

High Damage Threshold Mirrors for Pulsed, Solid State Lasers

These mirrors provide an unmatched combination of high laser damage threshold, ultra-low scatter, excellent wavefront performance, exceptional environmental stability and rugged mechanical durability. Designed primarily for use with pulsed, solid state lasers operating at 1064 nm, 532 nm and 355 nm, as well as for use with multi-spectral laser systems, they are ideal for demanding applications such as military targeting and rangefinding, industrial materials processing systems, intracavity laser use and high energy research lasers.

These superior characteristics are achieved through the use of ion beam sputtering (IBS) technology to produce fully densified coatings that are resistant to environmental contaminants, the employment of fabrication techniques that minimize sub-surface damage, and rigorous control of contamination at all steps throughout the production process. Furthermore, REO maintains extensive in-house metrology capabilities enabling us to thoroughly characterize and understand all the phases of our manufacturing; these include laser damage testing in compliance with ISO 11254, instrumentation for producing quantitative maps of defect sites, and equipment for measuring absorption and scatter loss at numerous laser wavelengths. As a result of all this, REO can routinely deliver mirrors with laser damage threshold levels exceeding 20 J/cm² for 3 ns pulses at 1064 nm, and 40 J/cm² for 20 ns pulses at 1064 nm.

REO fabricates and coats these mirrors on a custom basis with typical specifications of 99.99% reflectivity, $\lambda/20$ flatness (at 633 nm), 10-5 surface quality, and scatter loss of 1 part per million. A wide range of sizes and shapes can be delivered, typically over the 0.25" to 10" diameter range, from virtually any substrate material, including fused silica, optical glasses, Zerodur and Pyrex.



Typical Specifications

Substrate Material	Fused Silica and others
Design Wavelength Range	266nm – 1600nm
Reflectivity	99.99%
Damage Threshold	
- 1064 nm, 3 ns pulse	20 J/cm ²
- 1064 nm, 20 ns pulse	40 J/cm ²
Pulse Width	picosecond to microsecond
Surface Flatness (@ 633 nm)	$\lambda/20$
Surface Quality	10-5 or better
Size Range	0.25" to 10"
Clear Aperture	90%
Temperature Range	-196 °C to 400 °C
Humidity Range	0 to 100%