

## 6 in Vacuum Viewport

APPROVALS	DATE	REV	DCN NO.	BY	CHECK	DCC	DATE
AUTHOR: M. R. Smith	8/16/10	V2	E1000322	MRS			8/16/10
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### 1 SCOPE

This is a specification for a 6 in Vacuum Viewport Assembly, which consists of: 1) a modified 10 in conflat, 2) an o-ring sealed 6.0 in viewport, and 3) a viewport conflat cover.

### 2 APPLICABLE DOCUMENTS

#### 2.1 LIGO Documents

<http://www.ligo.caltech.edu/docs/E/E960022-B/E960022-B.pdf> , Vacuum Compatibility, Cleaning Methods and Qualification Procedures

<http://www.ligo.caltech.edu/docs/E/E960050-B/E960050-B.pdf>, Vacuum Compatible Materials List

### LIGO Vacuum Compatible Materials List

#### 2.2 Non-Ligo Documents

MIL-C-675C, Coating Adhesion and Durability

### 3 REQUIREMENTS

#### 3.1 Viewport Performance

Wavelength	1064 nm
Clear Aperture	5.0 in
Optical Transmissivity	> 99.5 %
Wavefront distortion	< 1/10 wave p-v @ 633 nm wavelength
Vacuum leak rate, Helium	< 1E-8 std cc/sec

#### 3.2 Design and Construction

##### 3.2.1 Conflat and retaining plate

Material 304 Stainless Steel

##### 3.2.2 O-ring

Material Viton (allowed sources with certification: Dupont, 3M, Parker, Parco)

##### 3.2.3 Viewport

Material	fused silica
Wedge angle	1 deg +/- 6 min
Surface Quality	10-5 laser quality
AR coating each face @ 1064 nm	high quality ion beam coating
Durability of AR coating	per MIL-C-675C
Surface roughness, each face	< 8 nm (super polish)

	<b>LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY</b>		E1000246	V2	D
	<b>SPECIFICATION</b>		Drawing No	Rev.	Group
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### 3.3 Marking on Individual Parts

A mark shall be scribed on the barrel of the viewport at the maximum thickness. Identifying numbers shall be scribed on the individual parts per 6.1.

### 3.4 Physical Dimensions

The physical dimensions shall be according to D1001678, shown in Figure 1.

### 3.5 Allowed Materials

All materials shall conform to LIGO document E9960050, Vacuum Compatible Materials List. Liquids containing hydrocarbons or other contaminants, other than the machining fluids specified herein, shall not be allowed to come into contact with the specified item. All machining fluids shall be water soluble and free of sulfur, chlorine and silicone.

### 3.6 Disallowed Materials

The following materials shall not be used: organic materials, vacuum grease, adhesives including epoxy, anodizing, or lubricants.

## 4 TEST PROCEDURES

### 4.1 Visual Surface Inspection Test

Both faces of the viewport shall be free of surface defects when the window is illuminated with a high-intensity light source and viewed in a darkened environment with the unaided eye.

### 4.2 Optical Transmissivity Test

Optical transmissivity through the clear aperture shall be measured with a suitable laser source.

### 4.3 Wavefront Distortion Test

The transmitted wavefront distortion over the clear aperture shall be measured at 632.8 nm wavelength.

### 4.4 Vacuum Leak Test

The vacuum leak rate shall be measured with a helium leak detector.

## 5 DOCUMENTATION

1. Interferogram of transmitted wavefront across the clear aperture
2. Optical transmissivity through the clear aperture
3. Vacuum leak rate
4. Compliance Certification for this specification
5. Calibration certification for the test equipment, as appropriate
6. Inspection report
  - o Dimensional verification
  - o Test results
  - o Material list
  - o Inspection test procedures

## 6 Quality Assurance/Control

### 6.1 Serial Number

The serial number D1001678-v1 S/N 00x shall be etched, or scribed on the part at the location indicated in Figure 1.

### 6.2 Purchaser Access

The purchaser shall have the right to witness all manufacturing processes.



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#### 6.3 QA Approval

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

### 7 HANDLING AND SHIPPING PROCEDURES

#### 7.1 Packaging for Shipment

The viewport assembly shall be shipped in the assembled condition. The viewport surfaces shall be protected with lint-free lens tissue. The shipping containers must ensure that the parts are properly protected during transit.

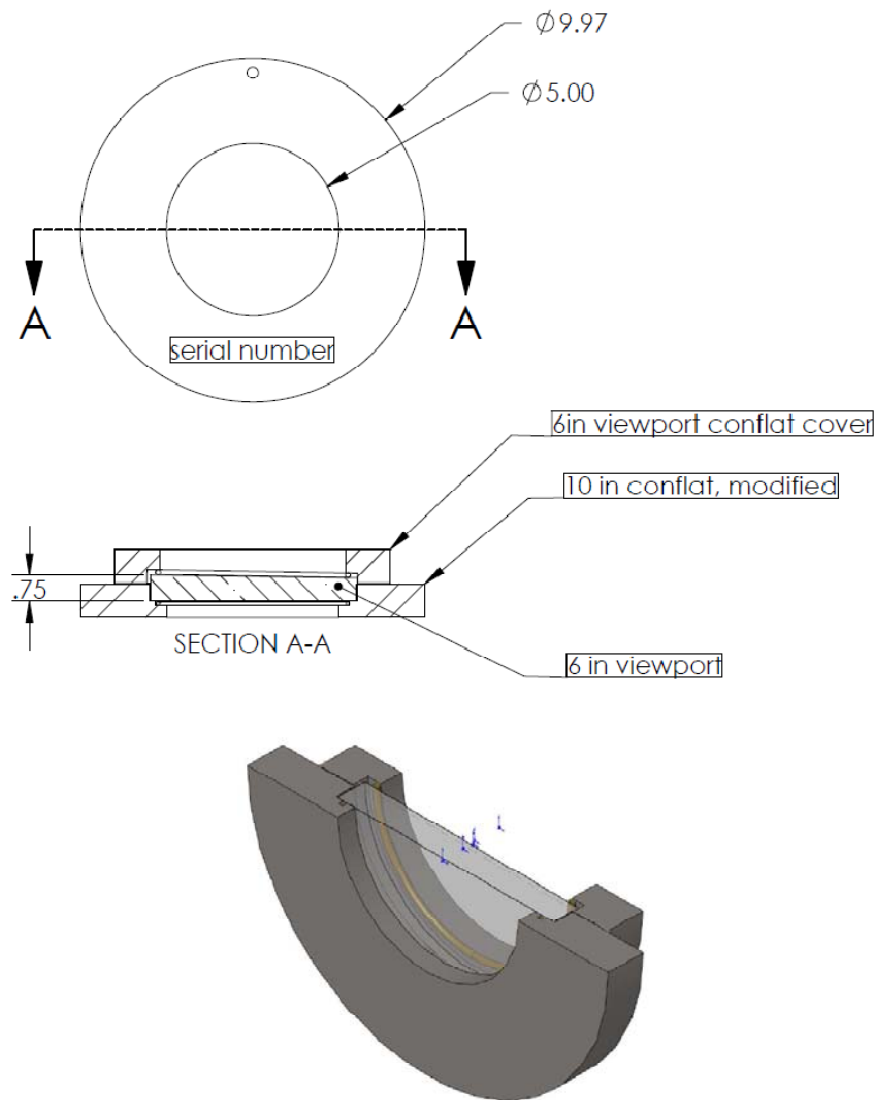


Figure 1: D1001678, 6 in Viewport Assembly