



SPECIFICATION

**Ponderomotive Interferometer
Input Mirror Substrate**

APPROVALS	DATE	REV	DCN NO.	BY	CHECK	DCC	DATE
AUTHOR: H. Armandula	11/10/04						
CHECKED: G. Billingsley	11/11/04						
APPROVED: Nergis Mavalvala							
DCC RELEASE							

Applicable Documents

LIGO-D040539-B

Requirements

Physical Configuration

According to:
LIGO-D040539-B

Clear Aperture

Central 30 mm

Material

Fused Silica

Striae

Grade A according to MIL-G-174, within clear aperture

Homogeneity

$\leq 5 \times 10^6$ peak to valley at $\lambda=632.8$ nm, within the clear aperture

Birefringence

≤ 5 nm/cm within the clear aperture

Bubble and Inclusion Cross-section within the clear aperture

Total ≤ 0.25 mm²/100cm² of glass.
Inclusions with a diameter of .06 mm or less are disregarded.
Maximum inclusion diameter ≤ 0.1 mm
Zero bubbles or inclusions within the central 10 mm diameter

Registration Mark

Registration mark, in the form of an arrow, shall be etched, ground or sandblasted to indicate the top surface of the optic corresponding to the phase maps required.



SPECIFICATION

**Ponderomotive Interferometer
Input Mirror Substrate**

Final shaping

Shaping shall be performed using a progression of grit size ending with a 320 or smaller grit wheel.

Side and Bevel Polish

Sides and Bevels shall be polished. These surfaces 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

There shall be no scratches, sleeks or point defects within the central 15 mm.
The total area of scratches, sleeks and point defects outside the central 15 mm diameter shall not exceed 5,000 square micrometers.

Inspection Method

The entire surface is visually inspected against a dark background using a three-bundle fiber-optic illumination system of at least 200W power. Any scratches that are detected should be measured using a calibrated eyepiece.
Inspection of the central 15mm diameter is carried out with a dark field microscope.

Surface Figure, measured over the central 30 mm diameter

Surface 1: Spherical, concave

ROC: 0.55 m concave \pm .001m
Surface micro-roughness: Superpolished \leq 1 angstrom rms

Surface 2: Nominally flat

ROC: ∞ , > 500m
Surface quality 40/20



LASER INTERFEROMETER GRAVITATIONAL WAVE
OBSERVATORY

SPECIFICATION

E040468 -00- D

Drawing No Rev. Group

Sheet 3 of 2

Ponderomotive Interferometer Input Mirror Substrate

Data Requirements

Vendor to provide an inspection sheet stating compliance with:

Physical Dimensions

Scratches and Point Defects – Location of scratches or defects noted on a surface's sketch

Surface Figure – Interferometer maps to be provided – For the purpose of full surface maps the substrate shall be oriented such that the point of minimum thickness shall be at the top center of the data.