

## Laser Safety

Lasers are now widely used in subsea ROV operation for metrology, distance measurements, pointers or as a green line for pipeline scour inspections.

They are a valuable tool in many respects – however, IMCA has been made aware of the underestimated safety risks with this type of equipment when sent out on a project from hire companies.

Use of lasers or safety around them seems to have been classed as an end use issue by the supplier and not one for the manufacturers of these units, so IMCA would like to highlight the safe use of these to assist our members.

Some laser pointers have been found to be more powerful than is acceptable for unrestricted use and have the potential to cause eye damage and other harm. This applies mostly topside during pre dive or post dive checks but also subsea when working with divers.

*Always refer to the documentation supplied with the unit and refer to the current harmonised International Standards for laser safety.*

IMCA recommends treating these units the same way you would treat radioactive devices. That is:

- ◆ One person on each shift is familiar with the use and safety of lasers.
- ◆ A permit is obtained.
- ◆ The ROV laser area is barriered off.
- ◆ Any reflective area is covered, and appropriate shields are in place to protect other workers.

After pre-dives, the device should only then be activated subsea. Divers should be made aware of their location or position relative to the ROV and be informed what other activities are being performed at the same time.

The harmonised International Standard IEC 60825-1 (BS EN 60825-1) sets out 8 classes of laser products, and most ROV subsea lasers fall into the Class 2 or 3 category, so we have highlighted those in this info note but please refer to British standards for a full explanation. See below class format:

- ◆ Class 1
- ◆ Class 1C
- ◆ Class 1M
- ◆ Class 2
- ◆ Class 2M
- ◆ Class 3R
- ◆ Class 3B
- ◆ Class 4



*“The body’s natural aversion responses are unlikely to provide adequate protection from eye injury for Class 3B laser or Class 4 lasers”*

## Class 2

Class 2 lasers are limited to a maximum output power of 1 milliwatt or one-thousandth of a watt (abbreviated to mW) and the beam must have a wavelength between 400 and 700 nm. A person receiving an eye exposure from a Class 2 laser beam, will be protected from injury by their own natural aversion response. This is a natural involuntary response which causes the individual to blink and avert their head thereby terminating the eye exposure. Repeated, deliberate exposure to the laser beam may not be safe.

## Class 2M

Class 2M laser products are products which produce beams with a large diameter beam in the wavelength range 400 to 700 nm. Therefore, only a small part of the whole laser beam can enter the eye and this is limited to 1 mW, similar to a Class 2 laser product. However, these products can be harmful to the eye if the beam is viewed using magnifying optical instruments.

## Class 3R

Class 3R laser products are higher powered devices than Class 1 and Class 2 and may have a maximum output power of 5 mW or 5 times the AEL for a Class 1 laser product. The laser beams from these products exceed the MPE for accidental viewing and can potentially cause eye injuries, but practically the risk of injury in most cases is relatively low for short and unintentional exposure. The risk is limited because of natural aversion behaviour for exposure to bright light for the case of visible radiation and by the response to heating of the cornea for far infrared radiation. Examples of Class 3R laser products include some laser pointers and some alignment products.

## Class 3B

Class 3B laser products may have an output power of up to 500 mW (half a watt). Class 3B laser products may have sufficient power to cause an eye injury, both from the direct beam and from reflections. The higher the radiant power of the device the greater the risk of injury. Class 3B laser products are therefore considered hazardous to the eye. However, the extent and severity of any eye injury arising from an exposure to the laser beam of a Class 3B laser product will depend upon several factors including the radiant power entering the eye and the duration of the exposure. Class 3B laser products which approach the upper limit for the Class may produce minor skin injuries or even pose a risk of igniting flammable materials.

## Related Guidance

Laser radiation: safety advice – GOV.UK:

<https://www.gov.uk/government/publications/laser-radiation-safety-advice/laser-radiation-safety-advice>

- ◆ Use personal protective equipment (for example: clothing, goggles or face shields) selected in accordance with the equipment safety instructions.
- ◆ Use relevant safety / warning signs.
- ◆ Raise awareness of best-practice and give personnel appropriate information as provided by the equipment supplier / manufacturer.
- ◆ Organise the work to reduce exposure to workers and restrict access to hazardous areas.
- ◆ If the ROV system utilises a class 3B or above, IMCA recommends installing a water depth lock-out based on water contact or Depth sensor readings to switch off the laser when less than 1 bar is observed.