

11th Department of Energy Laser Safety Officer Workshop



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Ultrafast Pulse Laser Safety Eyewear Specification Evaluation at NIST

Content :

Laser eyewear protection for ultrafast, high energy Class IV laser systems should meet specified attenuation levels (optical density or OD) across the full output pulse spectrum. In some cases, ultrafast laser pulses with inherently broad spectral output (typically >60 nm FWHM) can exceed cut-off wavelength ranges and result in lower than expected attenuation levels. To evaluate this possibility, transmission spectra and integrated power measurements were conducted on 22 eyewear test samples (absorbing dye and dielectric coatings) that were all rated for attenuation at the center wavelength of the laser output in question. A nominally 800 nm center wavelength Ti:Sapphire oscillator and regenerative amplifier system (150 mW average power, 60 nm FWHM at 82 MHz oscillator; 500 uJ/pulse, 35 nm FWHM 1 KHz amplifier) was used to measure transmission spectra and power through each sample as a function of pulse center wavelength. Transmission spectra and attenuation values for these filters under a low fluence exposure will be presented and compared to the stated values for each filter. Preliminary high fluence exposures were also performed to evaluate for potential saturable absorption effects in the same filter samples.

Summary :

Ultrafast, LPE, Laser Protective Eyewear, Optical Density, Broad Spectrum, Saturable Absorption.

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