



Laser Safety Procedures

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1. Governing Policy

[Work Health and Safety Policy](#)

[Work Health and Safety Management System](#)

2. Purpose

These procedures describe the requirements

- for the identification, assessment, control and use of laser radiation; and
- to ensure the University meets the requirements of [work health and safety legislation](#).

3. Scope

These procedures apply to all Flinders University workers, students and visitors using lasers at University workplaces.

4. Definitions

Accessible emission limit (AEL)	maximum accessible emission permitted within a particular class.
Laser	An acronym for Light Amplification by Stimulated Emission of Radiation. A laser is any device which can be made to produce or amplify electromagnetic radiation in the 180nm to 1mm wavelength range primarily by the process of controlled stimulated emission. Lasers emit in the Ultraviolet, Infrared & Visible parts of the electromagnetic spectrum.
Laser classifications as per AS/NZS IEC 60825.1:2014	
Class 1 and 1M	Laser products which are normally safe under reasonably foreseeable conditions of use, either because of the inherently low emission of the lasers themselves, or because they are totally enclosed and human access to higher levels of internal radiation is not possible during normal operation.
Class 1C	Laser products which exceed the permitted accessible emission limits for Class 1 but which, because of the geometrical spread of the emitted radiation, cannot cause harmful levels of exposure to the unaided eye. However, the safe level for ocular exposure can be exceeded, and injury can occur, if magnifying viewing instruments are used.
Class 2	Laser products emitting low levels of visible radiation (i.e. from 400 nm to 700 nm) which are safe for the skin but not inherently safe for the eyes. Eye protection is normally afforded by natural aversion responses to bright light.
Class 2M	Laser products emitting levels of visible radiation that exceed the permitted accessible emission limits for Class 2 but for which, because of the geometrical spread of the emitted radiation, protection of the unaided eye is normally afforded by natural aversion responses to bright light. However, the aversion response may not provide sufficient protection, and injury can occur, if magnifying viewing instruments are used.
Class 3R	Laser products having a level of accessible emission up to five times the limits for Class 1 (if invisible) or Class 2 (if visible). The maximum permissible exposure may be exceeded but the risk of injury is low.
Class 3B	Laser products having a level of accessible emission which can be harmful to the eyes, whether magnifying viewing aids are used or not. Class 3B laser products can also be harmful to the skin at output levels approaching the upper of the limit of this class.
Class 4	Laser products having a level of accessible emission which can be harmful to both the eyes and the skin. Diffuse reflections of the laser radiation may also be hazardous. The laser emission can also be sufficient to ignite material on which it impinges and to generate harmful radiation or fume hazards by interaction with target materials.

5. Register of lasers

- a. The University must keep a register of equipment used on its premises.
- b. College / Portfolio Areas which have laser equipment must ensure it is registered with the University WHS Unit using the Laser Equipment Registration form.
 - i. Any changes to laser equipment details, including location, must be update via the registration form.

- ii. A documented copy of the Laser Equipment Registration Form for each laser must also be kept by the local area.
- c. Where a laser is used as a research tool with multiple uses, these uses should be indicated on the registration form.

6. Minimum safety requirements

6.1. General

- a. Australian Standard AS/NZS IEC 60825.1 *Safety of laser products* and AS/NZ IEC 60825.14 *Safety of laser products – A user's guide* give details of control measures and associated requirements for the use of various classes of laboratory laser installations.
- b. Equipment containing lasers must comply with Australian standards unless alternative measures are adopted that provide equivalent or better protection as set out in the relevant standard.

6.2. Class 2 and 3R lasers

- a. Controls to prevent continuous viewing of the direct beam must be implemented. While momentary viewing is not considered to be hazardous, Class 2 and 3R lasers must not be aimed at people. It is preferable that beams are terminated at the end of their useful path or located well above or below eye level.
- b. Class 3R lasers must not be viewed with optical viewing aids.

6.3. Class 3B and 4 lasers

- a. Class 3B and 4 lasers must have:
 - appropriate controls to prevent unauthorized access to an area whilst lasers are in use (which may include controls such as key pad entry or remote interlock as appropriate);
 - beam stop or attenuator;
 - warning signs and labelling as per IEC AS/NZS 60825.1;
 - beams terminated at the end of their useful path;
 - beams as short as practicable, with minimum number of direction changes, and where practicable, be enclosed;
 - elimination of specular reflections;
 - use of eye protection where there is a potential eye hazard;
 - use of protective clothing;
 - medical examination of a laser user by a qualified specialist carried out immediately if there is a suspected injury;
 - provision of appropriate training on safe use of equipment, including maintenance; and
 - safe work procedures for control of hazards.
- b. Room requirements for workshop and laboratory design for Class 4 lasers include:
 - no windows;
 - an area for storing protective eyewear;
 - appropriate locks to prevent unauthorized and unprotected personnel from entering;
 - a non-defeatable door interlock or equivalent measures to prevent accidental exposure during laser operation;
 - signs at entrance;
 - laser beam path enclosed;

- beams positively terminated;
- laser work area free of unnecessary specular surfaces;
- fire resistant curtain materials where the types of lasers in use present an ignition risk;
- a clearly visible power cut-off switch which kills power to the laser;
- a warning light located outside the laboratory/workshop door to indicate when laser is firing; and

6.4. Training

- Must ensure any workers operating the laser equipment are trained in the proper operation of the equipment including the risks, control measures and personal protective equipment.
- In addition, all users of Class 3 and 4 lasers must undertake the University laser safety training.

7. Laser risk management

- Identification of hazards and assessment of risk associated with the use of the laser must be conducted to determine if any further controls need to be implemented in addition to the minimum requirements set out in AS/NZS IEC 60825.1 and AS/NZS IEC 60825.14.
- A risk assessment must be undertaken before a laser is first used and/or after it has been modified. The assessment must take into account at least the following:
 - the capacity of the laser to injure people;
 - an evaluation of the suitability of the laser for the work;
 - the environment in which the laser is used;
 - the hazards involved and the associated risks, including during any maintenance; and
 - the level of training required for staff and students.
- Persons responsible for lasers must keep a documented copy of the risk assessment.

8. Labelling and warnings

- Each laser must have affixed to it labels as required by Australian standards.
- Any area where Class 3 and 4 lasers are used must have clear signage with the name of the Laser Safety Officer and contact details including a telephone number at which he or she may be contacted.

9. Safe Work Procedures

- Safe work procedures (SWPs) must be available in a College/area or research centre where Class 3 or 4 lasers are used.
- The procedures must list the hazards associated with the particular laser(s) used, the conditions under which they can be used and the precautions necessary to ensure safety.

10. Lasers in construction or building operations

- Lasers used in surveying, building or construction must be used in compliance with Australian Standard AS/NZ 2397 *Safe use of lasers in the building and construction industry*.
- Class 3B and Class 4 lasers are not to be used in construction work.

11. Lasers in health care

The use of lasers in dental and medical practice must comply with Australian Standard AS/NZS 4173 *Safe use of lasers and intense light sources in health care*.

12. Portable lasers and associated instruments

Portable lasers and associated instruments (egg theodolites, total stations, laser scanners, laser levels) must be risk assessed and controls implemented for each specific use and location.

13. Intense light sources

Intense light sources such as some LEDs may pose similar risks to eyes and skin and must be risk assessed and controls implemented for each specific use and location.

Other light sources including non-ionising UV sources are considered under the IEC 62471 *Photobiological safety of lamps and lamp systems* standard.

14. Laser pointers

- a. Laser pointers with an AEL of greater than 1 milliwatt (1mW) are classed as a prohibited weapon and are not to be used other than for astronomical use as outlined in the Summary Offences (Weapons) Amendment Act 2012.
- b. Laser pointers with and AEL of <1mW may be used for teaching purposes.

15. Laser displays and shows

The use of lasers in displays, shows and presentations must comply with AS/NZS IEC 60825.3: *Safety of laser products - Guidance for laser displays and shows*.

16. Standards

Users of lasers must, at a minimum, comply with the following Australian Standards:

- AS/NZS IEC 60825.1 *Safety of laser products – Equipment classification and requirements*
- AS/NZS IEC 60825.14 *Safety of laser products – A user's guide*
- AS/NZS IEC 60825.3 *Safety of laser products - Guidance for laser displays and shows*
- AS/NZS IEC 60825.4 *Safety of laser products – Laser Guards*
- AS/NZS 1337.4 *Personal eye-protection - Filters and eye-protectors against laser radiation (laser eye-protectors)*
- AS/NZS 1337.5 *Personal eye-protection - Eye-protectors for adjustment work on lasers and laser systems (laser adjustment eye-protectors)*
- AS/NZS 2397 *Safe use of lasers in the building and construction industry*
- AS/NZS 4173 *Safe use of lasers and intense light sources in health care*

Where areas do not comply with specific requirements as set out in the Australian Standards, alternative measures that provide equivalent or better protection must be adopted. The implementation of control measures not specified by the Australian Standards must be risk assessed and controlled in line with these procedures.

17. Responsibilities

Vice-Presidents and Executive Deans of College, and Portfolio Heads	Where lasers are used <ol style="list-style-type: none">a. Systems are in place to ensure that these procedures are implemented effectively in their College/Portfolio;
Supervisors, managers and researchers	<ol style="list-style-type: none">a. Implement these procedures in their area of responsibility.b. Must ensure laser users are suitably trained in the safe operation of lasers.c. Providing suitable PPE to laser users.

	d. Ensure that any laser incidents are reported.
Property, Facilities and Development Project Officers	Ensure that use of a laser or laser product in building or construction by University staff and/or contractors at University sites or premises is in accordance with AS/NZS 2397.
Laser Safety Officer	<ul style="list-style-type: none"> a. Maintain a register of all potentially hazardous laser products; b. Monitoring compliance with these procedures for safe laser use; c. Taking immediate and appropriate action when non-compliance is observed; d. Participate in the review of this procedure; e. Assist laser users with laser risk management, including safety precautions to be implemented; f. Ensure that each area or research centre which uses Class 3R, Class 3B or Class 4 lasers maintains a register of the equipment in their possession; g. Conduct audits on areas that have and use lasers.
Staff and students	<ul style="list-style-type: none"> a. Comply with safety instructions and procedures, undertake any required training, and use control measures and/or personal protective equipment to ensure their own health and safety and the health and safety of others; b. work safely and not put themselves or others at risk of injury from exposure to lasers

18. Related procedures

[WHS Risk Management Procedures](#)

[Plant Safety Procedures](#)

[Personal Protective Equipment](#)

19. Forms

Laser Equipment Registration Form

Approval Authority	Will be as specified in the Policy on Policies or the Delegations Register
Responsible Officer	
Approval Date	To be completed by Policy & Secretariat
Effective Date	To be completed by Policy & Secretariat
Review Date*	To be completed by Policy & Secretariat
HPRM file number	To be completed by Policy & Secretariat

* Unless otherwise indicated, this procedure will still apply beyond the review date.

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