MONARCH INSTRUMENT

*Innovation in Instrumentation*

# Optical Safety Requirements for Laser Products

Much of the equipment being designed today may include lasers and/or LEDs. These components have myriad uses, including communications, sensing, measuring, aligning, etc. Although there may be many applications, they all share a common system of classification and safety consideration.

**The Relevant Standards**

There are two basic standards that are relevant to the optical safety of lasers and LEDs. The Center for Devices and Radiological Health (CDRH), which operates under the U.S. Food & Drug Administration (FDA), publishes the requirements in Title 21 of the Code of Federal Regulations, Part 1040, and Section 1040.10. The requirements establish a classification system (which is used as a way of enumerating the laser product's optical output), criteria for measurements, a labeling system, and other the criteria under which a laser product must operate.

The other major standard is IEC 60825. The International Electrotechnical Commission (IEC) publishes this standard and, as the name implies, is the set of safety specifications that is used outside of the U.S. This standard offers a classification system and operating requirements that are similar to those of the CDRH, but does have some differences in the required calculations. IEC 60825 is a product specific standard and there is no registration required to any governing authority, nor is there any need to demonstrate the product's repeatability under production.

Monarch Instrument produces products which contain Lasers classified 3R or lower per IEC 60825-1:2001. The following Labels, Safeguards and Precautions are found on our products and/or our support literature.


**WARNING** - This product emits a visible beam of laser light. Avoid exposure to the laser radiation. The use of optical viewing aids (binoculars, for example) may increase the ocular hazard.

**CAUTION** - The laser beam should not be intentionally aimed at people or animals.

**CAUTION** - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Read and follow all instructions in this manual carefully, and retain this manual for future reference.

Do not use this instrument in any manner inconsistent with these operating instructions or under any conditions that exceed the environmental specifications stated.

**Eye Protection is not required for Class 3R lasers that operate within the 400 to 700 nm wavelength range.**

| Class CDRH | Class IEC60825 | Output |
|---|---|---|
| I | 1 | Considered as safe to eye and skin under all reasonably foreseeable conditions of operation. |
| N/A | 1M | Considered as safe to eye and skin under all reasonably foreseeable conditions of operation, provided they are not viewed with magnifying optics of any kind. |
| IIa | N/A | Considered as safe when viewed for less than or equal to 1000 seconds. |
| II | 2 | Will not cause permanent eye damage under all reasonably foreseeable conditions of operation, provided that any exposure may be terminated by the blink reflex of the eye. Since this assumes the eye can detect this radiation, the wavelength range is limited to visible light (400nm to 700nm). The CDRH considers this class to be hazardous under continuous or chronic viewing. |
| N/A | 2M | Will not cause permanent eye damage under all reasonably foreseeable conditions of operation, provided that any exposure may be terminated by the blink reflex of the eye, and that these devices are not viewed with magnifying optics of any kind. |
| IIIa | 3R | Direct intrabeam viewing is potentially hazardous to the eye; has wavelength range of 302.5 to 106 nm (Near uv to far infrared). The CDRH also considers this as a hazard when viewed with magnifying optics. |
| IIIb | 3B | Unsafe for eye exposure at all wavelengths, but generally not powerful enough to damage skin during a short exposure. The CDRH considers this as a hazard to both the skin and eyes during direct exposure. |
| IV | 4 | Powerful enough to burn skin, cause fire, and ionize the air. |

Descriptions and definitions are subject to change without notice



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