

EH&S Fast Facts

LASER PROTECTIVE EYEWEAR



Make sure you have no reflective surfaces for class 3b and 4 lasers (no chance of specular reflection) in the beam path for outdoor applications. Eye protection is required when using all class 3b and 4 lasers or laser systems (most accidents occur during alignment of the laser) for lab applications. Potentially hazardous specular reflections can exist when using flat lens surfaces (filters). Curved filters are safer in the operational area.

Parameters

- ✦ **Wavelength:** Protective eyewear should be specific to prevent particular wavelength(s) of the laser from reaching the eye. Many lasers radiate at more than one wavelength (eyewear designed to have adequate attenuation for a particular wavelength can be completely inadequate at another wavelength, especially with lasers that are tunable over broad wavelength band - avoid direct viewing)
- ✦ **Optical Density:** Specifies attenuation afforded by a given thickness of any transmitting medium
- ✦ **Laser Beam Irradiance:** If the beam is never focused and is larger than the diameter of the pupil of the eye, the output energy per unit area or power per unit area should be the guiding value. If the beam is focused or if the beam can't be observed at the output, the maximum total beam energy or power output must be used
- ✦ **Visible Transmittance of Eyewear:** A low visible transmittance creates eye fatigue and may require an increase in ambient lighting, but adequate optical density should not be sacrificed for improved visible transmittance
- ✦ **Laser Filter Damage Threshold:** Typical damage thresholds from q-switched pulsed laser radiation fall between 10 and 100 joules/cm² for absorbing glass and 1 to 100 joules/cm² for plastics and dielectric coatings. Continuous wave power higher than 10W can fracture glass filters and burn through plastics (if you smell smoke and see a dark spot on your laser safety eyewear getting larger, move because you are in the beam path and will soon suffer eye damage)

Selecting Appropriate Eyewear

- ✦ Determine wavelength(s) of laser output, required optical density and maximum incident beam irradiance

Testing Laser Eye Protection

- ✦ Eye protection must be checked periodically for integrity

Identification of Eyewear

- ✦ All laser protective eyewear must be clearly labeled with optical density value and wavelength to indicate the level of protection provided (color-coding or other distinctive identification of protective eyewear is recommended for multi-laser systems)

Comfort & Fit

- ✦ Protective eyewear should be comfortable and prevent hazardous peripheral radiation

Visit www.ehs.ucr.edu for additional information or call EH&S at 827-5528 if you have any questions.