Laser Warning Signs and Labeling

SafetyNet #: 75

Principal Investigators who use lasers are responsible for ensuring that all lasers are appropriately labeled and warning signs are conspicuously displayed in locations where they will best serve to warn on-lookers.

The following requirements must be followed for proper labeling of lasers and posting of signs:

- The signal word "Caution" must be used with all signs and labels associated with class 2 and some 3R lasers or laser systems.
- A class 2 laser or laser system must be labeled with the warning "Avoid Long Term Viewing of Direct Laser Radiation." This label does not need the warning symbol or signal words but must be visible during operation and bear the designation "Class 2 Laser."
- The signal word "Danger" and “the white triangle with the red exclamation mark” must be used with all signs and labels associated with class 3 and 4 lasers and laser systems.
- Appropriate space must be left on all signs and labels to allow inclusion of pertinent information. Such information may be included during the printing of the sign or label or may be handwritten in a legible manner to include the following:

  - Above the tail of the sunburst, the following special precautionary instructions or protective actions may be required for individuals entering the area:
    
    a. For class 2 & 2M - **CAUTION - Laser Radiation - Do Not Stare Into Beam**
    
    b. For class 3R - **DANGER - Laser Radiation - Do Not Stare Into Beam or View Directly With Optical Instruments**
    
    c. For class 3B - **DANGER - Laser Radiation - Avoid Direct Exposure to Beam**
    
    d. For class 4 - **DANGER - Laser Radiation - Avoid Eye or Skin Exposure to Direct or Scattered Radiation**

  - Below the tail of the sunburst, the type of laser (e.g., Ruby, Helium-Neon, etc.) or emitted wavelength, the pulse duration if appropriate, and the maximum output must be provided.
Below the tail of the sunburst, precautionary instructions or protective actions to be taken by the reader should be provided such as "invisible beam, knock before entering, do not enter when light is on, restricted area, etc."

At the lower right, the class of the laser or laser system must be provided.

**Laser Hazard Classification**

All lasers are classified by the manufacturer and labeled with the appropriate warning labels. Any modification of an existing laser, construction of a custom laser or an unclassified laser must be classified by the Laser Safety Officer prior to use. The following criteria are used to classify lasers.

**Class 1**
Considered to be incapable of producing damaging radiation levels (Enclosed Beam). It is exempt from control measures. Class 1 laser can contain an enclosed laser system of Class 3B or 4.

**Class 1M**
A Class 1M laser is considered to be incapable of producing hazardous exposure conditions unless viewed with an optical instrument. It is exempt from any control measures.

**Class 2**
A visible laser (400-760nm) that due to the blink reflex (.25sec), does not present a hazard, but may if viewed for extended periods of time.

**Class 2M**
A Class 2M laser emits in the visible portion (400-760nm). Eye protection is provided by the “Blink Reflex” (0.25sec). It is potentially hazardous if viewed with an optical instrument.

**Class 3 (medium power)**
A Class 3 laser may be hazardous under direct or specular reflection viewing conditions. There are now two subclasses of Class 3 lasers.

**Class 3R (Reduced Requirements)**
Class 3R lasers are potentially hazardous under direct and specular reflection if the eye is focused and stable. They are hazardous if viewed with an optical instrument. This is consistent with the old 3a classification, 1-5mW visible laser.

**Class 3B**
Class 3B lasers and laser systems include wavelengths from 180nm to 1mm in the ultra violet, visible and infra red ranges. The average radiant power for Class 3B of CW lasers cannot exceed 500mW for more than 0.25 seconds. Repetitive pulsed lasers in the UV and far IR
range cannot produce a radiant energy greater than 125 mJ within an exposure time less than 0.25 seconds.

Lasers in the visible or near IR range, also known as “The Optical Hazard Region” from (400nm to 1400nm) cannot emit an average radiant power in excess of 500mW equal to or greater than 0.25 seconds and cannot produce a radiant energy greater than 30 mJ per pulse. Lasers and laser systems in this class are capable of eye injury if viewed directly or from specular reflection.

**Class 4**
Class 4 lasers or laser systems pose the most threat of injury to the eye and skin. They are a hazard from intrabeam (direct) viewing, specular and diffuse reflection and are capable of starting fires. Lasers and laser systems in this Class 4 are those that emit radiation that exceed levels of a Class 3B.

**Contact**

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**More information**
[https://safetyservices.ucdavis.edu/research-safety-staff-listing](https://safetyservices.ucdavis.edu/research-safety-staff-listing)

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