

Artificial Optical Safety (AOR) Standard Operating Procedures

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University of Sussex

Artificial Optical Radiation (AOR) Safety Standard Operating Procedures

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1. Introduction and Scope

The operation of some Artificial Optical Radiation (AOR) sources, including medium and high power lasers, may give rise to both beam and non-beam hazards that could pose risks to the eyes and skin of staff and students. The University of Sussex is subject to the provisions of health and safety legislation in relation to its operation of hazardous Artificial Optical Radiation sources and has a responsibility to protect its employees and others from the hazards associated with them.

This document is to provide guidance to users with regards to how Artificial Optical Radiation should be controlled.

This SOP applies to all activities carried out on University premises or by University staff/students involving the use of artificial optical radiation excluding the list of safe light sources outlined in Note 2 of the HSE guidance on the control of artificial optical radiation (AOR 2010). This will include:

- All work involving the operation of lasers or laser products of classes other than Class 1 or Class 2 (see annex 1 for details of the laser classification scheme);
- All work involving the operation of non-laser optical sources falling into Risk Group 3 (see annex 2 for details of the non-laser classification scheme); and
- All work involving the operation of laser or non-laser optical sources not classified under the schemes described in annexes 1 or 2 where exposure could exceed one or more of the Exposure Limit Values defined in the Control of Artificial Optical Radiation at Work Regulations 2010.

For the avoidance of doubt, this does not apply to lasers or equipment of Class 1 or Class 2 unless:

- they have been incorrectly classified and should actually fall into a higher class; or
- they contain embedded lasers of higher class, the beams from which are accessible during servicing or other activities.

2. Legislative Framework

Adherence to this Standard Operating Procedure will ensure that the University complies with all relevant legislation regarding the use of non-ionising radiation, including:

- The Control of Artificial Optical Radiation at work Regulations 2010
- The Management of Health and Safety at Work Regulations 1999
- the Personal Protective Equipment at Work Regulations 2002

3. Definitions

Staff

- LSO School Laser Safety Officer
- LSC University Laser Safety Co-ordinator (in practice this is the Radiation Protection Officer RPO)

Laser Systems

- For laser classes see Annex 1

Non-Laser Systems

In the case of non-laser sources there are four classes: Exempt; Risk Group 1; Risk Group 2; and Risk Group 3. Hazards increase with the risk group number.

3.1. Guidance

The Health & Safety executive has produced guidance to support the requirements of the control of artificial optical radiation at work regulations 2010, these are:

- Guidance for employers on the control of artificial optical radiation at work regulations (AOR) 2010.

A list of British Standards for exposure values can be found below in Annex 3

Guidance is also available for the use of lasers as produced by the European Union (for the requirements of the EU physical Agents Directive – Optical Radiation) and by the association of University Radiation Protection Officers (AURPO). These are:

- Non-binding guide to good practice for the implementing Directive 2006/25/EC – “Artificial Optical Radiation”
- Guidance on the safe use of Laser in Education and research guidance note no. 7 (2012)

4. Responsibilities

Operational responsibilities are defined in the University's Artificial Optical Radiation Safety Policy.

5. Operating Procedure

5.1. Risk Management

As outlined in the Artificial Optical Safety policy all employees have a responsibility to ensure that a suitable and sufficient risk assessment has been carried out prior to commencing any activity associated with hazardous artificial optical radiation, and this assessment must take account of the matters specified in Regulation 3(5) of the Control of Artificial Optical Radiation at Work Regulations 2010 (see Annex 5).

5.2. Hierarchy of Control

Where possible, work with artificial optical radiation should be planned so that the radiated power or energy does not present a reasonably foreseeable risk of adverse effects to the eyes or skin, taking account of the wavelength(s) and duration(s) of emission. Consideration should be given to temporary reductions in beam power when operation with open beams is essential.

Where it is essential to use radiated powers or energies that are potentially hazardous, engineered solutions must be used to control risks associated with the operation of artificial optical radiation equipment. In particular the University requires that wherever reasonably practicable potentially hazardous artificial optical radiation must be enclosed using the following hierarchy of enclosures:

1. total enclosure of all individual beam paths and optical components using localised enclosures such as flight tubes and turrets for laser beams or opaque panels for non-laser sources;
2. where it is not reasonably practicable to enclose individual beam paths then consideration should be given to localised enclosure of spatially adjacent beam paths and associated optical components;
3. where there is no other practical alternative, enclosure of optical tables using side shields is acceptable, but in these cases the enclosures should also be provided with top covers that should be used whenever possible; and
4. where localised enclosures are unlikely to change on a regular basis, consideration should be given to interlocking the enclosure to a shutter or power supply.

However, given the nature of the work undertaken, it is recognised that it may not always be possible to fully enclose hazardous artificial optical radiation or may not be possible to enclose them all of the time. In these situations appropriate administrative arrangements must be implemented, which must include:

- A written justification for open beam work that must explain why hazardous radiation cannot be enclosed and must be supported by a suitable and sufficient risk assessment;
- The designation of a laser controlled area with restricted access and appropriate signage as required by the Control of Artificial Optical Radiation at Work Regulations; and
- Preparation and implementation of local rules for the area in question

5.3. Local Rules

Local rules for areas used with open beam work should contain:

- The name of the Group Leader
- The name of the individual responsible for managing the area
- The name of the LSO
- The extent of the area
- A summary of the access arrangements
- List of users who have unsupervised access
- List of relevant equipment
- What safety checks are carried out
- A summary of the general working instructions with regards to how open beam work is managed
- A completed “Emergency Ophthalmic Examination after Laser Exposure form” (F-LE 007).

5.4. Personal Protective Equipment

The use of personal protective equipment (particularly laser protective eyewear) should be a last resort rather than standard working practice. Where there is an assessed requirement for laser protective eyewear, it must be ‘CE’ marked, conform to an appropriate British or European Standard and be appropriately specified according to the procedure in that standard. The University Laser Safety Co-ordinator must be consulted on all new purchases or acquisitions. All eyewear must be inspected to ensure that remains fit for purpose.

5.5. Maintaining Effectiveness of Controls

Where controls have been implemented, appropriate actions must be taken to ensure their continued effectiveness. Depending on the nature of the control measure adopted, this may include:

- Preventative maintenance
- Routine inspection and/or testing
- Routine review of administrative procedures
- Formal review of training

All of these actions must be recorded in writing to provide a permanent record that is amenable to audit.

6. Project Approval Process

The LSO and RPO must be consulted on all new projects being conducted within the University of Sussex facilities that use Class 3R/3B/4 laser systems or non-laser systems in risk group 3. The non-ionising radiation protection committee has final approval on all new projects/acquisitions and the control thereof.

6.1. Procurement

Prior to the purchase, lease or loan of any potentially hazardous artificial optical radiation equipment the School LSO together with the Supervisor must carry out a formal review of the engineering controls and design features with a view to assessing the potential for human exposure. The LSC should be consulted as part of this review process. Once the equipment is installed it should be subjected to a further examination to ensure that all engineering controls and other safety features are functioning effectively.

Contractors carrying out work on equipment capable of generating hazardous artificial optical radiation must be asked to provide copies of their Risk Assessment and SOP to the relevant School LSO prior to being allowed to commence work. They should also be asked to provide details of their laser or optical radiation safety training, which should be recorded.

6.2. New Facilities

The LSO and RPO must be consulted on the construction or modification (with regards to access or safety) of facilities used with relevant equipment. This should include input at the planning stage and an inspection of the area prior to work starting.

7. Storage and Security

While increased security arrangements to ensure that laser systems or other equipment in risk group 3 is not usually required to prevent theft or malicious use of the equipment, laser systems should not be left in open access areas in a state where they can be activated. This is achieved by ensuring that relevant equipment is stored in locked areas or has its power supply or key activation removed.

8. Training

Line managers have responsibility for ensuring that all staff, students or visitors required to work with or close to hazardous artificial optical radiation equipment have received adequate information, instruction and training to enable them to work safely. Annex 4

contains a training matrix of the training required of all relevant members of staff. All new, temporary or transferred personnel are expected to have a personal interview with the relevant School LSO prior to commencing work. This interview should assess the knowledge and competence of the individual and should be used as a basis to decide on the training needs of the individual concerned.

9. Health Surveillance

Health Surveillance is not required as a standard for users of relevant equipment. If deemed necessary by an LSO Occupational Health should be advised as to the requirements. In the event of an accidental exposure to the eye health surveillance may be required. This should be assessed by an eye doctor as part of the after incident actions.

10. Incidents

Supervisors are required to put in place contingency arrangements to deal with all reasonably foreseeable accident scenarios identified through a risk assessment. This must include completing the relevant sections of the "Emergency Ophthalmic Examination after Laser Exposure form" (F-LE 007). In the event of an accident or near miss contact the local LSO and the relevant School accident/incident reporter. Details of these individuals can be found on the University of Sussex's webpage under accident & incident reporting.

11. Inspections/Monitoring

Annual formal audit and inspection is carried out by the University RPO in conjunction with School LSOs.

LSOs monitor that;

- Local rules and risk assessments are in place.
- Checks on safety equipment are carried out
- Routine maintenance is performed and that procedures are in place to ensure that this is done safely.
- Training records are maintained.
- Routine surveys are carried out within groups to ensure compliance with the University AOR policy.