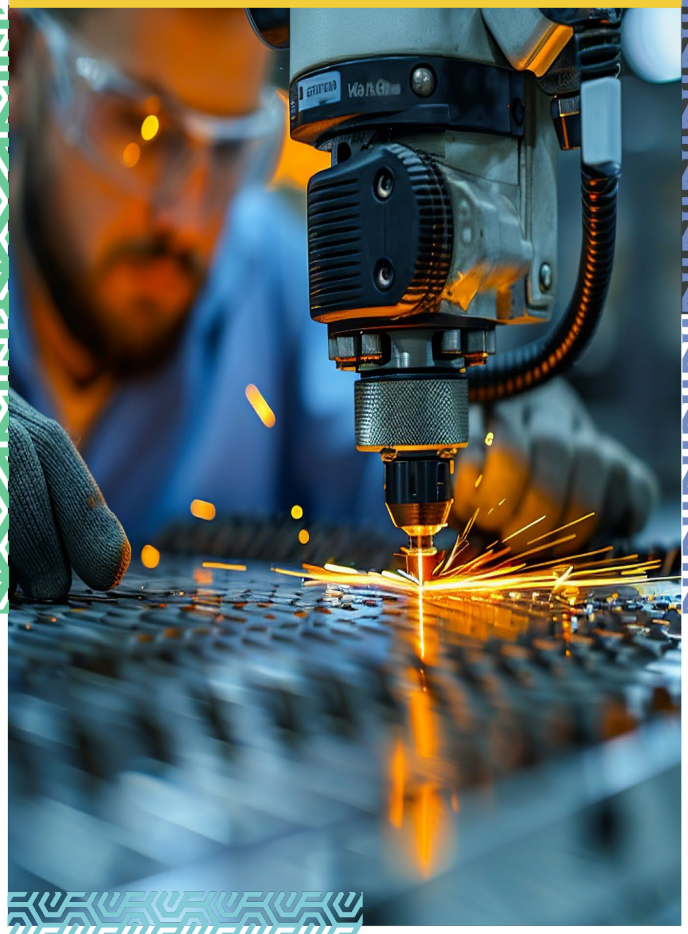
Risk control

Laser Safety in Higher Education



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Laser Safety in Higher Education

Introduction

Laser safety is a critical concern in Higher Education Institutions due to the potential hazards associated with laser use in research, teaching, and other activities. Lasers are powerful tools and they pose significant risks if not managed properly. This document outlines the legal responsibilities and practical management solutions for ensuring laser safety. The goal is to create a safe and compliant environment for all individuals involved in laser-related activities.

Legal Responsibilities

Institutions must adhere to the Control of Artificial Optical Radiation at Work Regulations (AOR) 2010[1]. This includes all artificial light sources, such as lasers, to protect workers from exposure. Compliance involves conducting risk assessments, implementing control measures, and providing adequate training and information.

The Health and Safety at Work etc. Act 1974[2] is the cornerstone of UK health and safety legislation that imposes a duty on employers to ensure, so far as reasonably practicable, the health, safety and welfare of employees and others who may be affected by their activities. It underscores the duty to prevent harm arising from work activities, including those involving lasers.

Institutions are required by the Management of Health and Safety Regulations 1999[3] to undertake an assessment of risk and implement the necessary control measures to manage risks from laser activities.

The Control of Substances Hazardous to Health Regulations 2002[4] may also apply if the laser produces hazardous substances during use.

Provision and Use of Work Equipment Regulations 1998[5] requires that work equipment provided for use at work is suitable, safe, properly maintained, and used only by people who have received adequate information, instruction, and training.

Hazards and Injuries

Eye Injuries

The most common and significant injury from laser exposure is to the eyes. Direct or reflected laser beams can cause permanent damage to the retina, leading to vision loss or blindness. The severity of the injury depends on the laser's power, wavelength, and exposure duration.

Skin Burns

High-power lasers can cause burns to the skin. These burns can range from mild to severe, depending on the laser's power and exposure time.

Photochemical Reactions

Some lasers can cause photochemical reactions in the skin, leading to conditions such as photokeratitis (like sunburn of the cornea) and photoaging which is premature aging of the skin.

Fire Hazards

Lasers can ignite flammable materials, creating a fire hazard in the laboratory or workshop. This is particularly a concern with high-powered lasers.

Harmful Fumes

Lasers can potentially cause harmful fumes, particularly when they are used in processes that involve cutting, welding, engraving, or marking materials.

Levels of Exposure and Associated Risks

Laser cutting or engraving can produce harmful fumes and particulates, which can be hazardous if inhaled.

Class 1 Lasers

These are low-power lasers that are not considered hazardous under normal use. They are commonly found in laser printers and CD/DVD players.

Class 2 Lasers

These are low-power visible lasers (e.g. Laser Pointers) that can be hazardous if viewed directly for extended periods of time. The natural blink reflex usually protects the eyes, but prolonged exposure can still cause damage.

Class 3 Lasers

These lasers can be hazardous if the beam is viewed directly. These lasers are divided into two subclasses:

Class 3R – These lasers are considered safe if handled carefully. They can cause eye damage if viewed directly for extended periods.

Class 3B – These lasers can cause immediate eye damage and skin burns. They require protective measures such as safety goggles and interlocked enclosures.

Class 4

These are high-power lasers that can cause severe eye and skin injuries, as well as fire hazards. They require stringent safety measures, including controlled access areas, protective eyewear, and interlocked enclosures.

Preventative Measures

To mitigate laser risks, Higher Education Institutions should implement comprehensive laser safety programs, including:

- Establishing of a robust laser safety policy
- Conducting thorough risk assessments for all laser-related activities
- Providing adequate training for all personnel and students using lasers
- Implementing control measures such as protective eyewear, interlocked enclosures, and well-ventilated areas where lasers are in use
- Establishing clear safety protocols, procedures and emergency response plans
- Establishing effective governance structures to support laser use in the institution

Laser Safety Policy

A Laser Safety Policy is crucial for Higher Education Institutions. A laser safety policy helps prevent accidents by ensuring that all users understand and follow safety protocols and procedures.

A robust policy will provide standardised approach to managing laser safety, ensuring consistency across departments/schools, and reducing the risk of errors or omissions in safety practices.

The policy should establish provisions for training and competency assessments, ensuring that all personnel and students are knowledgeable about laser hazards and safe handling protocols and procedures.

The appointment of designated persons should be included within the institutions Laser Safety Policy, identifying the roles and responsibilities of designated Laser Safety Officers.

The policy should outline procedures for risk assessment, incident reporting, and emergency response, helping to prevent accidents and ensure a swift, effective response if an incident occurs.

Regular reviews and updates to the policy ensure that the institution's laser safety practices remain current with technological advancements and regulatory changes.

Risk Assessment

Comprehensive risk assessments should be conducted for all laser activities. Identify potential hazards, evaluate the level of risk, and implement measures to mitigate or eliminate risks. Risk Assessments should cover all aspects of laser use, including direct exposure, reflections, and ancillary hazards such as electrical and chemical risks. Regular reviews and updates of risk assessments should account for any changes in laser use, equipment, personnel, or environment.

Establish a structured program for conducting regular risk assessments. This should include a checklist of potential hazards, evaluation methods, and documentation processes. Assign responsibilities for conducting risk assessments and ensure that all relevant personnel participate in the process.

From the risk assessment process develop local safety procedures specific to the department or activity. These should include protocols and procedures for laser operation, maintenance, and emergency response. Ensure protocols and procedures are tailored to the types of lasers in use and the specific risks associated with their operation.

As part of the risk assessment process, control measures will be identified. Implementation of engineering controls, such as interlocked enclosures for high-power lasers, beam stops, and warning signs, to minimize exposure risks. Use administrative controls like access restrictions, signage, and designated laser areas to control who can operate lasers and under what conditions.

Provide appropriate personal protective equipment (PPE), such as laser safety goggles that are appropriate to the laser in use, gloves, and protective clothing, to all laser users. Regularly inspect and maintain control measures to ensure their continued effectiveness. This could include routine checks of safety interlocks, beam enclosures, and ventilation systems.

Training and Competency

Ensure all personnel using lasers receive comprehensive training. This training should cover the safe use of lasers, potential hazards, emergency procedures, and relevant regulations. Periodically update training programs to reflect new regulations, technological advancements, and changes in laser use. Continuous professional development should be encouraged to keep skills and knowledge up to date.

Include practical training sessions where users can practice safe handling and emergency response actions under supervision. Regularly evaluate the effectiveness of training programs through assessments and feedback to ensure continuous improvement.

Appointed Persons

Designate Laser Safety Officers (LSOs) within each department, school, or unit. LSOs should have the appropriate training, experience, and authority to enforce laser safety protocols and procedures.

LSOs should ensure the completion of risk assessments for laser activities (collaborating with operators, academics, researchers etc), oversee training programs, and ensure compliance with safety protocols and procedures.

Establish clear reporting lines for LSOs to senior management to ensure that laser safety concerns are promptly addressed and adequately resourced.

LSOs should conduct regular safety audits, provide guidance on laser use, and function as a point of contact for any laser safety concerns.

Institutions should consider the establishing governance structures supporting the implementation and maintenance of laser safety policies and procedures. These could include the establishment of a Laser Safety Committee.

Keep detailed records of risk assessments, training, incident reports, and any safety inspections or audits. Develop and maintain standard operating procedures (SOPs) for laser use, ensuring they are easily accessible to all laser users.

Laser Safety Committees

Establish a laser safety committee to oversee laser safety policies, procedures, and compliance. Include representatives from various departments, such as LSOs, laser users and administrative staff.

There should be a direct line of communication established between the Laser Safety Committee and the Institutions primary Health and Safety Committee providing assurance of compliance with laser safety.

Communication

It is essential that the laser safety policies, protocols and procedures, and updates are communicated effectively to all relevant personnel and students. This can be achieved through written communication, training sessions, safety briefings, and signage. Establish robust incident reporting and investigation processes to capture and address any laser-related incidents or near-misses. Use this information to improve safety practices and prevent recurrence.

Conclusion

Effective laser safety management in Higher Education requires a combination of legal compliance and practical solutions. Continuous evaluation and improvement of laser safety practices are essential to ensure the well-being of students, staff, and visitors.

References

1. Control of Artificial Optical Radiation at Work Regulations 2010 (legislation.gov.uk) https://www.legislation.gov.uk/uksi/2010/1140/contents
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Further information

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Get in touch

For more information, please contact your broker, RMP risk control consultant or account director.

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