University of Southampton

Laser safety policy

From: Director of Health & Safety **Date: July 2024**

INTRODUCTION

Lasers have many uses in teaching, research, manufacturing, medicine, process engineering, sample measurement and fibre communications.

- Lasers emit radiation as narrow concentrated beams of light, not necessarily visible to the human eye.
- The optical and skin hazards presented by lasers vary markedly according to the wavelength, beam profile (continuous or pulsed) and power of the output. The hazards of lasers are often associated with the ability of the laser to damage eyesight or burn skin, but quite often the radiation or optical hazards are not the ones that can present a risk. Often, there are other risks associated with the laser use such as risks from electrical supplies, cryogenic liquids compressed gas or chemical dyes.

LEGISLATION

The Health & Safety at Work etc Act 1974

- Employers must ensure as far as is reasonably practicable, the health, safety, and welfare at work of his employees. This general duty extends to providing such information, instruction, training, and supervision as might be necessary.
- Employers must ensure that their work does not put the health and safety of others not employed by them, at risk. This includes contractors and members of the public.
- Employees must take reasonable care at work to look after their own health and safety and that of others. They must co-operate with their employer in respect of health and safety.

The Control of Artificial Optical Radiation at Work Regulations 2010 (AOR Regulations)

The AOR Regulations came into force with the aim to protect workers from the risks to health from hazardous sources of artificial optical radiation (AOR) including lasers.

- Requirement to assess and control the hazards from light emitted from all artificial sources in all its forms such as ultraviolet, infrared and laser beams. Assessment of the hazard must be carried out, in line with the requirements of the regulations, where there is a significant risk of exposure.
- Once risks have been identified the organization must take appropriate action to eliminate or control them so that workers are protected from the risks to health from hazardous sources of artificial optical radiation (AOR).
- Employees must not do anything which puts themselves or others at risk of exposure through their action or inaction. (This applies particularly when working with more powerful lasers).

- The most effective control measure for optical hazards from laser radiation is full enclosure. Open beam work should be the *exception* and only permitted after a robust justification has been made that it is not reasonably practicable to enclose the beam.
- The lowest power laser suitable for the purpose should be used and lasers should be operated so that individuals are not exposed to levels in excess of the maximum permissible exposure (MPE) levels or exposure limit values (ELV).
- Local arrangements shall be defined for the management of laser safety in accordance with this policy.
- All work involving hazardous lasers must be covered by risk assessments and where appropriate by written schemes of work / safe operating procedures.
- If reasonably practicable, undergraduate work should be restricted to Class 1/1M, 2/2M or visible 3R lasers, especially for class experiments. Sometimes it is possible to downgrade a higher-powered laser by the use of neutral density filters or beam expanders.
- Initial training will be a basic instruction in laser hazards, risks and their control. Class 3R, Class 3B and Class 4 laser workers should attend training before commencing any laser work and should also be familiar with the schemes of work/protocols provided.
- All class 3R, 3B and class 4 lasers shall be identified, and a laser inventory produced.
- Class 3B and 4 lasers should be operated in a laser-controlled area if engineering controls have not entirely eliminated the risks; in this case an interlock system should be fitted.
- The points of access to areas in which Class 3B and Class 4 lasers are used, must be marked with appropriate warning signs.
- Research supervisors must ensure that their laser users are effectively trained in the operating techniques and that inexperienced staff are adequately supervised.
- In order to make people aware of the hazards of lasers and to ensure that safe systems of work are being practiced management arrangements should be in place to identify users of lasers. Risk assessments should also identify users of lasers.
- If class 3 and class 4 lasers are used the University will have access to competent advice regarding the safe use of lasers.
- In areas where class 3B and class 4 lasers are used, the Head of School should appoint a local Laser Safety Officer (LSO) to ensure that local arrangements are adhered to and that all lasers under their responsibility are identified and used in compliance with the policy and guidance on laser safety.
- Duties of Laser safety advisers (LSA) and laser safety officers (LSO)are defined in the document “Guidance on the safe use of lasers in education and research”, AURPO Guidance note no. 7, 2018 Revised edition.
- Responsibilities of supervisors and users is defined in the document “Guidance on the safe use of lasers in education and research”, AURPO Guidance note no. 7, 2018 Revised edition.
- A “laser-controlled area” is an area where the occupancy and activity of those within, is subject to control and supervision for the purpose of protection from the laser radiation hazards.

- Access to a laser-controlled area should be restricted to all except authorised persons when the laser is turned on and there is the possibility of exposure.

RESPONSIBILITIES

President/Vice-Chancellor

- Will have an overarching role to;
  - Ensure that systems are in place and properly resourced to manage the significant risks facing the University.
  - Lead by example in respect of managing health and safety.
  - Send out clear messages to identify the need for risks to be effectively managed.

Executive Board Members

- Will approve this policy once they have satisfied themselves of its suitability.

Deans/VP Operations/Directors

- Will ensure that adequate arrangements are in place where facilities are shared or where staff and students are working on premises managed by other employers.
- Will ensure that rules and procedures are implemented to ensure that lasers are used appropriately.
- Will ensure that sufficient resources are made available to enable compliance with this policy.

Heads

- Will ensure that all staff are aware of, and adhere to, University policy, procedures and safe systems of work in order to ensure compliance with all relevant legislation.
- Will ensure that due consideration is given to the use of lasers within their area of operation prior to their being put into use.
- Will ensure that all control measures which are deemed necessary are maintained and effective.
- Will ensure that staff and students have sufficient instruction and information and are adequately trained and supervised.
- Will ensure that suitable and sufficient risk assessment has been written, approved, and documented.
- Will ensure sufficient resources are provided to adequately maintain equipment and test controls such as safety interlocks and warning signs.

Director of Health and Safety

- Will ensure that an appointment of LSA is made, in writing, where relevant and that the role-holder is competent to provide relevant advice on laser use.
- Will ensure this policy is reviewed and updated biennially or after any significant change whichever is the sooner.
- Will liaise with any relevant enforcement authorities as necessary.

Laser safety adviser (LSA)

- Will ensure that arrangements are in place for the training of new laser users.
- Will ensure that there is an inspection programme for laser facilities.
- Will ensure that there is routine auditing of laser facilities.

Laser safety officer (LSO)

- Will ensure that all lasers except for low power Class 1 devices (and excluding laser printers, DVDs, Class 2 laser pointers etc) are identified.
- Will ensure that all lasers are labelled appropriately, and laser designated areas clearly identified.
- Will ensure that personnel intending to work with Class 3R, Class 3B and Class 4 lasers, and others who may be working with modified Class 1M or Class 2M devices, will need to be identified and receive training in the safe use of lasers.
- Will ensure that laser safety eyewear is provided and worn (when appropriate) by all people working with Class 3B and Class 4 lasers when the beam is not totally enclosed, and that training is given in the use and maintenance of this eyewear.
- Will ensure that undergraduates working with lasers should use the minimum power practicable and follow a written scheme of work.
- Will ensure that routine surveys are undertaken to ensure compliance with the policy and adherence with the guidance.

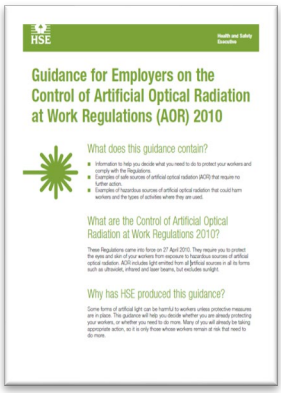
Line Manager (research supervisor or principal investigator)

- Will be responsible for the day-to-day health and safety management of their own team's individual research projects.
- Will ensure that their laser workers are effectively trained in the operating techniques required.
- Will ensure that inexperienced staff are adequately supervised.
- Will consult with the LSA/LSO if they intend to work (or supervise work) with lasers.
- Will ensure that University policy, procedures and safe systems of work are strictly adhered to in order to ensure compliance with all relevant legislation relating to the use of lasers.
- Will provide workers with appropriate personal protective equipment (PPE) and ensure that it is worn when necessary.
- Will ensure that any laser protective eyewear is free from scratches, defects, or damage. Any defective eyewear must be taken out of use and replaced.
- Will notify Health and Safety in the case of accidental (or suspected) over-exposure to lasers and submit an incident form.
- Will ensure that any malfunctioning piece of equipment which presents a potential hazard is removed from service immediately, and provide for its repair, replacement, or disposal as soon as possible.
- Will ensure that suitable and sufficient risk assessments are in place.
- Will ensure that laser systems are enclosed and that any open beam work is the exception and only after a robust justification has been made that it is not reasonably practicable to enclose the beam.

Laser users

- Will not attempt to work with lasers unless adequately trained and authorised to do so.
- Will understand the beam paths and power levels through their optical set up.
- Will ensure that where laser work is carried out on an optical table, laser beams are managed such that a beam cannot leave the boundary of the table and that exposure levels are below the MPE/ELV at the table boundary.
- Will be responsible for observing local arrangements for laser safety and follow the guidance of supervisors and laser safety officers.
- Will design their experiments such that open beam work is the exception and only permitted after a robust justification has been made that it is not reasonably practicable to enclose the beam.
- Will ensure that when working with class 3B or class 4 lasers, there is the possibility of stray laser beams that could damage eyesight, where required the appropriate laser eyewear **must be worn**.
- Will ensure that relevant hazard warning signs are displayed and maintained where appropriate, and security arrangements are implemented to prevent unauthorised access to controlled areas.
- Will read relevant risk assessments and comply with the required control measures, such as wearing specific eye protection, and/or appropriate clothing, and following instructions on using equipment generating non-ionising radiation.
- Will cooperate with anyone undertaking a health and safety role on behalf of the University.

EXTERNAL LINKS


HSE

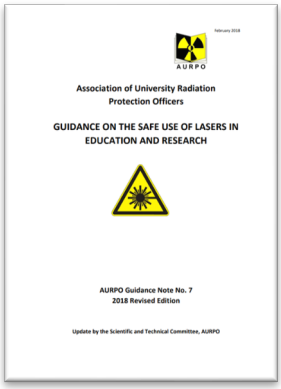
Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations (AOR) 2010

What does this guidance contain?

What are the Control of Artificial Optical Radiation at Work Regulations 2010?

Why has HSE produced this guidance?

Guidance for Employers on the Control of Artificial Optical Radiation
at Work Regulations (AOR) 2010
https://www.hse.gov.uk/radiation/nonionising/employers-aor.pdf



Guidance on the safe use of lasers in education and research
https://aurpo.org.uk/wp-content/uploads/AURPO_Files/Guidance_Documents/2018-02-AURPO-GN7-Safe-Use-of-Lasers-in-Education-and-Research.pdf

Ubiquitous lasers – Public Health England
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/496266/Ubiquitous_Lasers_StdQ.pdf

Laserbee – Laser calculation software
Available as a download from iSolutions
www.software.soton.ac.uk

VERSION CONTROL

Level:	3	**Hazard Group:**	Scientific Safety	**Version:**	V3.1
Consulted:		RPA, RPO, Science Safety team, CHSC		**Date consulted:**	May 2017 Sept 2019 Sept 2022

			Sept 2024
Feedback:			
Date to UEB/UHSC:	21 August 2017 21 October 2019 10 October 2022	**Date approved:**	August 2017 October 2019 October 2022
E&D Assessment:		**Review date:**	Sept 2026
Author/Job Title:			
Reviewers			
Lead Competent Person:	Peter Adams – Director of Health and safety		