
New Folder Name Drawing and Specifications
for Fused Quartz Substrate
T950068

LIGO-TS58068-004D

Research Electro-Optics

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FAX MESSAGE

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**To: Bill Kells
LIGO Project
(818)304-9834**

From: Ramin Lalezari

Hello Bill,

The following pages include a drawing of the fused quartz substrate and two pages of specifications. The specifications are not standard optical specifications but may be of some help. We may be able to you a reject to test the surface quality. The finished windows cost less than \$1000. I will let you know what the exact price is. We have the tooling to coat them.

Sincerely,



Ramin Lalezari
Executive Vice President

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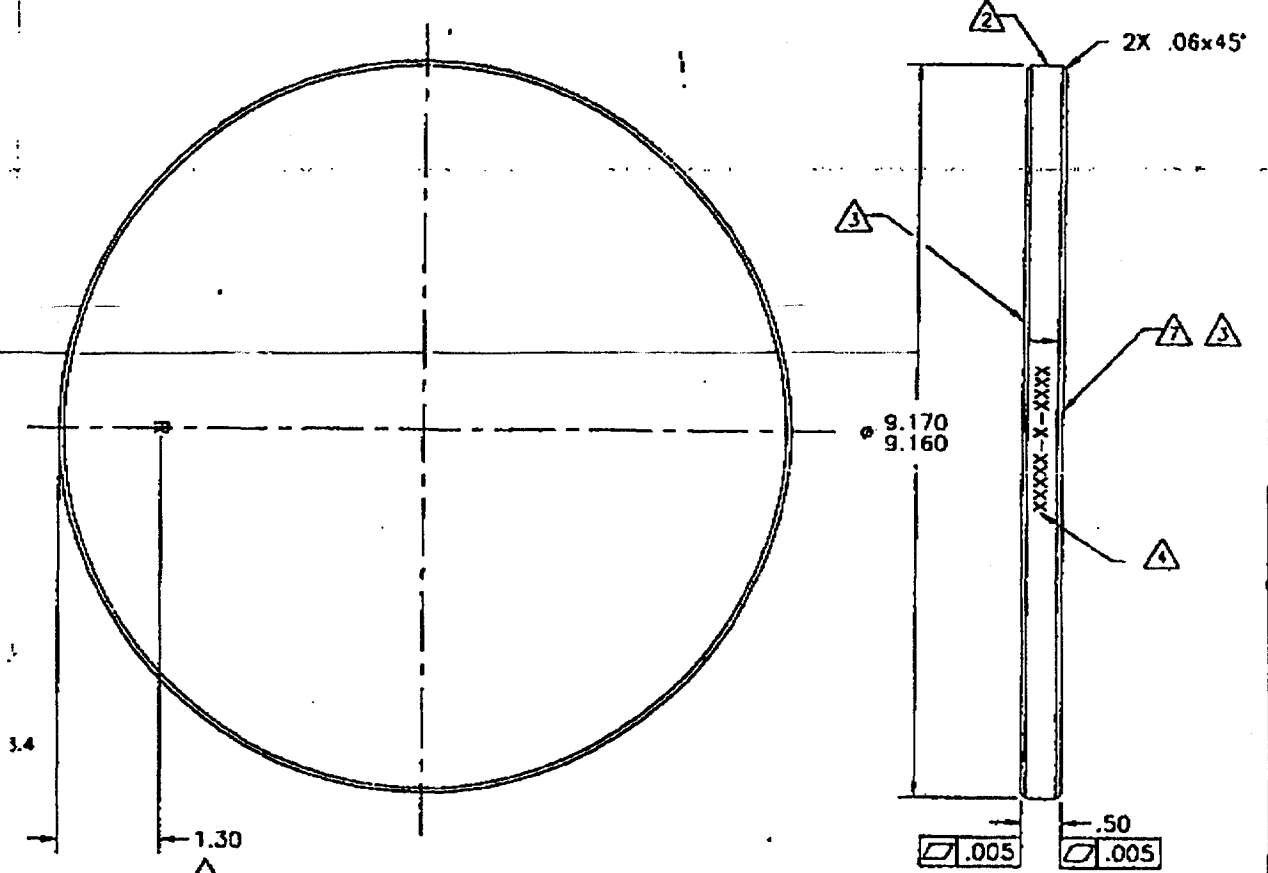
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REV	DESCRIPTION	BY	DATE	APR
A	REV PER ECO A4326	S.C.	6/19/91	S.C.
B1	REV PER ECO A4501	S.C.	6/19/91	S.C.
C	REV PER ECO A5773	GM	9/15/93	MB

3.2



REV 1 E9
 SH 1
 INC. 0200-09429

ITEM #	QTY	DESCRIPTION
NEX		

THIS DRAWING IS TO BE USED EXPRESS MATERIAL

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DOCUMENT

4.3 Substrate Quality Requirements

4.3.1 The surface quality of the coated side (both before and after coating) is as follows (ref. inspection techniques section 4.4 for viewing conditions);

4.3.1.1 The width of any scratches are to be ≤ 40 microns (.00157").

4.3.1.2 This surface cannot have more than one maximum (40 micron) scratch.

4.3.1.3 The accumulated length of all scratches present shall not exceed 1/4 of the part diameter.

4.3.1.4 Two intersecting scratches are permissible as long as each scratch width is ≤ 40 microns and the intersection is less than the allowable dig size of 200 microns (.0079").

4.3.1.5 Digs must be < 200 microns (.0079") average diameter.

NOTE: Pinholes and open bubbles are classified as digs.

4.3.1.6 No more than one maximum (200 micron) dig permissible on this surface.

4.3.1.7 No more than three defects (scratches and/or digs) per 400 sq. mm (.620 sq. inch) area.

4.3.1.8 No abrasions allowed.

4.3.1.9 No fractures allowed.

4.3.1.10 No protrusions or inclusions allowed.

4.3.2 Internal substrate quality requirements are as follows:

4.3.2.1 No bubbles larger than 1.3mm (.050") average diameter allowed.

4.3.2.2 No more than 16 bubbles per window with 1.3mm (.050") diameter.

4.3.2.3 No more than one bubble ≤ 1.3 mm (.050") diameter per 12.9 sq. cm (2 sq. inch) by 1.3 cm (1/2") thick volume.

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DOCUMENT NUMBER: 0250-09476

- 4.3.2.4 No visual obscurations greater than 2.5mm (.098") allowed.
- 4.3.2.5 No more than one obscuration \leq 2.5mm (.098") diameter per 12.9 sq. cm (2 sq. inch) by 1.3 cm (1/2") thick volume.
- 4.3.2.6 No more than 16 obscurations with 2.5mm (.098") per window.
- 4.3.2.7 No inclusions larger than 130 microns (.005") average diameter allowed.
- 4.3.2.8 No more than one visual inclusion \leq 130 micron (.005") per 12.9 sq. cm (2 sq. inch) by 1.3 cm (1/2") thick volume.
- 4.3.2.9 No more than 16 inclusions with 130 micron (.098") average diameter per window.

4.3.3 Surface quality of the non-coated side is as follows:

- 4.3.3.1 No fractures allowed.
- 4.3.3.2 No inclusions or protrusions allowed.
- 4.3.3.3 Optical polish this side (must be clear), to a 0.050 micrometer (2 micro inch) finish or better.

4.4 Recommended Inspection Techniques

4.4.1 Most of the defects mentioned above are difficult to see and require more than the unaided eye to find and therefore the following is recommended:

- 4.4.1.1 Thoroughly clean the window prior to performing the inspection.

NOTE: Whatever method is used to clean the windows must not degrade the polish.
(No residuals allowed)

- 4.4.1.2 Perform the inspection in a dark room, the only illumination being the light source used for inspection (see section 4.4.1.3), on a laminar flow table.

NOTE: Persons handling the window should wear latex rubber gloves. When additional cleaning during the inspection process is needed use lint free wipes and isopropyl alcohol.

- 4.4.1.3 Use a Halo high intensity illumination eye/75W lamp, or equivalent.
- 4.4.1.4 Use a black background for viewing the window.
- 4.4.1.5 Verify the types of defects seen under a 200m stereo microscope with 30X power.