



Thin Film Polarizer for Advanced LIGO Output Faraday Isolator

AUTHOR:	CHECKED:	DATE	APPROVALS		
			DCN NO.	REV	DATE
Rodica Martin	Mike Smith	09-8-10		V1	

Material and Polishing Specifications

Material	Low absorption Fused Silica, Grade Corning 0A, Heraeus Suprasil 312 or equivalent.
Diameter	2.00 in +/-0.01 in
Thickness	0.50 in +/-0.01 in
Clear Aperture	> 80% of the optic diameter
Bubble and inclusion cross section within the clear aperture	Determined by the glass Grade Corning 0A, Heraeus Suprasil 312 or equivalent. No bubbles or inclusions within the clear aperture
Striae within the clear aperture	Grade A according to MIL-G-174
Serial Number and Registration Marks	The optics should be serialized as TFP-w-56°-xx, where xx increments start at 01. Serial Numbers and Registration Marks shall be scribed or etched on the barrel of the optic. An arrow indicates Surface 1, the polarizer surface.
Bevel	Bevel for safety 0.03 in +/-0.01 in @ 45 deg
Wedge	0.5 deg +/-0.1 deg
Surface quality	No scratches, sleeks and point defects of radius greater than 2 micrometers within the central 20 mm diameter 10-5 scratch-dig outside the central 20 mm diameter
Microroughness	<0.2 nm



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Coating Requirements:

Surface 1 – Polarizer at 1064 nm	
Coating Area	2-3 mm to bevel
Coating Deposition Method	Ion Beam Sputtering
Angle of Incidence (AOI)	56 deg (Brewster's angle for fused silica)
Suppression of s-polarization Ts/Tp	Better than 1:5000
Transmission Efficiency	Tp > 99.5% for p-polarization
Absorption at 1064 nm	< 10 ppm
Transmitted Wavefront Error	1/20 th wave at 633 nm, over the clear aperture
Reflected Wavefront Error	1/10 th wave at 633 nm, over the clear aperture
Temperature Stability	The specified optical performance must be maintained over a temperature range 20 °C – 30 °C.
High Average Optical Power	> 300 kW/cm ² sustained
Surface 2 – Uncoated	

Measurement Matrix - Frequency and Method

Specification	Test Method	Frequency of Inspection	Data Delivered
Material	Process Control Material Certification	100%	Certification
Physical Dimensions	Measurement	100%	Diameter, Thickness, Wedge Angle
Inclusions	Visual Inspection	100%	Hand sketches indicating location, depth, and dimensions.
Striae	MIL-G-174, Section 4.4.5, method 1 or 2	100%	Certification
Surface Defect Analysis	Visual Inspection	100%	Hand Sketches including defect dimensions and digital images at four points equally spaced along a circumference of a centered 10 mm diameter.
Microroughness	Interferometry	100%	Certification