



Statement of Work Fabrication of Viewport Guard Assembly C1105144–v1

1.0 Scope

This SOW is for the fabrication and manufacture of the Viewport Guard Assembly, which is used to protect the vacuum system viewports during installation and removal of external components.

2.0 Document Access

Many supplemental documents and specifications are incorporated into and made a part this Statement of Work. Click on the document links to access these documents from the LIGO Document Control Center (DCC) or go on line to the LIGO Public DCC at <https://dcc.ligo.org/> to access the DCC#.

3.0 Commercial Terms and Applicable LIGO Specifications:

Note: The documents listed below are invoked for this Statement of Work and comprise additional requirements which are integral to this Statement of Work.

- [LIGO-C080185-v1](#) LIGO Commercial Items or Services Contract General Provisions
- [LIGO-Q0900001-v5](#) Advanced LIGO Supplier Quality Requirements
- [LIGO-Q1100003-v1](#) Acceptable Quality Level (AQL) for Inspection of LIGO Components

4.0 Quality System:

Referring to the above referenced LIGO Specification Q0900001, Suppliers should include a copy of their current ISO 9001, AS9100, or TS16949 certification in their bid package. Suppliers lacking current certification should send a copy of their Quality Manual with their bid package.

5.0 Parts/Assemblies to be manufactured and required quantities:

Note: refer to Section 8.0 for delivery schedule and location

Drawing #	Revision	Part Description	Total Qty
D080365	v2	VIEWPORT GUARD	264
D080366	v2	Viewport Shield	272
D080391	v1	Clamp, Viewport Guard	816
D0902791	v1	Viewport Guard Dust Cover	272
D1101169	v1	VIEWPORT GUARD	8
D1101170	v1	VIEWPORT GUARD ASSY EXTENSION	8

6.0 Manufacturing:

6.1 Requirements:

Suppliers must refer to the LIGO Specifications referenced in Section 3 for additional, and in some cases, non-industry standard requirements.

6.2 Sub-Contracted Work:

- LIGO expects that at least 2/3 (by dollar value) of the contracted work be performed by the Supplier named on the Purchase Order. The Supplier shall be responsible for all sub-contracted work.
- The Supplier's quote shall state their intent to sub-contract any welding operations performed on components intended for Vacuum use. If E0900048 is invoked in Section 3, then the component will be used in Vacuum.

6.3 Precedence:

The drawings typically represent the finished part as needed for use in service. Suppliers should always contact a LIGO representative to resolve any discrepancies uncertainties in the documentation or instructions.

6.4 Special Instructions:

- AQL Number = 1.0
- Drawing D080366 – 'AR' means 'Abrasion Resistant'.

6.5 Exclusions:

- None

7.0 End Item Data Package:

Before delivery of the parts, the Supplier shall provide the following data, as a minimum:

- Any as-built modifications (with approval of the LIGO Contracting Officer) as mark-ups to the drawings
- Material certifications
- Inspection reports of all dimensional features for the number of parts specified per the AQL number and referenced in the AQL table LIGO-Q1100003-v1 and any other inspection requirements detailed in Section 6.5 of this SOW
- Certificate of compliance for each part number stating conformance to contract and drawing requirements

8.0 Delivery Requirements:

8.1 Shipping Containers and Packaging:

The contractor is responsible for providing shipping containers and transportation which protects these parts from damage from the transportation environment (weather, handling, accidents, etc.). Mating edges of parts should be especially protected from damage during shipping.

8.2 Shipping Destination(s):

The deliveries are FOB at these destinations, i.e. the Supplier has the responsibility for shipping title and control of goods until they are delivered and the transportation has been completed. The contractor selects the carrier and is responsible for the risk of transportation and for filing claims for loss or damage.

Ship all items to:

California Institute of Technology (CIT)

LIGO Project MS 100-36

391 S. Holliston Ave.

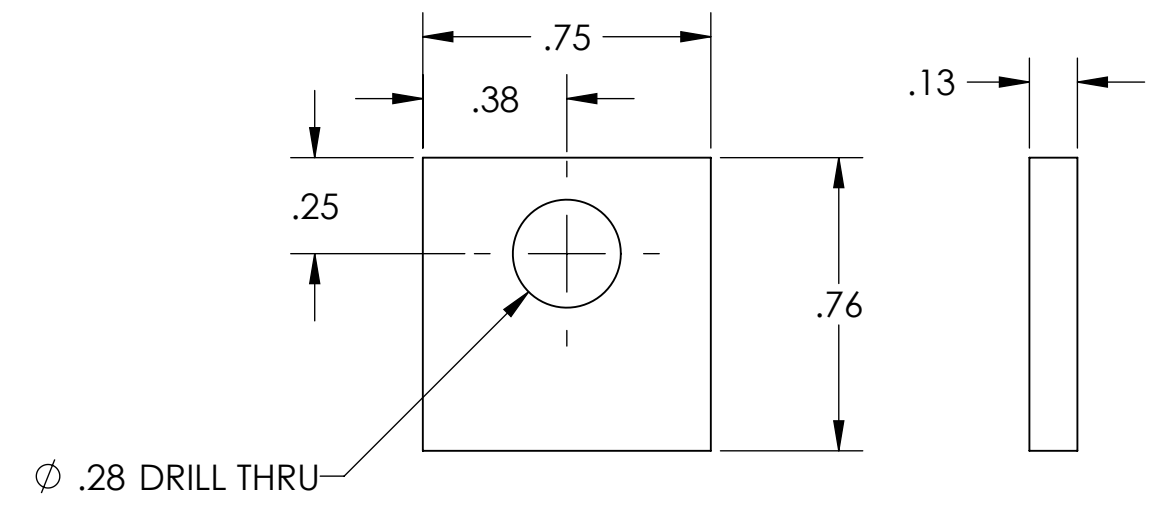
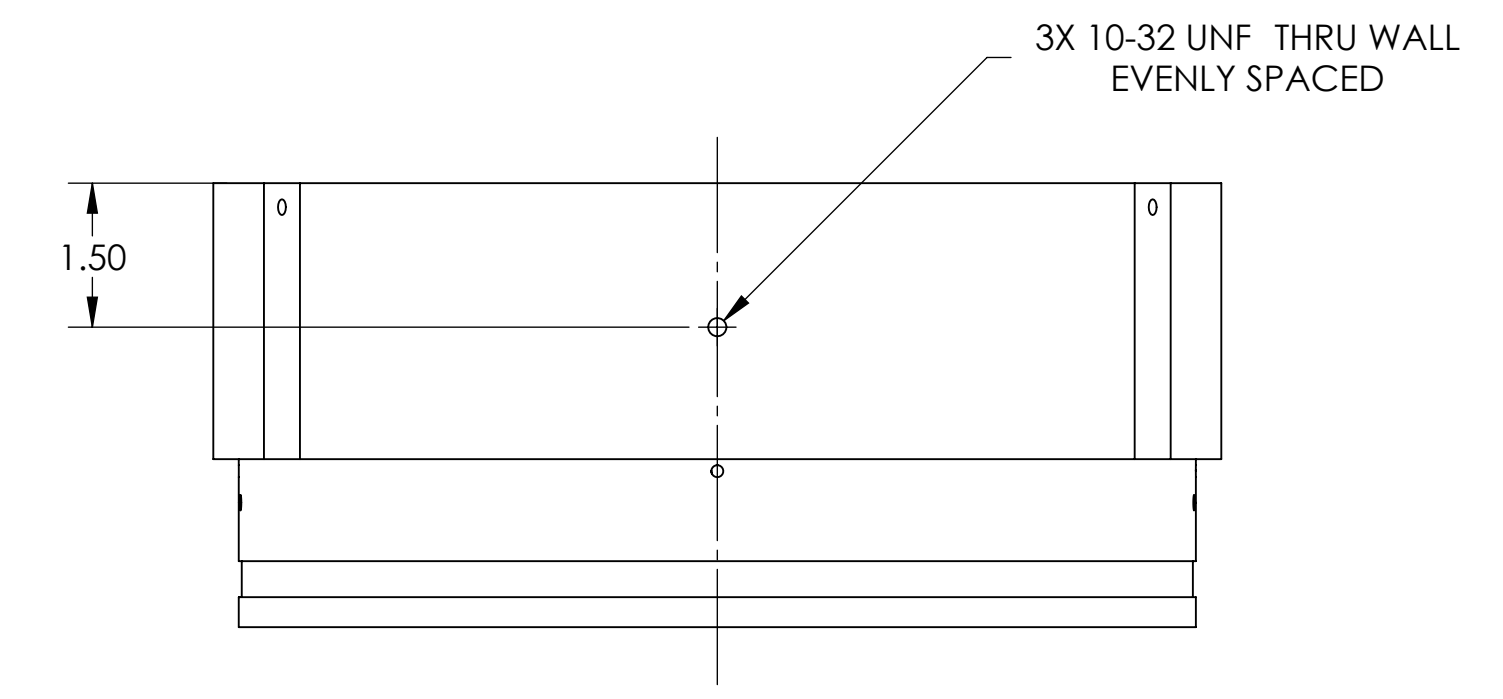
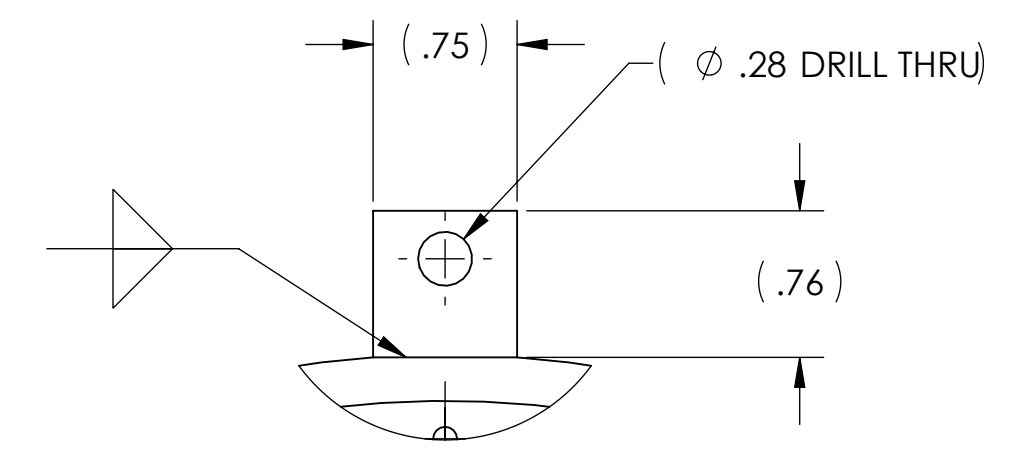
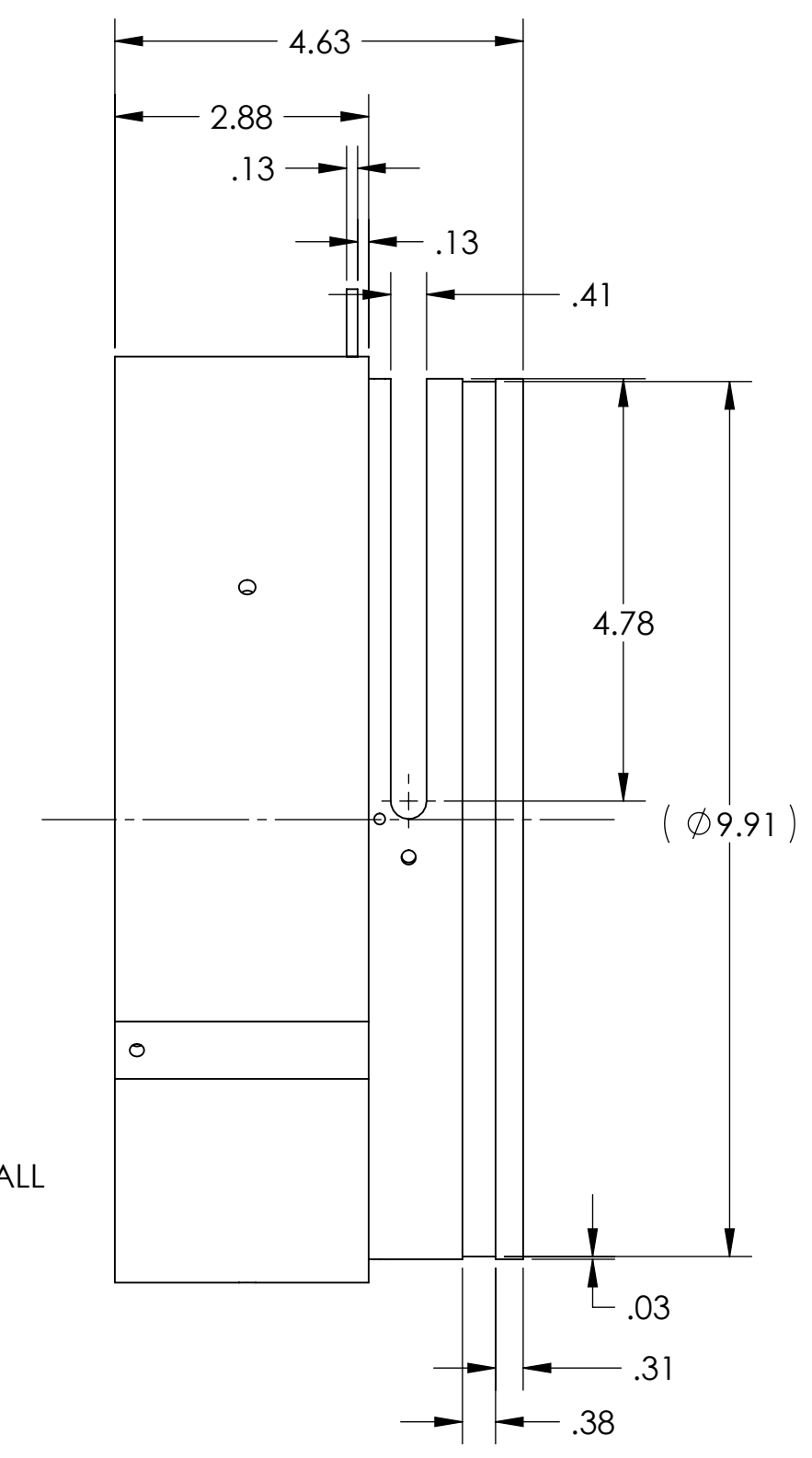
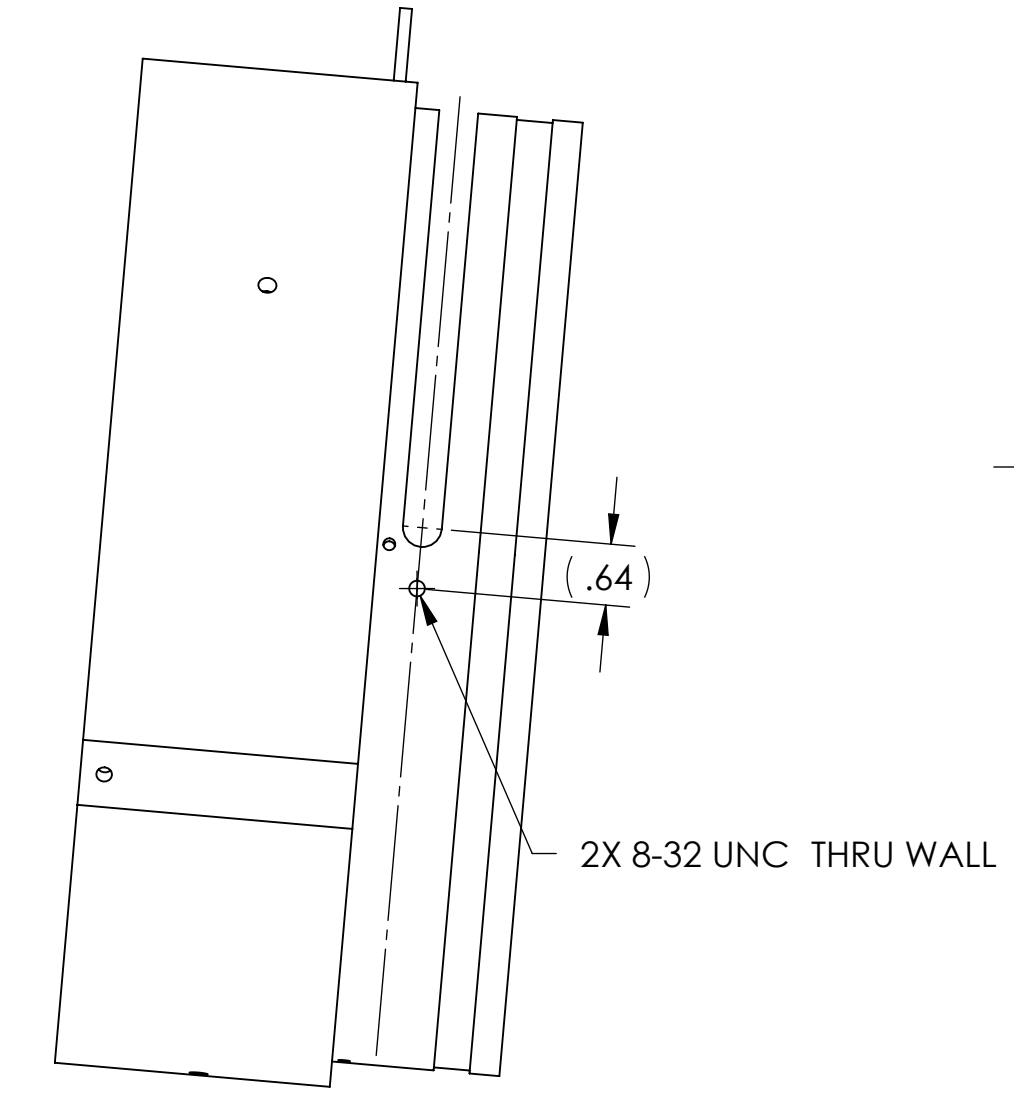
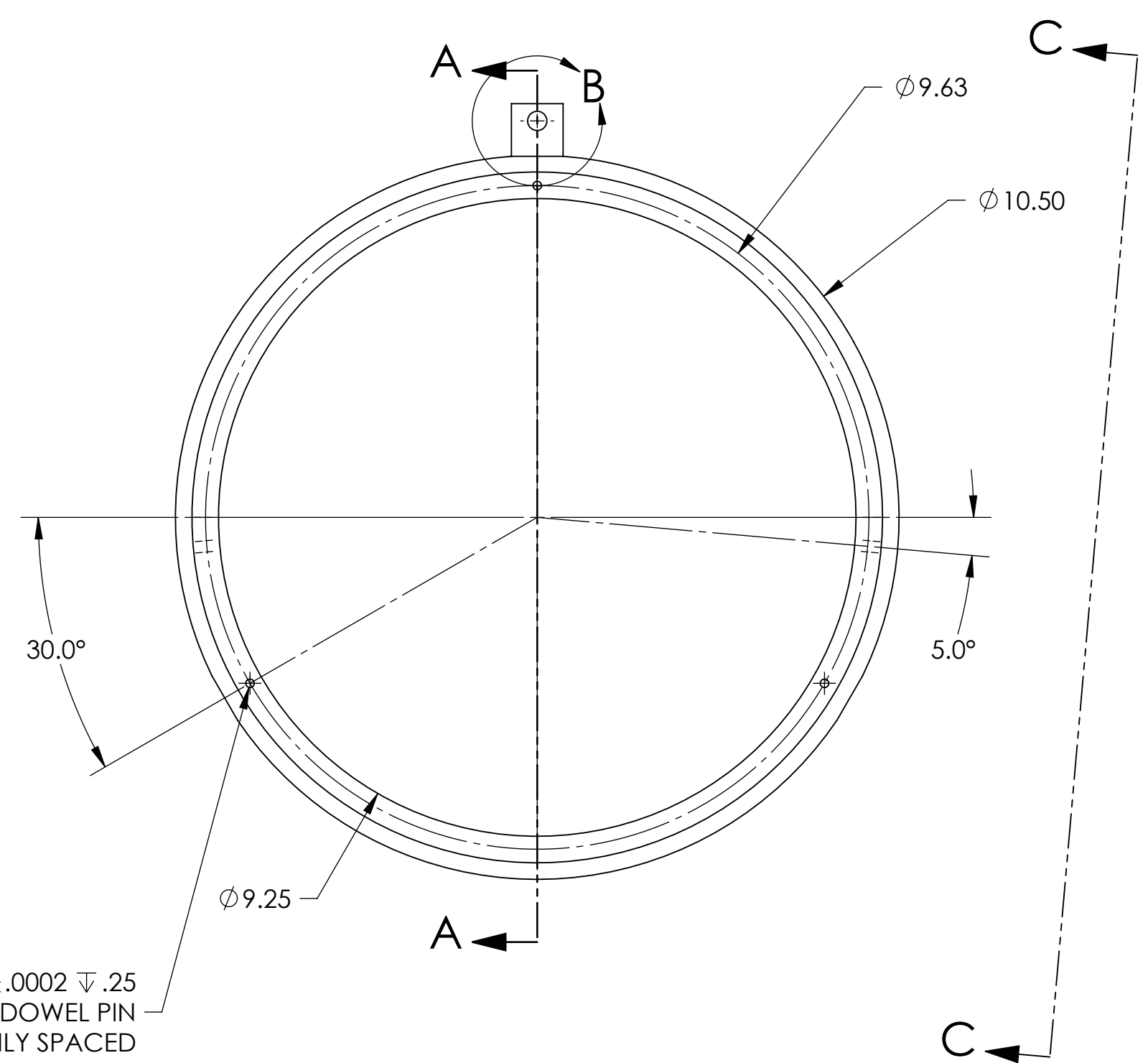
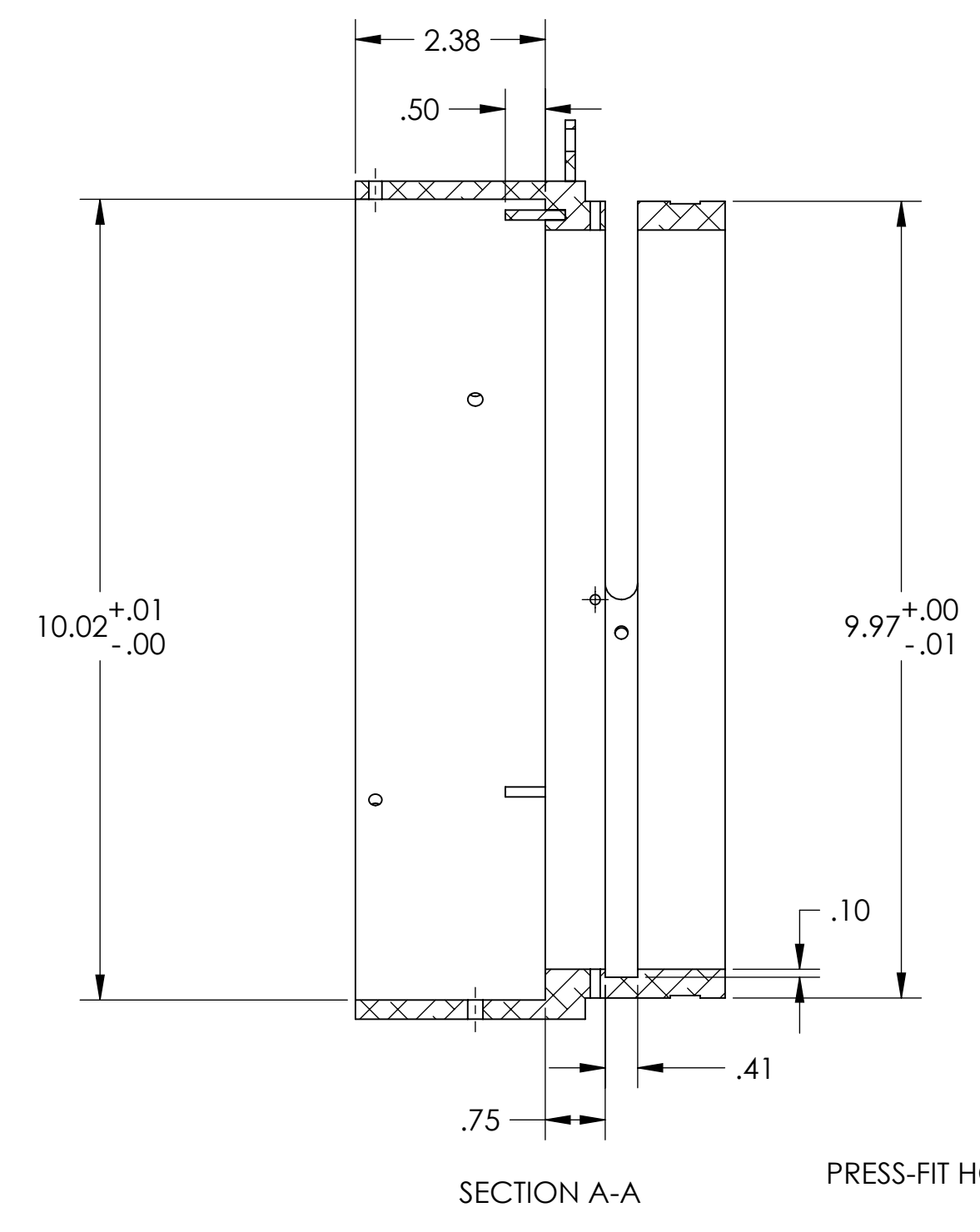
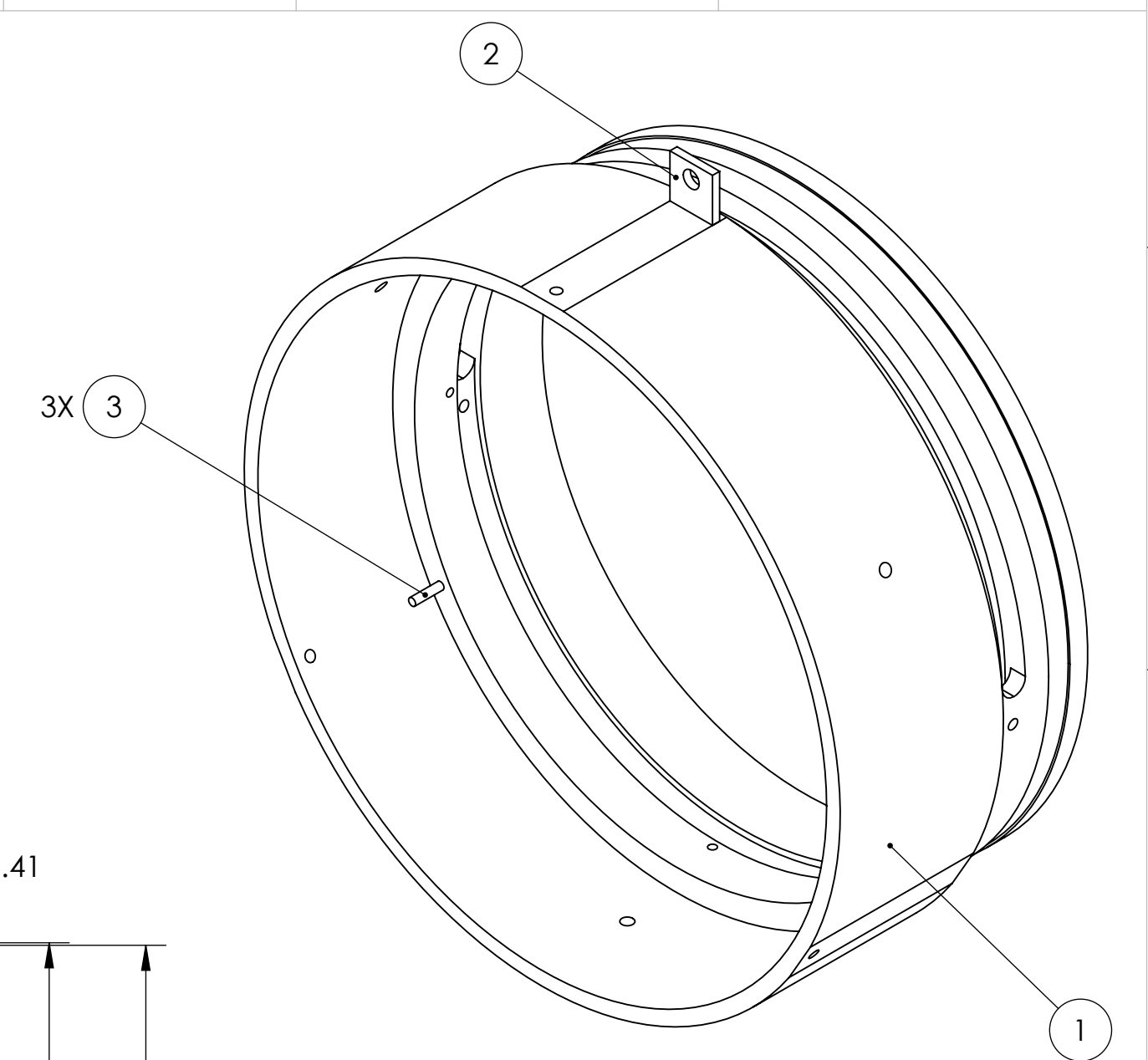
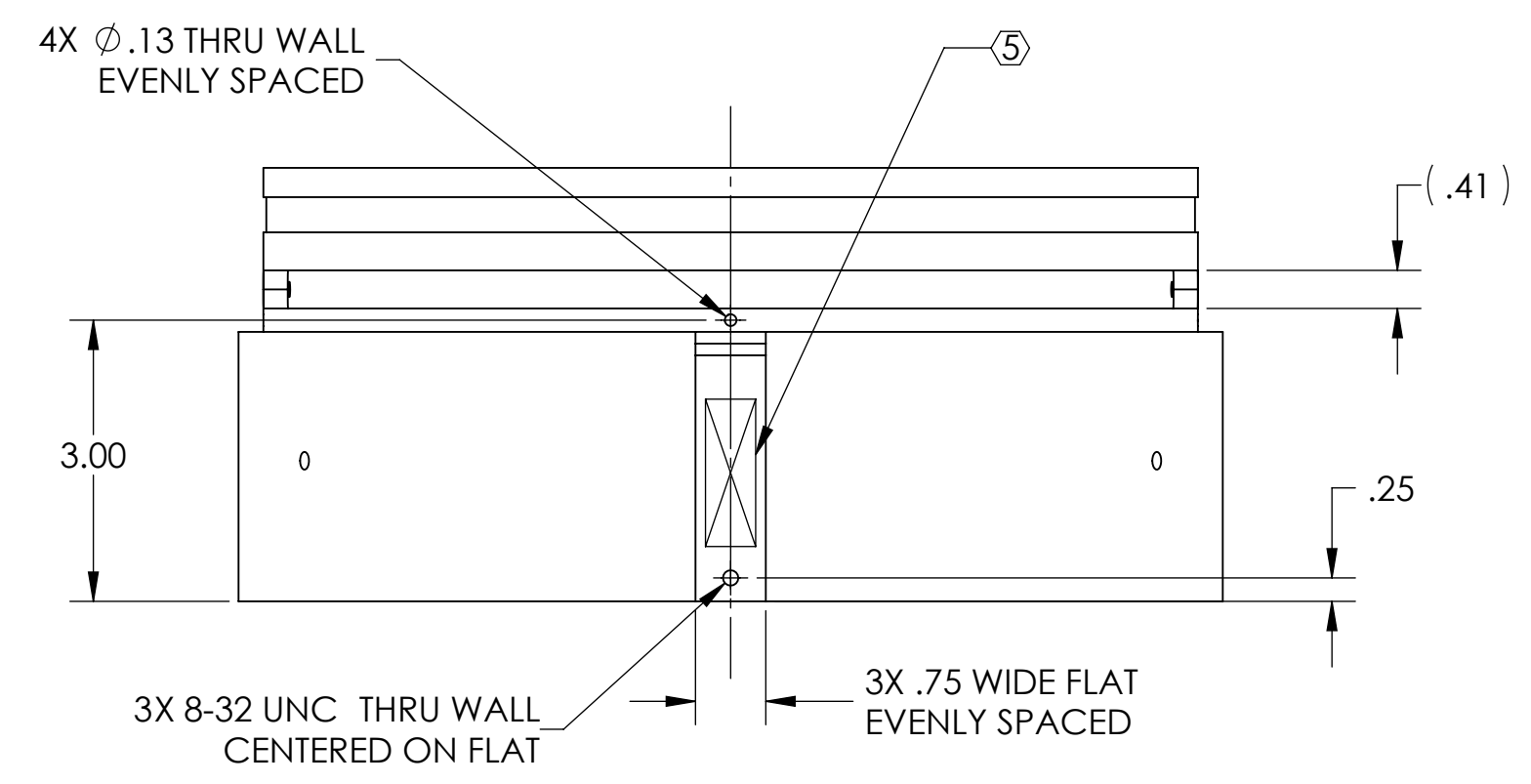
Pasadena, CA 91125

8.3 Delivery Schedule:

- Partial and/or early deliveries are acceptable.
- Ship Date: 8 weeks ARO.
- If this cannot be accommodated, please provide an alternative delivery schedule.

NOTES CONTINUED:
 ⑤ SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER, REVISION (AND VARIANT OR 'TYPE' IF APPLICABLE) ON NOTED SURFACE OF PART FOLLOWED ON THE NEXT LINE WITH A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 001 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE MINIMUM 0.12" HIGH CHARACTERS. UNLESS THE SIZE OF THE PART DICTATES SMALLER CHARACTERS. A VIBRATORY TOOL MAY BE USED. EXAMPLE: DXXXXXX-VY, TYPE-XX, S/N XXX
 ⑥ ITEMS 1 AND 2 CAN BE MADE FROM ONE PIECE IF DESIRED.

REV.	DATE	DCN #	DRAWING TREE #
v1	21 DEC 2009	E0900484	-
v2	22 JAN 2010	E1000014	-
-	-	-	-



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY
3	-	1/8" DOWEL PIN, 3/4" LONG	316 SSSL	3
2	D080365-2 ⑥	LOCKING TAB, 0.76" X 0.75" X 0.125 THICK	6061-T6 AL	1
1	D080365-1 ⑥	VIEWPORT GUARD	6061-T6 AL	1

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)	
DIMENSIONS ARE IN INCHES	
TOLERANCES: .XX ± .01 .XXX ± .005	
ANGULAR ± 0.5°	
MATERIAL	6061-T6 AL
FINISH	SEE NOTE 4

LIGO CALIFORNIA INSTITUTE OF TECHNOLOGY
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SYSTEM: **ADVANCED LIGO** SUB-SYSTEM: **VE**

NEXT ASSY: **D080367**

PART NAME
VIEWPORT GUARD

DESIGNER	M. MEYER	17 JUL 2008	SIZE	DWG. NO.	REV.
DRAFTER	M. MEYER	04 DEC 2009	D	D080365	v2
CHECKER	D. BRIDGES	08 DEC 2009	SCALE: 1:2	PROJECTION:	SHEET 1 OF 1

4

3

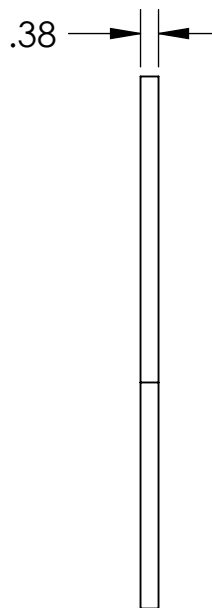
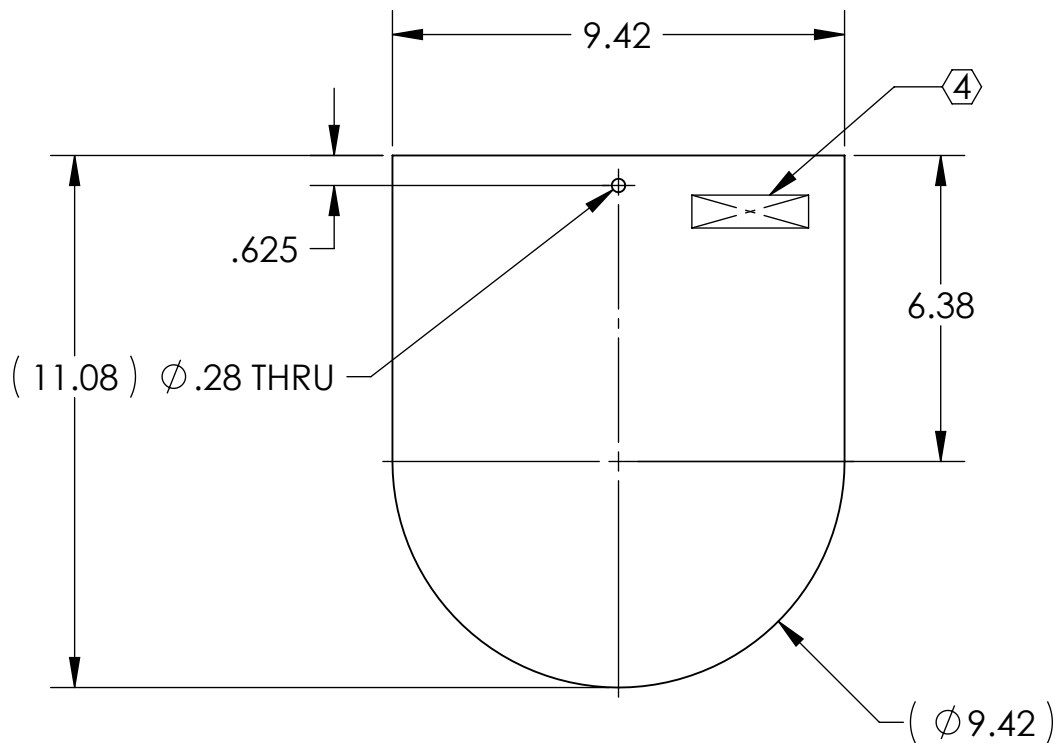
2

1

NOTES CONTINUED:

④ SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER, REVISION (AND VARIANT OR "TYPE" IF APPLICABLE) ON NOTED SURFACE OF PART FOLLOWED ON THE NEXT LINE WITH A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 001 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE MINIMUM 0.12" HIGH CHARACTERS, UNLESS THE SIZE OF THE PART DICTATES SMALLER CHARACTERS. A VIBRATORY TOOL MAY BE USED.
 EXAMPLE: DXXXXXX-VY, TYPE-XX, S/N XXX

REV.	DATE	DCN #	DRAWING TREE #
v1	21 DEC 2009	E0900484	-
v2	22 JAN 2010	E1000014	-
-	-	-	-



NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

DIMENSIONS ARE IN INCHES

TOLERANCES:
 .XX ± .01
 .XXX ± .005

ANGULAR ± 0.5°

1. INTERPRET DRAWING PER ASME Y14.5-1994.
2. REMOVE ALL SHARP EDGES, R.02 MIN.
3. DO NOT SCALE FROM DRAWING.

MATERIAL AR POLYCARBONATE

FINISH N/A μinch

LIGO CALIFORNIA INSTITUTE OF TECHNOLOGY
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SYSTEM ADVANCED LIGO SUB-SYSTEM VE

NEXT ASSY D080367

PART NAME VIEWPORT SHIELD

DESIGNER	M. MEYER	17 JUL 2008	SIZE	DWG. NO.	REV.
DRAFTER	M. MEYER	17 JUL 2008	A	D080366	v2
CHECKER	D. BRIDGES	18 JUL 2008			
APPROVAL			SCALE: 1:4	PROJECTION:	SHEET 1 OF 1

4

1

3

2

1

1

4

3

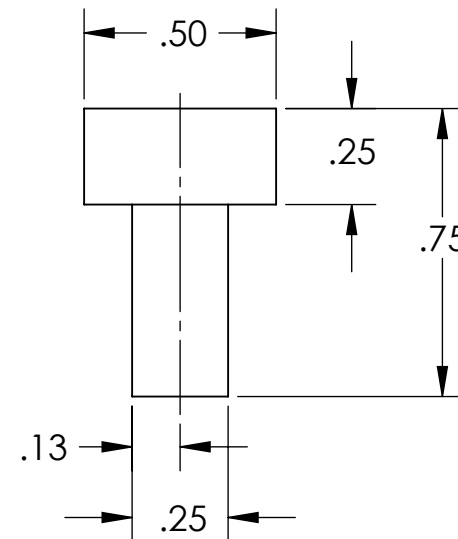
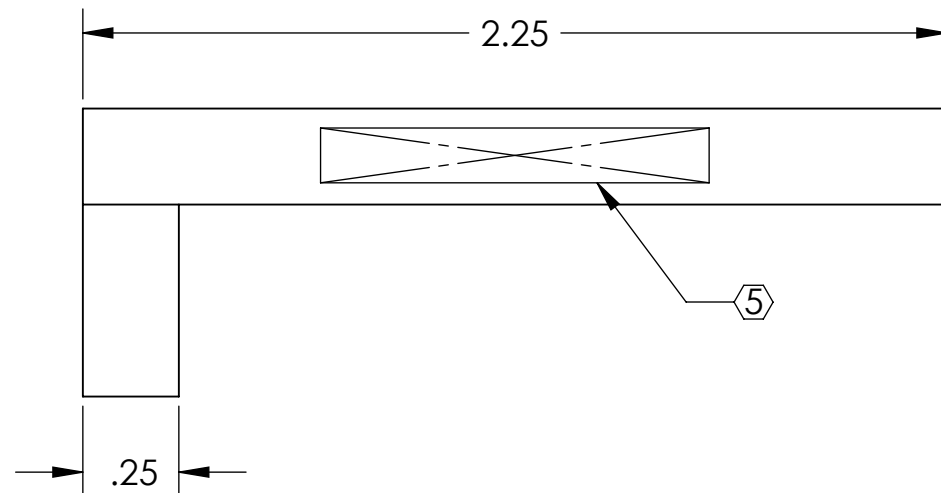
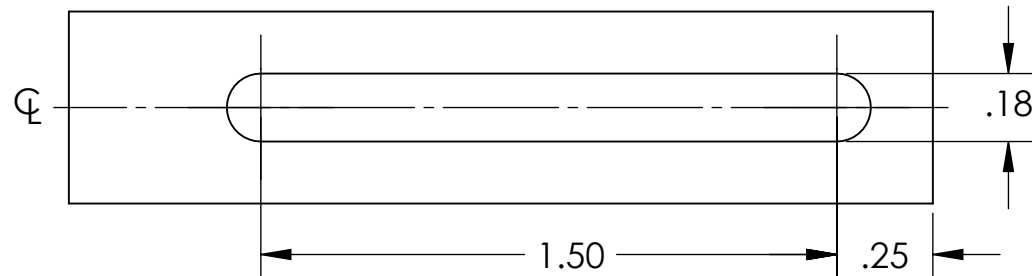
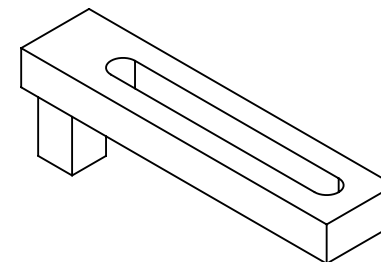
2

1

NOTES CONTINUED:

⑤ SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER, REVISION (AND VARIANT OR "TYPE" IF APPLICABLE) ON NOTED SURFACE OF PART FOLLOWED ON THE NEXT LINE WITH A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 001 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE MINIMUM 0.12" HIGH CHARACTERS, UNLESS THE SIZE OF THE PART DICTATES SMALLER CHARACTERS. A VIBRATORY TOOL MAY BE USED.
 EXAMPLE: DXXXXXX-VY, TYPE-XX, S/N XXX

REV.	DATE	DCN #	DRAWING TREE #
v1	21 DEC 2009	E0900484	-
-	-	-	-
-	-	-	-



NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

DIMENSIONS ARE IN INCHES

TOLERANCES:
 .XX ± .03
 .XXX ± .005

ANGULAR ± 0.5°

1. INTERPRET DRAWING PER ASME Y14.5-1994.
2. REMOVE ALL SHARP EDGES, R.02 MIN.
3. DO NOT SCALE FROM DRAWING.
4. CLEAR ANODIZE PER MIL-A-8625, TYPE II.

MATERIAL
 6061-T6 Al

FINISH
 SEE NOTE 4

LIGO CALIFORNIA INSTITUTE OF TECHNOLOGY
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SYSTEM
 ADVANCED LIGO
 NEXT ASSY
 D080367

SUB-SYSTEM
 VE

PART NAME

CLAMP, VIEWPORT GUARD

DESIGNER M. MEYER 17 JUL 2008
 DRAFTER M. MEYER 22 JUL 2008
 CHECKER D. BRIDGES 24 JUL 2008
 APPROVAL

SIZE DWG. NO.
 A D080391

REV.
 v1

SCALE: 2:1 PROJECTION: SHEET 1 OF 1

4

3

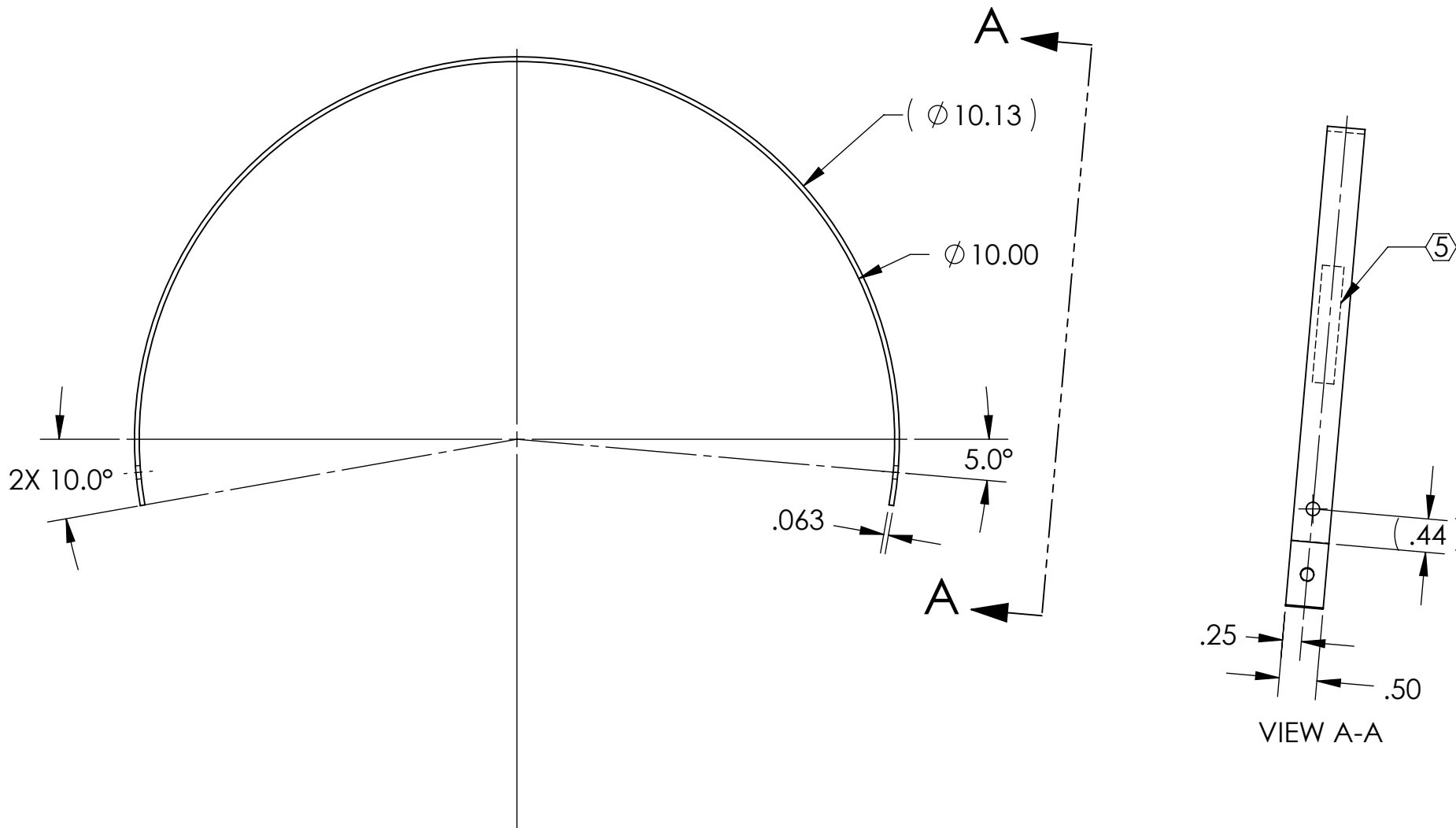
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1

NOTES CONTINUED:

⑤ SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER AND REVISION ON NOTED SURFACE FOLLOWED ON THE NEXT LINE BY A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 001 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE .07" MIN. HIGH CHARACTERS. EXAMPLE: DXXXXXX-VY, S/N 001. A VIBRATORY TOOL MAY BE USED.

REV.	DATE	DCN #	DRAWING TREE #
v1	22 DEC 2009	E0900484	-
-	-	-	-
-	-	-	-



NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

DIMENSIONS ARE IN INCHES

TOLERANCES:
 .XX ± .03
 .XXX ± .005

ANGULAR ± 0.5°

1. INTERPRET DRAWING PER ASME Y14.5-1994.
2. REMOVE ALL SHARP EDGES, R.02 MIN.
3. DO NOT SCALE FROM DRAWING.
4. CLEAR ANODIZE PER MIL-A-8625, TYPE II.

MATERIAL
 6061-T6 Al

FINISH
 SEE NOTE 4



CALIFORNIA INSTITUTE OF TECHNOLOGY
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SYSTEM
 ADVANCED LIGO

SUB-SYSTEM
 VE

NEXT ASSY
 D080367

PART NAME

VIEWPORT GUARD DUST COVER

DESIGNER M. MEYER 04 DEC 2009
 DRAFTER M. MEYER 04 DEC 2009
 CHECKER D. BRIDGES 08 DEC 2009
 APPROVAL

SIZE DWG. NO.
 A D0902791

REV.
 v1

SCALE: 1:2 PROJECTION: SHEET 1 OF 1

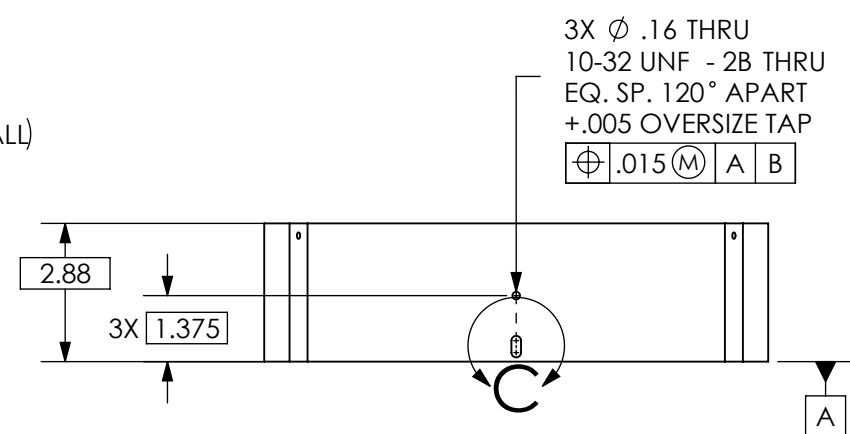
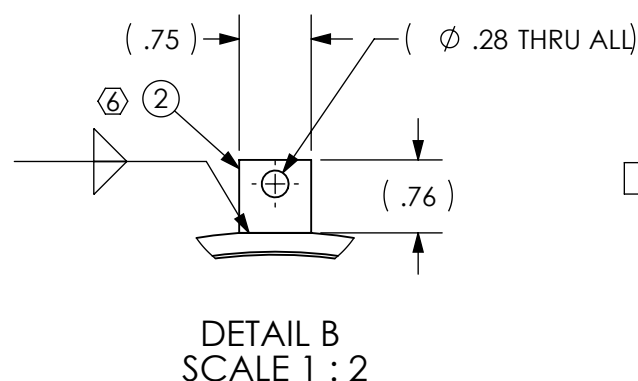
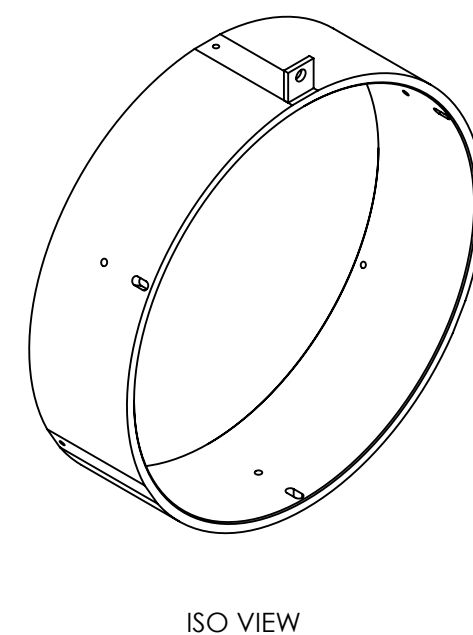
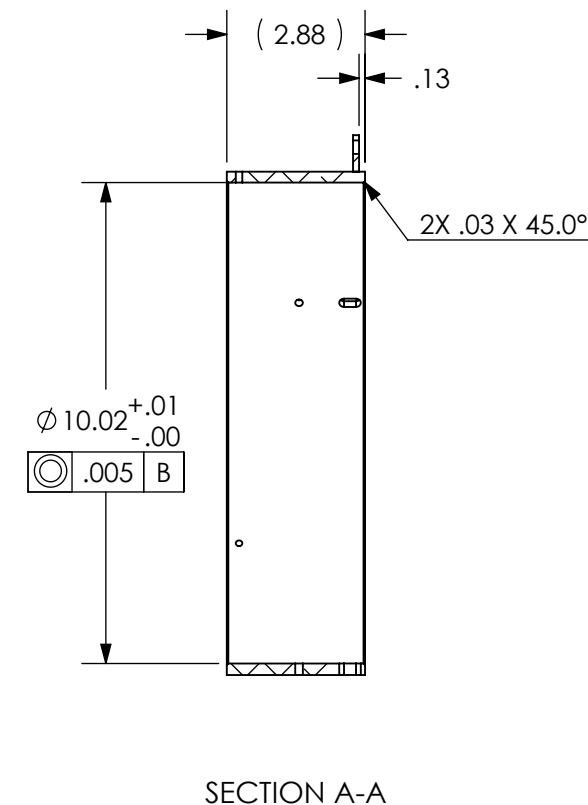
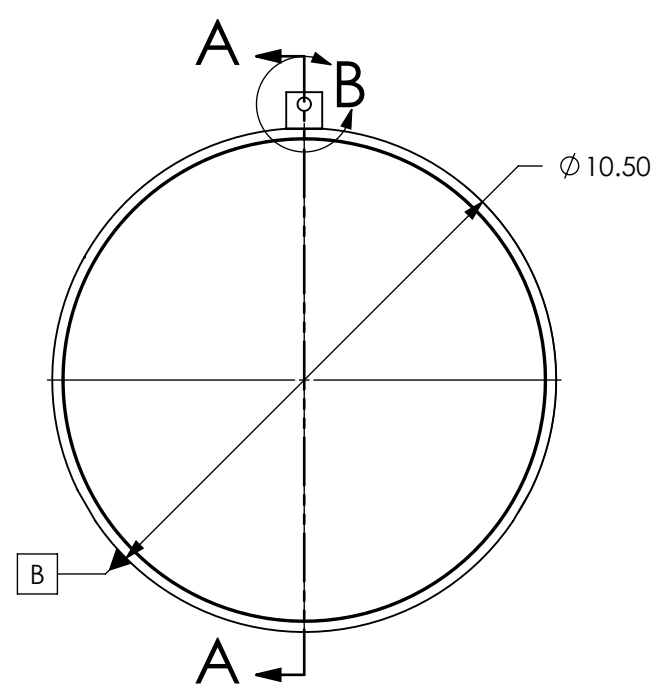
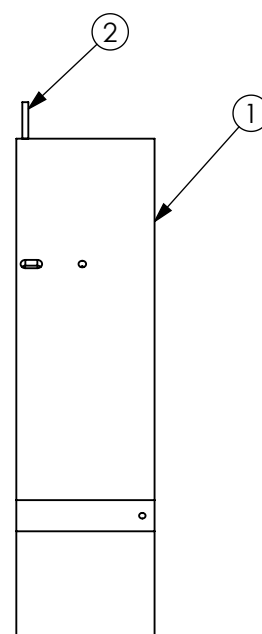
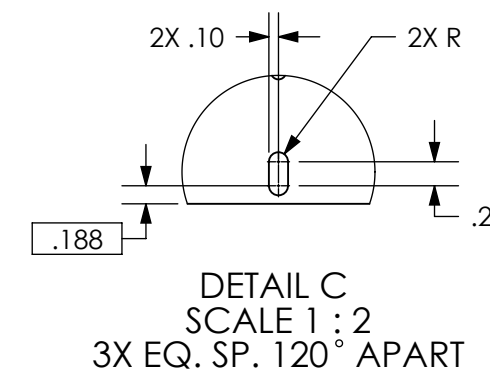
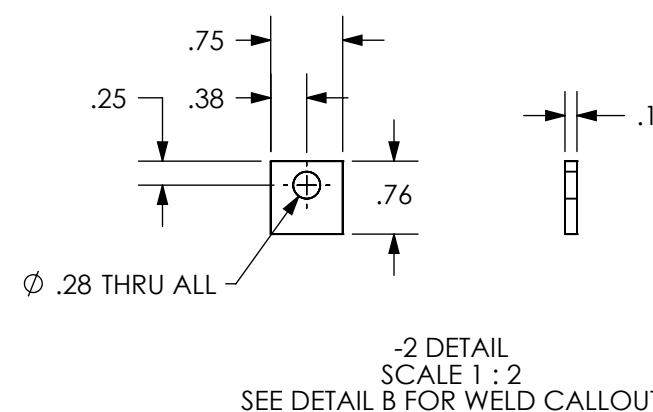
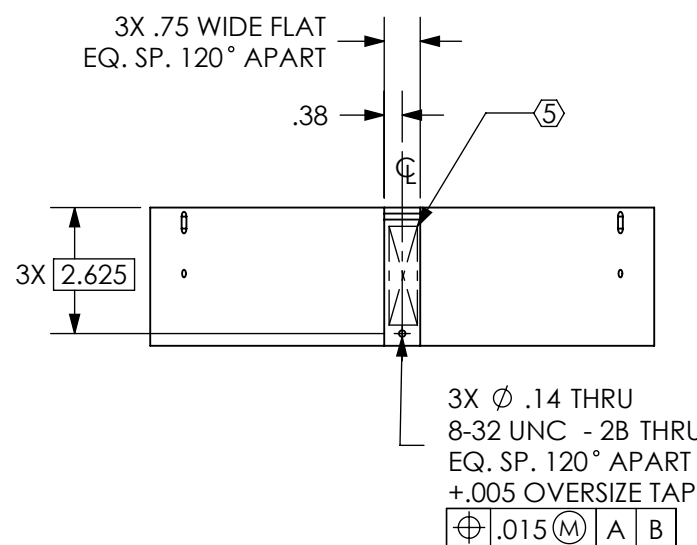
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NOTES CONTINUED:

⑤ SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER, REVISION (AND VARIANT OR "TYPE" IF APPLICABLE) ON NOTED SURFACE OF PART FOLLOWED ON THE NEXT LINE WITH A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 001 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE MINIMUM 0.12" HIGH CHARACTERS, UNLESS THE SIZE OF THE PART DICTATES SMALLER CHARACTERS. A VIBRATORY TOOL MAY BE USED. EXAMPLE: DXXXXXX-VY, TYPE-XX, S/N XXX

⑥ ITEMS 1 AND 2 CAN BE MADE FROM ONE PIECE IF DESIRED.

REV.	DATE	DCN #	DRAWING TREE #
v1	20 JUN 2011	E1100531-x0	-
-	-	-	-
-	-	-	-



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	REQ
2	D1101169-2	VIEWPORT GUAR ASSY., LOCKING TAB	6061-T6	1
1	D1101169-1	VIEWPORT GUAR ASSY., FLANGE MT. COUPLER	6061-T6	1

PARTS LIST		PART NAME	
ALIGO, VE, VIEWPORT GUARD ASSY., FLANGE MT. COUPLER		ALIGO, VE, VIEWPORT GUARD ASSY., FLANGE MT. COUPLER	
DESIGNER	E.SANCHEZ	20 JUN 2011	SIZE DWG. NO.
DRAFTER	E.SANCHEZ	20 JUN 2011	B
CHECKER			D1101169
APPROVAL			REV. v1

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)

DIMENSIONS ARE IN INCHES

TOLERANCES:
 .XX ± .01
 .XXX ± .005
 ANGULAR ± 0.5°

1. INTERPRET DRAWING PER ASME Y14.5-1994.
 2. REMOVE ALL SHARP EDGES, .005-.015, FOR MACHINED PARTS. ROUND ALL EDGES APPROXIMATELY R.02 FOR SHEET METAL PARTS.
 3. DO NOT SCALE FROM DRAWING.
 4. CLEAR ANODIZE PER MIL-A-8625, TYPE II

MATERIAL SEE PARTS LIST FINISH 63 μinch NEXT ASSY D1101171

CALIFORNIA INSTITUTE OF TECHNOLOGY
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

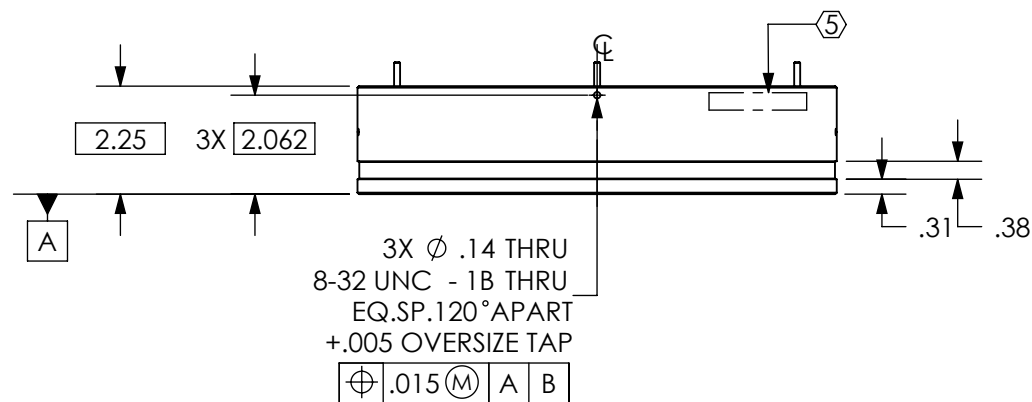
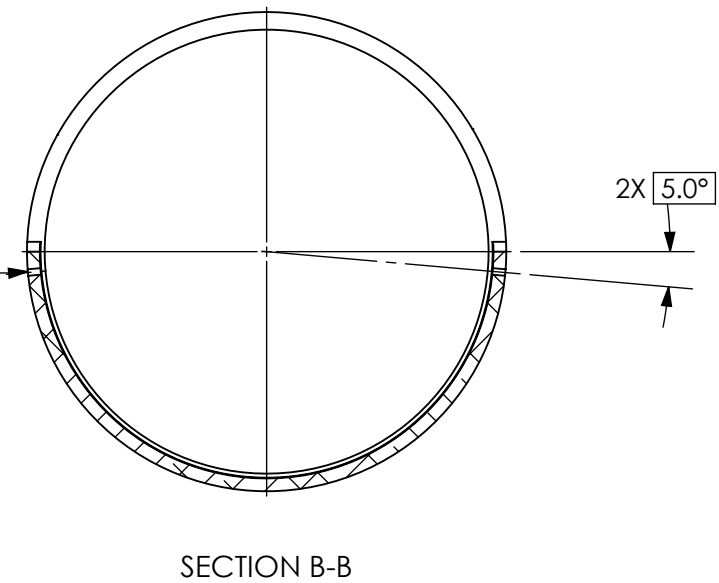
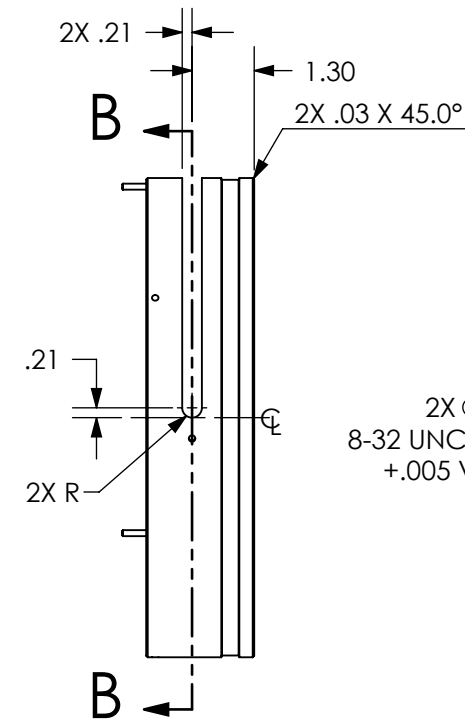
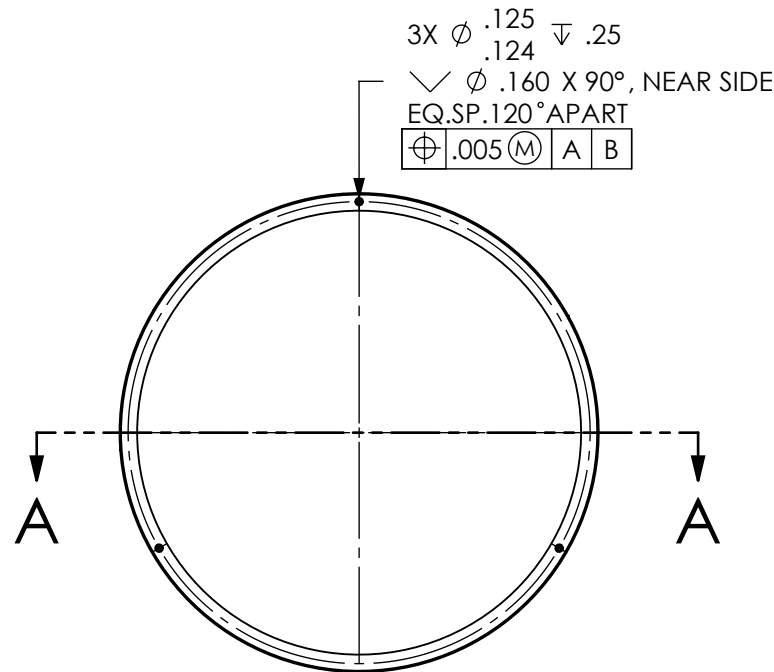
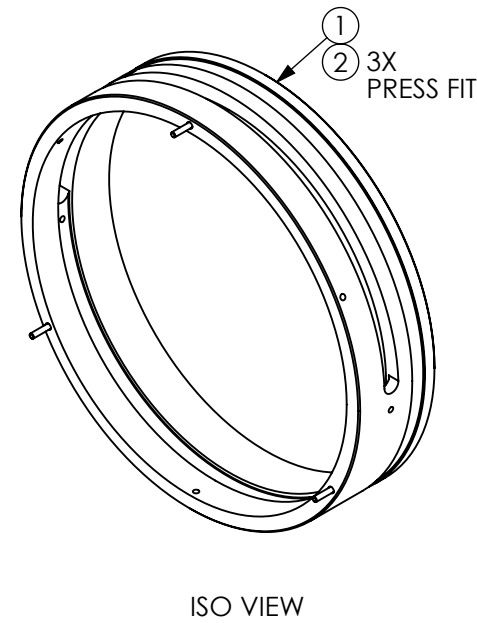
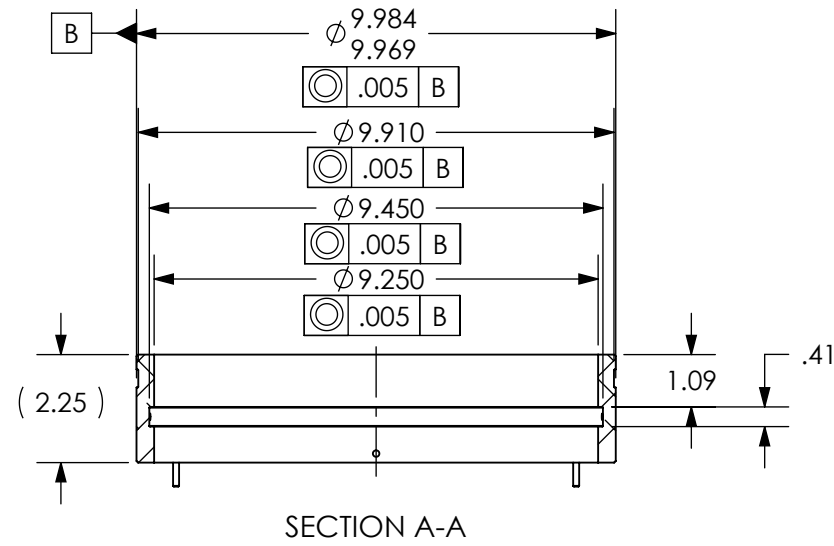
SYSTEM ADVANCED LIGO SUB-SYSTEM VE

SCALE: 1:4 PROJECTION: SHEET 1 OF 1

D1101170_d1lgo_ve, VIEWPORT GUARD ASSY., EXTENSION, PART PDM REV.: X-000, DRAWING PDM REV.: v1

NOTES CONTINUED:
 ⑤ SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER, REVISION (AND VARIANT OR "TYPE" IF APPLICABLE) ON NOTED SURFACE OF PART FOLLOWED ON THE NEXT LINE WITH A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 001 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE MINIMUM 0.12" HIGH CHARACTERS, UNLESS THE SIZE OF THE PART DICTATES SMALLER CHARACTERS. A VIBRATORY TOOL MAY BE USED. EXAMPLE: DXXXXXX-VY, TYPE-XX, S/N XXX

REV.	DATE	DCN #	DRAWING TREE #
v1	20 JUN 2011	E1100531-x0	-
-	-	-	-
-	-	-	-



ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	REQ
2	97395A451	PIN, DOWEL, .13 DIA. X .75 LG.	316 SSTL	3
1	D1101170	VIEWPORT GUARD ASSY., EXTENSION	6061-T6	1

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)
 DIMENSIONS ARE IN INCHES
 TOLERANCES:
 .XX ± .01
 .XXX ± .005
 ANGULAR ± 0.5°
 1. INTERPRET DRAWING PER ASME Y14.5-1994.
 2. REMOVE ALL SHARP EDGES, .005-.015, FOR MACHINED PARTS. ROUND ALL EDGES APPROXIMATELY R.02 FOR SHEET METAL PARTS.
 3. DO NOT SCALE FROM DRAWING.
 4. CLEAR ANODIZE PER MIL-A-8625, TYPE II

LIGO CALIFORNIA INSTITUTE OF TECHNOLOGY MASSACHUSETTS INSTITUTE OF TECHNOLOGY

SYSTEM: ADVANCED LIGO SUB-SYSTEM: VE

PART NAME: VIEWPORT GUARD ASSY., EXTENSION

DESIGNER: E.SANCHEZ DATE: 20 JUN 2011
 DRAFTER: E.SANCHEZ DATE: 20 JUN 2011
 CHECKER: APPROVAL: SCALE: 1:4 PROJECTION: SHEET 1 OF 1

SIZE DWG. NO. B D1101170 REV. v1

MATERIAL: N/A FINISH: 63 μinch NEXT ASSY: D1101171