



# Gratings for High Energy Laser Spectral Beam Combining

## Benefits

- High nonpolarizing Diffraction Efficiency
- Excellent Diffracted Wavefront Error
- High Laser-Induced Damage Threshold (LIDT)
- Low absorption to avoid heating effects
- Superior uniformity, even for sizes > 150 mm

## Typical Applications

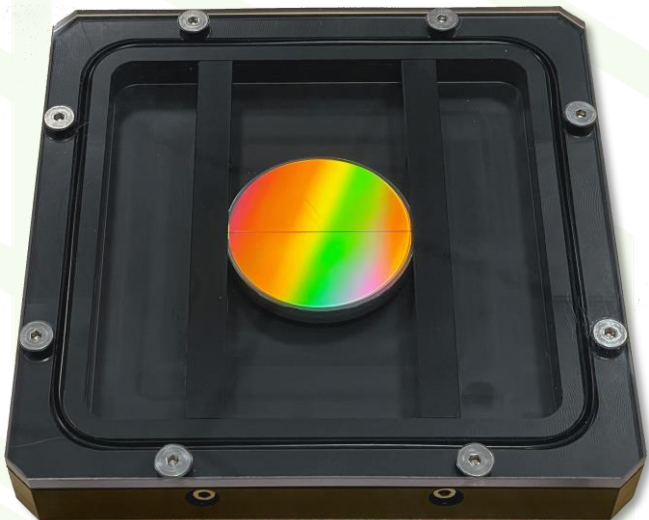
- Spectral Beam Combining of High Energy Lasers (HEL) for Directed Energy

## Features

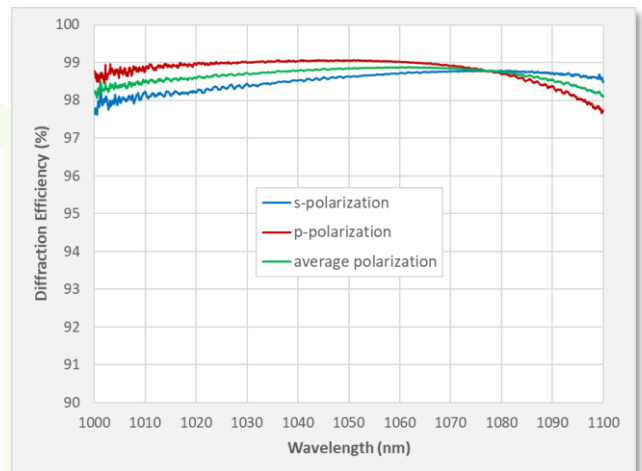
Grating Type	Multilayer Dielectric (MLD) Reflecting
Diffraction Efficiency	Typ. 96 – 99%
Bandwidth	> 50 nm (Typ. 1030 – 1080 nm)
Polarization	Nonpolarizing (TE and TM)
Diffracted Wavefront Error	< $\lambda / 4$ (size dependent)
Laser Damage Threshold	100's of kW / cm <sup>2</sup>

PGL is the leading commercial supplier of gratings that are proven to meet the performance requirements of Directed Energy HEL systems. For over 15 years we have been supplying MLD gratings to the world's premier ultrahigh-intensity laser facilities and laser manufacturers.

PGL's innovative combination of thin-film coating technology with grating design and fabrication know-how allows the diffraction efficiency, wavefront, LIDT, and power-handling capability required for Spectral Beam Combining (SBC) laser systems.



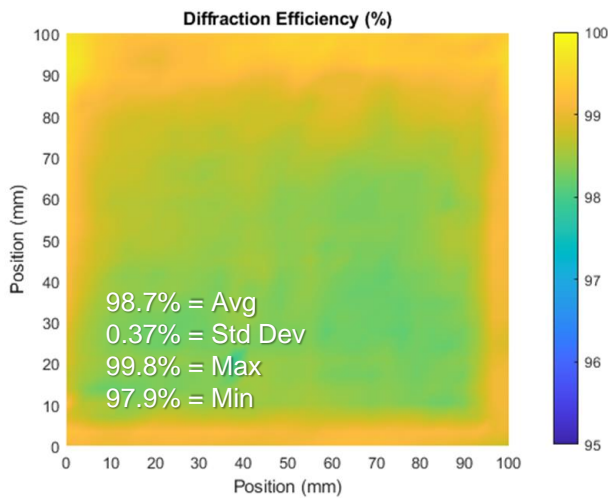
Nonpolarizing HEL MLD grating on Si substrate



Typical diffraction efficiency spectral performance

## Product Details

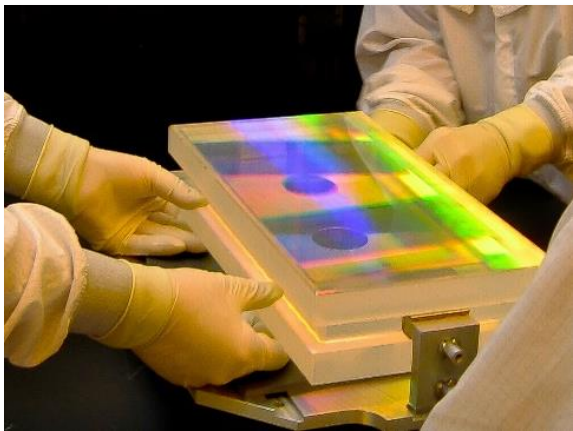
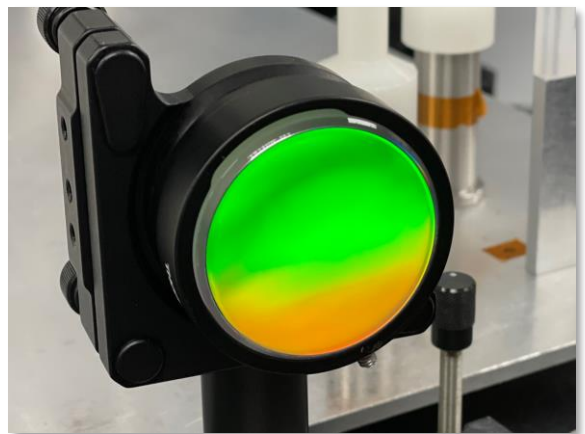
PGL has extensive expertise in grating manufacturing, as well as in thin-film optical coating, reactive-ion etching, optical metrology, and precision cleaning, inspection, and handling of large optics. All these processes are critical to high-performance MLD diffraction gratings for spectral beam combining.



*Diffraction efficiency uniformity for average polarization on a 100 mm x 100 mm MLD grating*

PGL's unique grating designs and proprietary thin-film coating processes enable us to produce SBC gratings with the highest possible diffraction efficiency, widest spectral bandwidth, and superior manufacturability.

And we are always innovating. PGL demonstrated the first all-silica-tooth gratings on high-damage-threshold, low-loss silica-hafnia thin-film coatings. These next-generation gratings will be required to meet the needs of future HEL systems with intensities  $> 1 \text{ MW/cm}^2$ .



*420 mm x 210 mm high-intensity laser MLD grating*

### Standard Sizes \*

---

50 mm Round x 15 mm

---

50 mm x 50 mm x 15 mm

---

100 mm x 100 mm x 15 mm

---

150 mm x 50 mm x 25 mm

---

\* Custom sizes available, including  $> 150 \text{ mm}$



**Plymouth Grating**  
LABORATORY

5 Commerce Way  
Carver, MA 02330

508.503.1719  
sales@plymouthgrating.com

[plymouthgrating.com](http://plymouthgrating.com)

**Plymouth Grating Laboratory** is dedicated to making the highest-quality diffraction gratings available today. Our focus is on lasers and laser systems. PGL gratings offer exceptionally high diffraction efficiency and laser damage threshold, combined with superior wavefront error and uniformity over large areas. This performance is made possible by PGL's exclusive use of the Nanoruler, based on the proprietary Scanning Beam Interference Lithography technology developed at MIT, and PGL's industry-leading process expertise. The company occupies 20,000 sq. ft. of dedicated manufacturing, engineering, and office space in Carver, MA just outside of Plymouth, and about 45 miles south of Boston. For more information see [plymouthgrating.com](http://plymouthgrating.com)