

Gloucester City Council

Environmental Health Factsheet

SAFETY IN THE USE OF LASERS

Most lasers that are used in entertainment, theatre and public exhibition work emit beams that are bright enough to cause a significant eye injury risk. As prices significantly drop and lasers become more available, their use in public entertainment, such as pubs and clubs, is increasing. This Factsheet provides employers, employees, and self employed persons who use lasers in these activities, with general information on the laser radiation safety problems they need to consider.

What the law says:

Licensing conditions require that no laser beam should be used in a public entertainment venue without prior consent from the council.

If you are an employer or self employed person who uses a laser either at your own premises or under contract to another venue, you have duties under the Health and Safety at Work etc. Act 1974, the Management of Health and Safety at Work Regulations 1999 and the Provision and Use of Work Equipment Regulations 1998. You must:

- (a) assess the health and safety risks caused by your work activity, including:
 - i. *Risks to employees and members of the public, for example members of an audience who may be exposed to hazardous laser radiation; and*
 - ii. *Take measures to control these risks so far as is reasonably practicable*
- (b) ensure that the work equipment you provide is suitable, "in any respect which it is reasonably foreseeable will affect the health and safety of any person".

If you are a venue owner who allows laser shows to be provided at your premises, you have a duty under the Management of health and Safety at Work Regulations 1999 to co-operate with the installer so they complete the laser show safely. **It is good practice to satisfy yourself that the installer has adequately assessed the safety of the laser show at your premises and, in particular, has addressed the matters dealt with in this Factsheet.**



ENVIRONMENTAL HEALTH

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Laser Hazards

The eye is particularly at risk because of the way in which it focuses the special light produced by lasers. Lasers produce a coherent light which, when looked at, appears to the eye to have come from a distant source. Consequently, the image formed on the retina by a laser source is always incredibly small and therefore of very high power density. Laser powers of just a few milli-watts can damage the retina long before natural aversion responses such as blinking can take place. The effect on the retina is similar to burning a piece of paper with a magnifying glass on a sunny day. Laser induced damage to the retina is always permanent, intricate tasks such as reading may be impossible and damage can result in permanent loss of vision.

Basic Safeguards

Design and Supply:

Laser equipment must be designed and manufactured such that it will be safe. Equipment should be supplied with full operating instructions including information on safety checks and maintenance procedures for users, and for installers who set up lasers, information about installation design and operational safety. Laser installations should be provided with one or more clearly identifiable and easily operated emergency stop controls.

Venue Considerations:

Laser installations should be designed so that hazardous emissions are not accessible at any point less than 3 metres above and 2.5 metres laterally from any location at which a member of the audience or public may gain access during the display. Members of the audience should not be able to expose either themselves or others to a direct beam through irresponsible behaviour, e.g. by climbing furniture or by placing reflective objects in beam paths.

Mezzanine and raised floors, balconies and staircases are all areas where people may be exposed to laser radiation. Careful hazard assessment of beam paths and acute laser masking are therefore important. Checks for correct alignment of all optical elements, such as mirrors, should be carried out. The possibility of other reflection hazards should also be considered, e.g. hazards arising from conventional, suspended lighting rigs, reflective décor (e.g. mirror tiles), and wet surfaces.

User Requirements:

Users need to be competent to operate a laser. They should:

- (a) Appoint a laser safety officer and provide effective supervision unless the installation is permanent, designed to operate entirely automatically and does not scan audiences; and
- (b) Ensure that any person who will be operating the laser is trained to operate and maintain the installation safely and that they receive general instruction on hazards arising from lasers and the safety precautions that need to be taken.

Users need to have effective systems of work for maintenance, alignment checks and setting up procedures. If safety assessment of these activities indicates that there is a risk of hazardous personal exposure, employees must be provided with appropriate protective eyewear. Users should determine the extent of any laser hazard areas that arise during a display so that personal access can be controlled. The user should ensure that the minimum separation distances are observed.

Safety Assessment

Lasers should be subjected to a thorough safety assessment before they are used. The issues that need to be addressed are:

- (a) whether laser beams are intended to be viewed or may be viewed inadvertently or following a malfunction
- (b) evaluation of the safety of the laser beams that are intended to be viewed, especially lasers used to scan an audience
- (c) restriction of access to potentially hazardous beams
- (d) viewing safety when a malfunction occurs so that it does not present exposure risks to the audience

For a more detailed guide on the safety of laser installations see HSE guidance publication HS(G)95 *The radiation safety of lasers used for display purposes*. If you are in any doubt about the safety of a recently installed laser then please contact us, or if you need further information regarding this or any other health and safety matter.