High Performance Risley Prism Pairs for Laser Beam Steering

These Risley (wedge) prism pairs enable high accuracy laser beam steering in a wide variety of demanding military, industrial and instrumentation applications. Beam steering accuracy with these coated optics is particularly dependent upon close matching of the prisms in a pair, and REO takes several steps to ensure this. These measures include precise matching of prism pair wedge angles (to < 0.5 arcsec) and bulk material indices of refraction, as well as careful control of internal coating layer stresses to guarantee that the coating deposition process does not degrade transmitted wavefront performance (specified at < λ/10 at 632.8 nm). REO Risley prism pairs also feature low scatter, low loss surfaces with 10-5 surface quality to maximize throughput and laser damage threshold.

REO can fabricate Risley prism pairs from a number of different materials suitable for operation at wavelengths throughout the ultraviolet, visible or infrared spectral ranges. Typical examples include fused silica, optical glasses, CaF_2, ZnS, ZnSe, Ge and Si. Prisms of up to 150 mm in diameter can be produced, depending upon material. REO can also design and manufacture optomechanical beam steering subassemblies that maintain the full, inherent precision of these prism pairs.

Typical Specifications

Materials	fused silica, optical glasses, CaF_2, ZnS, ZnSe, Ge and Si
Wavelength Range	244 nm to 20 µm
Diameter Range	5 mm – 150 mm
Diameter Tolerance	± 0.1 mm
Transmitted wavefront distortion per prism (@ 632 nm)	
Diameter ≤ 38 mm	λ/10
Diameter >38 mm	λ/5
Wedge Angle Tolerance	± 10 arcsec
Pair Wedge Angle Matching	< 0.5 arcsec
Temperature range	–196 °C to 400 °C
Humidity range	0 to 100%
Surface Quality	10-5
Clear Aperture	90%