testing button.

13. All portable outlets will have a minimum IP rating of IP66 and must be controlled by an on/off switch.

14. Double adaptors and piggy back plugs are not to be used at the University.

Extension leads

15. The maximum length of an extension lead, for a given conductor cross sectional area, shall comply with table 1 from the AS/NZS 3105:2014 Approval and test specification – Electrical portable outlet devices.

16. It is recommended that a single extension lead of an appropriate length should be used whenever possible

17. Extension leads shall not be joined such as the total length of any such combination exceeds the relevant maximum value specified in the below table.

Table 1

Extension lead rating	Conductor size	Maximum length of extension lead
Amps	Millimetres	Metres
10 Amp	1.0 mm ²	25 metres
	1.5 mm ²	35 metres
	2.5 mm ²	60 metres
	4.0 mm ²	100 metres
15 Amp	1.5 mm ²	25 metres
	2.5 mm ²	40 metres
	4.0 mm ²	65 metres
20 Amp	2.5 mm ²	30 meters
	4.0 mm ²	50 metres

18. All electrical extension leads will have a current electrical test tag attached prior to use, and also be inspected before each use by the worker using the lead.

19. The likelihood of damage to extension leads, and the risk of electric shock, increases with the route length and physical hazards.

20. Before starting any work requiring extension leads, ensure that risk control measures such as locating extension leads away from hazards and people are considered. I.e. avoid laying extension cords in areas of pedestrian traffic, across doorway, stairs etc. When this is not possible, suitable controls must be considered to reduce the risk such as:

- Warning signs, sandwich boards and high visibility tape;

- taping the cord to the floor or carpeting so that it is not a tripping hazard;
- affixing the cord above doorways or beside stairs and under railings/handrails;
- substituting with battery operated tools including vacuum cleaners; or
- timing of the work when fewer workers are present.

21. All Single phase 240V extension leads used in an outdoor environment will have a braided earth shield and be approved according to the University [Electrical safety management procedure](#). Contact the [Work Environment Group \(WEG\)](#) for enquiries.

22. It is a recommendation that all other extension leads purchased or constructed should include an earth braided sheath to provide greater safety. This will facilitate a phasing out of non-braided leads.

23. Always support leads off the ground or provide mechanical protection to prevent damage if they are out of view of the worker, across passageways, or the ground is wet.

24. Always switch the power off before removing plugs and remove the plugs by their body.

25. Where water/moisture is unavoidable, portable electrical equipment will only be permitted following a hazard assessment according to the [WHS Hazard management procedure](#).

26. Electrical work near water may only proceed after the relevant Executives (Dean, GM, Director (local area)) have assessed the hazards with high scores (13-19) and signed off that all implemented controls are in place prior to any work being undertaken as there is increased potential for a fatal shock. Refer to the [WHS Hazard management procedure](#), hazard approver table for further information.

General work rules for portable electrical equipment

27. All portable electrical equipment will have a current electrical test tag attached.

28. All extension leads used in a plant environment must have braided earth shielding.

29. Portable RCD units will be used on all portable electrical equipment unless labelled "RCD protected". The International Protection IP rating shall be minimum IP66.

30. Always disconnect electrical equipment before making adjustments or repairs.

- The worker must be in control of the electrical power plug at all times to ensure it is not energised during adjustments; and/or
- The portable equipment must be isolated with an isolation bucket (locks power plug), a personal lock and a danger tag to ensure it is not accidentally energised by another person or worker.

31. Do not use electrical equipment in wet or damp environments unless appropriate authorisation has been given.
32. All welding machines shall have VRDs fitted.

PATs and pneumatic tools

33. These tools are considered an item of plant and are discussed in the Code of Practice: [Hazardous Manual Task \(Cth\)](#).
34. The use of PATs and pneumatic tools will be supported by a documented hazard assessment and a safe operating procedure that has been reviewed by the worker and the immediate supervisor. The hazard assessment requires competency to be witnessed and safe use demonstrated prior to operation.
35. Safety precautions for these types of tools include that:
 - the manufacturer's specifications and operating instructions for these tools will be read, understood, and complied with;
 - hearing and eye protection will be worn by the worker and others in the vicinity;
 - before using the tool, the worker completes a pre-task inspection to check that the tool is clean, operating correctly and the barrel is free from obstructions; and
 - warning signs are posted where these tools are used and protective screens or shields are set up in areas where nearby workers may be exposed to flying fragments, chips, dust, and excessive noise.
36. When using PATs, the worker will ensure that:
 - the PAT is kept in a locked container when not in use;
 - the PAT will not be loaded unless it is to be used immediately and never left unattended;
 - the weakest compatible charge is used for the first (test) firing and the strength of the charges selected to do the work do not apply excessive force to the fastener;
 - unless specified in the tool's operating manual, fasteners are at least 75mm from an edge, corner, or predrilled hole of concrete or brickwork (For steel, at least 12mm from an edge or hole);
 - fasteners will not be driven into material through which they can pass or into very hard or brittle materials;
 - if the PAT misfires, the worker will continue to hold the tool against the work surface for at least 10 seconds before trying to fire again. If the second attempt doesn't fire, the worker will wait at least another 10 seconds so that the faulty charge is less likely to explode, and then carefully remove the charge and place it in water;

- if the PAT jams in the firing position, it will be left alone and locked away where it cannot harm anyone, if it accidentally discharged (then contact the manufacturer for directions); and
- they are not used if flammable vapours or materials may be present.

Motorised portable tools (engines)

37. Motorised portable tools such as leaf blowers, chainsaws, and vacuums can be dangerous if used incorrectly or by non-competent worker(s). They must be assembled, operated, and maintained correctly according to manufactures' instructions.

38. No worker shall operate a chainsaw without a Statement of Competency Operation and Maintenance of Chainsaws (AHCMOM213) or equivalent qualification, or by demonstrated use of long term employment in industry.

39. The use of all motorised equipment must be supported by a documented hazard assessment and a safe operating procedure that has been signed by the worker and the immediate supervisor. The hazard assessment requires competency to be witnessed and safe use demonstrated prior to operation.

40. Care must be taken to avoid excessive exposure to vibration that can lead to permanent nerve damage and circulation problems.

Handheld angle grinders

41. Grinders with diameters greater than 178mm (7" inches) are not permitted on the University for any use by ANU staff or contractors.

42. Grinders shall be fitted with a 'dead man' switch which stops the disc spinning on release.

43. Grinders must not have an active override switch.

44. Grinders must not be used without the manufactures' guard.

45. Grinders shall be fitted with handle(s) that is 90 degrees to the body of the grinder.

46. Grinders with anti-kickback devices are recommended. This includes electric grinders fitted with a clutch that disengages the disc if it becomes jammed and compressed air grinders that stall rather than kick back.

47. Grind only with undamaged grinding disks and cut metal only with undamaged cutting disks. Do not cut with grinding wheels or grind with cutting wheels.

48. Face shields and safety glasses must be worn at all times using angle grinders and heavy leather gloves should be used.

49. Operations should not deviate from the recommendations and safety precautions in the manufactures' manual or local area safety procedures for the angle grinder.

50. Hot work permits should be considered when creating sparks. Refer to the [Permit to work procedure](#).

Records and documentation

51. The responsible local area will maintain records of tool's hazard assessments and subsequent safe operating procedures within the Electronic Records Management System (ERMS).

Training

52. All local areas will ensure that all workers operating hand and power tools have been appropriately trained in their use and deemed as competent by their supervisor.

53. The immediate manager or supervisor are responsible for ensuring that the training records are maintained and recorded on personnel files within the Human Resources Management System (HRMS).

Sources

Legal and other requirement
<i>Work Health and Safety Act 2011 (Cth)</i>
<i>Work Health and Safety Regulations 2011 (Cth)</i>
Safe Work Australia - Hazardous Manual Tasks - Code of Practice
AS/NZS 3105:2014 Approval and test specification – Electrical portable outlet devices
AS/NZS 3439.4: 2009 Low voltage switchgear and control gear assemblies Particular requirements for assemblies for construction sites (ACS)

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