CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

LIGO-E990086 -   *A*

DRWG NO.   **REV.**

GID

SHEET 1 **OF** 6

LIGO

COMPONENT SPECIFICATION

COS Viewport Window

APPROVALS:	DATE	REV	DCN NO	BY	CHK	DCC	DATE
DRAWN: JONATHAN KERN, MICHAEL SMITH	**2/4/99**	**A**	**E990087-A**				
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1   SCOPE

This is a specification for a COS vacuum window viewport: Type 1 and Type 2.

2   APPLICABLE DOCUMENTS

2.1.   LIGO Documents

LIGO-E960022-03, Vacuum Compatibility, Cleaning Methods and Compatibility Procedures
- *http://ligo.caltech.edu/LIGO_web/dcc/docs/E960022-03.pdf*

2.2.   Non-LIGO Documents

MIL-C-675C

3   REQUIREMENTS

3.1.   General Characteristics

Diameter	3.000 inch +/- 0.010
Clear Aperture	2.75 inch
Thickness	0.500 inch +/- 0.005
Wedge	3 min. +/- 2 min
Transmissivity through optical aperture	see 3.1.2.
Wavefront distortion across clear aperture	$<l/10?$ @ 633 nm wavelength
Edge chamfer	0.010 inch @ 45 deg +/- 10deg

3.1.1.   Surface Quality

Type 1	<0.8 Å (Superpolish)
Type 2	10-5 laser quality

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3.1.2.   Antireflection Coating

3.1.2.1   Coating, Type 1 (Provided by Research Electro Optics)

Applied to both surfaces of window

Polarization	S
Wavelength	1064 nm
Incidence angle	5.3 deg
Transmissivity per surface	>99.9%
Durability	MIL-C-675C
Protective overcoat	SiO_2 overcoat on surface S2

3.1.2.2   Coating, Type 2

Applied to both surfaces of window

Polarization	S
Wavelength	1064 nm
Incidence angle	5.3 deg
Transmissivity per surface	>99.6%
Durability	MIL-C-675C
Protective overcoat	SiO_2 overcoat on surface S2

3.1.3.   Window material

3.1.3.1   Material, Type 1

Optical grade "A" fused silica (Hereaus Infrasil 301-A, Herasil 1-A, Suprasil 311-A, Suprasil 312-A may be used).
A substitution of any other window material must be approved by cognizant LIGO personnel.

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3.1.3.2   Material, Type 2

 BK-7

4   TEST PROCEDURES

4.1. Optical Surfaces

4.1.1.   Visual Surface Inspection Test

Both surfaces of the optical window shall be free of visible stains and surface defects when the window is illuminated with a high-intensity lightsource and viewed in a darkened environment with the unaided eye.

4.1.2.   Transmissivity Test

Transmissivity through the clear aperture shall be measured with a collimated light source @ 1064 nm wavelength. The light source shall fill the clear aperture when making transmissivity measurements.

4.1.3.   Wavefront Distortion Test

Wavefront distortion over the clear aperture shall be measured at 633 nm wavelength with an appropriate interferometer.

5   DOCUMENTATION

 1) Interferogram of transmitted wavefront across clear aperture
 2) Transmissivity through clear aperture
 3) Compliance Certification for this specification
 5) Inspection report
 • dimensional verification
 • test results
 • material list
 inspection test procedure

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COMPONENT SPECIFICATION		**SHEET** 4 **OF** 6			

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5.1. Quality Assurance/Control

5.1.1. Identification

5.1.1.1 Serial Number

A serial number shall be etched, or scribed on the edge of the window. See figure 1.

5.1.1.1.1 Serial Number Format

The Serial number shall be of the format:
E990086-y-c Where

E990086-y is the LIGO piece part or assembly drawing number, E990086, including the revision letter, -y, to which the hardware item was built;
and $c=1$ describes the REO coating, $c=2$ describes the Standard coating.

5.1.1.2 Outside Surface

The outside surface, S2, shall be marked with an arrow-- etched, or scribed on the edge of the window. See figure 1.

5.1.2. Quality Assurance Provisions

5.1.3. Purchaser Access

Non-escort privileges for the buyer, owner, government and owner representatives to all areas of the facilities where work is being performed shall be arranged. This will include access to all areas where material is being processed and stored. The purchaser shall have the right to witness all manufacturing processes.

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5.1.4. QA Approval

LIGO QA reserves the right to inspect and approve vendor/fabricator QA plan and processes.

6 HANDLING AND SHIPPING PROCEDURES

6.1. Cleaning

Approved cleaning procedures for UHV components are detailed in LIGO-E960022, Vacuum Compatibility, Cleaning Methods and Compatibility Procedures.

6.1.1. Optical Surfaces

All optical surfaces shall be cleaned in accordance with good commercial practice. Nothing shall contact the optical surfaces after cleaning, except for lint-free lens tissue.

6.2. Packaging for Shipment

6.2.1. Optical Parts

The cleaned optical components shall be protected with lint-free lens tissue. In addition, all components shall be placed in a sealed, clean polyethylene bag before shipping.

The shipping containers must ensure that the bag does not get punctured and that the parts are properly protected during transit.

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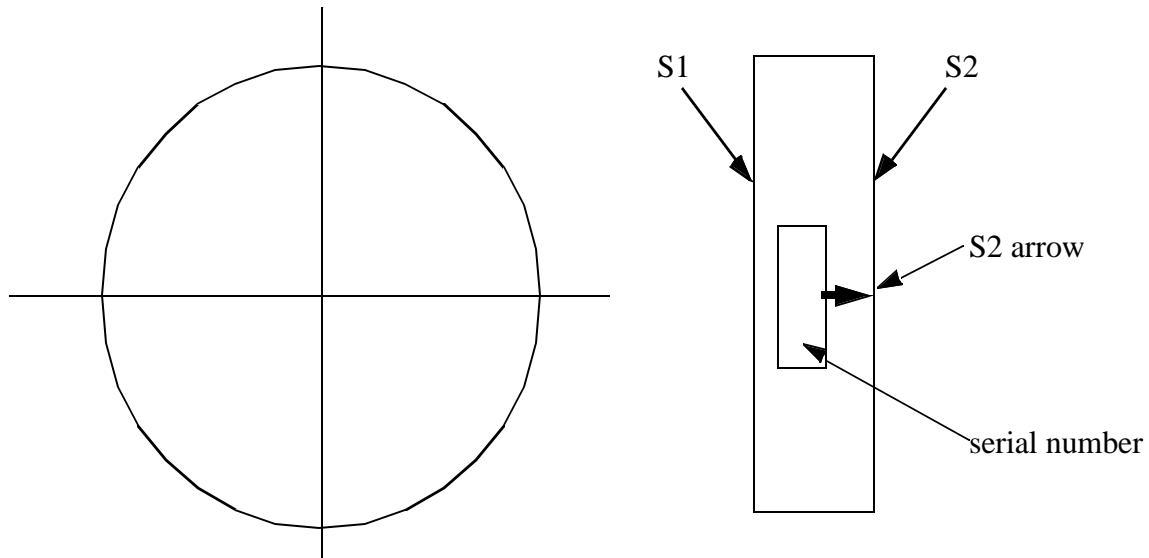| APPROVALS:	DATE	REV	DCN NO	BY	CHK	DCC	DATE
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S1   S2

S2 arrow

serial number

Figure 1: COS viewport window drawing