

LASER SAFETY

Operating a laser alone can be hazardous.

The vast majority of industrial process lasers, whether in the field of marking, welding or cutting, are class 4.

It is therefore imperative to operate them in a suitable, closed and secure enclosure (Pld level) and thus avoid any contact with people. In which case the whole becomes a perfectly secure class 1 installation.

THEMIS Technologies SUPPORTS YOU IN INTEGRATING YOUR LASERS INTO SECURE EQUIPMENT.

CLASSIFICATION REPOSITORY

A key factor in the operation of lasers given the associated risks to the eye and skin, among others. Lasers are classified according to EN 60825-1 which defines 4 classes from least dangerous to most dangerous.

CLASS 1

Devices are safe during use, even in the case of direct vision of the beam over a long period of time, even when exposure occurs when using telescopic systems.

Class 1 also includes high-power lasers that are totally enclosed so that no potentially hazardous radiation is accessible during the operation (device with incorporated laser).

In-beam vision of Class 1 devices that emit visible radiant energy can still produce glare visual effects, especially at low ambient light levels.



CLASS 1M

Laser devices emitting between 302.5 to 4000nm, which are safe, including looking directly into the beam over a long period with the naked eye. The MPE may be exceeded and eye damage may occur after exposure with an optical device such as binoculars for a collimated beam with a diameter as specified by the standard.

In-beam vision of Class 1M devices that emit visible radiant energy can still produce glare visual effects, especially at low ambient light levels.

MPE = Maximum Permissible Exposure - the level of radiation to which people can be exposed under normal conditions without adverse effects.

CLASS 1C

Laser devices intended for direct application of laser radiation to the skin or internal body tissues as part of medical, diagnostic, therapeutic or cosmetic procedures such as hair removal, wrinkle reduction or acne.

Although laser radiation may be class 3R,3B or 4 level, ocular exposure is prevented by one or more technical means. The level of skin exposure depends on the application.

CLASS 2

Laser devices emitting visible radiation of wavelength between 400 and 700 nm with a power of less than 1mw, which are safe for momentary exposures, but which can be hazardous for deliberate in-beam exposure.

The risk of injury is very low for momentary exposure slightly longer than the time base related to the eyelid reflex, i.e. 0.25 s). The use of optical instruments does not increase the eye risk. Glare and blinding can be caused by a Class 2 laser beam especially in conditions of low ambient light levels. These conditions may pose a safety risk when they are combined with safety-critical activities such as work with machines or at height , in the presence of high voltage, or while driving.

Labels warn users not to look into the beam continuously and intentionally.



CLASS 2M

Laser devices that emit visible beams (wavelength 400-800nm) and are safe for short-term exposure only, with the naked eye.

The MPE may be exceeded and eye damage may occur after exposure with an optical device. The recommendations related to the consequences of glare, blindness, etc., are identical to those of Class 2.

In addition, the labelling of class 2M devices also warns users of telescopic optical instruments exposure.

MPE = Maximum Permissible Exposure - level of laser radiation to which people may be exposed in normal conditions without adverse effects harmful effects.

CLASS 3R

Laser devices with power between 1 and 5mw that emit laser radiation with a wavelength between 302.5 and 10,600nm that can exceed the MPE for direct in-beam vision, but the risk of injury in most cases is relatively low.

The risk of injury increases with the duration of exposure and exposure may be hazardous for ocular exposure under the most adverse conditions or direct and intentional in-beam vision.

Class 3R lasers should only be used when direct in-beam vision is unlikely.

CLASS 3B

5 to 500mw power laser devices that are normally hazardous when in-beam eye exposure occurs (inside the NOHD), including accidental short-term exposure. Diffuse reflection vision is normally safe.

Class 3B lasers that approach Class 3B PEL can produce minor skin injuries or even present a risk of ignition of flammable materials. However, this can only happen if the beam has a small diameter or is focused.

NOHD = Nominal ocular hazard distance or area within which the corneal MPE is exceeded.

PEL = Permissible Emission Limit = maximum emission allowed in a particular class.





CLASS 4

Laser devices for which in-beam vision and skin exposure are hazardous, and for which diffuse reflection vision can be dangerous. These lasers also often present a fire hazard.

All operations in class 4 require the following precautions:

- Specific premises for the laser.
- The wearing of suitable PPE.
- Medical monitoring of users.
- Hazard awareness.

