

 <div style="text-align: center;"> LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY SPECIFICATION </div>	E020389 -00- D	
	Drawing No	Rev. Group
	Sheet 1 of 2	

Sapphire Substrate, LASTI Test Mass, R&D

AUTHOR:	CHECKED:	DATE	APPROVALS		
			DCN NO.	REV	DATE
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Scope

The substrates defined by this specification are to be used in research as first article Test Masses. These substrates should be manufactured using all processes intended for production quantity LIGO Test Masses.

Applicable Documents

LIGO-D020150 Substrate, LASTI Test Mass

Requirements

Physical Configuration

According to
LIGO-D020150 Substrate, LASTI Test Mass

Material

A-Axis Sapphire, Hemlite

Part and Serial Number

None

Registration Mark

None

Side and Bevel Polish

Sides and Bevels shall appear transparent with no gray, scuffs or scratches visible to the naked eye when viewed in normal room light against a black background.

Scratches and Point defects

An 80/50 or better scratch/dig finish on mounting flats and surfaces.

Mounting Flats, measured over the central 5cm x 5cm area

Figure: Flat.

Figure Error: $\sigma_{\text{rms}} < 65 \text{ nm rms}$

Surface 1, measured over the central 80% diameter

Figure: Flat.

Figure Error: $\sigma_{\text{rms}} < 300 \text{ nm rms}$

Microroughness: $\sigma_{\text{rms}} < 0.4 \text{ nanometers}$

Measured at the center of the surface.

Surface 2, measured over the central 80% diameter

Figure: Flat.

Figure Error: $\sigma_{\text{rms}} < 300 \text{ nm rms}$

Microroughness: $\sigma_{\text{rms}} < 0.4 \text{ nanometers}$

Measured at the center of the surface.

Root mean square standard deviation (σ_{rms}) values are calculated from the phase maps that are to be provided with each substrate. σ_{rms} is defined as the square root of the mean of the square of each pixel value. Known bad pixels may be excluded from this calculation.

Table 1 Certification Data Requirements

Specification	Test Method	Data Delivered
Physical Dimensions	Visual Inspection	Diameter, Thickness, Wedge angle.
Side and Bevel Polish	Visual Inspection	Inspection Report included with Certification
Surface Figure	Interferometry	Surface Map
Mounting Flat Figure	Interferometry	Surface Maps
Surface Errors - High Spatial Frequency	High resolution Surface Map	Numerical values included with Certification

Format: All Data shall be delivered according to Table 1.