



SPECIFICATION

Advanced LIGO Compensation Plate Coating Specification

AUTHOR:	CHECKED:	DATE	APPROVALS		
			DCN NO.	REV	DATE
R. Dannenberg	G. Billingsley	5/11/09	E0900132	V1	5/11/09
R. Dannenberg	G. Billingsley	10/15/09	E0900359	V2	10/15/09
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<b>Purpose</b>	<b>Coating properties as per v2. Coatings are applied to CP03 and CP04, custom Polish</b>
<b>Applicable Documents</b>	
<b>Blank Specification</b>	E080037-A
<b>Polish Specification</b>	E1400394-v3 (for use with CP03 and CP04 only)
<b>Polish Drawing (Fabricate From)</b>	D1000979-v3
<b>Surfaces 1 &amp; 2</b>	<b><u>ARROWS ON OPTIC SIDE POINT TO SURFACE 1</u></b>
<b>Optical Performance Uniformity</b>	On both surfaces, the specified single surface reflectance or transmittances at the specified wavelengths must be maintained over a 160 mm diameter aperture.
<b>Coating Deposition Method</b>	Ion Beam Sputtered
<b>Coating Area</b>	To Bevel
<b>Witness Sample Durability Testing</b>	On one witness piece per run, coating to resist: <ul style="list-style-type: none"> <li>1. Adhesion test per MIL-C-48497A 4.5.3.1 Adhesion (snap tape).</li> <li>2. MIL-C-4.5.3.2 Humidity (120F 95% RH for 24 hours), combined with before/after reflectance &amp; transmittance spectrophotometer scans from 350 - 2500 nm in about 1 nm increments, marking the specimen ensure the same area is scanned. The scans will be provided in an Excel spreadsheet as columnar data. There should be no measureable spectral shift.</li> <li>3. MIL-C-4.5.3.3 Moderate Abrasion (cheesecloth rub).</li> </ul>



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<b>Coating Type</b>	Antireflection
<b>Angle of Incidence</b>	Normal
<b>Average Reflection at 1064 nm</b>	< 50 ppm, either surface may exceed 50 ppm as long as the average remains less than 50 ppm.
<b>Absorption at 1064 nm</b>	< 1 ppm
<b>Max Scratche area inside 120mm diameter (units sq. microns)</b>	500,000
<b>Max Point Defects Surface 1 inside 120mm diameter</b>	50
<b>Surface Scratch/Defect Inspection Method</b>	<p>METHOD 1. The surface is examined visually by two observers independently. The examination is done against a dark background using a fiber optic illumination system of at least 150 W total power. A 100% inspection of the surface is carried out. Pits and scratches down to 2 micrometers in width can be detected using this method of inspection. Any scratches or sleeks that are detected will be measured using a calibrated eyepiece.</p> <p>METHOD 2. Inspection will be done with a minimum 6X eyeglass using the same illumination conditions, again with two observers. Sleeks down to 0.5 micrometers wide can be detected using this method. The surface will be scanned along one or two chords from center to edge, then at ten positions around the edge, and ten to fifteen positions near the center.</p> <p>Data to be supplied as a hand sketch from both Methods 1 &amp; 2.</p>
<b>Additional Deliverables</b>	
<b>Witness Samples</b>	<p>SURFACE 1 &amp; 2:</p> <p>Two 1-inch witness samples per run required + as many 1 inch witness pieces that can be fit additionally per run (provided by vendor).</p>



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<b>Layer Thicknesses Information</b>	For all layers in the design, measured thickness data from the deposition for each run, designed thicknesses, and measured indices of refraction at both 1064 nm and 532 nm for both coating materials (based on individual layers).
<b>Durability Test Data &amp; Samples</b>	
	All samples from the durability tests and data, including transmittance and reflectance spectrophotometer scans of the representative coating on each side in an Excel spreadsheet with columnar data spaced by approximately 1 nm from 350 - 2500 nm.