OBJECTIVE

These guidelines detail the requirements to ensure that RMIT manages the health and safety risks associated with the use of lasers, through the effective implementation of our Global Safety Model, regulations and applicable Standards.

BACKGROUND

SCOPE

These guidelines apply to RMIT operations globally.

Lasers differ from other sources of non-ionising radiation in both the mechanism of operation and the quality of radiation produced. Laser beams usually are of a small diameter with low divergence and a high-power density. Lasers can either emit radiation continuously or in a single pulse or a series of pulses. The output is either monochromatic or consists of several specific wavelengths.

WHAT MUST GO RIGHT?

The expected outcomes – known as 'what must go right' – will be that:

- Persons are protected from laser radiation in the wavelength range 100 nm to 1 mm by indicating low risk working levels of laser radiation
- information is provided to the user ensuring procedures providing adequate controls are developed
- it is ensured that there is adequate warning of hazards associated with accessible radiation from laser products through signs, labels and instructions
- there is reduced possibility of injury by minimising unnecessary accessible radiation, provide improved control of laser radiation hazards through protective features, and to provide safe usage of laser products by identifying user control measures
- there is safe installation, operation, maintenance and disposal of laser systems or equipment
- there is sufficient and effective laser safety training and supervision provided to users of laser systems and equipment
- those who manage, support, maintain and/or use understand their responsibilities concerning laser safety
- a person who has completed the required laser safety training is appointed as the Laser Safety Officer

PROCEDURE

1. Laser Classification and Modification

Classification

The ***AS/NZS IEC 60825*** series divide lasers into eight classes according to accessible emission limits which are given in tables for a range of laser wavelengths and exposure times. The classes are: 1, 1C, 1M, 2, 2M, 3R, 3B and 4.

Lasers are classed according to the hazard level with Class 4 lasers being the highest. The power of the laser can be either in a continuous or pulsed mode, with a specified wavelength/colour. Class 4 lasers can cause significant damage to the human body and there are strict requirements for their use.

The classification system can be broadly described in the following terms:

- **Class 1** - includes any laser product which during operation does not permit human access to accessible laser radiation in excess of the accessible emission limits of Class 1 for applicable wavelengths and emission durations.

- **Class 1C** - any laser product which is designed explicitly for contact applications to the skin or non-ocular tissue and that:
  - during operation ocular hazard is prevented by engineering means, i.e. the accessible emission is stopped or reduced to below the accessible emission limits of class 1 when the laser/applicator is removed from contact with the skin or non-ocular tissue;
  - during operation and when in contact with skin or non-ocular tissue, irradiance or radiant exposure levels may exceed the skin MPE as necessary for the intended treatment procedure; and
  - the laser product complies with the applicable vertical standards.

- **Class 1M -** any laser product in the wavelength range from 302.5 nm to 4 000 nm which during operation does not permit human access to accessible laser radiation in excess of the accessible emission limits of Class 1 for applicable wavelengths and emission durations.
  Class 1 and 1M lasers are those which are incapable of damaging the eyes or skin because of either engineered design or inherently low power output. The lasers used in CD players are the most common example of this category.

- **Class 2** - include any laser product in the wavelength range from 400 nm to 700 nm which during operation does not permit human access to accessible laser radiation in excess of the accessible emission limits of Class 2 for applicable wavelengths and emission durations.
  Class 2 lasers have sufficient power output to cause damage to the eyes if viewed continuously. However, their outputs are low enough to allow the natural aversion responses, such as blinking, to prevent damage. Additional hazard control measures take the form of cautionary signs or labels. The laser pointers often used by conference presenters are common examples.

- **Class 2M** - include any laser product in the wavelength range from 400 nm to 700 nm which during operation does not permit human access to accessible laser radiation in excess of the accessible emission limits of Class 2 for applicable wavelengths and emission durations.
  Class 2M lasers can be hazardous if the beam is viewed directly with optical instruments.

- **Class 3R -** lasers have the potential to cause damage to the eyes from intra-beam viewing and precautions are required to prevent either direct viewing or viewing with optical instruments. They include any laser products which during operation permits human access to laser radiation in excess of the accessible emission limits of Class 1 and Class 2, as applicable, but which does not permit human access to laser radiation in excess of the accessible emission limits of Class 3B.

- **Class 3B -** lasers are more hazardous because of either higher output or operation outside visible wavelengths. These are powerful enough to cause eye damage in a time shorter than the aversion response, human blink reflex or the blink reflex is by-passed due to the invisibility of the beam. In addition, specular reflections may also be hazardous. In general, more stringent controls are needed to prevent exposure. include any laser products which during operation permits human access to laser radiation in excess of the accessible emission limits of Class 1, Class 2 and Class 3R, as applicable, but which does not permit human access to laser radiation in excess of the accessible emission limits of Class 4.

- **Class 4 -** lasers include any laser product which permits human access to laser radiation in excess of the accessible emission limits of Class 3B. They are high power devices capable of producing eye damage even from diffuse reflection. Skin damage is also possible from even brief exposures. Class 4 lasers may also constitute a fire hazard. Examples of class 4 lasers include entertainment lasers, surgical lasers and those used in the plastic, wood and metal fabrication industries.

Embedded Laser Systems

Laser products of one class may contain an embedded or enclosed laser of a higher class. This is commonly encountered in laser products assigned to Class 1 or Class 2 laser products.

Class 1 and Class 2 lasers products that have embedded Class 3 or Class 4 lasers can present higher levels of radiation exposure risks to users. This risk may arise during:

- opening, removal or displacement of any part of the enclosure during installation, servicing or maintenance or operation
- tampering with in-built over-ride systems or
- potential failure of the in-built interlock systems

For such systems with embedded higher class laser, local safety procedures must be developed for installation, servicing and maintenance and correct use of the system, as per the manufacturer's manual.

The Manufacturer's Manual must always be consulted when assessing the risks and developing local safety procedures and control measures.

Modification

Modifications to the design of a laser can change the intended function of that laser. Modification to laser design can place the laser into a higher or lower classification within the scope of ***AS/NZS IEC 60825.1***. Modifications to lasers may only proceed after a risk assessment has been completed. Modifications must be carried out and/or checked by a Level 1 Laser Safety Officer or equivalent.

If any laser has been or will be modified, then the person completing the modification must ensure that the laser is reclassified and relabelled within the scope of ***AS/NZS IEC 60825.1***.

The modifications are to be communicated to all key stakeholders prior to and post making the modifications.

Modification for prohibited weapons

Some laser pointers are prohibited under the ***Control of Weapons Act 1990*** and ***Regulations 2011 (Vic)***.

Class 3R, 3B and 4 laser pointers are prohibited, and it is an offense to import, sell, manufacture, possess and use them.

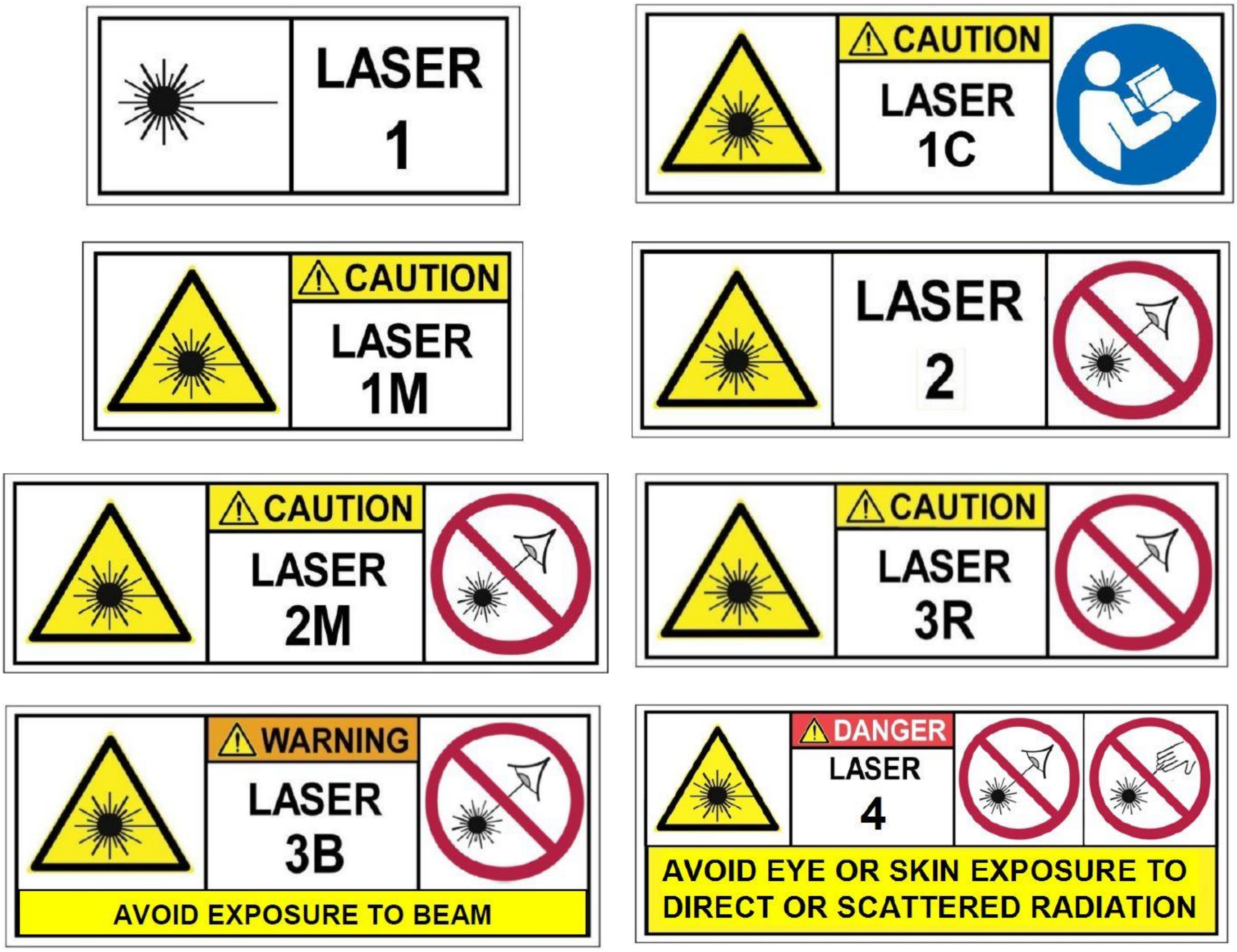
RMIT strictly prohibits the use of all laser pointers that are not classified as Class 1 or 2. User of higher-class lasers should be based on a risk assessment and appropriate level of approval.

2. Engineering and Labelling Specifications

Product manufactures are required to build in certain safety features into lasers depending on the class.

Additionally, each laser product is required to be labelled in accordance with ***AS/NZS IEC 60825.1***. Labels must be durable, permanently affixed, legible and clearly visible during operation, maintenance and service, according to their purpose. Labels shall be so positioned that they can be read without the necessity for human exposure to laser radiation in excess of the accessible emission limits for Class 1. Text borders and symbols shall be black on a yellow background except for Class 1, where this colour combination need not be used.

Examples:



3. Informational Requirements

It is the responsibility of the manufacturer to provide user instruction or an operation manual that contains all relevant safety information. ***AS/NZS IEC 60825.1*** outlines the safety information that the manufacturer needs to provide. Operational Leaders, Supervisors, Technical Officers and Educators are responsible for ensuring that user instruction or operational manuals are always available.

4. Laser Safety Officer

It is recommended that a Laser Safety Officer (LSO) is appointed where a Class 3B or Class 4 laser is in use; or where a Class 1M or Class 2M laser is in use and there is a risk that the beam may be viewed. Each portfolio, college, school or department should review what laser products are in use and then determine whether a Laser Safety Officer is required. The Laser Safety Officer may be already a person of responsibility and accountability.

The LSO has the responsibility for the administration of day-to-day matters of laser safety on behalf of RMIT. This includes, as a minimum:

- oversee and maintain Laser Registration form records
- monitor work practices to ensure safe systems of work are being followed
- ensure the wearing of appropriate PPE by each operator of a Class 3 or Class 4 laser systems
- oversee the appropriate training of each laser system operators

- report all accidents, incidents and near misses
- ensure appropriate warning signs are posted at entrances of all laser facilities
- Review risk assessments to ensure appropriate hazard and risk mitigation strategies are in place.
- monitor compliance with these guidelines, taking appropriate action(s) when there is non-compliance and / or where these guidelines are inadequate

A portfolio, college, school or department may appoint a Local Laser Safety Officer (LLSO) to assist the LSO with the above roles and responsibilities. The LLSO may be a person who is already a person in the Technical Officer role.

The person appointed as the LSO/LLSO must complete mandatory training as detailed below in Part 5 – Risk Management - Training.

5. Risk Management

Laser Hazards

Lasers can produce intense beams of coherent radiation at visible, UV and IR wavelengths. While lasers vary greatly in power output, wavelength and purpose, the hazard potential of the types used for research purposes can be significant.

Eyes are the most susceptible to damage from lasers. Different parts of the eyes are susceptible to different wavelengths. Damage can occur from heating, photochemical reactions and explosive rupture. Appropriate controls are essential to prevent ocular damage.

Skin is less at risk from damage caused by lasers, but exposure to lasers still need to be managed appropriately to minimise the potential for skin burns.

Improperly used laser devices are potentially dangerous. Effects can range from mild skin burns to irreversible injury to the skin and eye. The biological damage caused by lasers is produced through thermal, acoustical and photochemical processes.

Thermal effects are caused by a rise in temperature following absorption of laser energy. The severity of the damage is dependent upon several factors, including exposure duration, wavelength of the beam, energy of the beam, and the area and type of tissue exposed to the beam.

Acoustical effects result from a mechanical shockwave, propagated through tissue, ultimately damaging the tissue. This happens when the laser beam causes localized vaporization of tissue, causing the shockwave analogous to ripples in water from throwing a rock into a pond.

Beam exposure may also cause photochemical effects when photons interact with tissue cells. A change in cell chemistry may result in damage or change to tissue. Photochemical effects depend greatly on wavelength.

The table below summarises the probable biological effects of exposure of eyes and skin to different wavelengths.

CIE spectral region	Eye	Skin
Ultra-violet C	Photokeratitis	Erythema (sunburn) Accelerated skin aging Increased pigmentation
Ultra-violet B		
Ultra-violet A	Photochemical cataract	Pigment darkening Skin burn
Visible	Photochemical and thermal retinal injury	Pigment darkening Photosensitive reactions Skin burn

Infra-red A	Cataract and retinal burn	Skin burn
Infra-red B	Corneal burn, aqueous flare, cataract	
Infra-red C	Corneal burn only	

Exposure to the laser beam is not limited to direct beam exposure. Particularly for high powered lasers, exposure to beam reflections may be just as damaging as exposure to the primary beam.

Intrabeam exposure means that the eye or skin is exposed directly to all or part of the laser beam. The eye or skin is exposed to the full irradiance or radiant exposure possible.

Specular reflections from mirror surfaces can be nearly as harmful as exposure to the direct beam, particularly if the surface is flat. Curved mirror-like surfaces will widen the beam such that while the exposed eye or skin does not absorb the full impact of the beam, there is a larger area for possible exposure.

A diffuse surface is a surface that will reflect the laser beam in many directions. Mirror-like surfaces that are not completely flat, such as jewellery or metal tools, may cause ***diffuse reflections*** of the beam. These reflections do not carry the full power or energy of the primary beam, but may still be harmful, particularly for high powered lasers. Diffuse reflections from Class 4 lasers are capable of initiating fires.

Whether a surface is a diffuse reflector or a specular reflector will depend upon the wavelength of the beam. A surface that would be a diffuse reflector for a visible laser may be a specular reflector for an infrared laser beam.

Additional information on the biophysical hazards associated with lasers is available in section *Annex D* of the standard ***AS/NZS IEC 60825.1 – 2014***.

Identifying Hazards

Any work that involves the installation, operation, maintenance, service or disposal of laser equipment can result in exposure to several hazards. Laser radiation is a major hazard associated with laser use. Additional hazards such as electricity, fumes, and high-pressure gases can also potentially cause harm to those working with lasers.

The following table summarises the hazards listed in the standard ***AS/NZS IEC 60825.14 - 2011*** and outlines possible control solutions:

HAZARD	POTENTIAL DANGER	RISK CONTROLS
Laser radiation	▪ Exposure to radiation from a laser whose emission are potentially hazardous – usually a laser of any class other that 1 or 2	▪ Eliminate by enclosing the radiation at the source ▪ Use flame retardant screens to isolate users and bystanders from the radiation ▪ Interlock systems
Health Hazards	▪ Direct exposure to the eyes or skin to laser radiation	▪ Appropriate design of equipment; eliminate health hazards by enclosing the radiation at the source ▪ Personal protective equipment, e.g. wear appropriate laser safety glasses and skin protection gloves
Electricity	▪ High voltage electricity ▪ Capacitors that store significant amounts of electric charge	▪ Appropriate design of equipment; ensure all electrical

	which can remain after the equipment has been disconnected from the electrical supply	terminals are enclosed and isolated from the laser user ▪ Develop safe work procedures for servicing work that might expose the electrical terminals, precautions must be taken to ensure the removal of stored energy
Collateral radiation	▪ Other types of radiation other than laser radiation can be produced by the laser equipment	▪ Ensure control measure protect the laser user from radiation if external laser casing needs to be removed ▪ Personal protective equipment
Hazardous chemicals	▪ The material used as the active medium in several lasers can be toxic and carcinogenic	▪ Adopt stringent storage, handling and disposal precautions ▪ Develop safe work procedures to document storage, handling and disposal requirements
Fume	▪ Class 4 lasers can release hazardous particulate and gaseous by products through the interaction of the laser beam with the target material	▪ Engineer equipment to allow for emergency stop aspects to be built into the design ▪ Develop safe work procedures that ensure that provisions are made to shut down the laser if hazardous particulate and gaseous by products are produced as the result of laser work
Noise	▪ Discharge of capacitor banks within the laser power supply can generate potentially hazardous noise levels ▪ Ultrasonic emissions and repetitive noise from pulsed lasers	▪ Engineering laser design to minimise the impact of noise ▪ Personal Protective Equipment including hearing protection
Mechanical hazards	▪ Handling of ancillary items including gas cylinders, trailing cables and water circulation tubing can cause trip hazards	▪ Engineer gas supply systems into building services ▪ Substitute large gas bottles for smaller gas bottles ▪ Tie up loose wires and pipes to eliminate trip hazards
Fire, explosion and thermal damage	▪ Laser emission from high power laser can ignite target materials ▪ Laser emissions from lower class lasers can cause explosions in in combustible gases or in high concentrations of airborne dust, especially when	▪ Use of filters to reduce heat and radiation that are emitted from the laser ▪ Have firefighting equipment available ▪ Train laser user to use firefighting equipment

	concentrated over very small areas ▪ Internal components can explode, for example high-pressure discharge lamps and capacitor banks ▪ Faulty equipment can cause flammable components to catch fire	▪ Develop safe work procedures that require a laser user to always be present in the area that lasers are being used
Heat and cold	▪ Internal parts of some laser can be hot ▪ Beam-steering mirrors used in conjunction with high-power processing lasers can reach high temperatures ▪ Cryogenic cooling can sometimes be used with or in conjunction with laser equipment	▪ Engineer laser design to isolate the user from hot and cold hazards
Temperature and humidity	▪ Excessive high or low ambient temperatures can affect the performance of in-built laser safety features ▪ High levels of humidity can affect the performance of in-built laser safety features ▪ Condensation on optical components can affect beam transmission through the system	▪ Use lasers in areas that have strict temperature control, for example airconditioned laboratories and other ventilation systems
Mechanical shock and vibration	▪ Can cause misalignment of the optical path, generating hazardous errant beams	▪ Engineer the laser set up so that the equipment is bolted down to a stable surface, for example a table
Atmospheric affects	▪ A high-powered laser beam can ignite solvent vapour, dust and inflammable gases.	▪ Do not use laser near flammable or combustible products including open solvent containers ▪ Use of non-flammable products such as nitrogen to clean systems
Ergonomic considerations	▪ Poor arrangement of the physical layout of the laser and associated equipment	▪ Get a professional ergonomist to conduct an assessment ▪ Ensure that operators are not operating at a level where their eyes are at the same level as the laser beam

Whenever it is reasonably practicable health and safety hazards, must be controlled through effective engineering design. When it is not reasonably practicable to do so, Operational Leaders, Supervisors, Technical Officers, Educators and Laser Safety Officers are responsible to ensure that the risks associated with health and safety hazards are managed through other control options.

Risk Assessment and Control

Risk assessments for the use of lasers need to be completed following the requirements of ***HR - HSW-PR09 - HSW Risk Management*** and utilising the ***STEM-RA-009 – Laser Radiation*** template.

Risk assessments must be reviewed and approved by a designated Laser Safety Officer or equivalent.

Control

The completion of a risk assessment will help to determine any further controls to be implemented in conjunction with this guideline.

Low powered lasers, such as those incorporated in consumer products, usually have a high degree of inherent safety control measures engineered into the design and no additional safety measures are needed.

The lasers used in research are often high-power units and while some level of engineered safety features are inherent in their design, a risk assessment is must be completed in order to identify additional hazards that have not been mitigated by engineering controls.

Documented safe working procedures are vital – particularly in research applications where equipment configurations may need to be altered frequently. This increases the importance of the safety awareness of users because more reliance must be placed on procedural safety measures and the use of protective equipment.

As a minimum the following controls must be implemented when working with lasers:

Safe Work Procedures

As noted above documented safe working procedures are vital – particularly in research applications where equipment configurations may need to be altered frequently. Details for completing documented safe work method statements (SWMS) are in ***HR - HSW-PR09-WI04 - SWMS Work Instruction***.

Training

All users must be made aware of any hazards to which they may be exposed during the use of laser equipment and of the applicable procedures necessary to ensure protection. Adequate warnings including the laser hazard symbol must be displayed.

Enough local instruction and/or training must be provided so that users have the necessary understanding to avoid placing themselves and others at unacceptable risk.

Such instruction and training must be commensurate with the type of hazard and appropriate for the users concerned. It must include, but need not be limited to the:

- RMIT's procedures for safe laser use including local procedures and rules
- risks of harm that could arise from the use and reasonably foreseeable misuse of the laser equipment
- meaning of displayed warning signs
- correct use and operation of the laser equipment, and of associated equipment, including personal protective equipment (where applicable)
- procedures to be followed in the event of an actual or suspected incident (whether safety-related or other).

In addition to the above, the following training is mandatory or recommended:

- RMIT Laser Safety module – introductory laser safety module provided through Bridge; mandatory for all users of laser systems Class 1 to Class 4

- Level 3 Operator Laser Safety – recommended for users of Class 1, Class 2 and Class 3R laser systems; recommended as an introductory pre-course activity prior to attending Level 2 and/or Level 1 Laser Safety training; course provided through external training provider
- Level 2 Operator Laser Safety – mandatory for users of Class 3B and 4 laser systems; and for staff that are directed to implement laser safety programs under the direction of Level 1 Laser Safety Officer; course provided through external training provider
- Level 1 Operator Laser Safety – mandatory for Laser Safety Officers who are completing quantitative analysis of laser hazards in accordance with Australian Laser Safety Standards; course provided through external training provider

Laser Safety training must be completed prior to operating or working with laser products. Refresher training is to be completed as required to ensure continuing compliance.

Records of training are to be kept by the College / School / department or portfolio using ***HSW-PR46-FR02 – Laser User Registration Form*** and as detailed in ***HSW-PR04 - HSW Records Management*****.**

Administrative Controls

An administrative framework is needed to ensure that the procedures and conditions necessary for a safe working environment are maintained. Where lasers of class 3 (all 3 subdivisions) and class 4 are used, more detailed safe working rules and emergency procedures will need to be developed. Advice can be obtained from the Laser Safety Officer (LSO) regarding the content of such safety rules and procedures.

To aid in managing the risks associated with the use of lasers, the following controls are to be implemented where lasers are used:

1. Each School or Unit which uses lasers of classes 3 or 4 shall keep a register of the equipment (***HSW-PR45-FR01 - Laser Equipment Registration Form***) in their possession. The register is to include full details of make, model, serial number, power output, classification and the designated purpose for use of each laser. Where a laser is employed as a research tool capable of multiple uses, this is to be indicated.
2. The Operational Leader of a department or research centre where lasers are used shall appoint a person with appropriate knowledge to act as Local Laser Safety Officer (LLSO). Such deputies – Technical Officers with Level 2 Laser Safety qualification - shall be appointed as necessary to ensure availability of expertise, considering leave and other absences.
3. Every laser of Class 3 or 4 shall have affixed to it (in addition to such labels required under appropriate Australian Standards) the name of the Local LSO and a telephone number at which they may be contacted.
4. Appropriate safe operating procedures must be available in a department or research centre in which lasers of classes 3 or 4 are used. The procedures must list the hazards associated with the lasers used in the department, the conditions under which they can be used and the precautions necessary to ensure safety.
5. Lasers for use in surveying, building or construction must be used in compliance with ***AS 2397***. As with ***AS/NZS IEC 60825.1***, a copy must be made available to the LSO, Local LSO and to users.
6. An examination of the eye by an optometrist or ophthalmologist must be conducted after an accidental exposure in excess of the MPE and should follow the details given in ***AS/NZS IEC 60825.14***. Pre-placement or periodic examination of the eye as a safety measure is not required.
7. An examination of the skin by a medical practitioner should be conducted after an accidental exposure in excess of the MPE in conjunction with a full biophysical investigation of the accident. Pre-placement or periodic examination of the skin as a safety measure is not required.

Supervision

Users / operators of laser systems, who have completed RMIT Laser Safety module and / or Level 3 Operator Laser Safety course, must be directly supervised by someone who has completed Level 2 or Level 1 Operator Laser Safety course until the user / operator of the laser system has been deemed competent to use the laser system by the same supervisor.

Users / operators of laser systems who have not completed the required training for the system they wish to operate must be supervised at all times by someone who has completed the training and is deemed competent.

Specific Controls for Class 3 and 4 Lasers

Class 3 and 4 lasers are required to have:

- specific safety protocols including remote interlock and/or laser beam enclosure
- beam stop or attenuator
- warning signs and labelling
- elimination of specular reflections
- use of eye protection where there is a potential eye hazard
- use of protective clothing
- requirement for medical examination immediately if there is a suspected injury
- provision of appropriate training on safe use of equipment including maintenance
- safe work procedures for control of hazards

Considerations for workspace and laboratory design for class 3 and 4 lasers include:

- no windows
- an area for storing protective eyewear – outside laser room where possible
- key locks to prevent unauthorised and unprotected personnel from entering
- a non-defeatable door interlock
- signs at entrance to lab
- laser beam path must be enclosed
- beams must be positively terminated
- laser work area must be free of unnecessary specular surfaces
- curtain materials must be fire resistant
- a clearly visible power cut-off switch which kills power to the laser
- a warning light must be located outside of the lab door to indicate when the laser if firing
- other controls as necessary

Incident, near miss and hazard reporting

All incidents, near misses and hazards involving lasers and laser equipment must be reported. The Operational Leader must ensure the incident or near miss is recorded in P.R.I.M.E within 24 hours of the incident or near miss being reported, or as soon as practicable. Any person can enter the incident or near miss into P.R.I.M.E., it does not have to be the person involved.

If P.R.I.M.E. is unavailable for any reason, an Incident Report Form (***HSW-PR10-FR01 - Incident Report Form***) and Hazard Report Form (***HSW-PR10-FR02 - Hazard Report Form***) can be downloaded and completed as a hard copy document. After notifying the HSW Team of the incident or hazard, the completed Report Form should be forwarded to **healthandsafety@rmit.edu.au**, and when P.R.I.M.E. is available enter the incident or hazard as soon as practicable.

6. Responsibilities

Senior Leaders

- Ensure compliance with this process within their area of authority.
- Ensure consultation arrangements are followed while implementing this procedure.

Operational Leaders, Supervisors

- Ensure laser operators work in accordance with this guideline.
- Ensure that, as a minimum, risk management activities are undertaken.
- Ensure that personnel who are operating lasers are provided with suitable levels of training, supervision and instruction.
- Ensure all users of Class 3B and/or Class 4 lasers are trained
- Ensure the correct laser safety eyewear is readily available for users as per the risk assessment
- Ensure laboratories where Class 3B and/or Class 4 are used are indicated with external signage

Laser Safety Officer(s) (LSO)

- Ensure laser operators work in accordance with this guideline.
- Review and approve risk assessments as required.
- Ensure that personnel who are operating lasers have completed mandatory and/or suitable levels of training.
- Ensure and manage the maintenance of Laser Equipment Registration forms.
- Liaise with Local Laser Safety Officers.
- Ensure that suitable and effective safe operating procedures or safe work procedures are available for lasers and laser equipment as well as ensuring necessary instructions, from the relevant laser equipment’s operational manual, are implemented into safe work procedures
- Review, assess and implement control measures for reported hazards associated with lasers and laser equipment
- Participate in incident or near miss investigations, including formulating and implementing control and/or preventive measures

Laser Operators

- Participate in risk assessments for the work being undertaken that involves the use of lasers.
- Work in accordance with any safe operating procedures or safe work procedures
- Report all incidents, near misses and hazards associated with lasers and laser equipment

7. Definitions

Defines any key terms and acronyms relating to the process where they apply.

Term / acronym	Definition

Infrared (IR) radiation	Electromagnetic energy having a wavelength of 700nm to 1mm (Near IR – 700 nm to 1400 nm; Far IR – 1400 nm to 1 mm).
Laser	Acronym for "Light Amplification by Stimulated Emission of Radiation" and defined as any device which can be made to produce or amplify electromagnetic radiation in the wavelength range from 100 nm to 1mm primarily by the process of controlled stimulated emission (AS/IEC 60825.1). Lasers emit in the Ultraviolet, Infrared & Visible parts of the electromagnetic spectrum.
Laser pointer	A type of portable pen-shaped laser normally designed to be held by hand and are most commonly used to project a point of light that can highlight items of interest, for example during a presentation. Most laser pointers have a low output beam power (less than 1 mW). In NSW, laser pointers that have outputs of ≥1mW are illegal without a firearms licence.
Maximum Permissible Exposure (MPE)	The level of laser radiation to which, under normal circumstances, persons may be exposed without suffering adverse effects.
Non-ionising radiation	Electromagnetic radiation not capable of producing ion pairs in biological material(s).
Ultraviolet (UV) radiation	Electromagnetic energy having a wavelength of 100nm to 400nm (UV-A 315-400 nm; UV-B 280-315 nm; UV-C 180-280 nm).
Visible light radiation	Electromagnetic energy having a wavelength of 400nm to 700nm.

8. Supporting Documents

Lists the supporting and related Processes and Guidance Material, Legislative references, Australian and International Standards etc. that may be useful references for process users

- HR - HSW-PR09 - HSW Risk Management
- HR - HSW-PR09-WI04 - SWMS Work Instruction
- HR - HSW-PR01-FR01 - SWMS Review Checklist Form
- HR - HSW-PR09-TM03 - Safe Work Method Statement Form
- STEM-RA-09 – Laser Radiation risk assessment template
- AS/NZS IEC 60825 Safety of Laser Products (series)
  - Part 1 – Equipment classification and requirements
  - Part 3 – Guidance for laser displays and shows
  - Part 4 – Laser guards
  - Part 5 – Manufacturers checklist for IEC 60825-1
  - Part 13 – Measurements for classification of laser products
  - Part 14 – A user's guide
- AS 2397 Safe Use of Lasers in the Building and Construction Industry
- AS/NZS 4173 Guide to the Safe Use of Lasers in Health Care
- Laser Classifications and Potential Hazards Information Sheet (Safe Work Australia)
- RPS 18 Safety Guide for the Use of Radiation in Schools (ARPANSA)
- ICNIRP Guidelines on Limits of Exposure to Laser Radiation of Wavelengths between 180 nm and 1,000 µm (International Commission on Non-Ionising Radiation Protection)