University Health & Safety Arrangements: Chapter 27

Laser Safety

Contents

Introduction

1. This document describes how laser safety is managed within the University. It embodies the guidance provided in, and should be used together with:

    - IEC TR 60825-14:2004 'Safety of laser products: Part 14 - A user's guide';[1]
    - the Association of University Radiation Protection Officers (AURPO) Guidance Note No. 7 2018 'Guidance on The Safe Use of Lasers in Education and Research';[2] and
    - Non-binding guide to good practice for implementing Directive 2006/25/EC "Artificial Optical Radiation".[3]

Laser Safety Management and Responsibilities

University Laser Safety Officer (ULSO) responsibilities

2. The University Laser Safety Officer (ULSO) has overall responsibility for the administration and auditing of systems of control relating to laser safety. The ULSO must ensure that arrangements are in place for:

    - the training of staff and students;
    - identification of lasers, and users of lasers;
    - provision of a measuring service;
    - inspection of new laser facilities;
    - routine auditing of laser facilities;
    - provision and updating of the University Laser Safety Arrangements and Guidance;
    - reporting to the University Health, Safety and Well-being Committee (via the Radiation Safety Advisory Group) on a regular basis.

Head of School/Department/Institute responsibilities

3. The Heads of Schools/Departments/Institutes have primary responsibility for ensuring that their school/department/institute works in accordance with the University Laser Safety Arrangements and Guidance.

[1] https://www.librarysearch.manchester.ac.uk/discovery/fulldisplay?docid=bsi000000000030076540&context=PC&vid=44MAN_INST:MU_NUI&search_scope=MyInst_and_CI&tab=Everything&lang=en

[2] https://aurpo.org.uk/publications/guidance/

[3] https://ec.europa.eu/social/main.jsp?catId=738&langId=en&pubId=5926&type=2&furtherPubs=no

4. Where laser equipment of Class 3B or 4 is present (including Class 1 products containing these lasers if emission may be accessible under certain conditions, e.g. servicing) they must appoint, in consultation with the ULSO, a local laser safety advisor (LLSA). The LLSA must be officially appointed by letter, outlining their responsibilities, a copy of which must be sent to the ULSO. The Head of School/Department/Institute should ensure the LLSA has sufficient time and resources to discharge their responsibilities.

Local (department/school/institute) Laser Safety Advisor (LLSA) responsibilities

5. The Local (department/school/institute) Laser Safety Advisors (LLSA) have the following responsibilities:

    - act as a source of advice on laser safety to staff and students whose work involves use of laser equipment;
    - identify all lasers, except for Class 1 lasers and Class 2 laser pointers (whose classification has been verified by measurement rather than by label). This includes any Class 1 product with an embedded Class 3B or 4 laser, apart from "consumer type" Class 1 products (e.g. laser printers);
    - ensure risk assessments are drawn up, and standard operating procedures/schemes of work are in place for safe operation of lasers. These must include robust justifications why it is not reasonably practicable to enclose any Class 3B or 4 open beams;
    - identify personnel intending to work with Class 3R, 3B, and 4 lasers, and others who may be working with modified Class 1M or 2M devices, and assist them to receive adequate training in the safe use of lasers;
    - regularly inspect all laser activities to ensure that all lasers in the school/department/institute are used in accordance with the University Laser Safety Arrangements and Guidance. Reporting the findings of inspections to the local health and safety committee and the ULSO;
    - restrict or stop any laser activity that is known not to comply with the University Laser Safety Arrangements and Guidance and inform the manager of the area and Head of School/Department/Institute of their action;
    - ensure that undergraduates working with lasers follow a written scheme of work;
    - attend and contribute to the school/department/institute health and safety committee and the Non-Ionising Radiation Technical Advisory Group meetings.

Principal Investigator and Research Supervisor responsibilities

6. Principal Investigators and Research Supervisors have a duty, delegated to them by Heads of Schools/Departments/Institutes, to provide "such supervision as is necessary" to ensure the safety of all the individuals for whom they are responsible. This includes all postgraduate and undergraduate students working with lasers. They have the following responsibilities:

    - day-to-day health and safety management and the provision of immediate supervision and training for the use of lasers in the laboratory;
    - consult with the LLSA when any new activity or significant change in activity involving lasers is planned (submit a LS1 form);
    - inform the LLSA of the intention to buy a laser system or bring one on site prior to its purchase or loan and arrival (submit a LS2 form);
    - inform the LLSA of the intention to dispose of a laser system prior to disposal (submit a LS2 form);
    - ensure that lasers are made safe prior to disposal and dealt with appropriately if they contain hazardous materials;
    - ensure that all users are competent to work with lasers safely. This must occur before they start working with lasers in the University, and will normally consist of ensuring the users have attended appropriate training and been taken through the safety checklist (submit a LS3 form);
    - implement, and enforce, the University Laser Safety Arrangements and Guidance. In particular ensuring that risk assessments, and standard operating procedures/schemes of work are in place and up-to-date, reviewing at least annually or when there is any new or significantly different activity involving lasers;
    - attend an appropriate Laser Safety Training Session (at least once every 5 years);
    - notify Safety Services and the LLSA immediately of any accident involving lasers (using standard University forms[4]).

Laser User responsibilities

7. Laser user refers to a person who during their normal work could be exposed to radiation greater than the accessible emission limit of a class 2/2M laser for visible light (400 nm to 700 nm) and class 1/1M for invisible light. Laser users have the following responsibilities:

[4] http://www.healthandsafety.manchester.ac.uk/toolkits/accidents/

- work in accordance with the University Laser Safety Arrangements and Guidance and follow safety procedures detailed in risk assessments, and standard operating procedures/schemes of work;
- follow the guidance of Principal Investigators, Research Supervisors, and the LLSA;
- keep the Principal Investigator/Research Supervisor fully informed of any proposal to depart from established safety procedures and be responsible for their own safety and that of others who may be affected by their acts or omissions;
- where required, the appropriate laser eyewear must be worn as instructed;
- attend an appropriate Laser Safety Training Session (at least once every 5 years).

Organisational Structure

8. The organisation in place to implement the University's health & safety policy is described in detail in the following document. The University Arrangements Chapter 1 also gives details of the University Health, Safety and Well-being Committee.

Radiation Safety Advisory Group (RSAG)

9. The Radiation Safety Advisory Group reports to, and is responsible for advising the University Health, Safety and Well-being Committee on measures to ensure the legal and safe use of all sources of radiation, and the protection of persons liable to be exposed to radiation hazards. The chair of the Non-ionising Radiation Technical Advisory Group is a member of the RSAG. The University Arrangements Chapter 4 gives further details of its remit and membership.

Non-Ionising Radiation Technical Advisory Group

10. The Non-Ionising Radiation Technical Advisory Group reports to the Radiation Safety Advisory Group on laser radiation and is responsible for drafting arrangements to comply with legislation, ensuring consistency in compliance with laser safety requirements, and encourages the dissemination of good practice in this field. Membership includes the University Laser Safety Officer and all the School/Department/Institute Local Laser Safety Advisors.

Training Requirements

11. Laser users, Principal Investigators / Research Supervisors, the LLSA and the ULSO must all attend an appropriate Laser Safety Training Course. For Laser Users and Principal Investigators / Research Supervisors this may be provided by

the ULSO, the school/department/institute, or by an external organisation if approved by the ULSO. All laser users must repeat this training every five years. A record of attendance will be kept by the ULSO.

12. The user should then use the induction and training checklist (form LS3) to form the basis of their local instruction on the systems they will use. The local instruction will occur in the school/department/institute and will be carried out by the principal investigator, research supervisor and/or the LLSA. This must occur before they start working with lasers in the University. Copies of the completed checklist should be kept by the Laser User and an electronic copy sent to the LLSA.

Documentation

Management Forms

13. Laser Safety Management Form LS1 must be completed by the Principal Investigator or Research Supervisor to notify their LLSA of any new laser activity or significant change in laser activity.

14. Laser Safety Management Form LS2 must be completed by the Principal Investigator or Research Supervisor to notify their LLSA of any newly acquired laser or any laser for disposal.

15. Laser Safety Management Form LS3 must be completed by the Laser User and signed off by the Principal Investigator or Research Supervisor before the user is permitted to use any laser or laser system.

16. Copies of the forms must be sent to the LLSA in order that a record of lasers in their area can be maintained, users are identified and user training recorded.

Risk Assessment

17. A suitable and sufficient risk assessment must be carried out for all laser work undertaken at the University or by University employees. These assessments must include:

    - A description of the system being assessed;
    - An assessment of the beam hazards along with suitable control measures to mitigate these hazards.
    - A robust justification for any open beam work with Class 3B and 4 lasers;

18. Completed risk assessments must be signed by the assessor, all users and the Principle Investigator / Research Supervisor. Risk assessments for Class 3B and 4 lasers must be reviewed by the LLSA.

19. Standard Operating Procedures/Schemes of Work should be provided based on the conclusions of the risk assessment to detail the safe operating procedures for working with a particular laser or laser system.

Open beam work

20. Open beam work with lasers should be eliminated wherever possible.

21. Where open beam work with class 3B and 4 lasers is essential, it must be robustly justified in the risk assessment and signed off by the Head of School/Department/Institute. A suitable risk assessment must be carried out and control measures put in place to properly protect users and others from beam hazards. All risk assessments for open beam work with class 3B and 4 lasers must be reviewed by the LLSA.

Use of Personal Protective Equipment (PPE)

22. Suitable PPE must be available and used when required. The calculations to show the PPE is appropriate must be included in the risk assessment. Training should be given in the use and maintenance of any available eyewear.

23. The PPE must comply with BS EN 207:2017 or BS EN 208:2009 and have a CE mark. Condition of PPE must be inspected on a regular basis with a record being kept of such inspections, and checked before each use.

Use of lasers by undergraduates

24. Undergraduates working with lasers should use the minimum power laser practicable and follow a written Scheme of Work.

25. Schools/departments/institutes should make every attempt to use lasers of lower power and class for undergraduate experimental work (i.e. class 1/1M, 2/2M or visible CW 3R lasers). If a school/department/institute wishes to use class 3B or 4 lasers for undergraduate teaching, the LLSA must be consulted and suitable arrangements made and recorded to ensure that the students (or inexperienced staff) receive appropriate training, instruction, information, and supervision.

26. Students involved in project work and working with class 3B or 4 lasers should be treated as laser users and be subject to the normal training process. The risk

assessment should take into account the inexperience of the users and additional close supervision is likely to be necessary.

Laser Installation and Service Engineer Visits

27. If an outside agency (*e.g.* the laser equipment supplier) is engaged to install or service any laser equipment, then a permit-to-work procedure must be adopted for handing the equipment over to the service engineer and accepting it back fully-restored to normal operation when the work is completed.

Use of lasers out doors and off campus

28. The use of lasers of any class out doors or off campus should be subject to careful planning and thorough risk assessment, which must include a consideration of any risks to the public, and of public relations or reaction to the work. Any laser work out doors or off campus must be discussed with the University Insurance Office.

29. If the beam is to be directed upwards and the risk assessment indicates a hazard (including distraction) is present for aviators it may be necessary to consult the Civil Aviation Authority. Users should review CAA document CAP736 while in the planning stages for any such work. [5] If lookout arrangements are put in place for short term outdoor laser operations, these should take into account the possibility of low or no noise airborne craft such as gliders.

Accidents and accident reporting

30. Accidents and incidents must be promptly reported as described on the health and safety web pages: www.healthandsafety.manchester.ac.uk/toolkits/accidents/reporting .

31. If Laser Users suspect they have been struck in the eye by a laser beam or have any immediate concerns over their eyesight they should go to A&E as a matter of urgency. In emergencies the LLSA or a member of staff should assist and ensure that a copy of all relevant documentation is taken that may help in diagnosis and treatment.

Support and Guidance

[5] https://publicapps.caa.co.uk/docs/33/CAP736.PDF

32. The Radiation Safety Unit is a source of further support and guidance and can be contacted through www.staffnet.manchester.ac.uk/rsu/ .

Document control box	
Title	Chapter 27: Laser safety
Date approved:	August 2019
Approving body:	Health, Safety & Well-being Committee
Version:	v2.1 Nov 2020 – Radiation Safety Co-ordinating Committee updated to Radiation Safety Advisory Group following Will Spinks' Governance review
Supersedes	v2.0 August 2019 – revised following introduction of AURPO Guidance Note No. 7 v1.0 – Implemented 1st February 2018
Next review date:	Three years or upon significant change
Related Policies:	University Health and Safety Policy
Owner of this chapter	Non-ionising Radiation Technical Advisory Group Chair : Dr Darren Graham Secretary: Dr Ian Haslam