



Laser Protective Eyewear



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Laser Protective Eyewear for Alignments

The Office of Radiation Safety receives many requests on selecting laser protective eyewear for alignment purposes. The information below should be helpful. If you have additional questions on laser protective eyewear or any other laser safety issue, please contact EHS at 865-6391.

- Even if you are wearing laser protective eyewear, **never look directly into any laser beam.** Intrabeam viewing of lasers is not allowed except with the direct permission of the Laser Safety Officer. Contact the Laser Safety Officer if you feel that aligning your laser requires intrabeam viewing.
- The SOP for each laser indicates if laser protective eyewear is required for alignment or use of the laser. If laser protective eyewear is required, the SOP specifies the OD (optical density) at the laser wavelength(s) being used. The OD specified is the minimum OD sufficient to protect the user against a momentary intrabeam or specular reflection exposure.
- For visible lasers, the minimum OD required to protect the user against intrabeam viewing should allow the viewing of a diffuse spot on a light colored surface. If the laser protective eyewear has an OD much larger than the specified minimum OD, it may be impossible to properly view a diffuse beam spot (or even see properly in the laser facility).
- In some instances (visible lasers from 400 - 450 nm and 650 - 700 nm), it may be preferable to reduce the OD below the specified intrabeam minimum OD to better view a diffuse spot. Reducing the OD by 1 or 2 should substantially improve viewing while still offering adequate eye protection (the intrabeam OD has a X10 safety margin calculated into the value which includes the human aversion (blink) response). Reducing the specified OD by a number greater than 2 may reduce the protection factor enough to allow eye injury should a specular reflection be viewed accidentally.

- For invisible lasers, the minimum OD for intrabeam viewing should not be reduced as OD reduction will not aid in viewing the beam. Instead, the laser protective eyewear should be chosen to allow the wavelength produced by the viewing aid to be transmitted while absorbing the invisible beam. For example: a Nd:YAG beam at 1064 nm is being aligned with the use of an IR sensing card which absorbs some of the 1064 nm radiation and emits radiation at 550 nm. The calculated intrabeam OD for the Nd:YAG is 6.0. A good choice for laser protective eyewear would be a goggle with a UVEX type 06 filter (an OD of 8+ at 1064 nm and an OD of less than 1 at 400 to 700 nm). This goggle has a visible light transmission of 70% and should allow the diffuse spot to be easily viewed while giving excellent protection from the invisible Nd:YAG beam. NOTE: this eyewear would obviously not be a good choice if the Nd:YAG beam was frequency doubled to 532 nm.
- All laser protective eyewear should have a visible light transmission (VLT) sufficient to allow safe operation in the laser facility. EHS recommends a VLT of at least 35%. Laser protective eyewear with a low VLT will generally not be worn by users and so cannot provide any protection.

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