

LASER SAFETY CODE OF PRACTICE

1. INTRODUCTION

This code of practice is based upon The Control of Artificial Optical Radiation at Work Regulations (AOR) 2010 cover all forms of artificial light, including lasers.

2. SCOPE

The aims and objectives of this code of practice are:

- To ensure that Departments have a program of risk assessments to identify significant hazards in their activities and implement measures to eliminate them or to reduce them so far as is reasonably practicable.
- To ensure that Departments have a suitable and sufficient program to manage the risk in their area including the implementation of risk assessments, local procedures, appointed persons and training.
- To ensure that the above arrangements are transparent and clearly communicated to all who may require them.

3. RISK ASSESSMENT

Risk assessments must be undertaken and documented for all activities involving lasers, in accordance with the Control of Artificial Optical Radiation at Work Regulations 2010.

Assessments must be reviewed following any significant changes, or if the safety controls are suspected to be insufficient, following an incident for example.

Every effort must be made to ensure laser beams are enclosed. In exceptional circumstances, where controls are down to the level of laser safety eyewear, a robust justification must be in place to demonstrate that it is not reasonably practicable to enclose the beam.

4. TRAINING & INFORMATION

All staff likely that may be harmed by laser activities must be provided with appropriate laser safety awareness training and information.

Staff in key safety responsibility roles should be knowledgeable in laser safety management.

Safety information should be incorporated into the written procedures to help demonstrate provision of laser safety training and information. Staff should read, understand and sign the relevant documents. Understanding of these should be actively checked and documented by a suitable member of staff.

The table below provides a guide to training.

	Laser safety Awareness training	Laser safety Management training
Staff / Students	Anyone who may be harmed as a result to the laser activity	University Laser Safety Adviser, Laser Safety Supervisors
Update Period	3 years, following a significant break, or when there are any significant changes.	5 years, following a significant break from the role, or when there are any significant changes.
Example Methods	Written procedures, safety talks, e-learning	Laser safety management course by laser safety training provider or in-house.

5. LASERS EXPLAINED

5.1 The word 'laser' is an acronym for Light Amplification by the Stimulated Emission of Radiation. The 'light' produced by a laser, a form of non-ionising radiation, has a unique combination of characteristics that distinguishes laser radiation from all other light sources. Lasers come in various forms and have many uses at work, in the home and for leisure: teaching, research, manufacturing, medicine, dentistry, shop checkouts, surveying tools, communications, entertainment, and office and audiovisual equipment. Lasers emit radiation as narrow concentrated beams of light, not necessarily visible to the human eye. Their most commonly recognised hazard is their ability to damage eyesight or burn skin, which can vary markedly according to the wavelength and power of the output. However, in some cases, other associated risks from use of the equipment may be more hazardous such as heat, dust and fumes.

5.2 The British Standard BS EN 60825-1:2014 'Safety of laser products Part 1: Equipment classification and requirements' classifies laser products according to the laser beam hazard. Brief definitions are:

Class 1 - Safe under reasonably foreseeable conditions of operation.

Class 1C - Safe without viewing aids, lasers are designed explicitly for contact applications to the skin or non-ocular tissue.

Class 1M - As Class 1 but not safe when viewed with optical aids such as eye loupes or binoculars.

Class 2 - (visible beams only) the eye is protected by the aversion responses, including the blink reflex and head movement.

Class 2M - As Class 2 but not safe when viewed with optical aids such as eye loupes or binoculars.

Class 3R - More likely to cause harm to the eye than lower class lasers but do not need as many control measures as higher-class lasers.

Class 3B - Eye damage likely to occur if the beam is viewed directly or from shiny reflections.

Class 4 - Eye and skin damage likely from the main laser beam and reflected beams. These lasers may cause fires.

6. SAFE LASERS

The Health and Safety Executive (HSE) ['Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations \(AOR\) 2010'](#) gives examples of 'safe' and 'hazardous' lasers based on definitions in the British Standard BS EN 60825-1:2014.

The HSE guidance states that any Class 1 laser product as defined in BS EN 60825-1:2014 is regarded as 'safe', for example bar code scanners and laser printers. Many items of scientific equipment are Class 1 lasers and may also be regarded as 'safe', for example spectrophotometers and particle sizers. These products may contain a higher-powered laser as an embedded component, but it is not accessible in normal use.

The HSE guidance also identifies that some lasers are perfectly safe under normal conditions of use but have the potential to cause harm if used inappropriately, for example if held very close to the eyes. They give examples of Class 1M, 2 or 2M lasers, for example some low power laser pointers in surveying tools. Some scientific and technical equipment may also contain Class 1M, 2 and 2M lasers. Class 1C lasers are engineered to be ocular safe.

7. HAZARDOUS LASERS

The HSE guidance gives examples of 'hazardous' lasers that present a 'reasonably foreseeable' risk of harming the eyes and skin of workers and where control measures are needed. All use of Class 3B and 4 lasers in industry, research and education is specified as 'hazardous' because of the potential to cause damage to eyes including blindness, burns to the skin, and fire. The guidance also states that lasers which would not otherwise be accessible, for example in a Class 1 product, but which are exposed during manufacture or repair of the equipment may also be 'hazardous' lasers for the duration of that activity.

The HSE guidance sets out the control measures to be considered on a case-by-case basis to reduce the risk of harm to the eyes and skin of workers to as low as is reasonably practicable. For use of Class 3B and 4 lasers in industry, research and education the key measures to be considered are:

- Specialist advice
- Engineered measures – enclosure, controlled areas, interlocks, remote controls, screening, clamps to hold material.
- Designated laboratories with restricted access
- Face shields, goggles or other protective eyewear and coveralls/lab coat
- Gloves where appropriate
- Include laser sources in the fire risk assessment.
- Information and training for users
- Appropriate warning signs
- Monitoring and enforcement of control measures
- Medical examination if there has been over-exposure, and health surveillance if appropriate.

8. LASER POINTERS

Misuse of laser pointers can cause damage to eyes. Under this Code of Practice, only Class 1 or 2 lasers may be used for demonstration, display or entertainment. Members of staff wishing to use a Class 3 laser pointer must first consult the University Laser Safety Adviser. Students are not permitted to use a laser pointer above Class 2 on university premises. When operating laser pointers, users must ensure that they follow the manufacturer's safety instructions, use them in a safe manner and do not expose themselves or others to the beam. Laser pointers are not to be modified in any way.

9. RESPONSIBILITIES

Executive Deans and Directors of Professional Services are responsible for:

- Appointing a Laser Safety Supervisor if Class 3R, 3B or 4 lasers are used.
- Ensuring no Class 3B or 4 laser is put into use for the first time without the approval of both the Laser Safety Supervisor and the University Laser Safety Adviser.
- Ensuring a laser survey form is completed for each laser of Class 3R and above prior to first use and on an annual basis thereafter.
- Ensuring a risk assessment is completed in an approved format and written procedures for use are produced prior to use for the first time of any laser of Class 3R and above. The written procedures for use should be kept in the same area as the laser. The risk assessment and procedures must be reviewed and if necessary revised at least annually or if there are significant changes.
- Ensuring risk assessments and laser survey forms for Class 3B and 4 lasers are forwarded to the University Laser Safety Adviser with the laser registration form prior to first use.
- Ensuring the Department Laser Safety Supervisor annually surveys laser systems of Class 3R

and above using the University laser survey form.

- Addressing any problems or recommendations notified by the Laser Safety Supervisor that arise from the annual survey. It is the responsibility of the appropriate academic supervisor to address any such problems. In conjunction with the Head of Health & Safety and the University Laser Safety Adviser, The Laser Safety Supervisor has the authority to recommend to the Executive Dean/Director of Professional Service that use of a certain laser facility should cease until remedial action has been taken.

University Laser Safety Adviser

The University Laser Safety Adviser is appointed by the Chief Operating Officer and is responsible for advising the Vice Chancellor and Laser Safety Supervisors on matters concerned with laser safety.

They are responsible for

- Assisting in preparing and keeping up to date University Policies and Codes of Practice relating to laser safety.
- Maintaining a register of all University lasers of Class 3R and above.
- Maintaining a register of all University users of lasers of Class 3R and above.
- Conducting annual audits of lasers of Class 3R or above, to ensure that the University Code of Practice for Laser Safety is being followed and making recommendations to the relevant Executive Dean/Director of Professional Service for any remedial action required.
- Advising Laser Safety Supervisors and Executive Dean/Directors of Professional Services on the operation of the University Code of Practice for Laser Safety; training for registered workers; protective equipment for laser use; labelling of lasers; and safe working procedures.
- Liaising with the Head of Health and Safety and University Occupational Health Service on matters relating to medical examinations and health of registered laser workers.
- Reporting on laser safety to the University Health and Safety Committee.

Laser Safety Supervisors

Laser Safety Supervisors are appointed by their Executive Dean/Director of Professional Service to carry out the following functions:

- Ensuring that lasers of Class 3R and above, and their users, are registered on the University laser registration form and that a copy is sent to the University Laser Safety Adviser. Registrations must be made prior to first use and then updated for changes.
- Assisting in risk assessment and drawing up of written procedures for use of all lasers in their departments.
- Liaising with the and the University Laser Safety Adviser, to arrange training in the safe use of lasers, for all registered laser users.
- Ensuring that information and precautions identified by the risk assessment, are available to laser users.

- Conducting an annual survey of their lasers of Class 3R and above and reporting results to the University Laser Safety Adviser. If there has been no change from the previous year then written confirmation of this is acceptable.

10. HIGHER EDUCATION SECTOR GUIDANCE

The Association of University Radiation Protection Officers ([AURPO](#)) [Guidance Note No 7 'Guidance on the safe use of lasers in education and research'](#) sets out Higher Education sector good practice on laser safety.

The HSE guidance makes no reference to Class 3R lasers, but they are included in the British Standard BS EN 60825-1:2014 and in the AURPO guidance. They are therefore included in the main provisions of this Code.

11. RELEVANT LEGISLATION, STANDARDS & GUIDANCE

The Control of Artificial Optical Radiation at Work Regulations 2010 to implement EC Directive 2006/25/EC.

British Standard BS EN 60825-1:2014 Safety of laser products - Part 1: Equipment classification and requirements.

PD IEC TR 60825-14:2004 Safety of laser products - Part 14: A user's guide (originally included in Part 1 of the British Standard)

Other British Standards in this series cover laser processing machines, optical fibre communication systems (OFCS), and laser displays and shows.

Health and Safety Executive [Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations \(AOR\) 2010](#) available to download from www.hse.gov.uk The HSE website also has general information about lasers used for display purposes.

The Non-binding Guide to good practice for implementing "Artificial Optical Radiation" Directive 2006/25/EC provides detailed guidance and is available to download from www.hse.gov.uk. The Public Health England (PHE)/Health Protection Agency (HPA) website also has general information about laser hazards and precautions, including laser pointers. See www.hpa.org.uk

University sector guidance is given in the Association of University Radiation Protection Officers (AURPO) [Guidance Note No.7 Guidance on the safe use of lasers in education and research](#). www.aurpo.org.uk

12. DOCUMENT CONTROL INFORMATION

[The table below should be completed by the document owner and included within every University Policy Document. The version control table will also be uploaded to the University Policy Documents webpage that hosts the procedure.]

Document Name	Laser Safety Code of Practice
Owner	David Taylor – Head of Health and Safety, Legal, Governance & Compliance
Version Number	1
Equality Analysis Form Submission Date	
Approval Date	24 October 2023
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Date of Commencement	24 October 2023
Date of Last Review	
Date for Next Review	24 October 2026
Related University Policy Documents	Health and Safety Policy
<i>For Office Use – Keywords</i>	