

Annex's for the Artificial Optical Radiation (AOR) Policy & Standard Operating Procedure

Lasers are grouped into classes in order to give an indication of their potential to cause harm. These classes are specified in the British Standard BS EN 60825-1: 2007. The classification of a laser is determined by its Accessible Emission Limit (AEL), which is the maximum level of laser radiation that is accessible under all reasonably foreseeable single fault conditions. The classification system applies to laser systems (i.e., the laser itself and an appropriate energy source) and laser products (i.e., any product or assembly of components which constitutes, incorporates or is intended to incorporate a laser or laser system).

The laser classes are:

Visible and invisible lasers. Class 1 lasers are considered safe under reasonably foreseeable conditions of operation and present no hazards to the eye or skin. Class 1 lasers may contain embedded lasers of higher class that could be accessible during servicing.

302.5 nm to 4000 nm only. The difference between a Class 1 and a Class 1M laser is that the total power in the beam can be much higher for the latter. However, the beam will be either highly divergent or collimated and of large diameter. Class 1M laser beams are considered safe to the skin. However, class 1M lasers may present a hazard to the eye if viewed using magnifying optics, e.g., lenses.

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H&S Document No	HS G047	Version	1.0	Date Issued	May 2022
Author	Alistair Hardwick	Reviewed by		Department ID code	

Visible lasers only (400 nm to 700 nm only). Class 2 are low powered lasers and emit continuous or pulsed radiation. They do not present a hazard to the skin. Protection of the eye is afforded by the human blink reflex, i.e., the 'Aversion' response. The maximum power into the eye is 1mW.

The difference between a Class 2 and a Class 2M laser is that the total power in the beam can be much higher for the latter. However, the beam will be either highly divergent or collimated and of large diameter so that the proportion of the beam that can normally enter the eye is small. Class 2M laser beams are considered safe to the skin. However, class 2M lasers are not safe to the eye if the beam is viewed using magnifying optics.

302.5 nm to 1 mm. These are medium power lasers where the AEL is generally five times larger than that of a class 1 laser. Class 3R lasers present a higher risk to the eye than Class 1 or 2 lasers, but do not pose a hazard to the skin.

Visible and invisible lasers. Medium/high power lasers where the maximum power can be up to 500 mW. Although not hazardous to the skin, direct viewing of a beam from a class 3B laser is always hazardous. Specular reflected beams (reflections off shiny surfaces) present a hazard to the eye.

These lasers are high powered lasers and are considered extremely hazardous. Class 4 lasers present a hazard to both eye and skin. Direct beam or reflected beam viewing is always hazardous and is likely to result in injury. Environmental damage (e.g. fire) is also a serious possibility. The use of class 4 lasers requires extreme caution.

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The basis for the Risk Group 2 classification is that the lamp will not pose a hazard due to the aversion response to very bright sources or due to thermal discomfort. This requirement is met by any lamp which exceeds the Risk-Group 1 limits but does not pose:

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- BS EN 1266-1029 Td33

Document Control					
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- PD IEC/TR 60825-3 *Safety of laser products – Part 3: Guidance for laser displays and shows*
- HS(G) 95 The radiation safety of lasers used for display purpose.

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It is requirement of Regulation 3(5) of the Control of Artificial Optical Radiation at Work Regulations that the following matters must be considered in any assessment of risks. This does not preclude consideration of matters not listed below.

- a) the level, wavelength and duration of exposure;
- b) the exposure limit values;
- c) the effects of exposure on employees or groups of employees whose health is at particular risk from exposure;
- d) any possible effects on the health and safety of employees resulting from interactions between artificial optical radiation and photosensitising chemical substances;
- e) any indirect effects of exposure on the health and safety of employees such as temporary blinding, explosion or fire;
- f) the availability of alternative equipment designed to reduce levels of exposure;
- g) appropriate information obtained from health surveillance, including where possible published information;
- h) multiple sources of exposure;
- i) any class 3B or 4 laser that is classified in accordance with the relevant IEC standard that is in use by the employer and any artificial optical radiation source that is capable of presenting the same level of hazard; and

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