

HYBRIS DRAWING LIST, HIERARCHIC, RECURSIVE

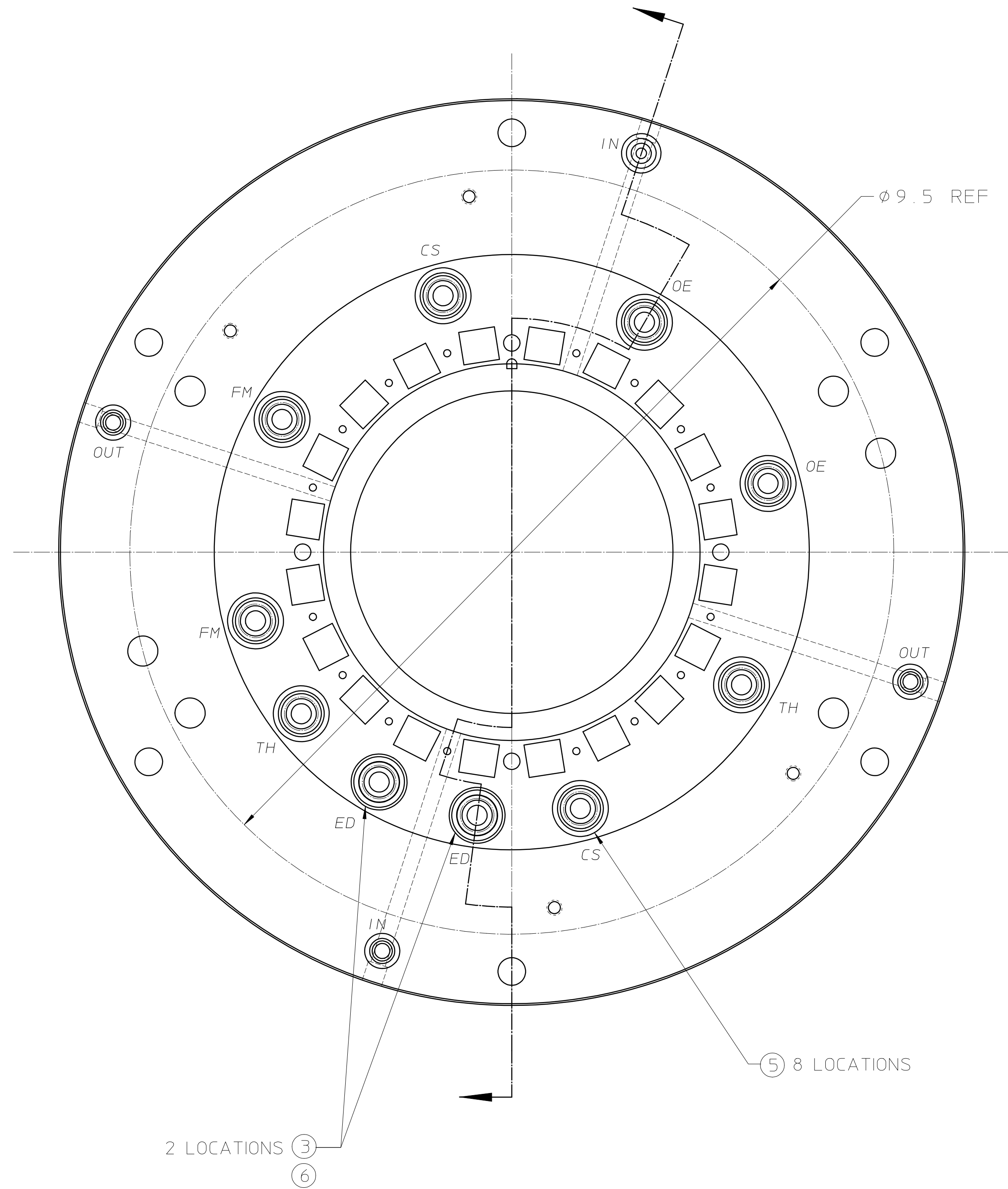
LINE	LEVEL	QTY	PART NO.	DESCRIPTION
1	1	1	27A328	HYBRIS ASSEMBLY
2				
3	2	1	27A330	WELDMENT, CATHODE FLANGE
4	3	1	27A331	CATHODE FLANGE MACHINING
5	3	1	27A332	COVER, WATER, CATHODE FLANGE
6	3	2	27A335	TUBE, WATER
7	3	1	27A336	TUBE, GAS, CATHODE
8				
9	3	1	27A360	WELDMENT, VIEW PORT
10	4	1	27A337	TUBE, VIEW PORT, CATHODE
11	4	1	27A338	FLANGE, VIEW PORT, CATHODE
12				
13	2	1	27A343	WELDMENT, EXTRACTOR
14	3	2	27A335	TUBE, WATER
15	3	1	27A344	EXTRACTOR CORE MACHINING
16	3	1	27A345	COVER, WATER, EXTRACTOR
17	3	1	27A346	FLANGE, EXTRACTOR / CATHODE
18	3	1	27A347	FLANGE EXTRACTOR / OUTLET
19	3	2	27A348	TUBE, VACUUM, EXTRACTOR
20	3	2	27A349	FLANGE, VACUUM, EXTRACTOR
21				
22	2	1	21C989	PLASMA CHAMBER WELDMENT
23	2	1	27A329	INSULATOR, CATHODE / PLASMA CHAMBER
24	2	1	27A333	ELECTRODE, CATHODE
25	2	1	27A334	CLAMPING RING, ELECTRODE, CATHODE
26	2	1	27A339	COVER, VIEW PORT, CATHODE
27	2	4	27A340	BUSHING, CATHODE / PLASMA CHAMBER
28	2	1	27A341	GLASS, VIEW PORT
29	2	1	27A342	INSULATOR, EXTRACTOR / CATHODE
30	2	2	27A350	INSULATOR, EXTRACTOR VACUUM
31	2	2	27A351	CLAMSHELL, CLAMP, VACUUM, EXTRACTOR
32	2	1	27A352	ELECTRODE, EXTRACTOR
33	2	1	27A353	CLAMPING RING, ELECTRODE, EXTRACTOR
34	2	4	27A354	BUSHING, EXTRACTOR / CATHODE
35	2	11	27A355	WASHER, BUSHING, 1/4"
36	2	5	27A356	BUSHING, EXTRACTOR / OUTLET
37	2	5	27A357	WASHER, BUSHING, #8
38	2	1	27A358	INSULATOR, EXTRACTOR / OUTLET
39	2	5	27A359	THREADED INSERT, OUTLET
40	2	1	REF	FLANGE, MICROWAVE ION SOURCE, ARGONNE

HYBRIS DRAWING LIST, SERIAL, NON-RECURSIVE

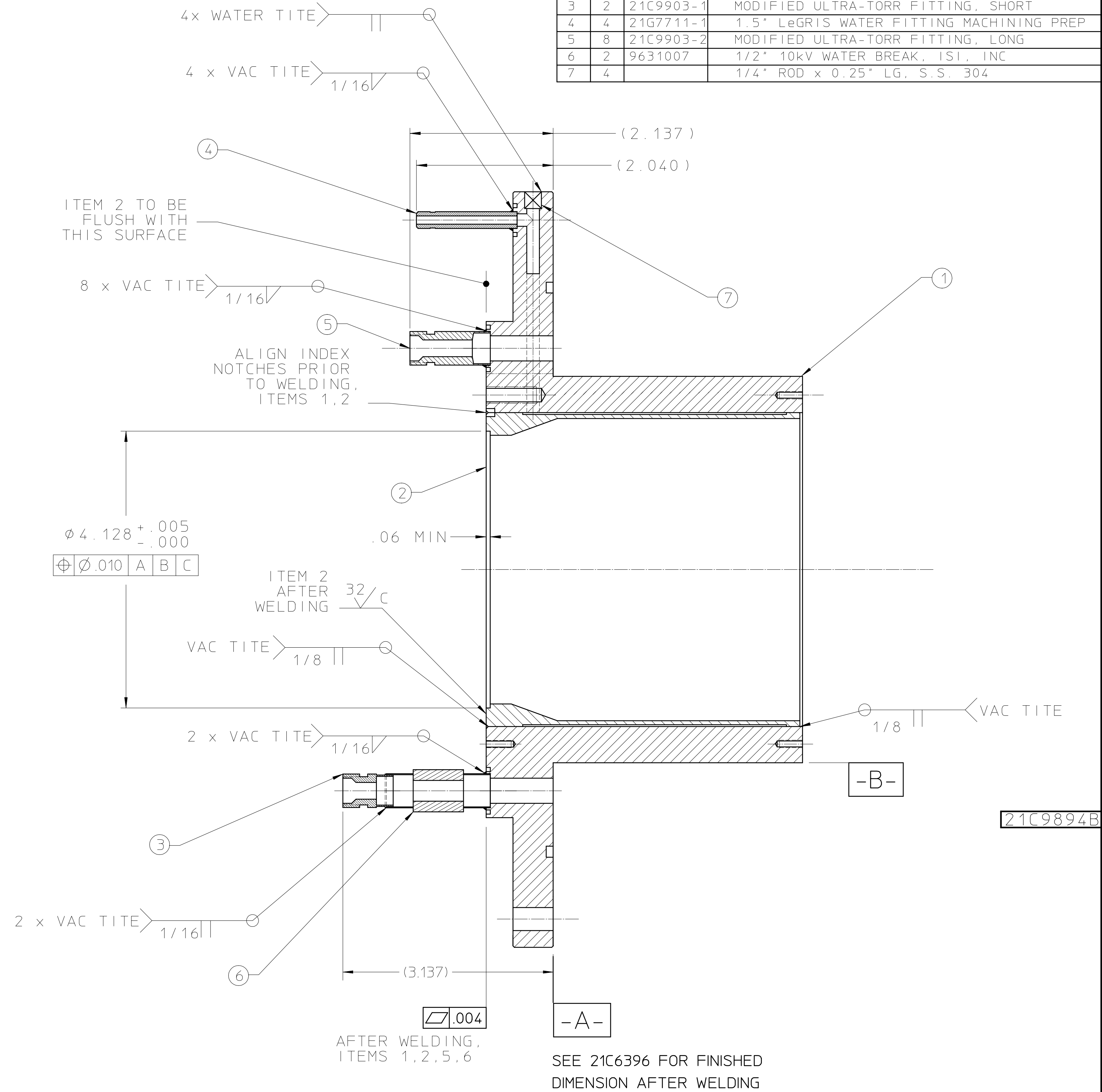
ITEM	DWG. NO.	DESCRIPTION
1	21C989	PLASMA CHAMBER WELDMENT
2	27A328	HYBRIS ASSEMBLY
3	27A329	INSULATOR, CATHODE / PLASMA CHAMBER
4	27A330	WELDMENT, CATHODE FLANGE
5	27A331	CATHODE FLANGE MACHINING
6	27A332	COVER, WATER, CATHODE FLANGE
7	27A333	ELECTRODE, CATHODE
8	27A334	CLAMPING RING, ELECTRODE, CATHODE
9	27A335	TUBE, WATER
10	27A336	TUBE, GAS, CATHODE
11	27A337	TUBE, VIEW PORT, CATHODE
12	27A338	FLANGE, VIEW PORT, CATHODE
13	27A339	COVER, VIEW PORT, CATHODE
14	27A340	BUSHING, CATHODE / PLASMA CHAMBER
15	27A341	GLASS, VIEW PORT
16	27A342	INSULATOR, EXTRACTOR / CATHODE
17	27A343	WELDMENT, EXTRACTOR
18	27A344	EXTRACTOR CORE MACHINING
19	27A345	COVER, WATER, EXTRACTOR
20	27A346	FLANGE, EXTRACTOR / CATHODE
21	27A347	FLANGE EXTRACTOR / OUTLET
22	27A348	TUBE, VACUUM, EXTRACTOR
23	27A349	FLANGE, VACUUM, EXTRACTOR
24	27A350	INSULATOR, EXTRACTOR VACUUM
25	27A351	CLAMSHELL, CLAMP, VACUUM, EXTRACTOR
26	27A352	ELECTRODE, EXTRACTOR
27	27A353	CLAMPING RING, ELECTRODE, EXTRACTOR
28	27A354	BUSHING, EXTRACTOR / CATHODE
29	27A355	WASHER, BUSHING, 1/4"
30	27A356	BUSHING, EXTRACTOR / OUTLET
31	27A357	WASHER, BUSHING, #8
32	27A358	INSULATOR, EXTRACTOR / OUTLET
33	27A359	THREADED INSERT, OUTLET
34	27A360	WELDMENT, VIEW PORT
35	REF	FLANGE, MICROWAVE ION SOURCE, ARGONNE

NOTES (UNLESS OTHERWISE SPECIFIED):

- 1) DIMENSIONS IN INCHES.
- 2) ALL WELDS SHOULD BE PERFORMED IN AN INERT GAS GLOVE-BOX ENVIRONMENT TO PREVENT ANY OXIDATION TO WELDED SURFACES.

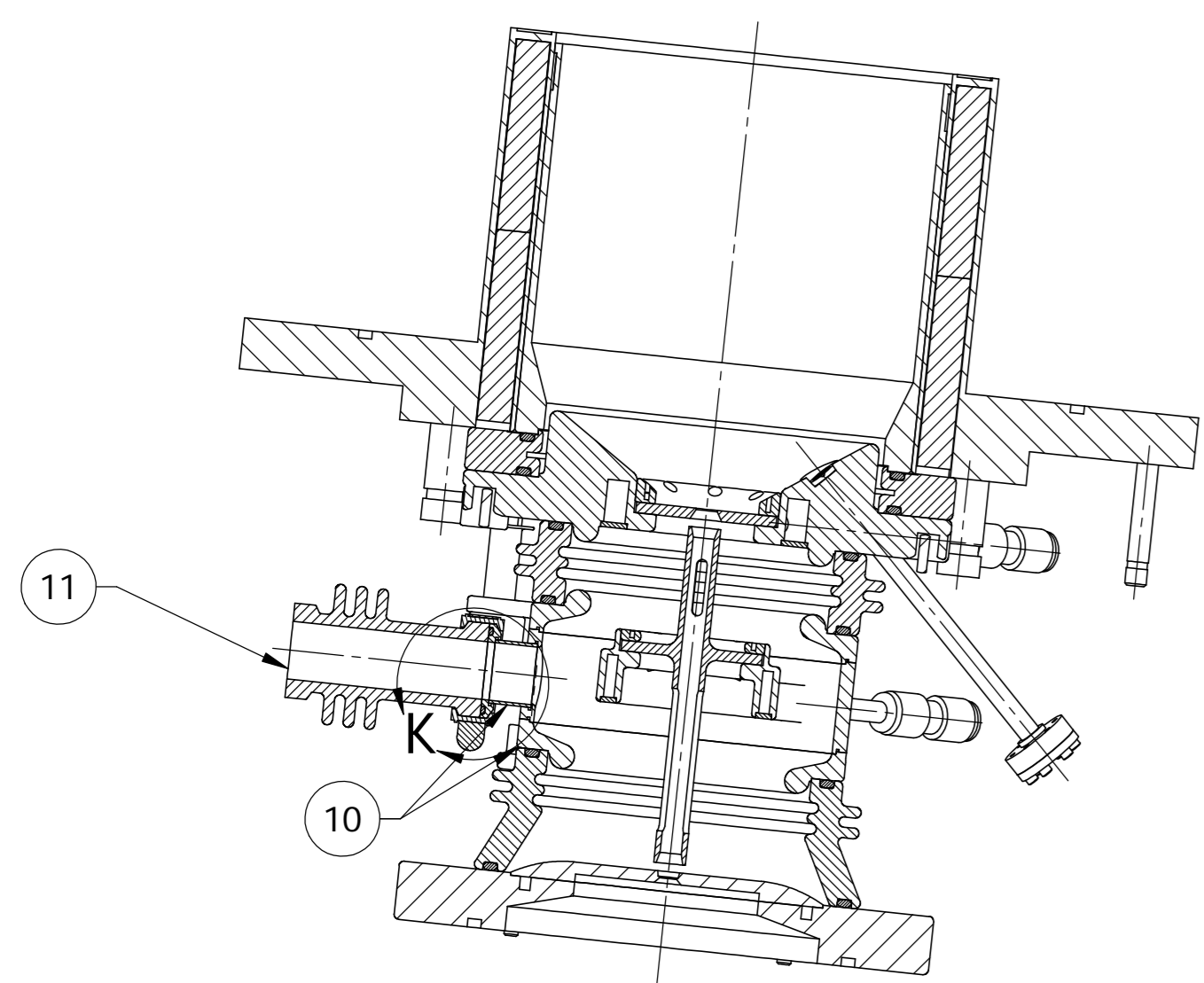


ITEM	REQD	PART NUMBER	DESCRIPTION
1	1	21C6396	CUSP MAGNET BODY
2	1	21C9786	PLASMA CHAMBER
3	2	21C9903-1	MODIFIED ULTRA-TORR FITTING, SHORT
4	4	21G7711-1	1.5" LeGRIS WATER FITTING MACHINING PREP
5	8	21C9903-2	MODIFIED ULTRA-TORR FITTING, LONG
6	2	9631007	1/2" 10kV WATER BREAK, ISI, INC
7	4		1/4" ROD x 0.25" LG. S.S. 304

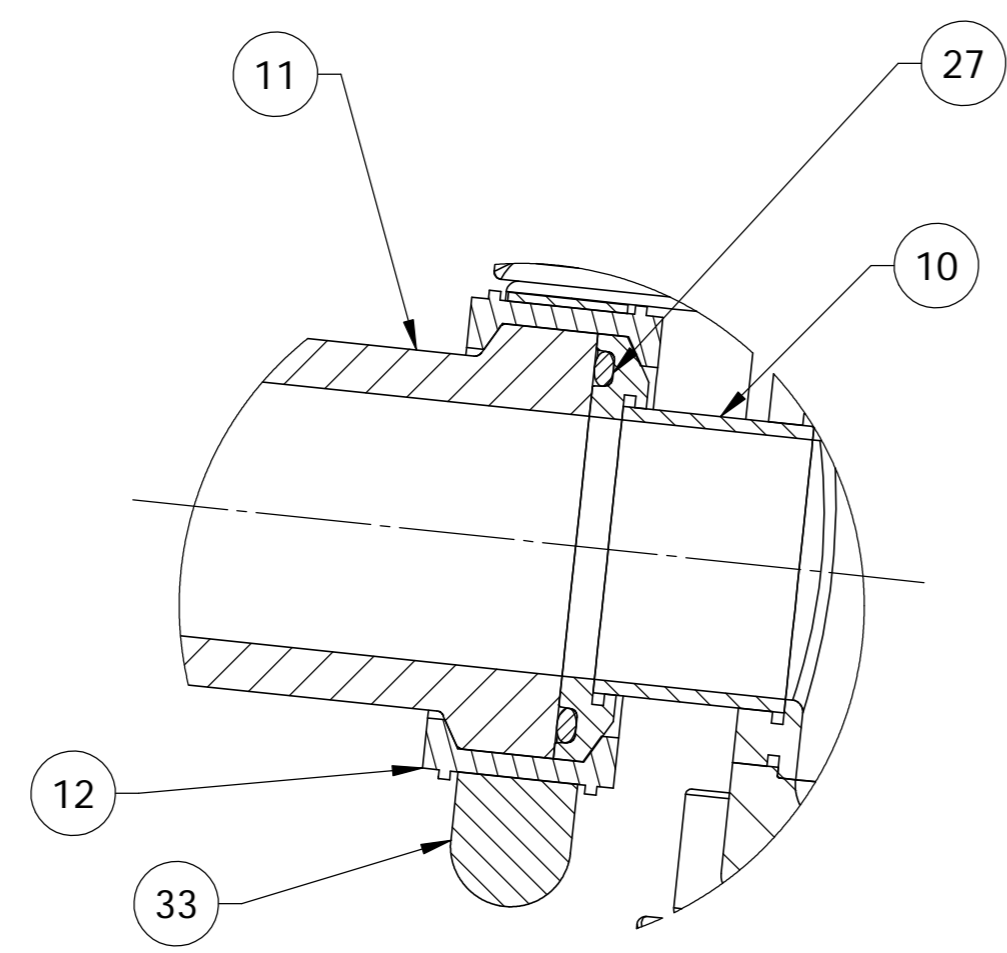


SEE 21C6396 FOR FINISHED DIMENSION AFTER WELDING

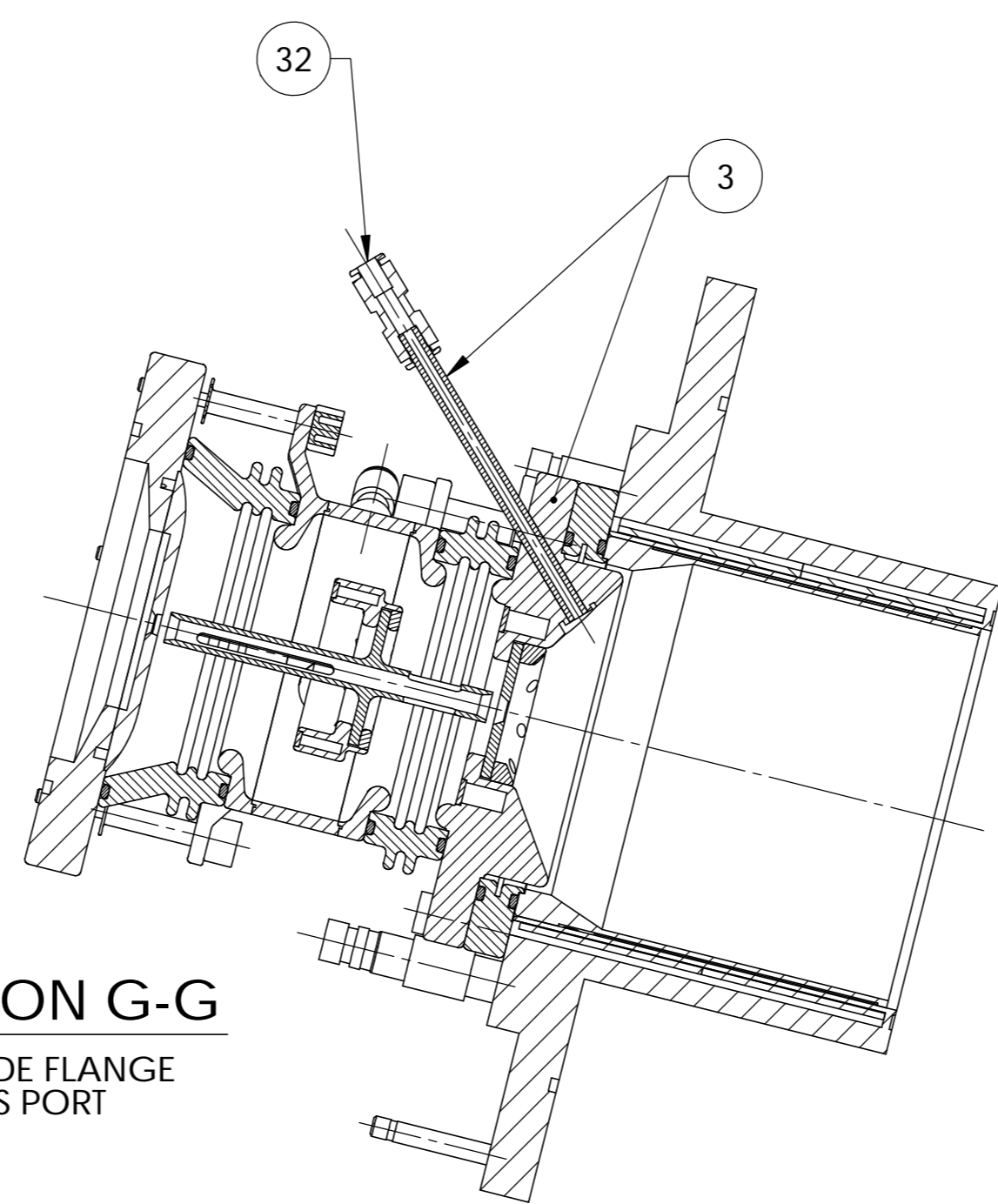
				UNLESS OTHERWISE SPECIFIED		SHOP ORDERS			LAWRENCE BERKELEY NATIONAL LABORATORY					
C	PL	PL	11/21/03	ADDED Ø 4.128 C-BORE FOR HYBRIS RETROFIT. ADDED DATUM B. CORRECTED ITEM 5 P/N.	THREADS ARE CLASS 2	.X ± .1	FRAC. ± 1/64	ACCT. NO.	SERIAL NO.	UNIVERSITY OF CALIFORNIA-BERKELEY				
B	DWC		10/18/01	ADDED NOTE 2 REGARDING GLOVE-BOX WELDS ADDED MARKERS FOR WATER FEEDTHRUS	CHAMFER ENDS OF ALL SCREW THREADS 30°	.XX ± .01	ANGLES ± 0.5°	DATE ISSD	DATE RECD	NO. RECD	SNS - FRONT END SYSTEM			
A	JM	DWC	9/18/01	ADDED WELDMENTS OF ITEMS 3 THRU 7 CHANGES	CUT 1.5 PITCH THRD RELIEF WITH ROUND NOSE TOOL ON MACHINING CUT THREADS.	.XXX ± .005	FINISH 125/7	DELIVER TO	SURFACE TREATMENT CLEAN			ION SOURCE PROTOTYPE DESIGN		
REV	DWG	CHK	ZONE	DATE	BREAK EDGES .016 MAX. ON MACHINED WORK REMOVE BURRS WELD SPLATTER & LOOSE SCALE REF: ASME Y14.5M & ANSI B46.1.			IDENT. METH.	TAG	PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	DO NOT SCALE PRINTS
								BY PAL	DATE 02-01-99	MICROFILMED	DETAIL		FULL	
								CHK BY SKM	DATE 02-02-99	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE	REV.
										8210-14		21C9894	C	



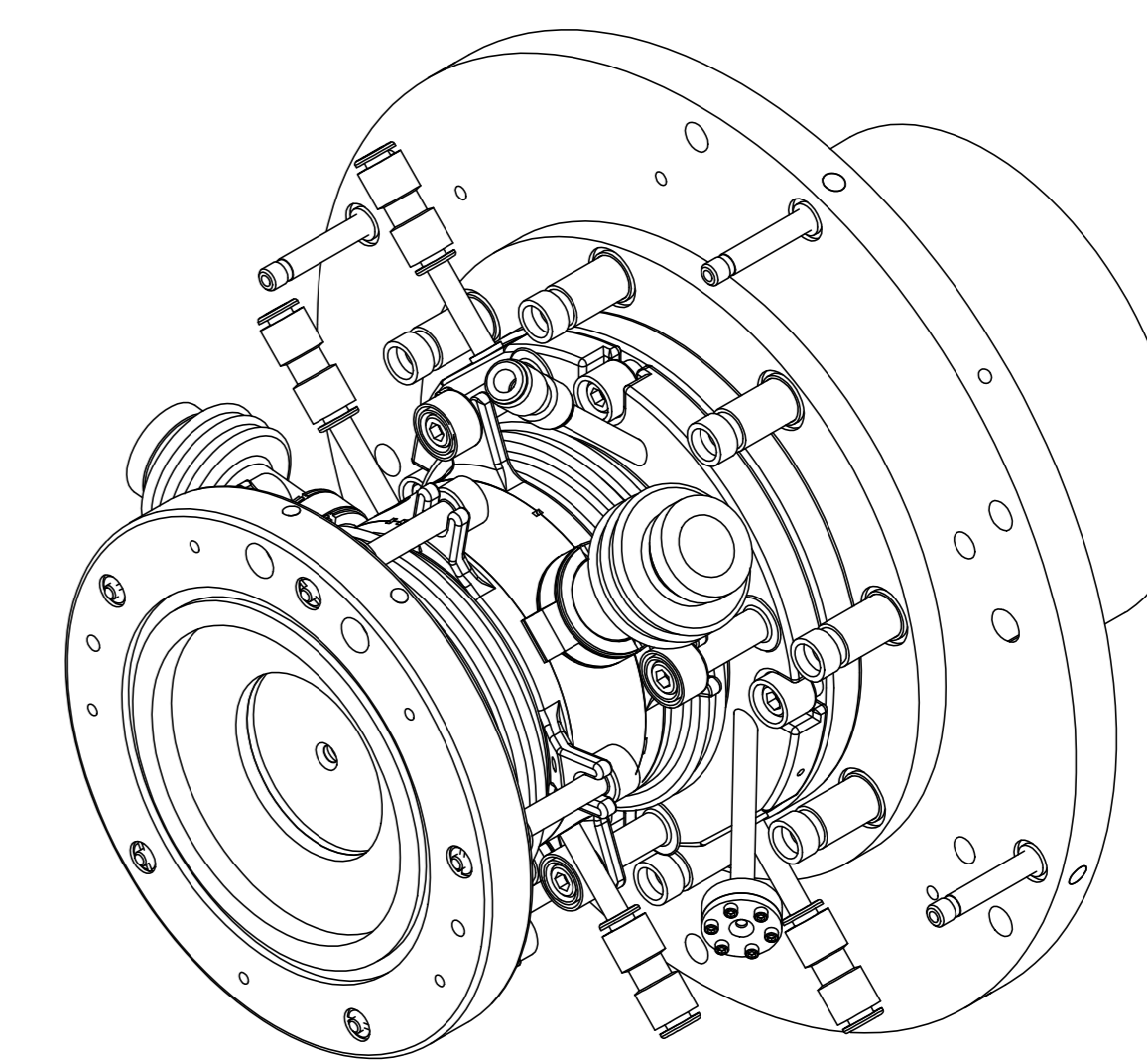
SECTION B-B
CATHODE VACUUM
PORTS, 2PL



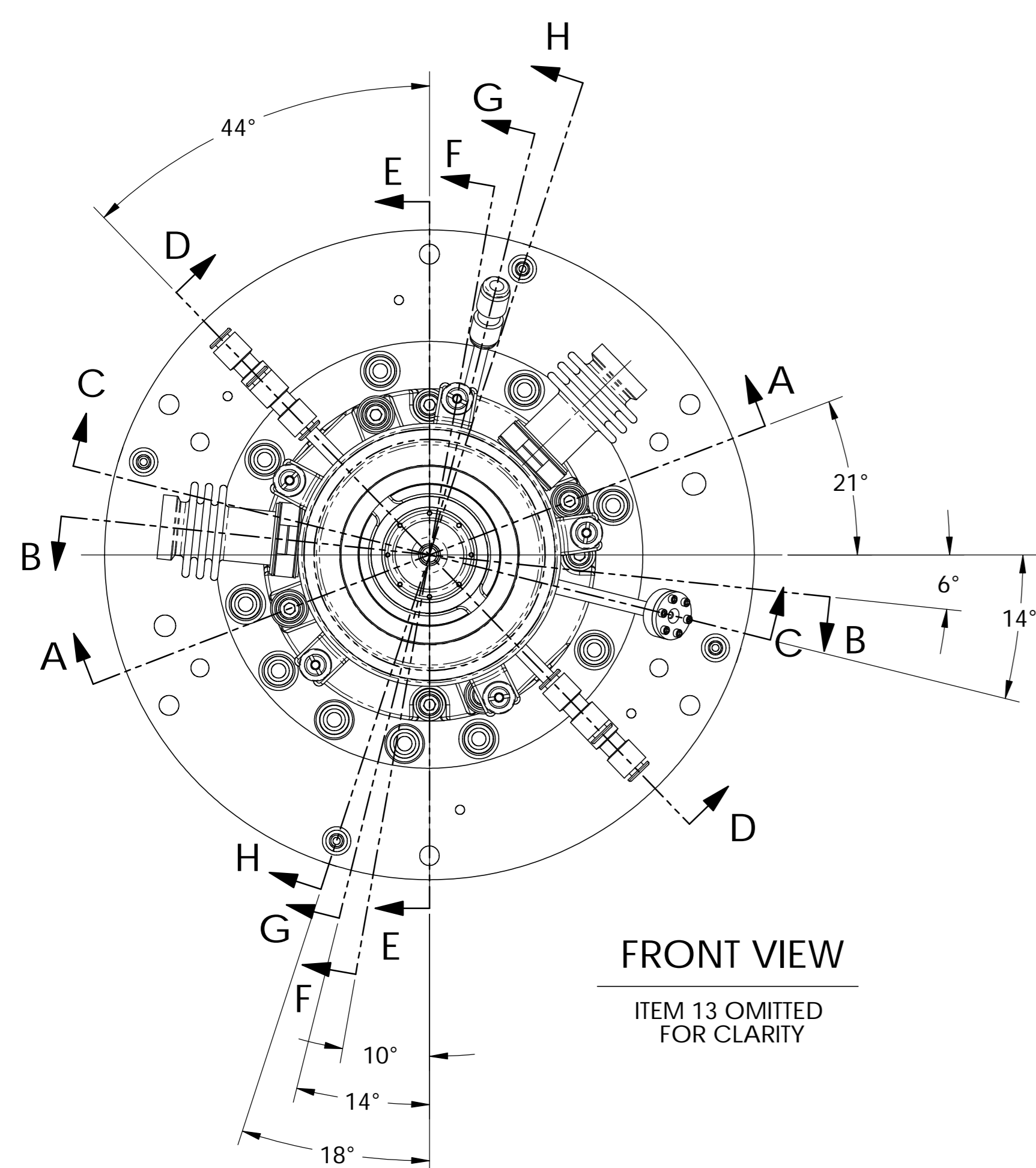
DETAIL K
SCALE 2 : 1



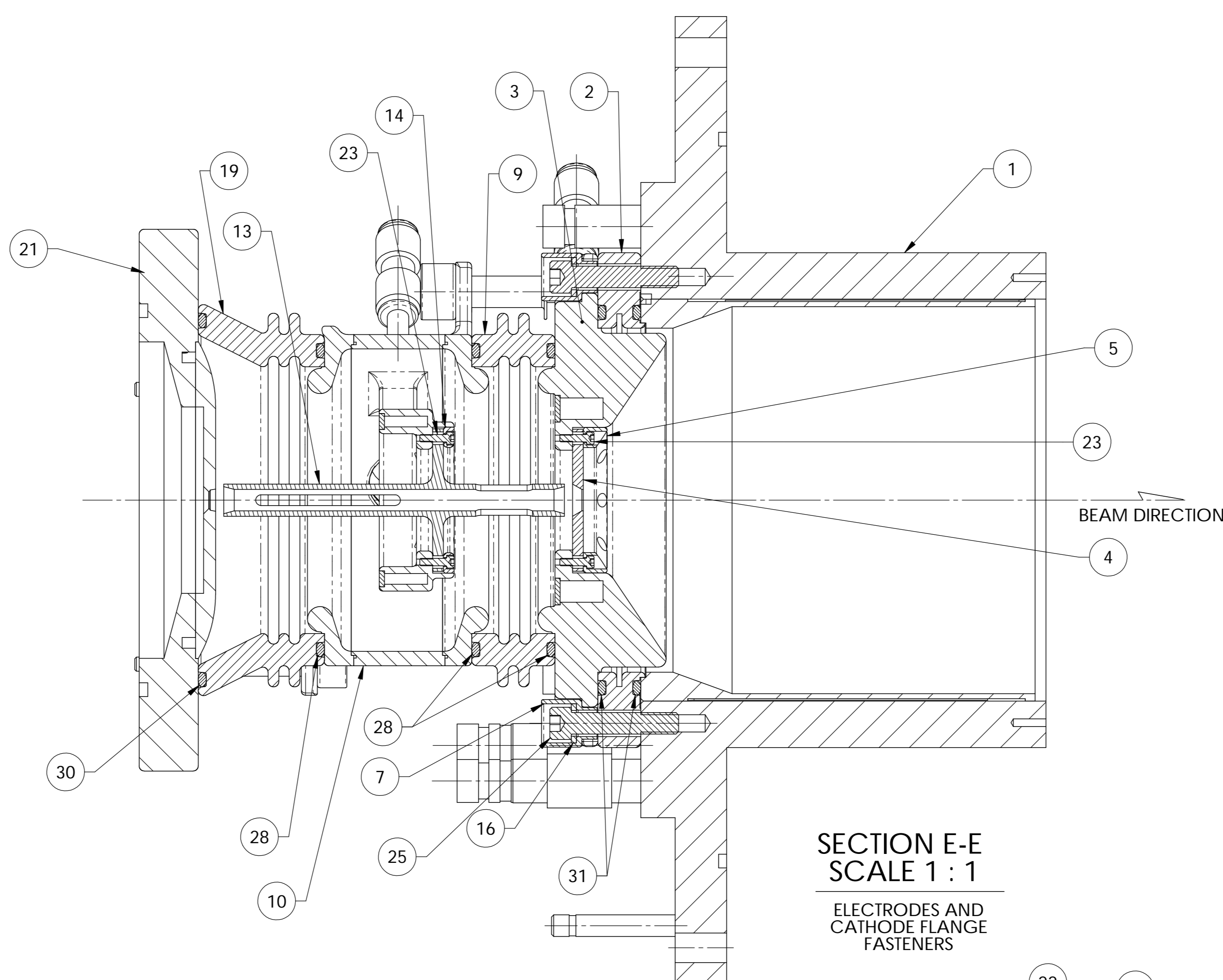
SECTION G-G
CATHODE FLANGE
GAS PORT



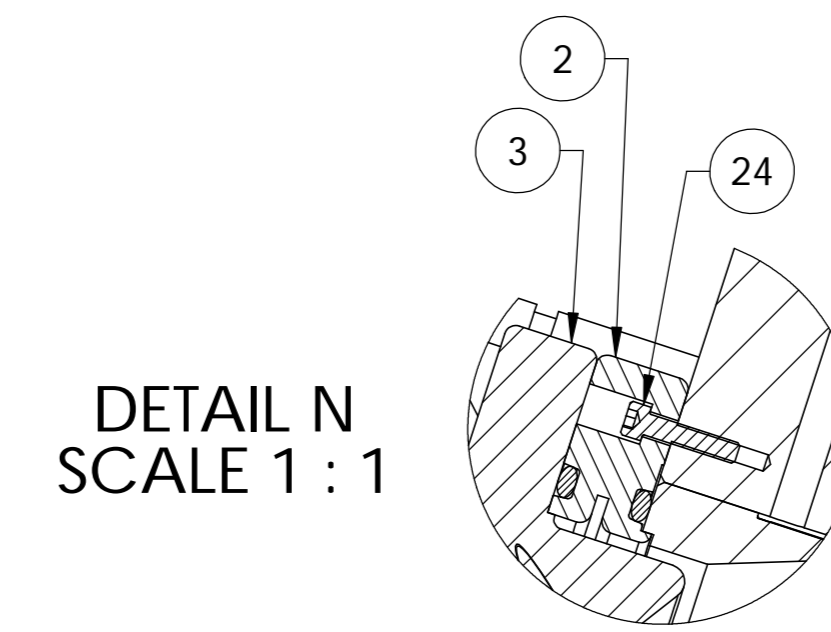
AUXILIARY VIEW



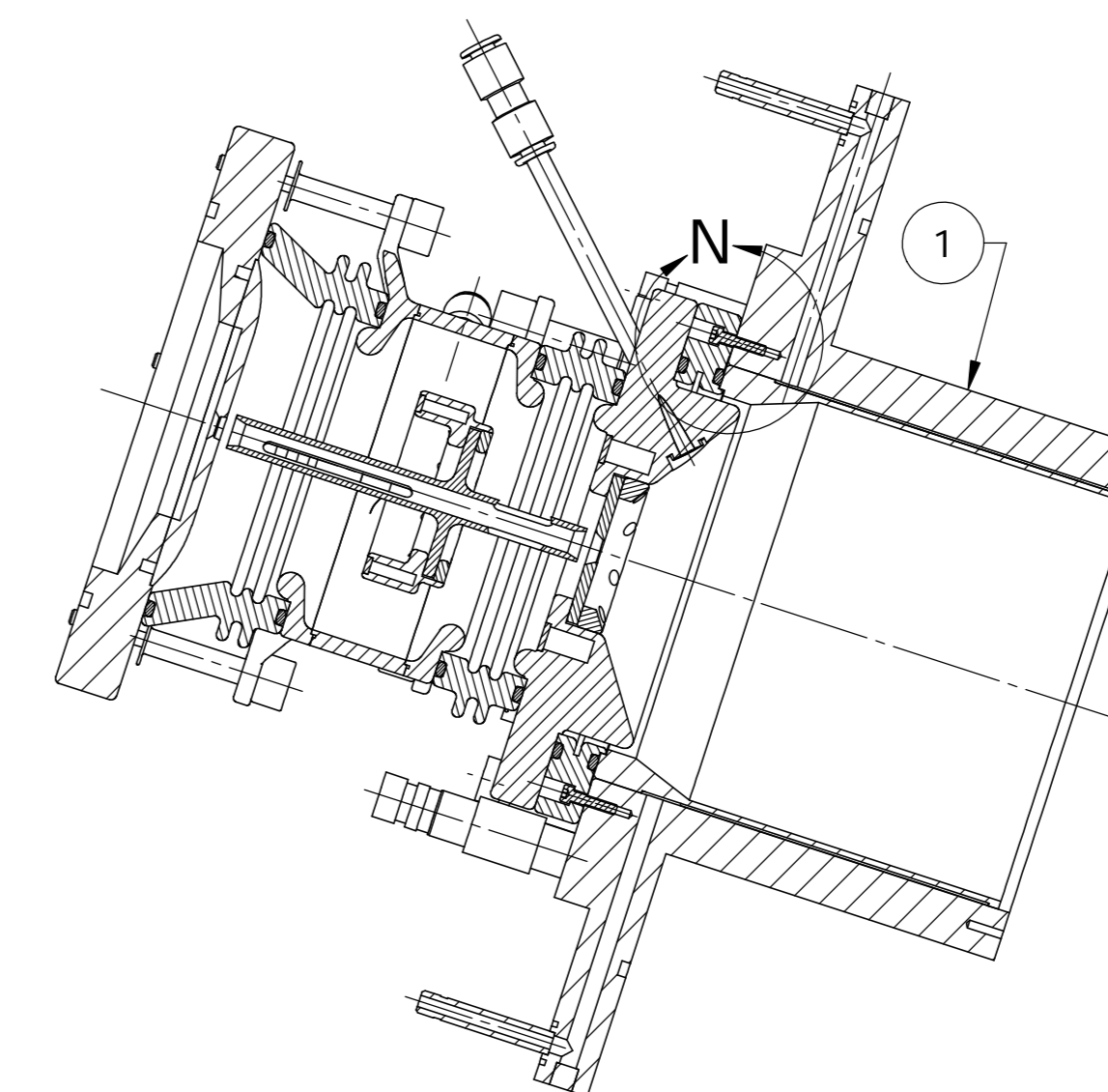
FRONT VIEW
ITEM 13 OMITTED
FOR CLARITY



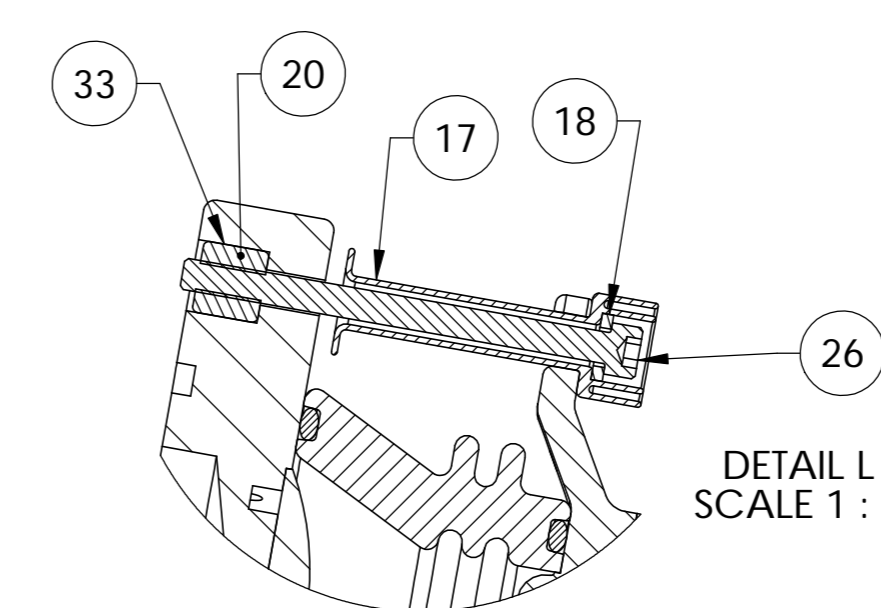
SECTION E-E
SCALE 1 : 1
ELECTRODES AND
CATHODE FLANGE
FASTENERS



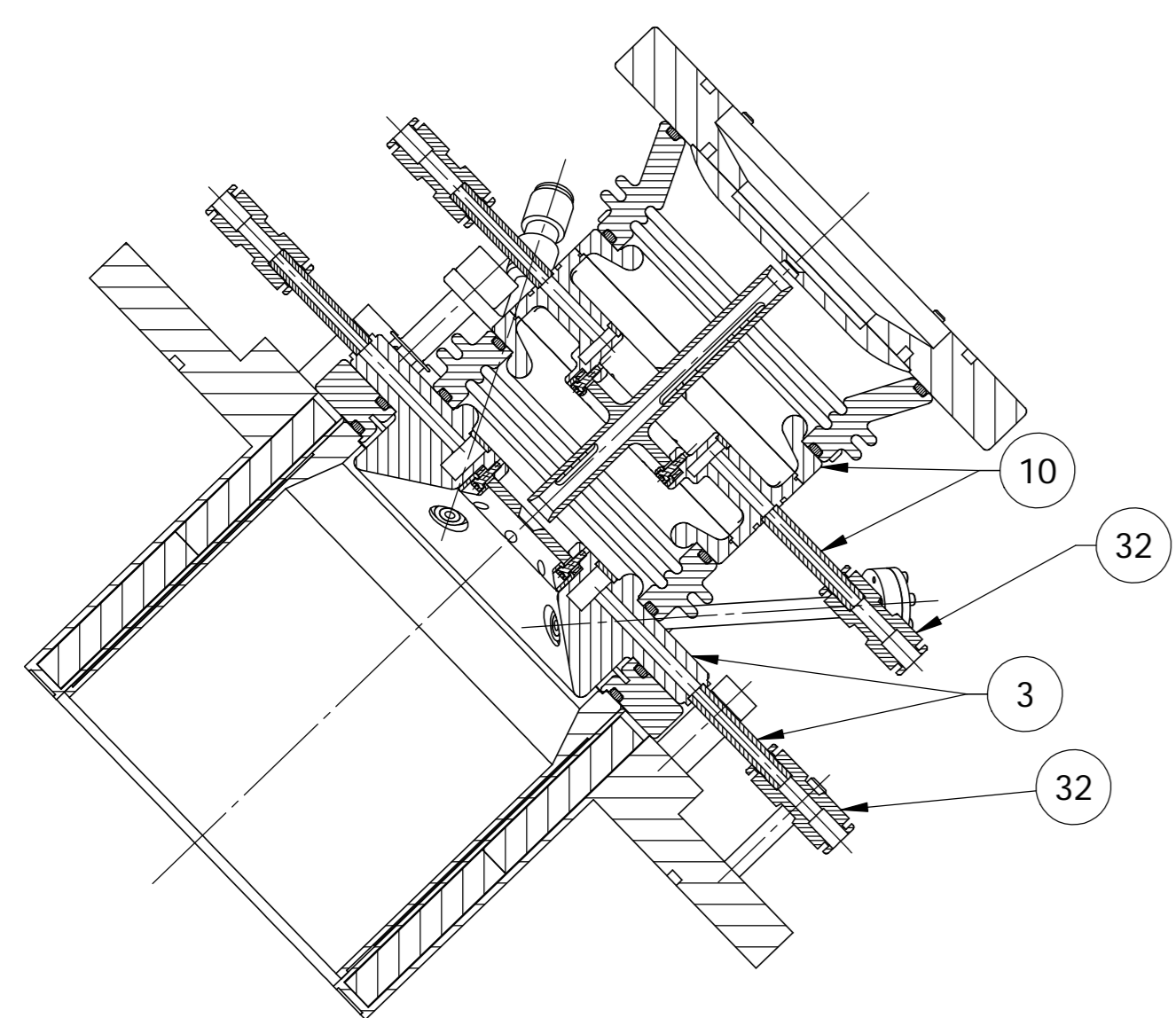
DETAIL N
SCALE 1 : 1



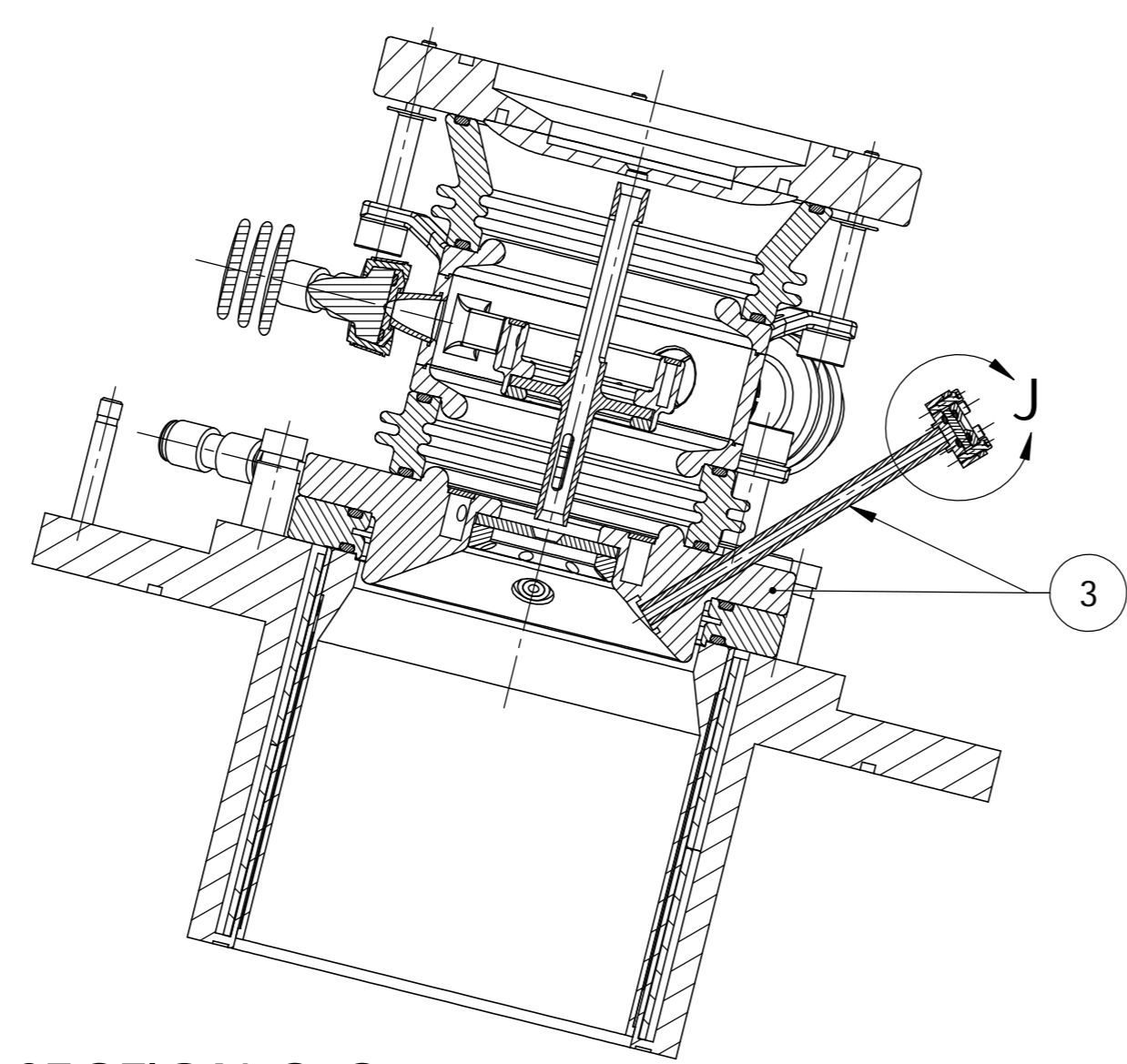
SECTION H-H
PLASMA CHAMBER
FASTENERS



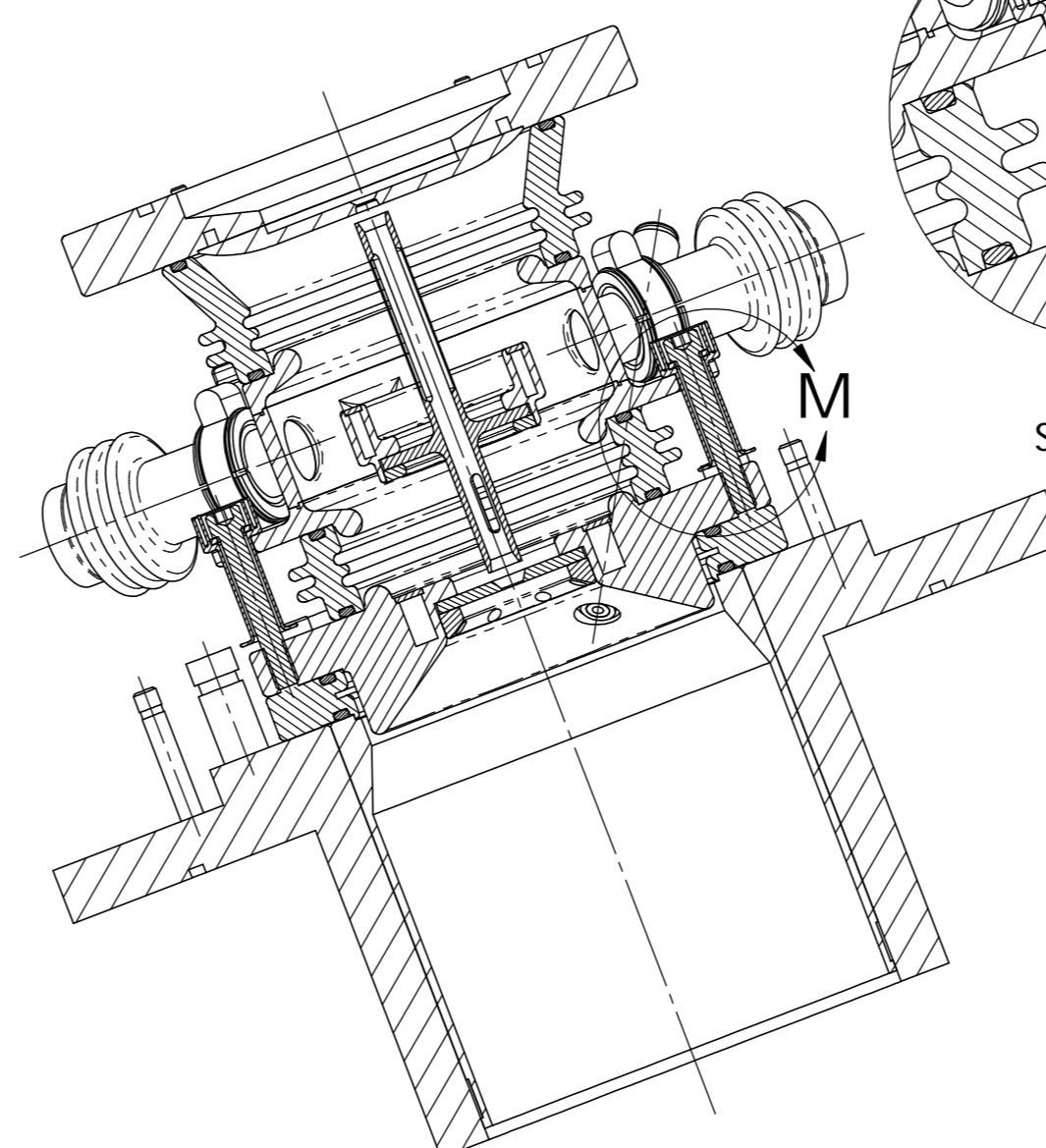
DETAIL L
SCALE 1 : 1



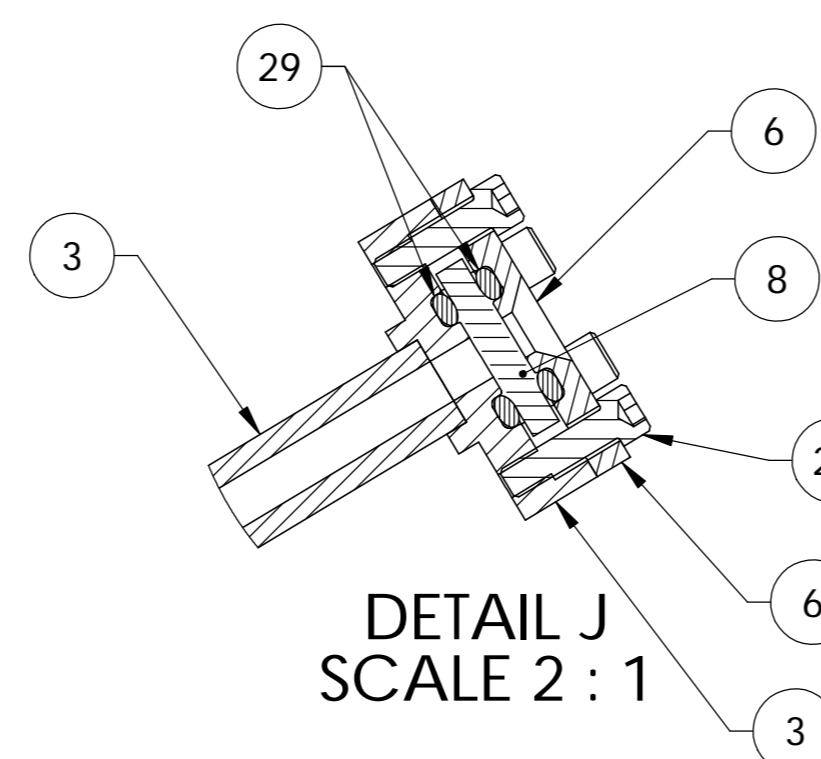
SECTION D-D
WATER COOLING,
EXTRACTOR & CATHODE
FLANGES



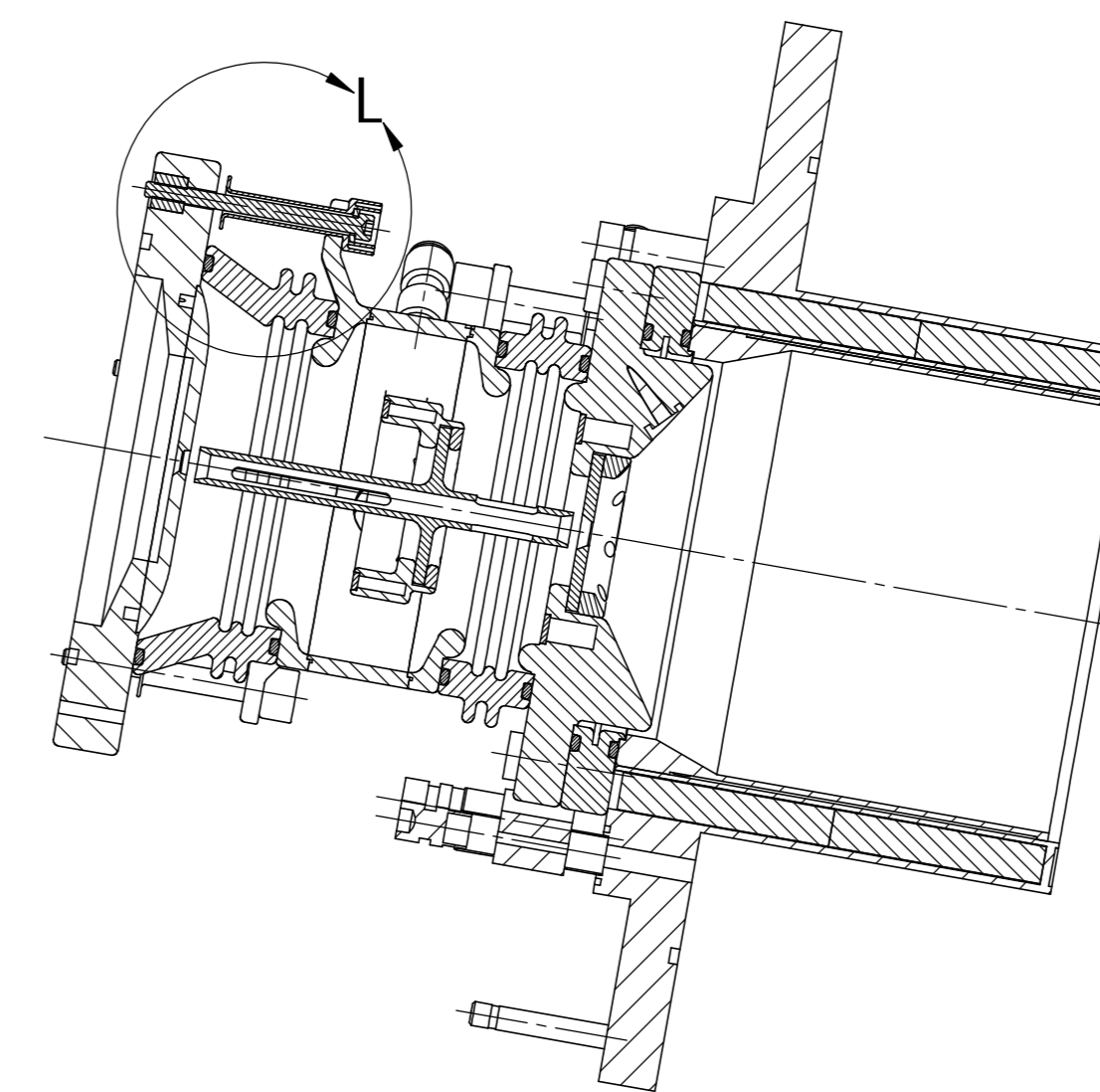
SECTION C-C
CATHODE FLANGE
VIEW PORT



SECTION A-A
EXTRACTOR
FASTENERS



DETAIL J
SCALE 2 : 1

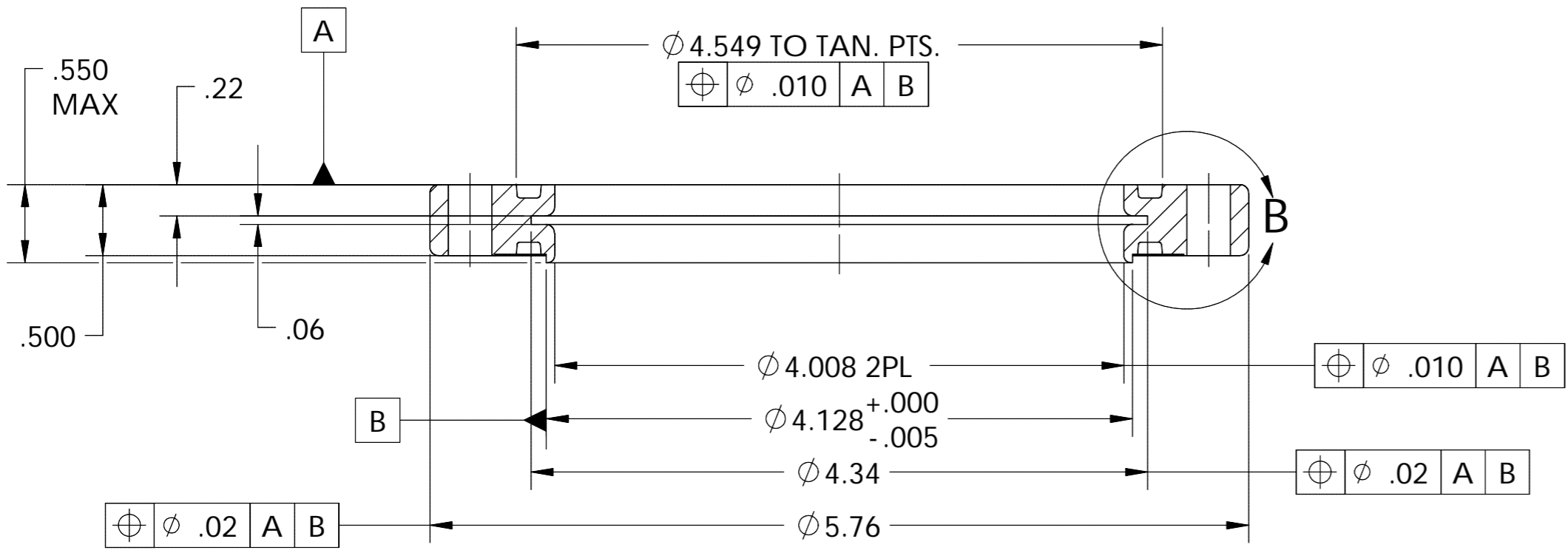
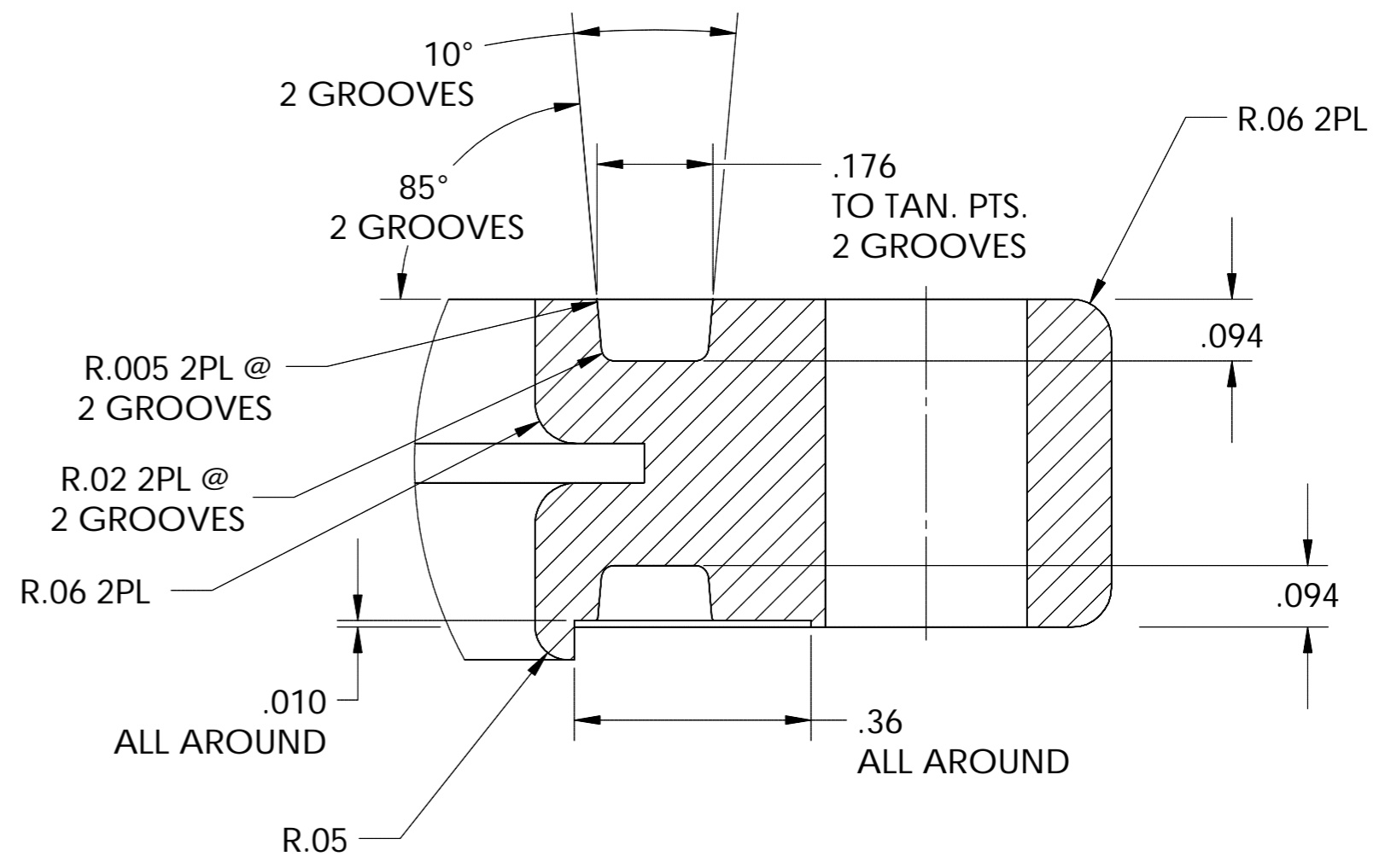
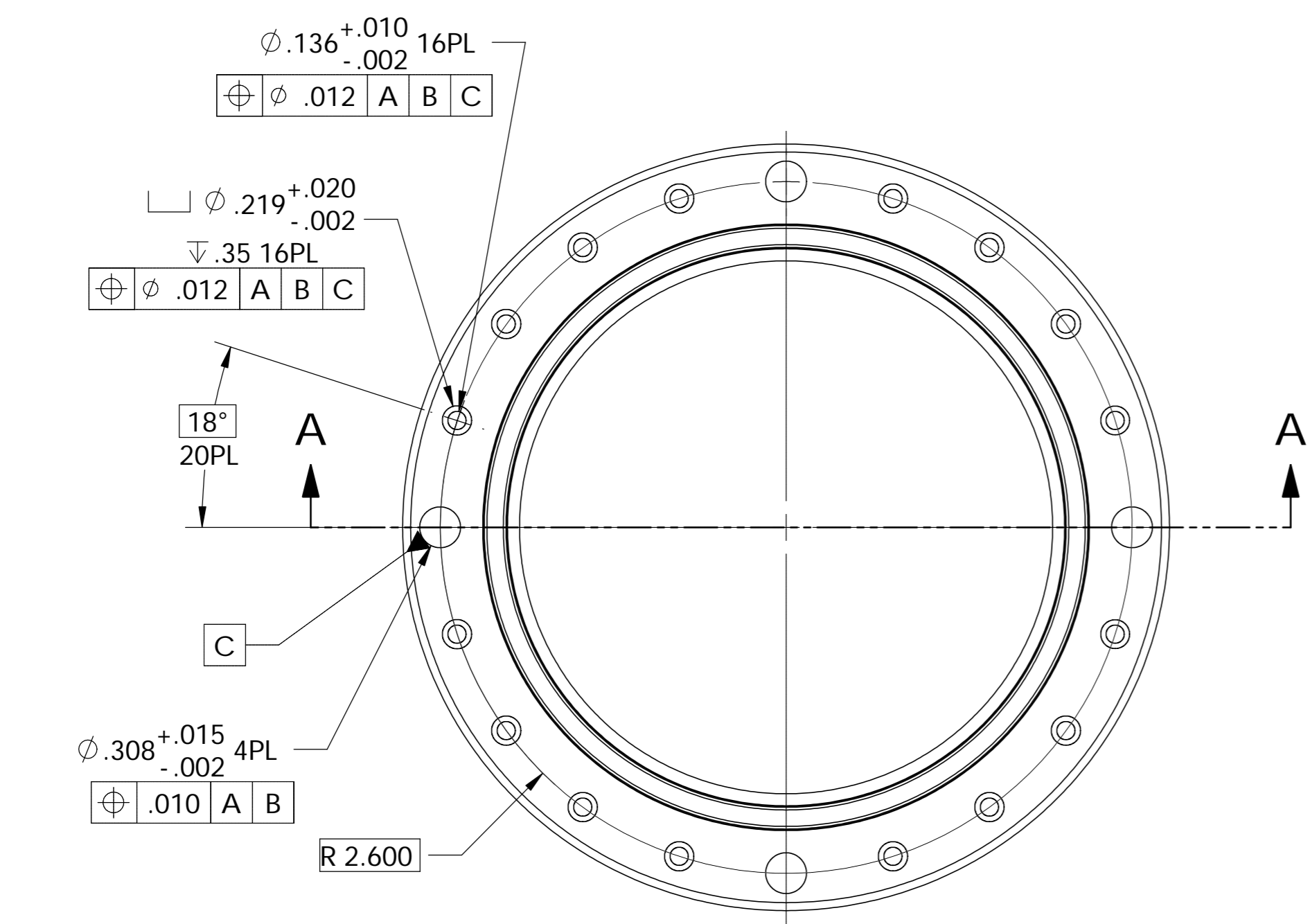


SECTION F-F
OUTLET FASTENERS

ITEM	QTY	PART NO.	DESCRIPTION
34	A/R		LOK-TITE
33	2	54195K24	HOSE CLAMP, 5/16 W X 15/16 I.D. 1-1/2" DIA, SST 305, MCMASTER-CARR OR EQ.
32	5		FITTING, COUPLING, LEGRIS, 1/4"
31	2		O-RING, VITON, 2-243 (1.39" X 4.109" ID)
30	1		O-RING, VITON, 2-242 (1.39" X 3.984" ID)
29	2		O-RING, VITON, 2-011 (0.70" X .301" ID)
28	3		O-RING, VITON, 2-236 (1.39" X 3.234" ID)
27	2		O-RING, VITON, 2-020 (0.70" X .864" ID)
26	5		SCR, SCH, 8-32 UNC-2A X 2.25 L, SST
25	4		SCR, SCH, 1/4-20 UNC-2A X 1.25 L, SST
24	16		SCR, SCH, 4-40 UNC-2A X .50 L, SST
23	22		SCR, SCH, 2-56 UNC-2A X 5/16 L, SST
22	4		SCR, SCH, 1/4-20 UNC-2A X 1.75 L, SST
21	1	REF	FLANGE, MICROWAVE ION SOURCE, ARGONNE
20	5	27A359	THREADED INSERT, OUTLET
19	1	27A358	INSULATOR, EXTRACTOR / OUTLET
18	5	27A357	WASHER, BUSHING, EB
17	5	27A356	BUSHING, EXTRACTOR / OUTLET
16	11	27A355	WASHER, BUSHING, 1/4"
15	4	27A354	BUSHING, EXTRACTOR / CATHODE
14	1	27A353	CLAMPING RING, ELECTRODE, EXTRACTOR
13	1	27A352	ELECTRODE, EXTRACTOR
12	2	27A351	CLAMPSHELL, CLAMP, VACUUM, EXTRACTOR
11	2	27A350	INSULATOR, EXTRACTOR VACUUM
10	1	27A343	WELDMENT, EXTRACTOR
9	1	27A342	INSULATOR, EXTRACTOR / CATHODE
8	1	27A341	GLASS, VIEW PORT
7	4	27A340	BUSHING, CATHODE / PLASMA CHAMBER
6	1	27A339	COVER, VIEW PORT, CATHODE
5	1	27A334	CLAMPING RING, ELECTRODE, CATHODE
4	1	27A333	ELECTRODE, CATHODE
3	1	27A330	WELDMENT, CATHODE FLANGE
2	1	27A329	INSULATOR, CATHODE / PLASMA CHAMBER
1	1	27C399-4	PLASMA CHAMBER WELDMENT

UNLESS OTHERWISE SPECIFIED				PROJECT NAME	ERNEST ORLANDO LAWRENCE
X ± 1/16 INCH XX ± 0.1 INCH XXX ± 0.005 INCH				PROJECT NUMBER	BERKELEY NATIONAL LABORATORY
FRACTIONS: -/16				NEXT ASSY:	UNIVERSITY OF CALIFORNIA
ANGLES: 0.1° / INCH				CALC. WT.	KG.
MACH. SURFS: 125 MICRO-INCH				SCALE	1:2
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .018 MAX. REMOVE BURRS, WELD SPATTER & LOOSE SCALE.				THIRD ANGLE PROJECTION	1 SHEET OF 1
B	PAL	R. KELLER	12/16/03	EXTRACTOR AND CATHODE EBW JOINTS CHANGED TO BRAZE	
A	PAL	R. KELLER	12/02/03	INITIAL RELEASE	
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION	

HYBRIS ASSEMBLY		DWG NO: 27A328	REV B
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SECTION A-A

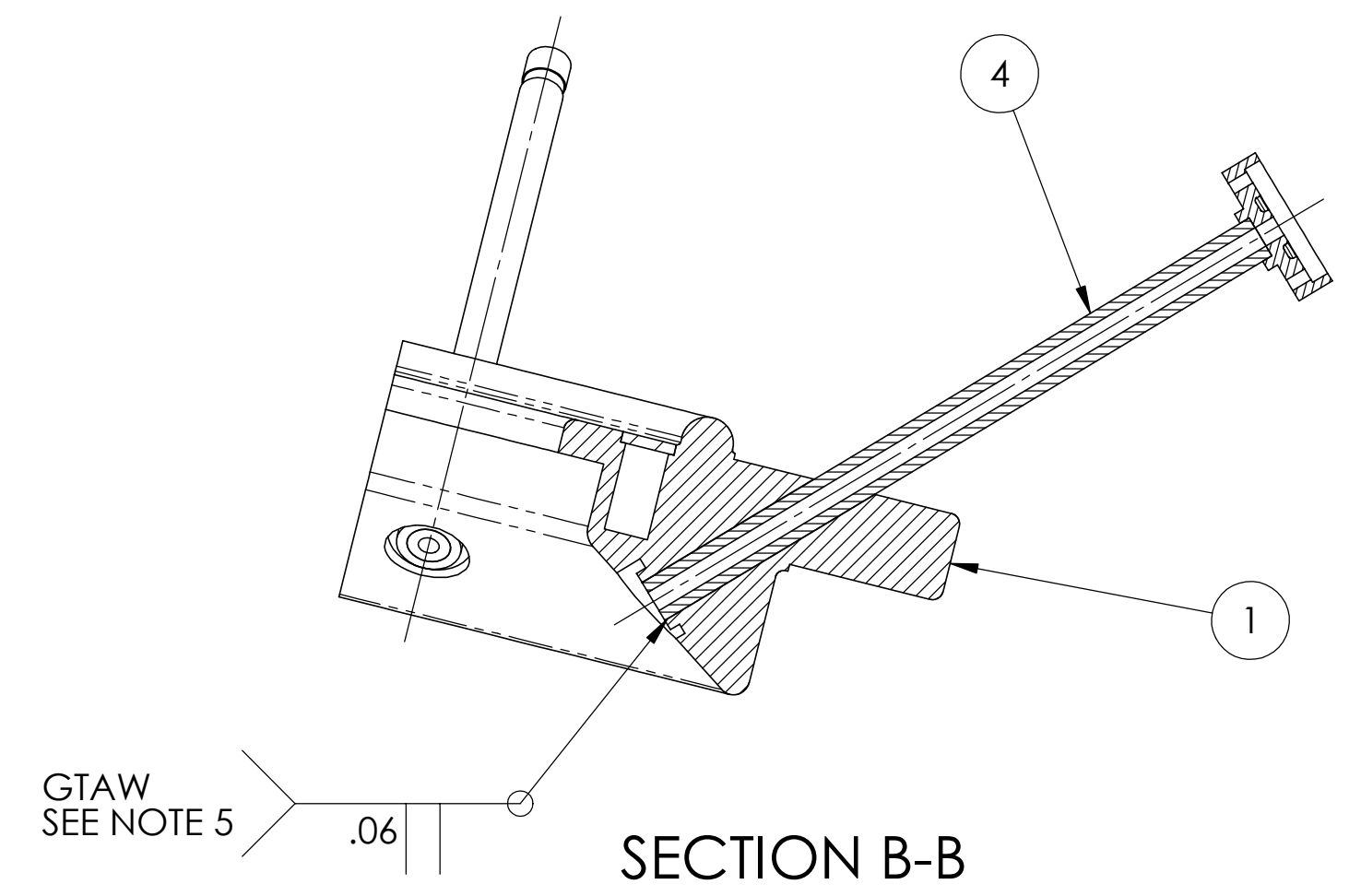
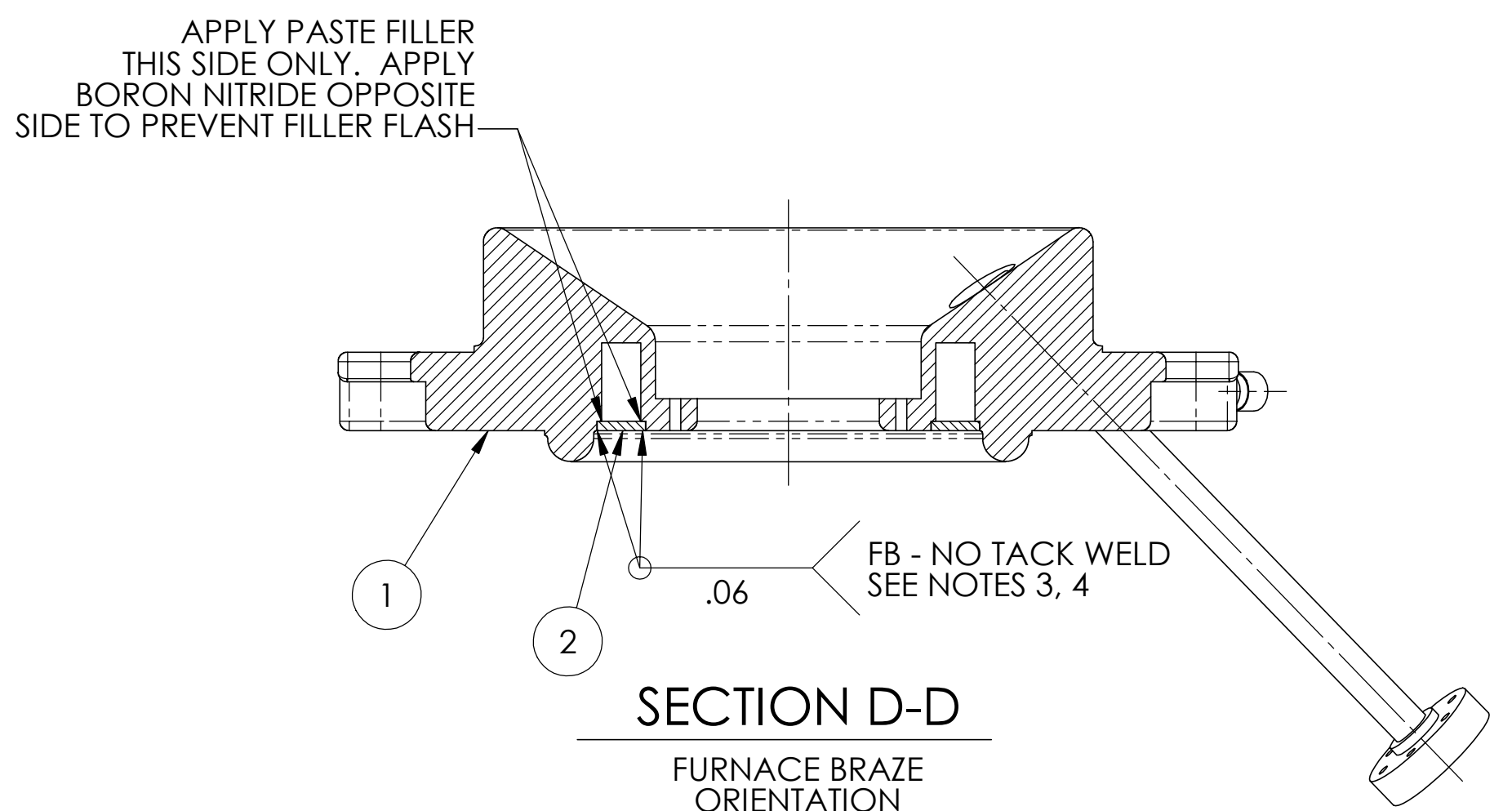
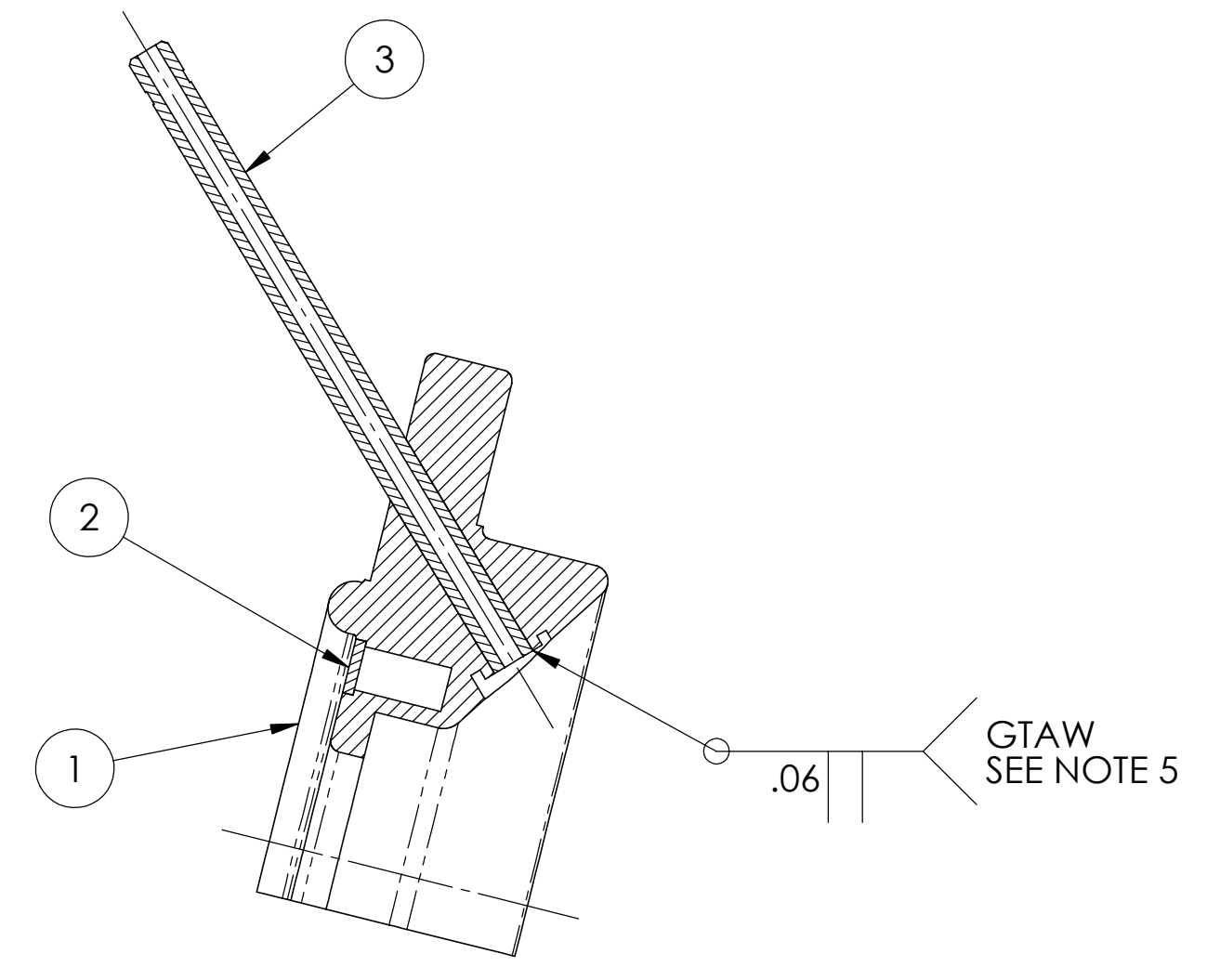
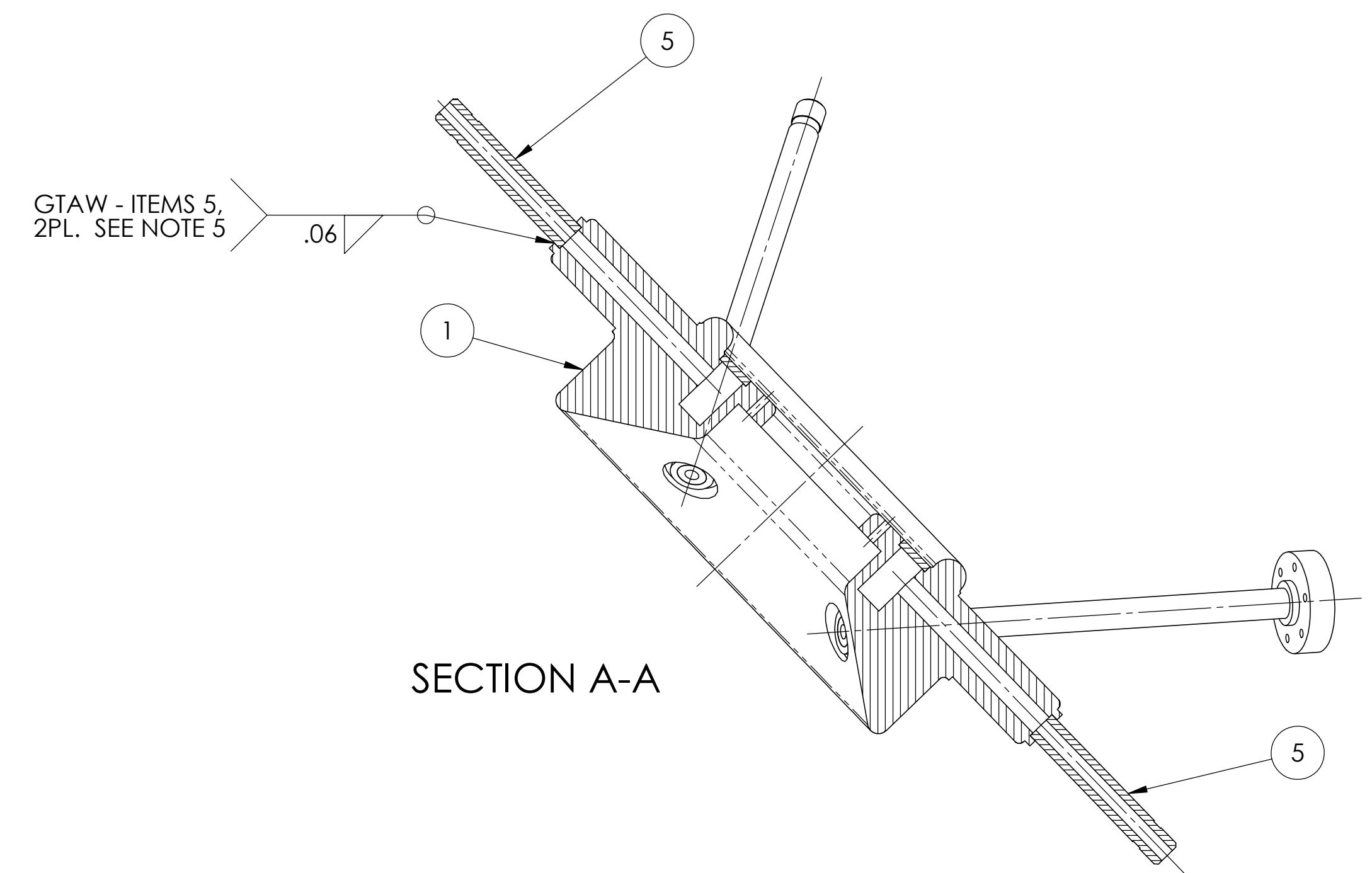
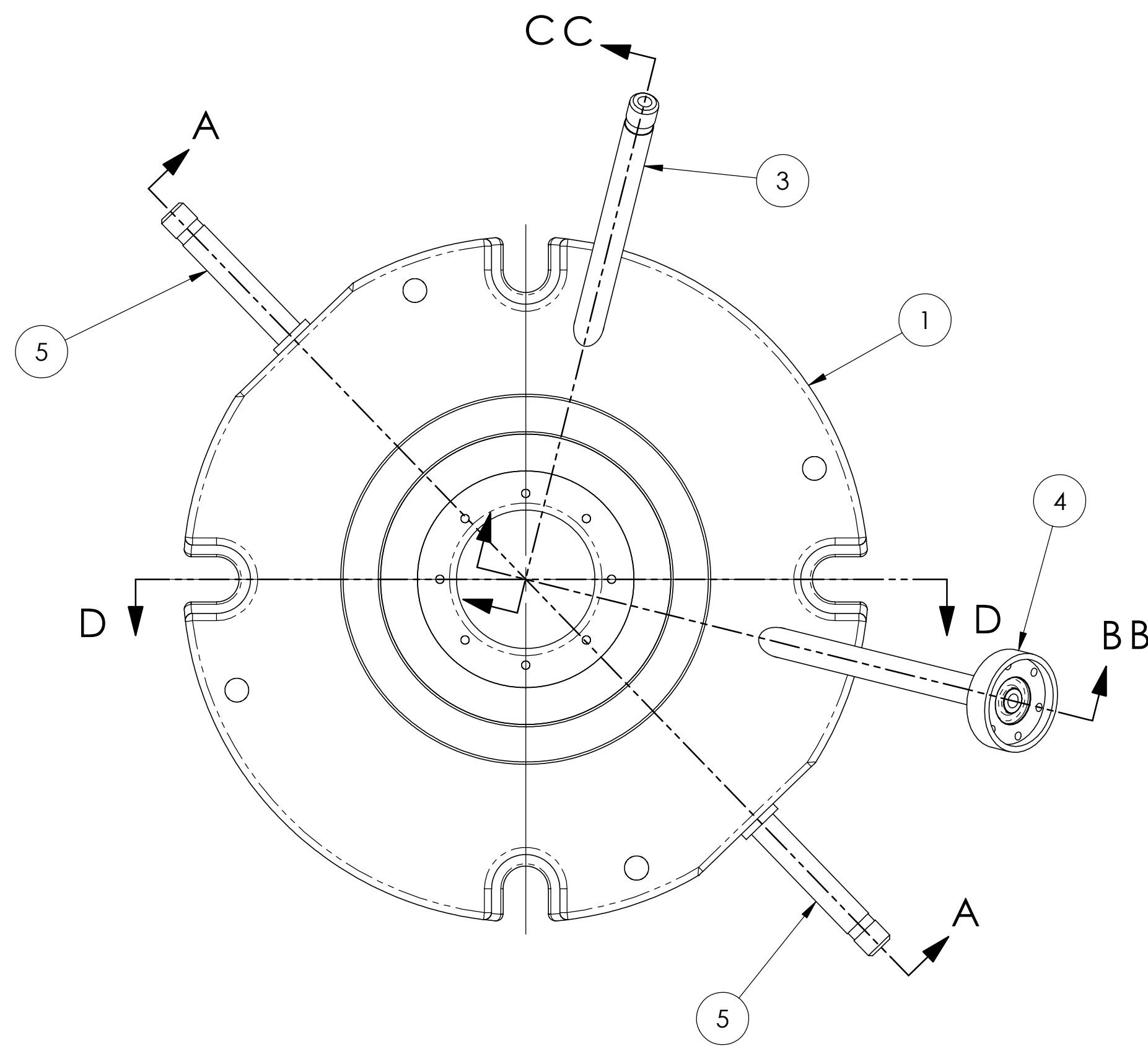
DETAIL B SCALE 4 : 1

A/R			VESPEL, SP1
REQD	ITEM	PART NO.	DESCRIPTION
PROJECT NAME:			ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:			
NEXT ASSEMBLY:			27A328
CALC. WT.		KG.	0.290 LB.
DO NOT SCALE PRINT			CATEGORY CODE:
SCALE:			1:1
THIRD ANGLE PROJECTION			
SHEET			INSULATOR, CATHODE / PLASMA CHAMBER
OF			1
SIZE:			C
DWG NO:			27A329
REV			A

UNLESS OTHERWISE SPECIFIED				
TOLERANCES	.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH			
	FRACTIONS: -/--			
	ANGLES: 0.1° / INCH			
	MACH. SURFS.: 125 MICRO-INCH ✓ OR BETTER			
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.				
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/14/03	INITIAL RELEASE

NOTES:

- 1) VACUUM TIGHT TO 10E-6 TORR.
- 2) CLEANING, WELDING AND VACUUM PROCEDURES PER LBNL ENGINEERING NOTE M8184.
- 3) BRAZE FILLER: NICKLE, SILVER OR COPPER BASED BRAZING ALLOY.
- 4) AFTER BRAZING, INSPECT JOINT VACUUM SIDE (ARROW SIDE) FOR SMOOTH PHYSICAL TRANSITION AND ABSENCE OF FILLER FLASH. POST-GRIND AS REQUIRED WITH DIE GRINDER TO ACHIEVE 32 MICRO-INCH FINISH BLEND OR BETTER.
- 5) WELD TUBES AFTER BRAZING TO MINIMIZE REQUIRED FURNACE VOLUME.



ITEM	QTY	PART NO.	DESCRIPTION
5	2	27A335	TUBE, WATER
4	1	27A360	WELDMENT, VIEW PORT
3	1	27A336	TUBE, GAS, CATHODE
2	1	27A332	COVER, WATER, CATHODE FLANGE
1	1	27A331	CATHODE FLANGE MACHINING

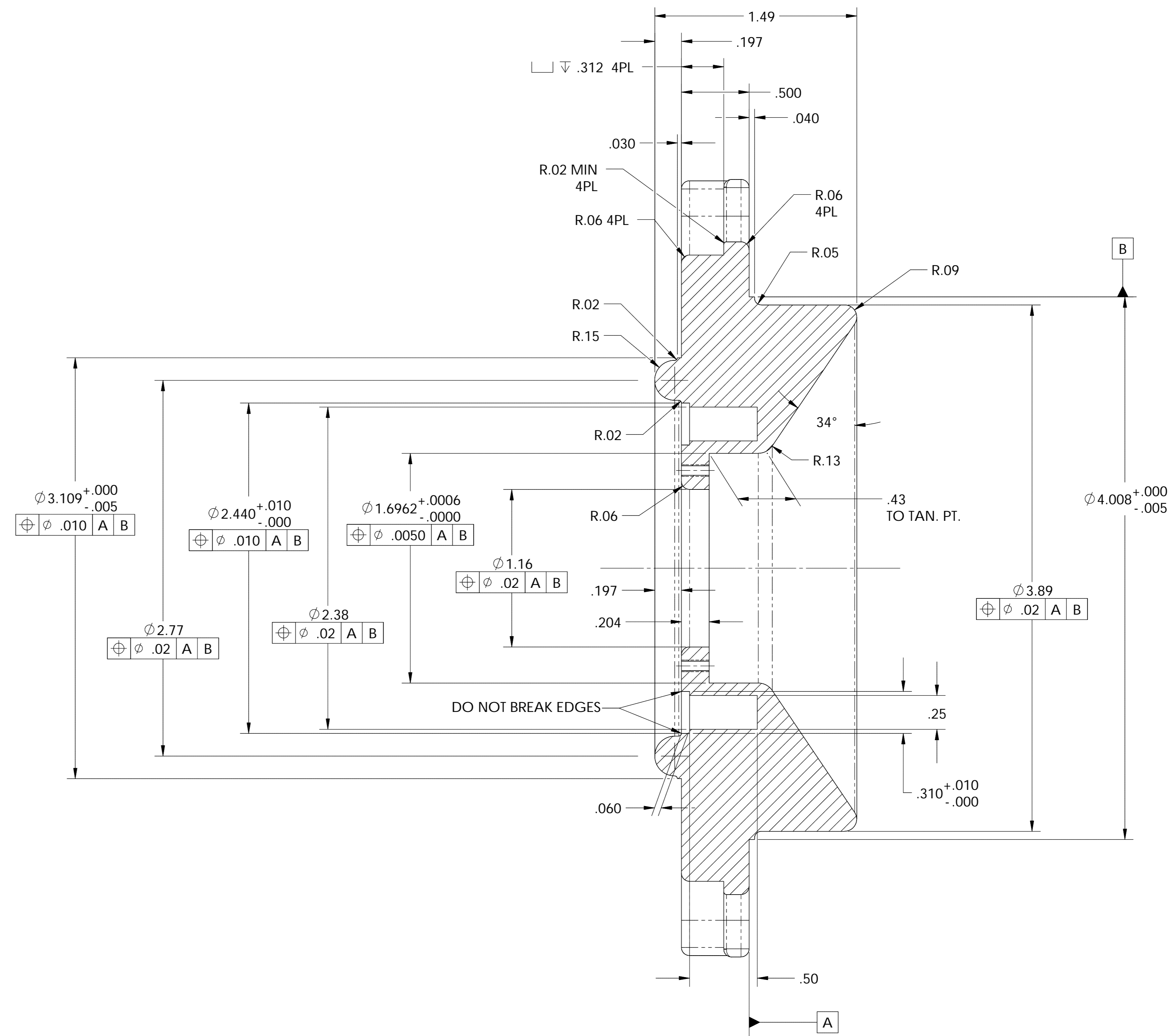
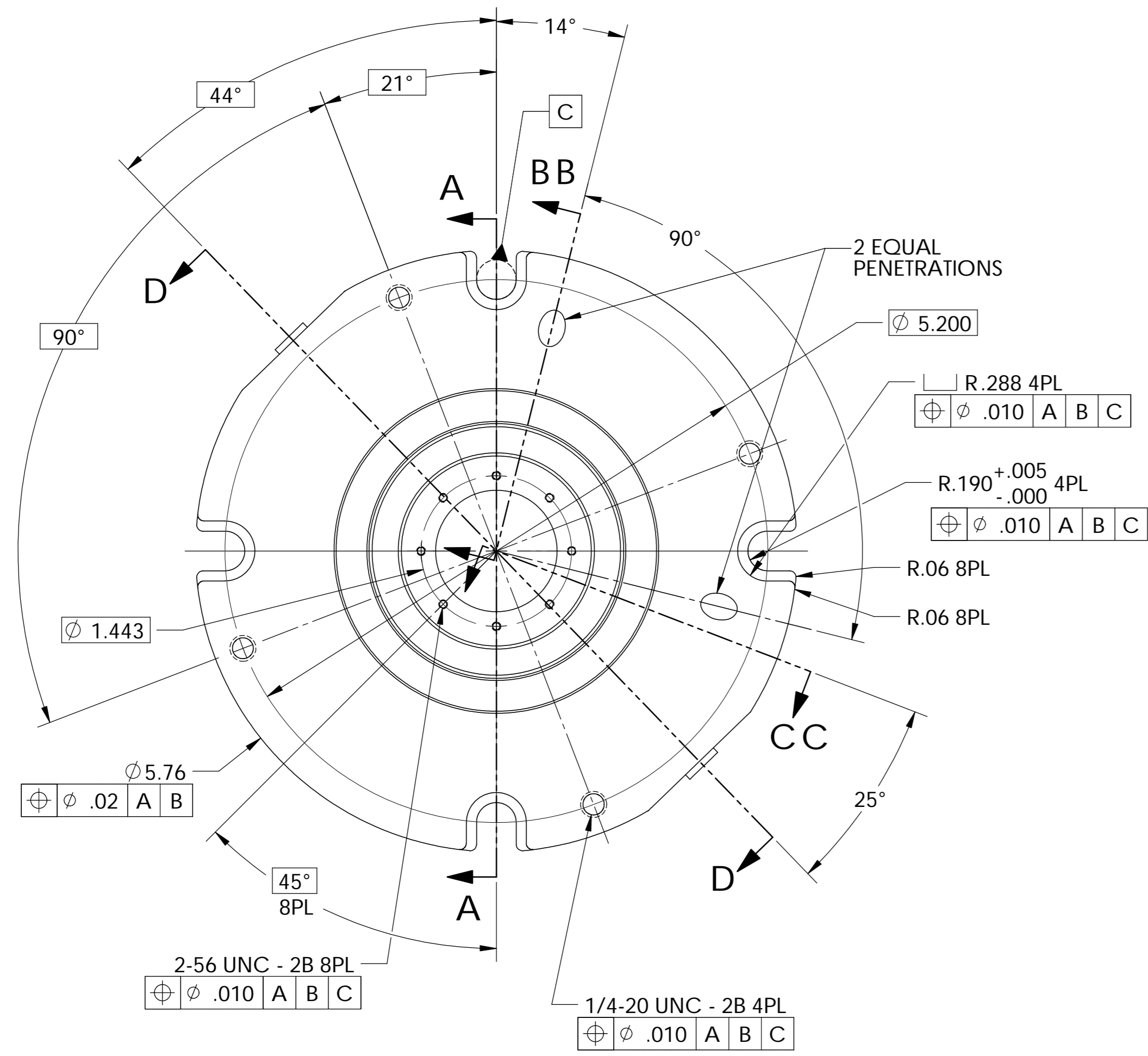
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	EBW DESIGN CHANGED TO BRAZE.
A	PAL	R. KELLER	12/01/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED		PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY	
FRACTIONS: -/-		PROJECT NUMBER:	UNIVERSITY OF CALIFORNIA	
ANGLES: 0.1° / INCH		NEXT ASSEMBLY:	27A328	
MACH. SURFS.: 125 MICRO-INCH ✓ FB BETTER		CALC. WT.	KG.	4.6 LB.
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES. 016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.		SCALE:	1:1	
		THIRD ANGLE PROJECTION		
		SHEET 1 OF 1 SIZE: D DWG NO: 27A330 REV B		

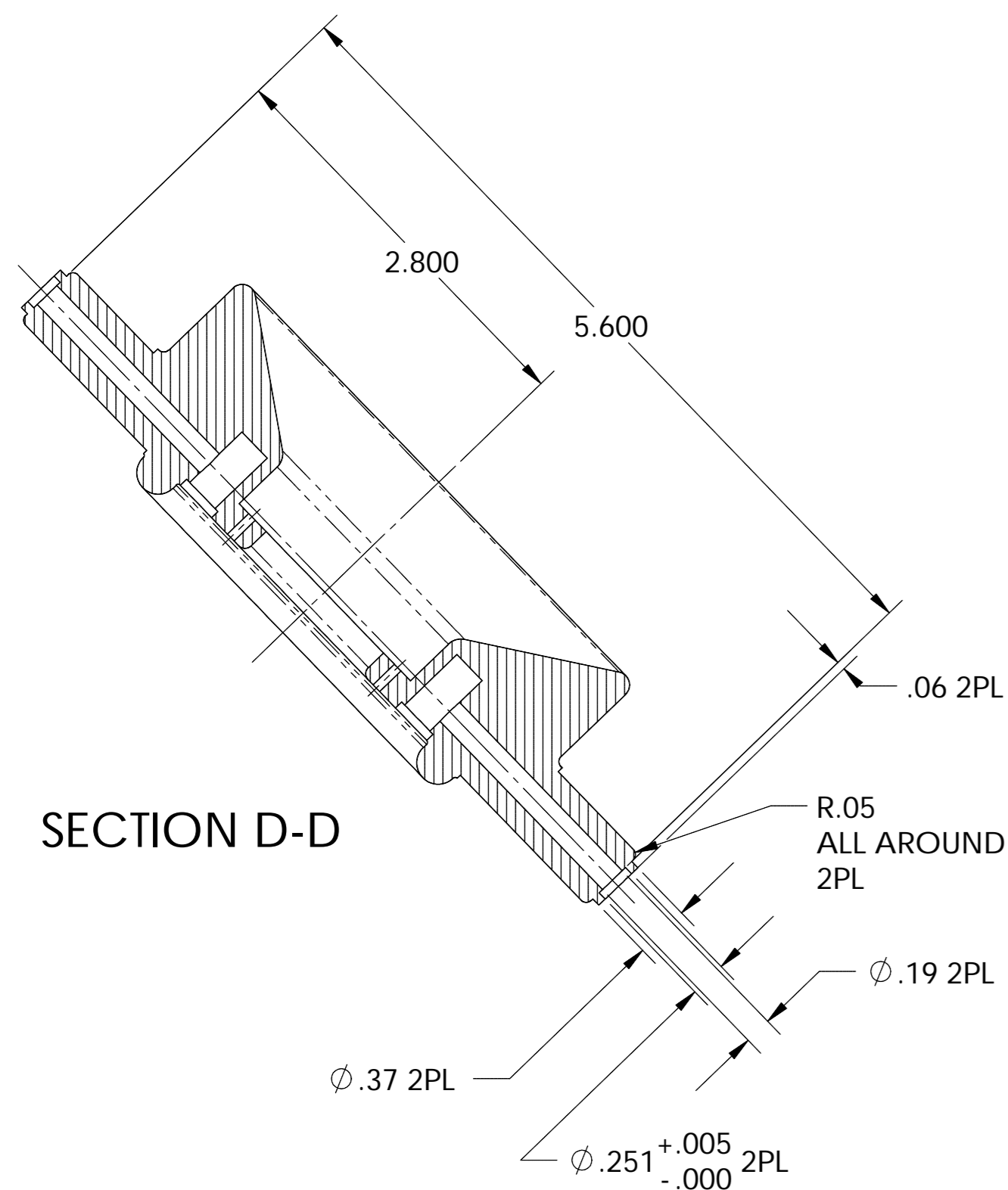
HYBRID ION SOURCE (HYBRIS)

WELDMENT, CATHODE FLANGE

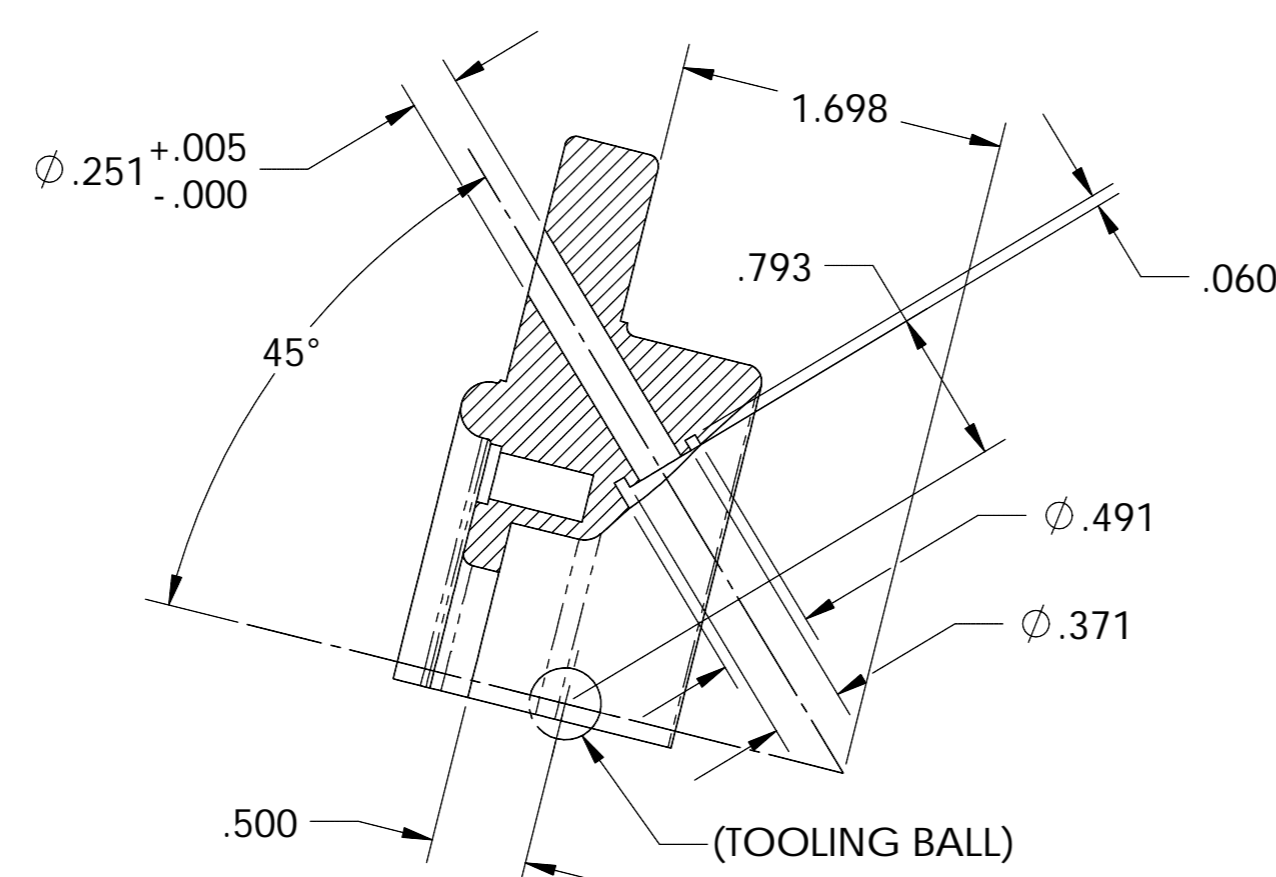




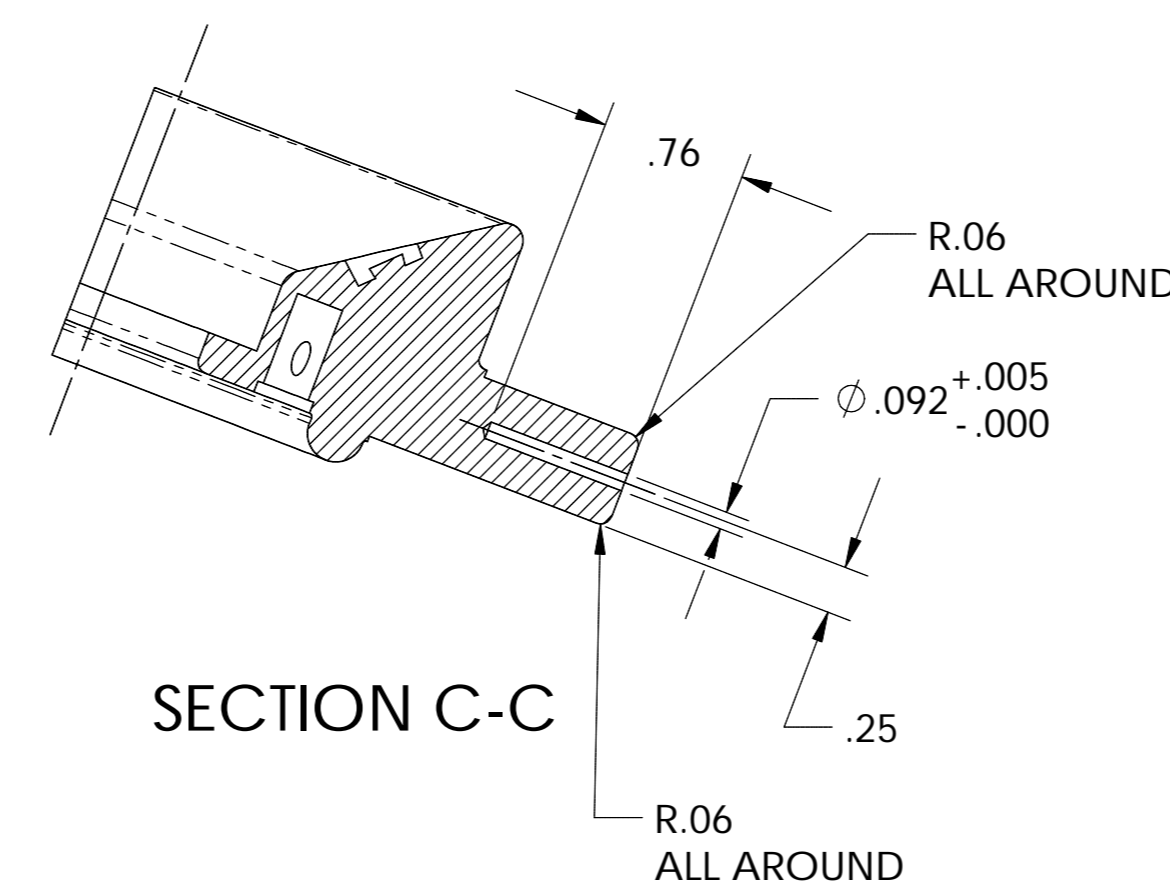
SECTION A-A
SCALE 2 : 1



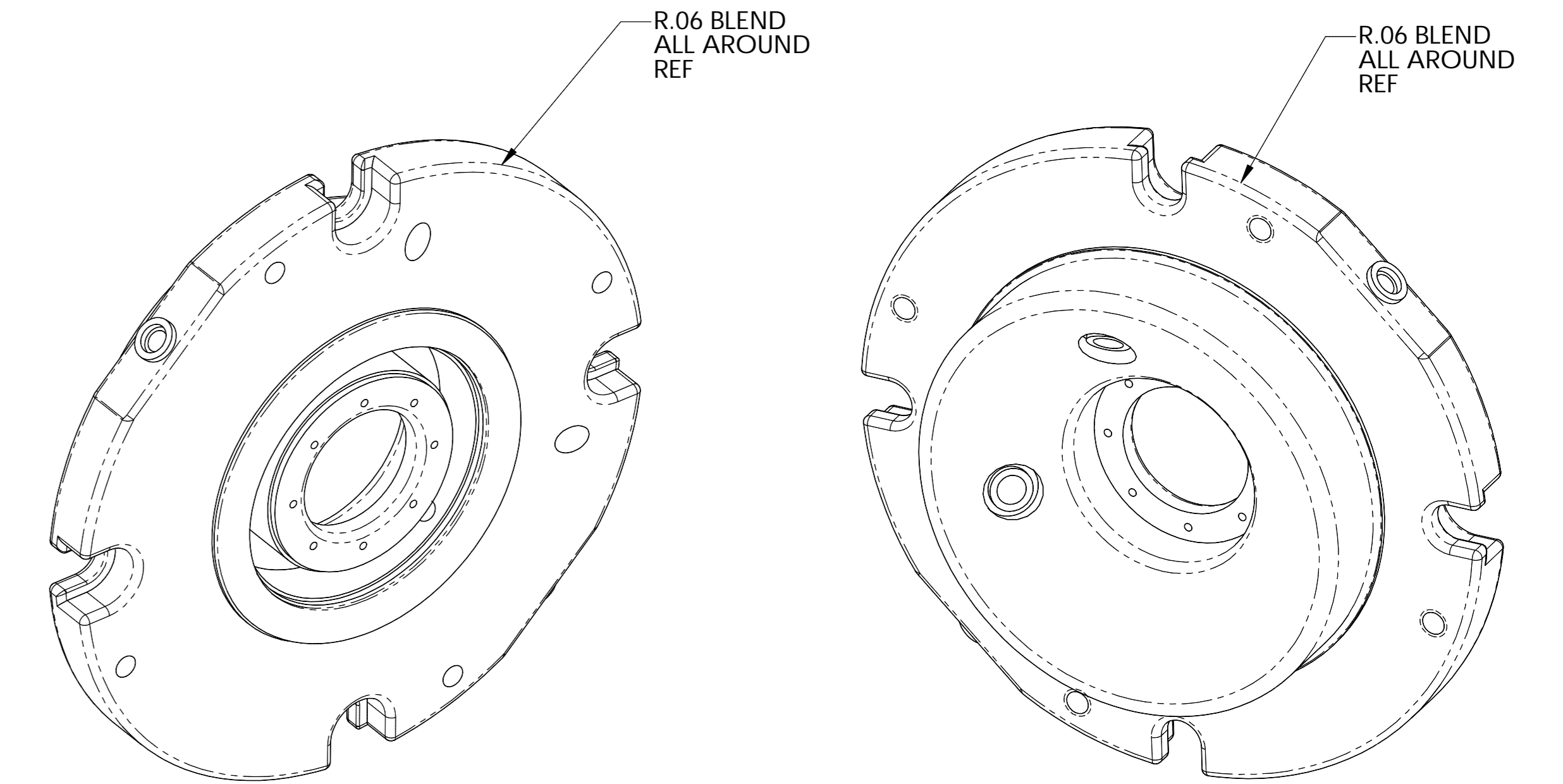
SECTION D-D



SECTION B-B
2 EQUAL PENETRATIONS
AT ANGULAR OFFSET
SHOWN



SECTION C-C



REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	EBW DESIGN CHANGED TO BRAZE. MATERIAL MODIFIED.
A	PAL	R. KELLER	11/18/03	INITIAL RELEASE

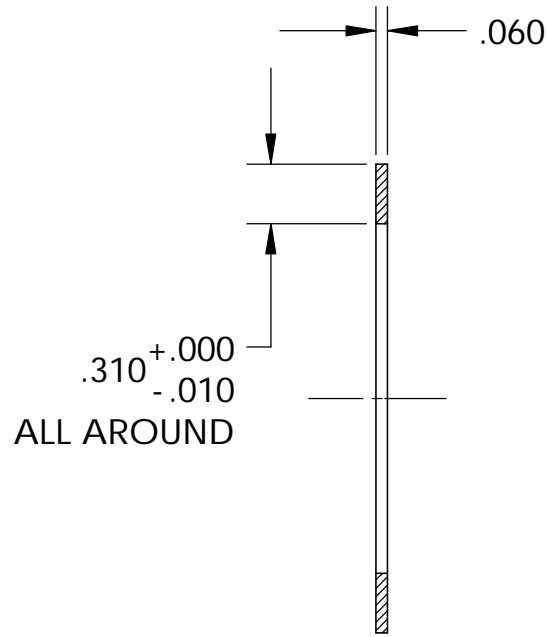
UNLESS OTHERWISE SPECIFIED
 X ± 1/16 INCH XX ± 01/32 INCH XXX ± 005/32 INCH
 FRACTIONS: -/ -
 ANGLES: 0.1° / INCH
 MACH. SURFS: 125 MICRO-INCH $\sqrt{R_a}$

DO NOT SCALE DRAWING.
 INTERPRET PER ASME Y14.5M-1994
 THREADS ARE CLASS 2
 BREAK MACHINED EDGES .018 MAX.
 REMOVE BURRS. WELD SPLATTER &
 LOOSE SCALE.

SCALE: 1:1
 THIRD ANGLE PROJECTION

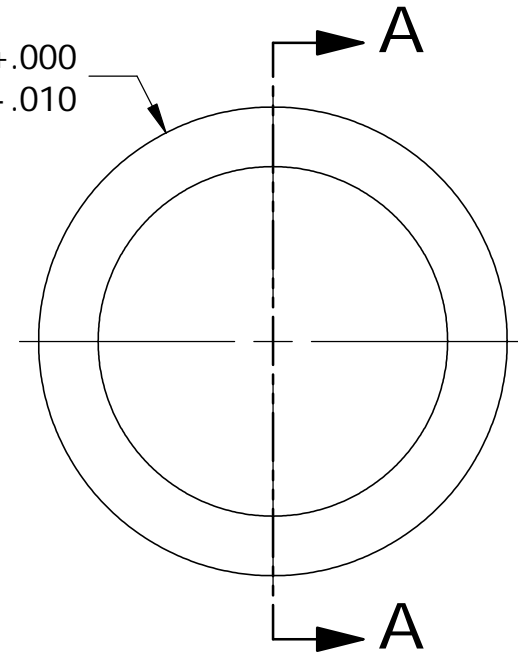
A/R				SST. 304L
REQD	ITEM	PART NO.	DESCRIPTION	
PROJECT NAME		27A330	ERNEST ORLANDO LAWRENCE	
PROJECT NUMBER		27A330	BERKELEY NATIONAL LABORATORY	
NEXT ASSY.			UNIVERSITY OF CALIFORNIA	
CALC. WT.		KG. 4.52 LB.	HYBRID ION SOURCE (HYBRIS)	
CATHODE FLANGE MACHINING				
1	SHEET OF 1	SIZE: E	DWG NO: 27A331	REV B

NOTES:
1) DO NOT BREAK EDGES.



SECTION A-A

$\phi 2.440^{+.000}_{-.010}$



A/R			SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:	
NEXT ASSY:	27A330
CALC. WT.	KG. 0.04 LB.



DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 1:1	
THIRD ANGLE PROJECTION	

HYBRID ION SOURCE (HYBRIS)			
WELDMENT, CATHODE FLANGE			
COVER, WATER, CATHODE FLANGE			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A332	REV B

REV	DWN.	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	ADDED NOTE 1. MATERIAL MODIFIED.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED =>		.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH	
TOLERANCES	FRACTIONS:	-/-	
	ANGLES:	0.1° / INCH	
	MACH. SURFS.	125 MICRO-INCH	<input checked="" type="checkbox"/> OR BETTER

DO NOT SCALE DRAWING.
INTERPRET PER ASME Y14.5M-1994.
THREADS ARE CLASS 2.
BREAK MACHINED EDGES .016 MAX.
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.

4

3

2

1

D

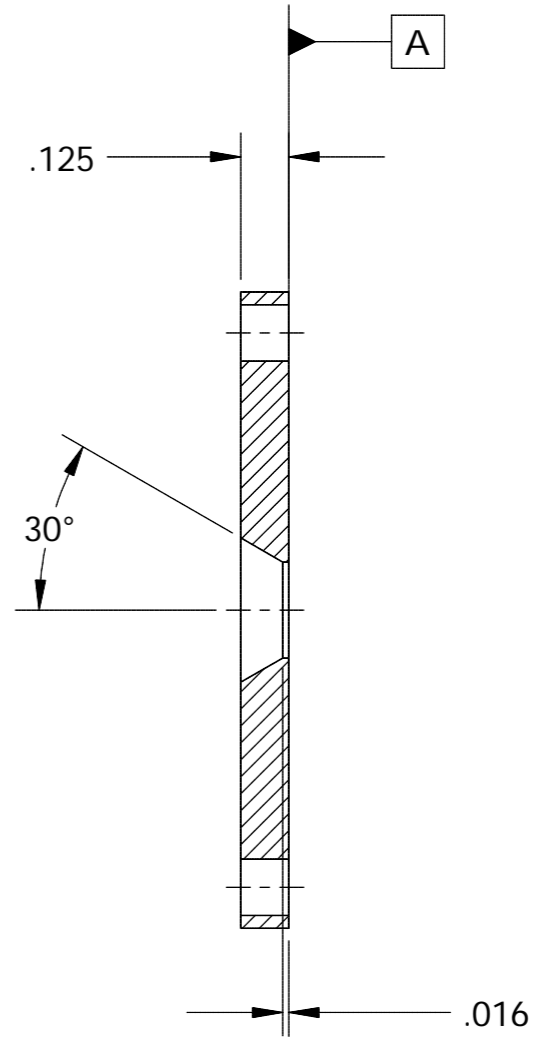
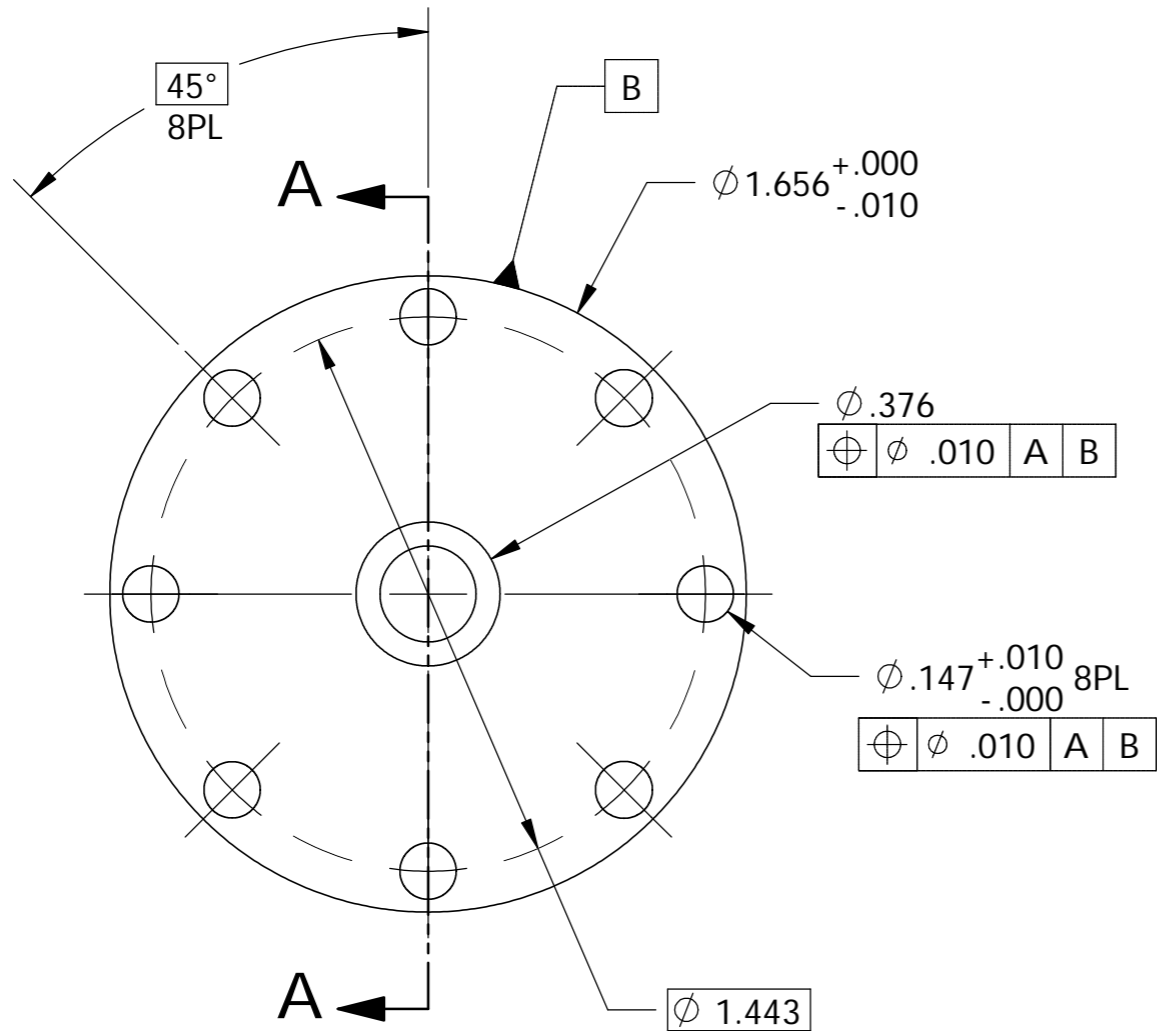
D

C

C

B

B



SECTION A-A

PRELIMINARY - NOT FOR FABRICATION

A/R			SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION
PROJECT NAME:		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY	
PROJECT NUMBER:		UNIVERSITY OF CALIFORNIA	
NEXT ASSY:		27S328	
CALC. WT.	KG.	0.07 LB.	
DO NOT SCALE PRINT		CATEGORY CODE:	
SCALE:	2:1		
THIRD ANGLE PROJECTION			
SHEET 1 OF 1		SIZE: B	DWG NO: 27A333
			REV B

UNLESS OTHERWISE SPECIFIED				
X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH				
FRACTIONS: -/--				
ANGLES: 0.1° / INCH				
MACH. SURFS.: 125 MICRO-INCH <input checked="" type="checkbox"/> OR BETTER				
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.				
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	MATERIAL MODIFIED.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE

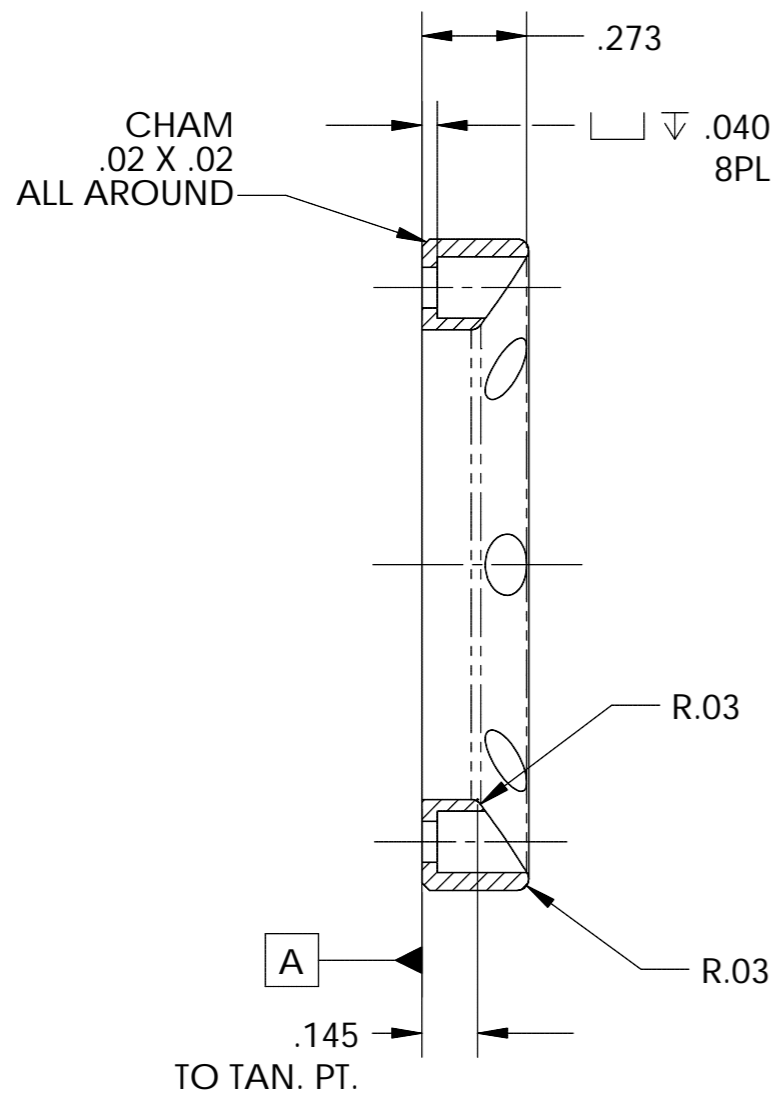
A

A

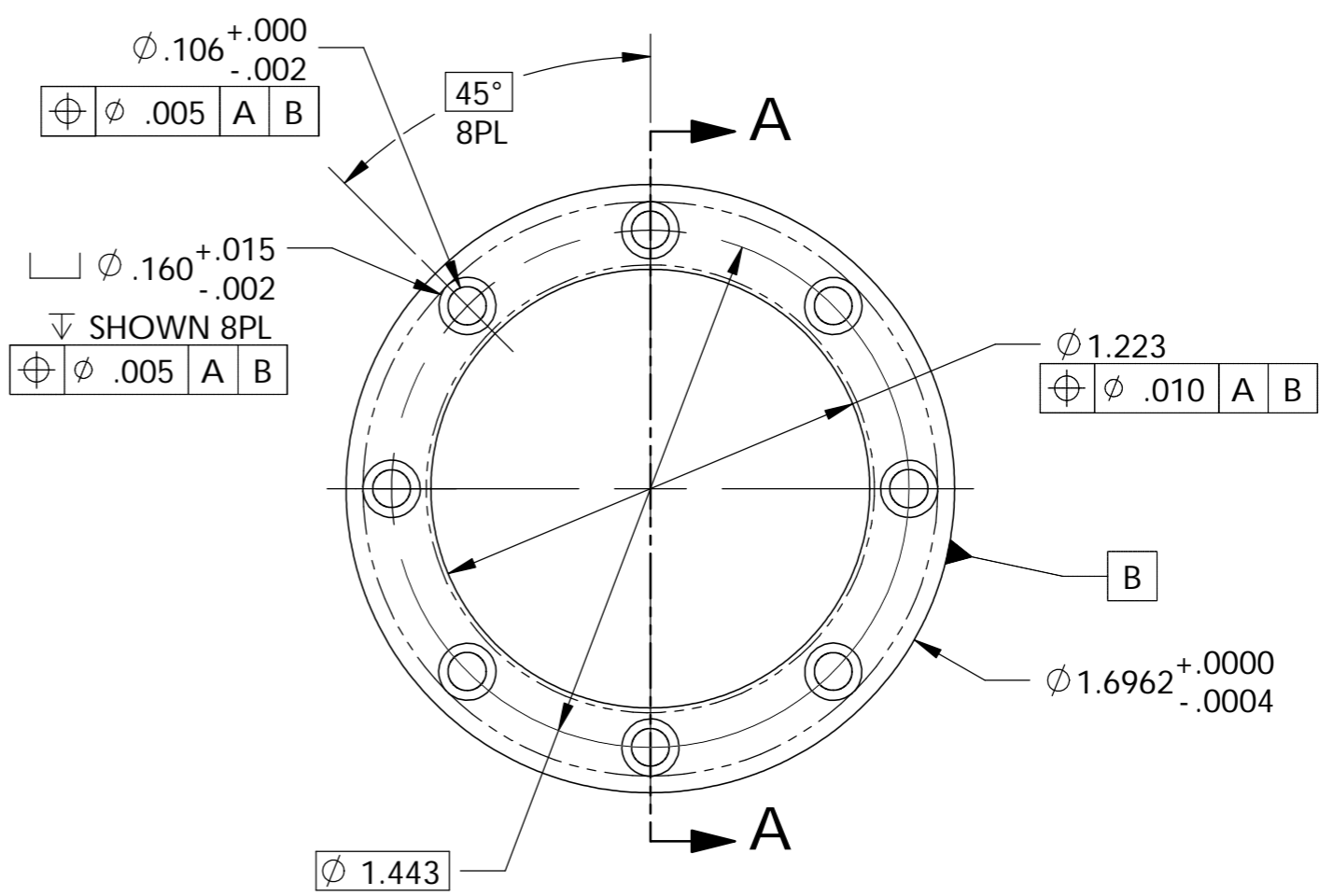
4

3

2



SECTION A-A

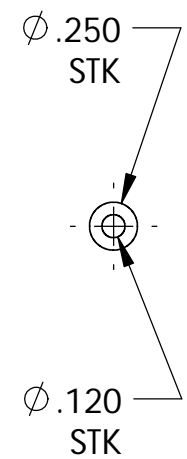
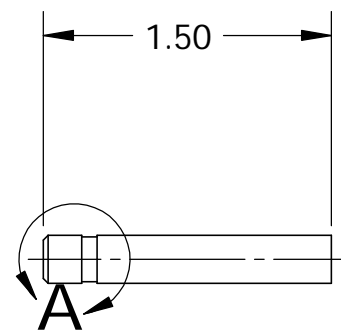
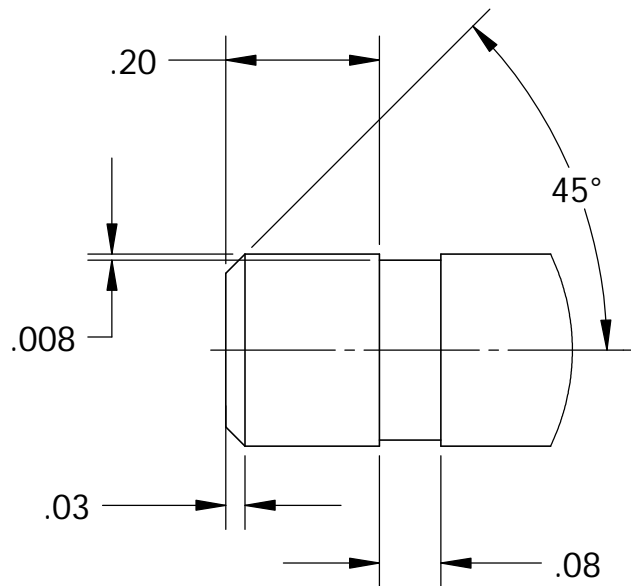


A/R			SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION

B	PAL	R. KELLER	12/15/03	MATERIAL MODIFIED.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED		PROJECT NAME:	ERNEST ORLANDO LAWRENCE	
X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH		PROJECT NUMBER:	BERKELEY NATIONAL LABORATORY	
FRACTIONS:	-/--	NEXT ASSY:	UNIVERSITY OF CALIFORNIA	
ANGLES:	0.1° / INCH	CALC. WT.	KG.	0.06 LB.
MACH. SURFS.:	125 MICRO-INCH ✓ OR BETTER	SCALE:	2:1	
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.		DO NOT SCALE PRINT	CATEGORY CODE:	
		THIRD ANGLE PROJECTION	SHEET 1 OF 1	

HYBRID ION SOURCE (HYBRIS)		CLAMPING RING, ELECTRODE, CATHODE	
SIZE:	B	DWG NO:	27A334
REV	B		

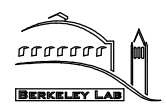



DETAIL A
SCALE 4 : 1

A/R			TUBE, 1/4" OD X .065 WALL, SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	
PROJECT NUMBER:	
NEXT ASSY:	27A330, 27A343
CALC. WT.	KG. 0.02 LB.

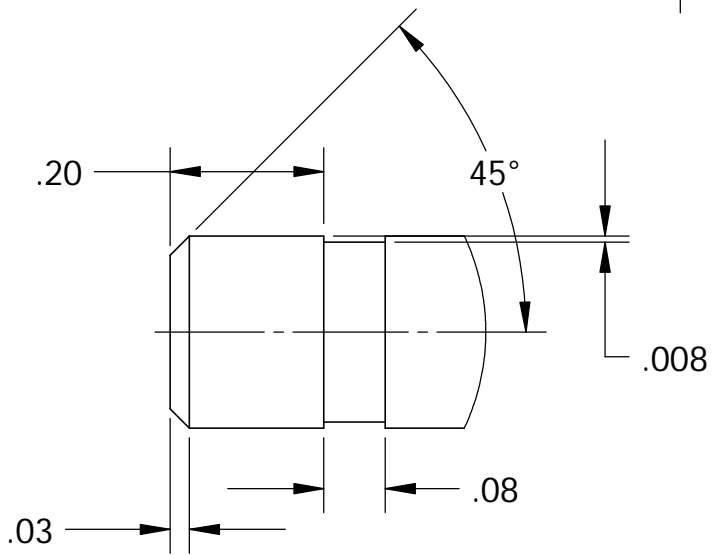
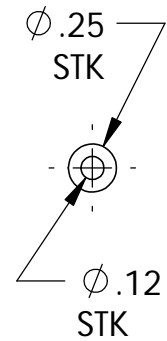
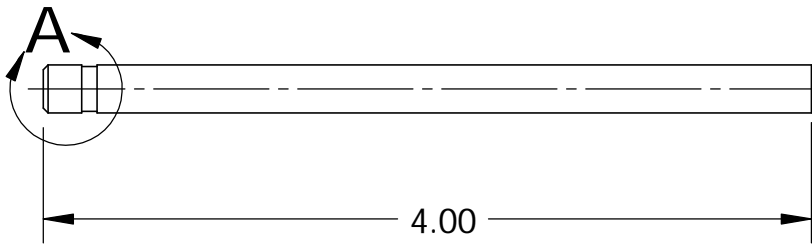
ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA



DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 1:1	
THIRD ANGLE PROJECTION	

HYBRID ION SOURCE (HYBRIS)			
COOLING, CATHODE & EXTRACTOR			
TUBE, WATER			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A335	REV B

UNLESS OTHERWISE SPECIFIED =>	TOLERANCES	.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH		
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.	FRACTIONS:	-/-		
	ANGLES:	0.1° / INCH		
	MACH. SURFS.	125 MICRO-INCH ✓ OR BETTER		
REV	DWN.	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	MATERIAL MODIFIED.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE



DETAIL A
SCALE 4 : 1

A/R			TUBE, 1/4" OD X .065" WALL. SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION

B	PAL	R. KELLER	12/15/03	MATERIAL MODIFIED.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE
REV	DWN.	APPVD.	DATE	DESCRIPTION

PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:	
NEXT ASSY:	27A330
CALC. WT.	KG. 0.04 LB.



UNLESS OTHERWISE SPECIFIED =>		.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH	
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.	TOLERANCES	FRACTIONS:	-/--
		ANGLES:	0.1° / INCH
		MACH. SURFS.	125 MICRO-INCH ✓ OR BETTER

DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 1:1	
THIRD ANGLE PROJECTION	

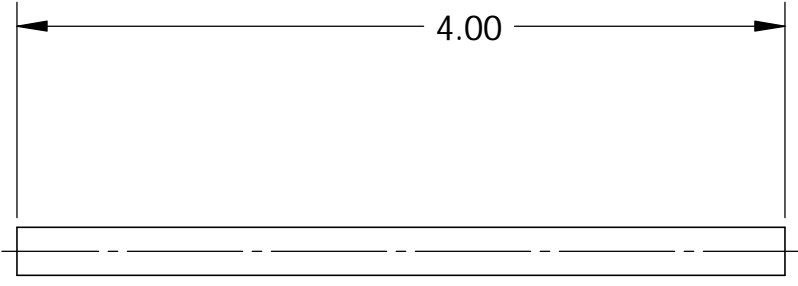
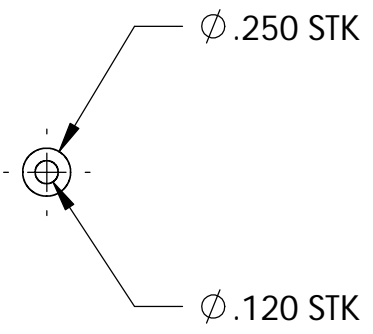
HYBRID ION SOURCE (HYBRIS)			
WELDMENT, CATHODE FLANGE			
TUBE, GAS, CATHODE			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A336	REV B

2

1

B

B



▶

◀

A

A

A/R			TUBE, 1/4" OD X .065" WALL, SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:	
NEXT ASSY:	27A330
CALC. WT.	KG. 0.04 LB.

UNLESS OTHERWISE SPECIFIED =>

DO NOT SCALE DRAWING.
INTERPRET PER ASME Y14.5M-1994.
THREADS ARE CLASS 2.
BREAK MACHINED EDGES .016 MAX.
REMOVE BURRS, WELD SPLATTER &
LOOSE SCALE.

TOOLERANCES
.X ± 1_INCH .XX ± 01_INCH .XXX ± 005_INCH

FRACTIONS: -/--

ANGLES: 0.1° / INCH

MACH. SURFS. 125 MICRO-INCH ✓ OR BETTER

DO NOT SCALE PRINT

SCALE: 1:1

THIRD ANGLE PROJECTION

CATEGORY CODE:

HYBRID ION SOURCE (HYBRIS)
WELDMENT, CATHODE FLANGE
TUBE, VIEW PORT, CATHODE

REV	DWN.	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	MODIFIED MATERIAL.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE

SHEET 1 OF 1

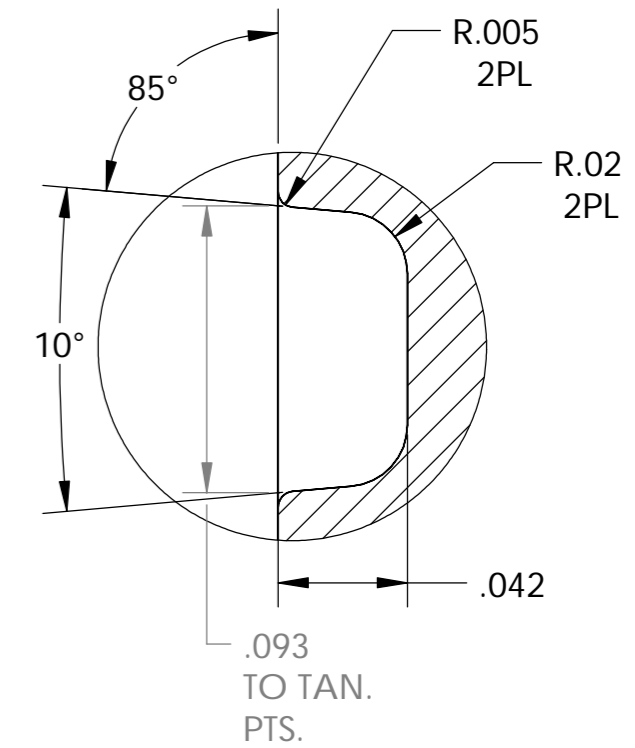
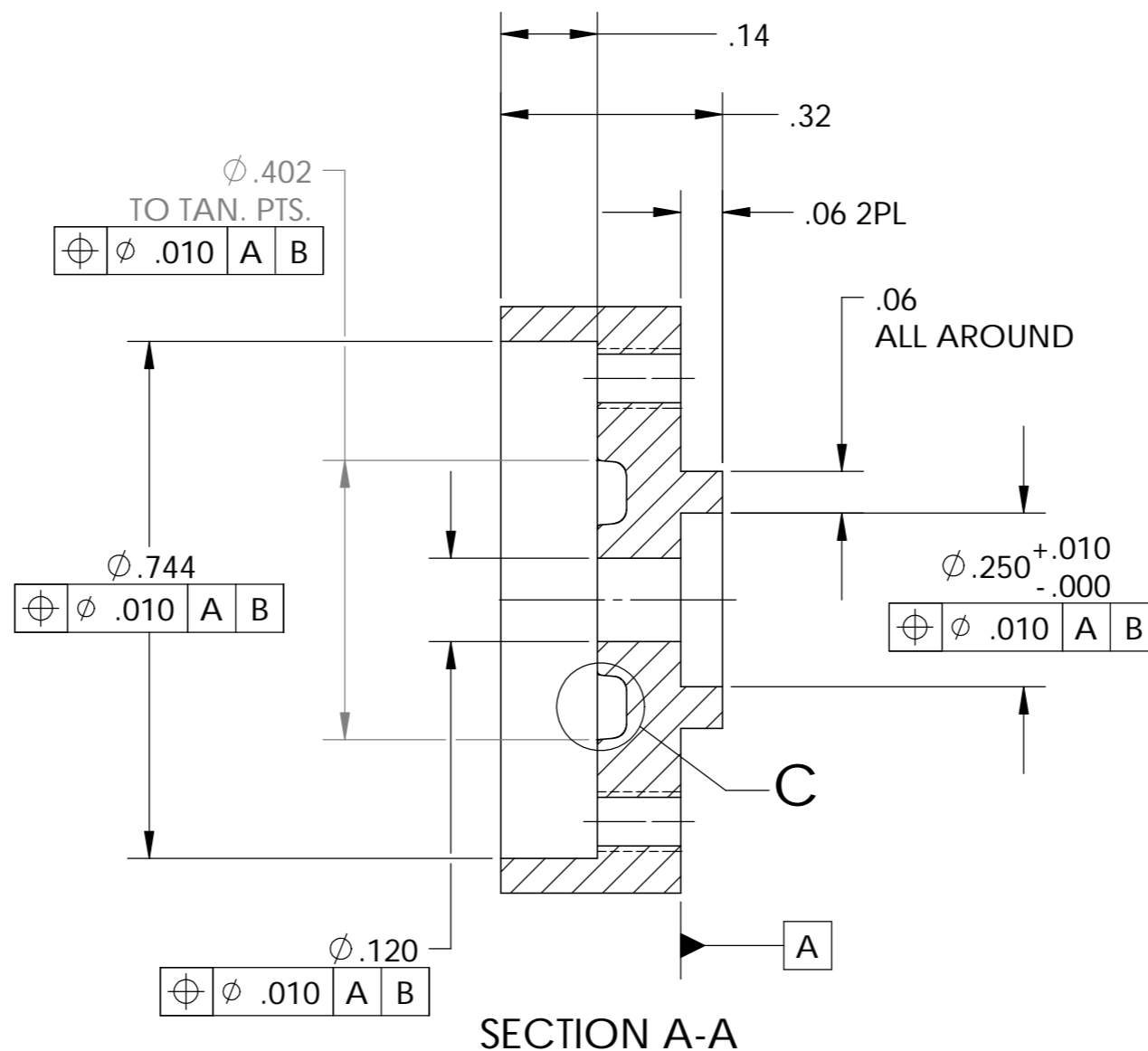
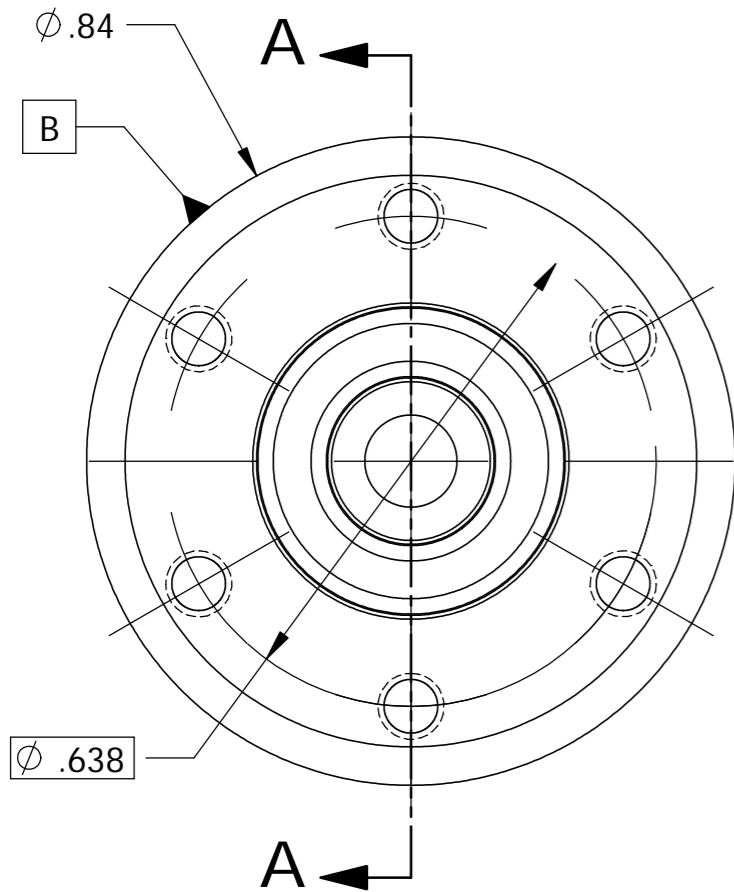
SIZE: A

DWG NO: 27A337

REV B

2

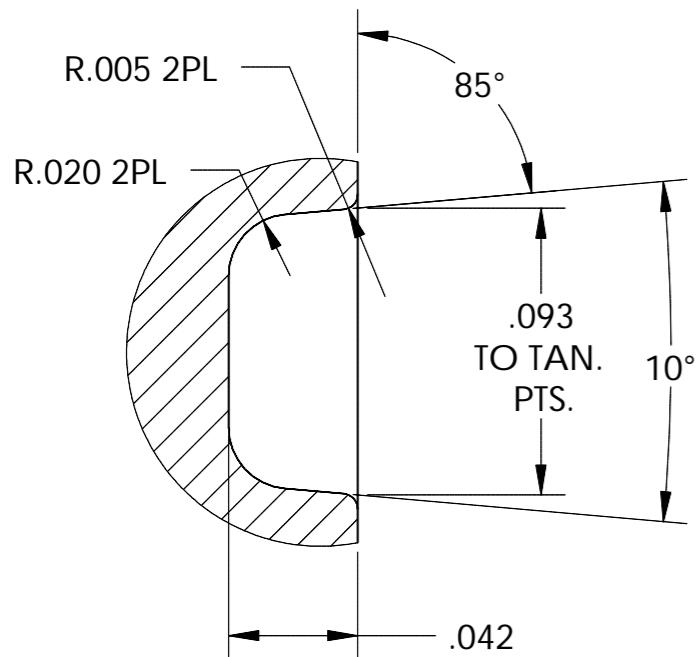
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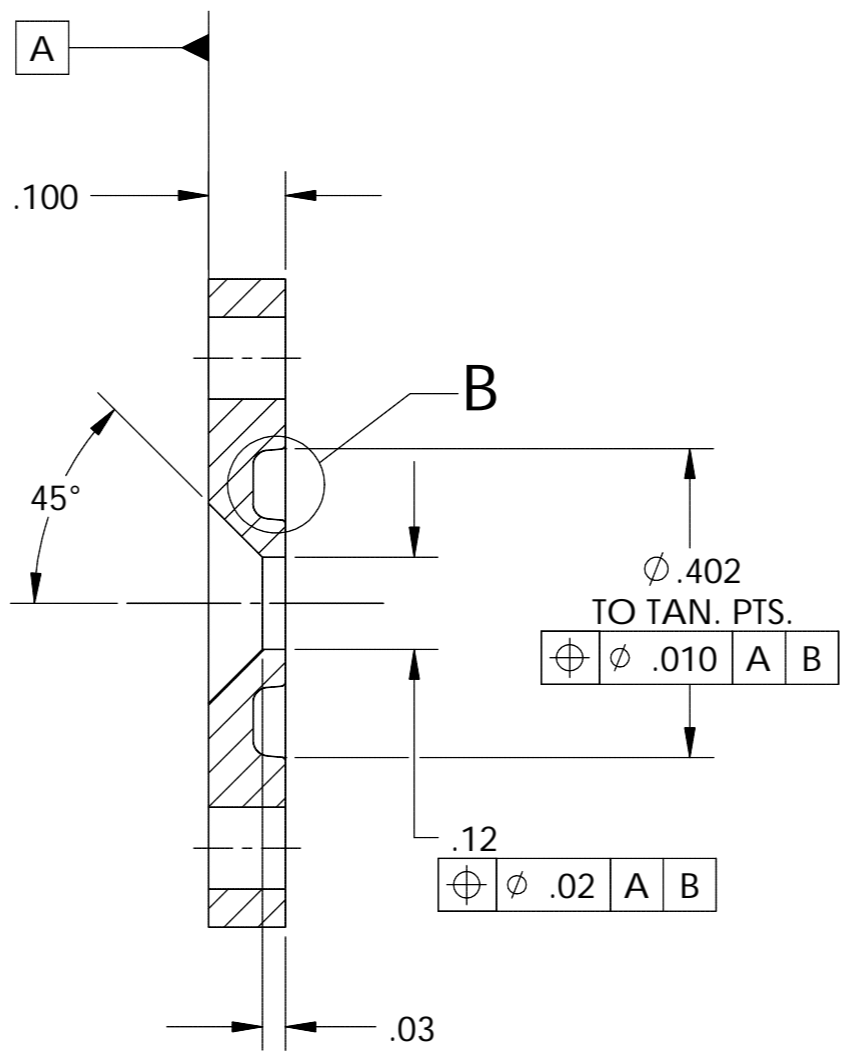
DETAIL C
SCALE 16 : 1

					UNLESS OTHERWISE SPECIFIED			PROJECT NAME:		ERNEST ORLANDO LAWRENCE		
					X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH			PROJECT NUMBER:		BERKELEY NATIONAL LABORATORY		
					FRACTIONS: -/--			NEXT ASSY: 27A328		UNIVERSITY OF CALIFORNIA		
					ANGLES: 0.1° / INCH			CALC. WT. KG. 0.02 LB.		HYBRID ION SOURCE (HYBRIS)		
					MACH. SURFS.: 125 MICRO-INCH ✓ OR BETTER			SCALE: 4:1		FLANGE, VIEW PORT, CATHODE		
					DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.			THIRD ANGLE PROJECTION		SHEET 1 OF 1		
								CATEGORY CODE:		SIZE: B DWG NO: 27A3338		
										REV C		
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION								
C	PAL	R. KELLER	01/22/04	C-BORE .14 DIM WAS .10, .32 DIM WAS .28								
B	PAL	R. KELLER	12/15/03	MODIFIED MATERIAL.								
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE								

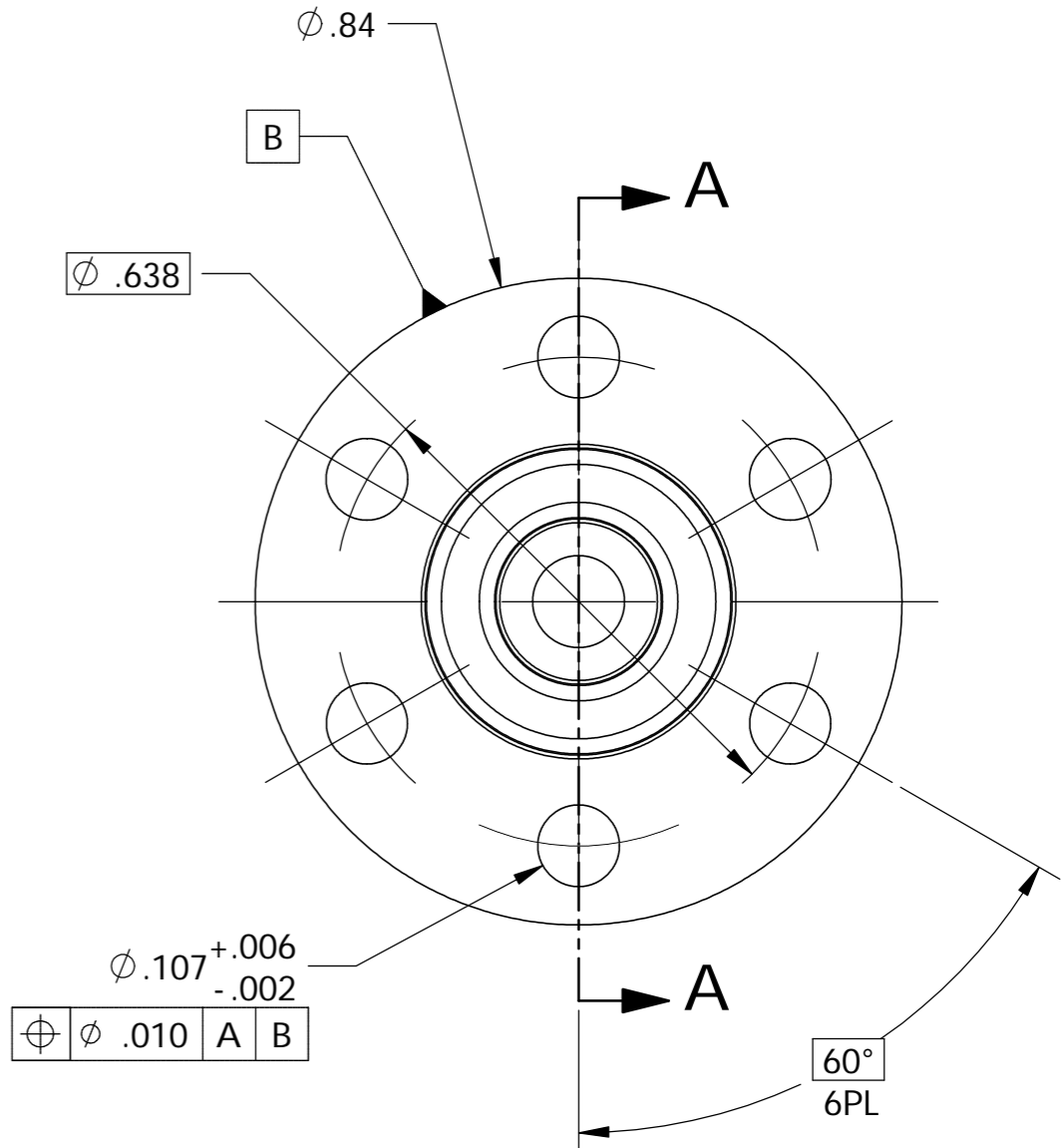
PRE-02



DETAIL B
SCALE 16 : 1



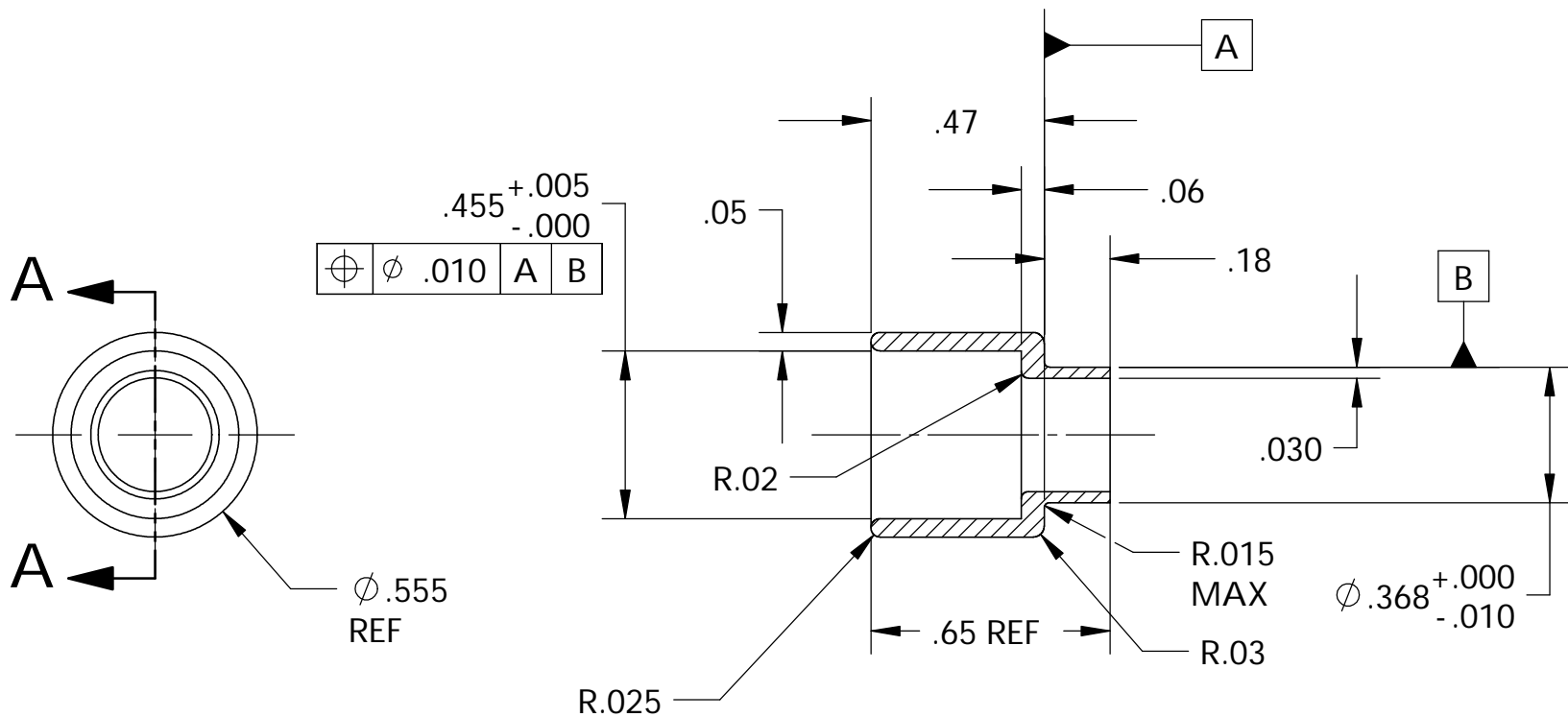
SECTION A-A



A/R		SST, 303/304
REQD	ITEM	PART NO. DESCRIPTION
PROJECT NAME:		ERNEST ORLANDO LAWRENCE
PROJECT NUMBER:		BERKELEY NATIONAL LABORATORY
NEXT ASSY:		UNIVERSITY OF CALIFORNIA
CALC. WT.	KG.	0.01 LB.
DO NOT SCALE PRINT		CATEGORY CODE:
SCALE:	4:1	
THIRD ANGLE PROJECTION		
SHEET 1 OF 1		COVER, VIEW PORT, CATHODE
SIZE:	B	DWG NO: 27A339
REV A		

UNLESS OTHERWISE SPECIFIED
 X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH
 FRACTIONS: -/--
 ANGLES: 0.1° / INCH
 MACH. SURFS.: 125 MICRO-INCH OR BETTER
 DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.

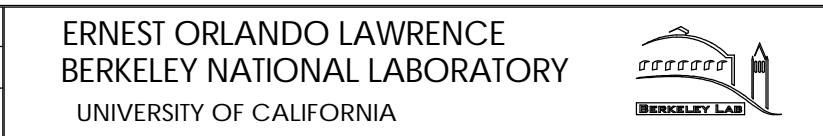
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE



SECTION A-A

A/R			VESPEL, SP1
REQD	ITEM	PART NO.	DESCRIPTION

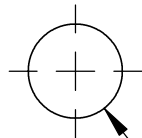
PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:	
NEXT ASSY:	27A320
CALC. WT.	KG. 0.002 LB.



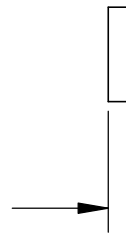
DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 2:1	
THIRD ANGLE PROJECTION	

HYBRID ION SOURCE (HYBRIS)			
BUSHING, CATHODE / PLASMA CHAMBER			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A340	REV A

UNLESS OTHERWISE SPECIFIED =>	.X ± 1_INCH .XX ± 01_INCH .XXX ± 005_INCH			
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.	TOLERANCES	FRACTIONS:	-/--	
		ANGLES:	0.1° / INCH	
		MACH. SURFS.	125 MICRO-INCH <input checked="" type="checkbox"/> OR BETTER	
REV	DWN.	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/20/03	INITIAL RELEASE



Ø 12.50 mm
STK



3mm STK

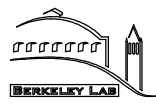
VENDOR ITEM DRAWING

A/R			GLASS, BK7, FINE, ANNEALED, EDMUND P/N NT45-658 OR EQL
REQD	ITEM	PART NO.	DESCRIPTION

B	PAL	R. KELLER	01/22/04	P/N NT45-658 WAS NT45-630. 3mm STK THICKNESS WAS 2mm
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE
REV	DWN.	APPVD.	DATE	DESCRIPTION

PROJECT NAME:	ERNEST ORLANDO LAWRENCE
PROJECT NUMBER:	BERKELEY NATIONAL LABORATORY
NEXT ASSY:	27A331
CALC. WT.	0.00063 KG. LB.

UNIVERSITY OF CALIFORNIA



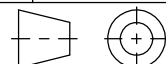
HYBRID ION SOURCE (HYBRIS)

UNLESS OTHERWISE SPECIFIED =>		.X ± .1_INCH .XX ± .01_INCH .XXX ± .005_INCH
TOLERANCES	FRACTIONS:	-/--
	ANGLES:	0.1° / INCH
	MACH. SURFS.	125 MICRO-INCH ✓ OR BETTER

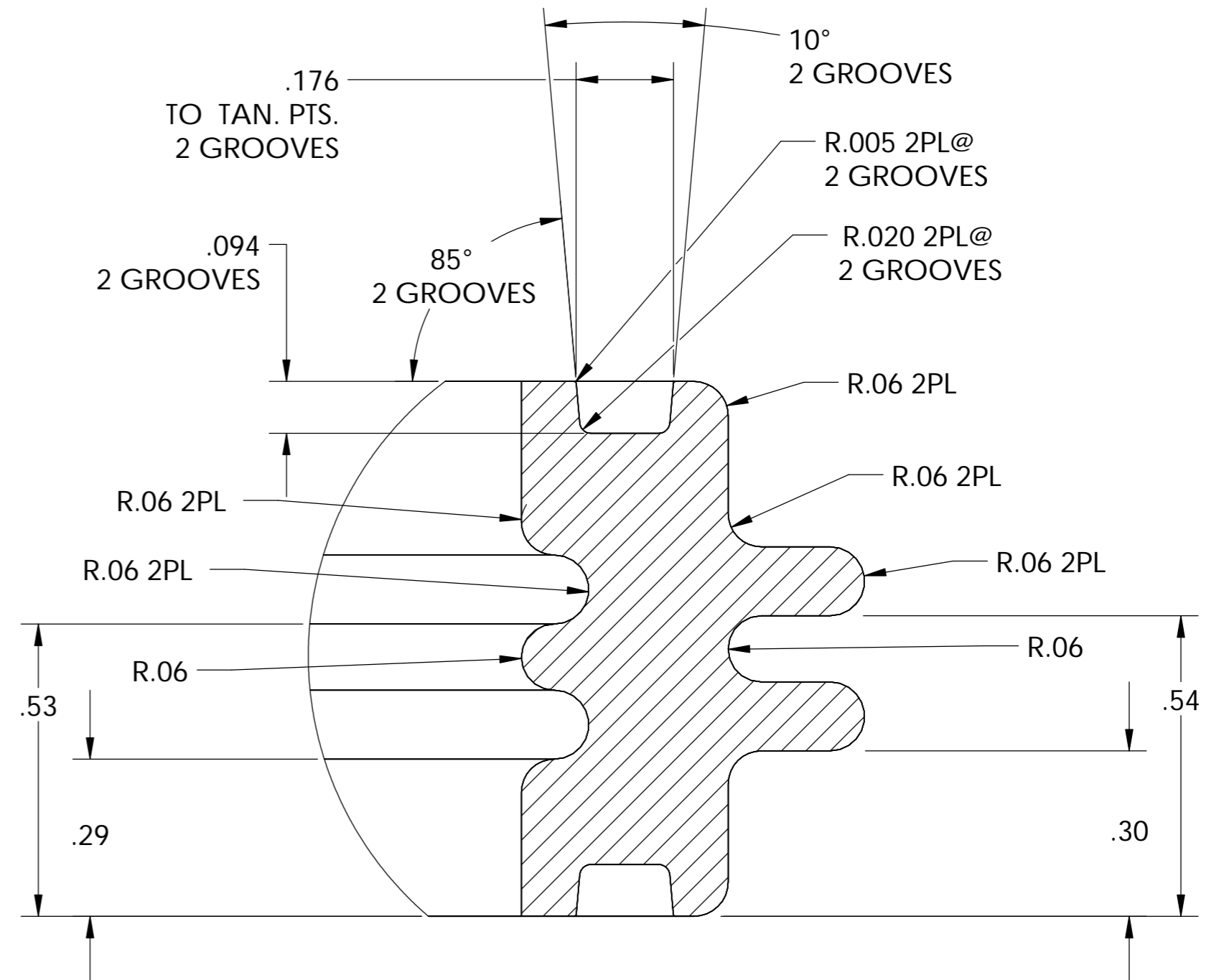
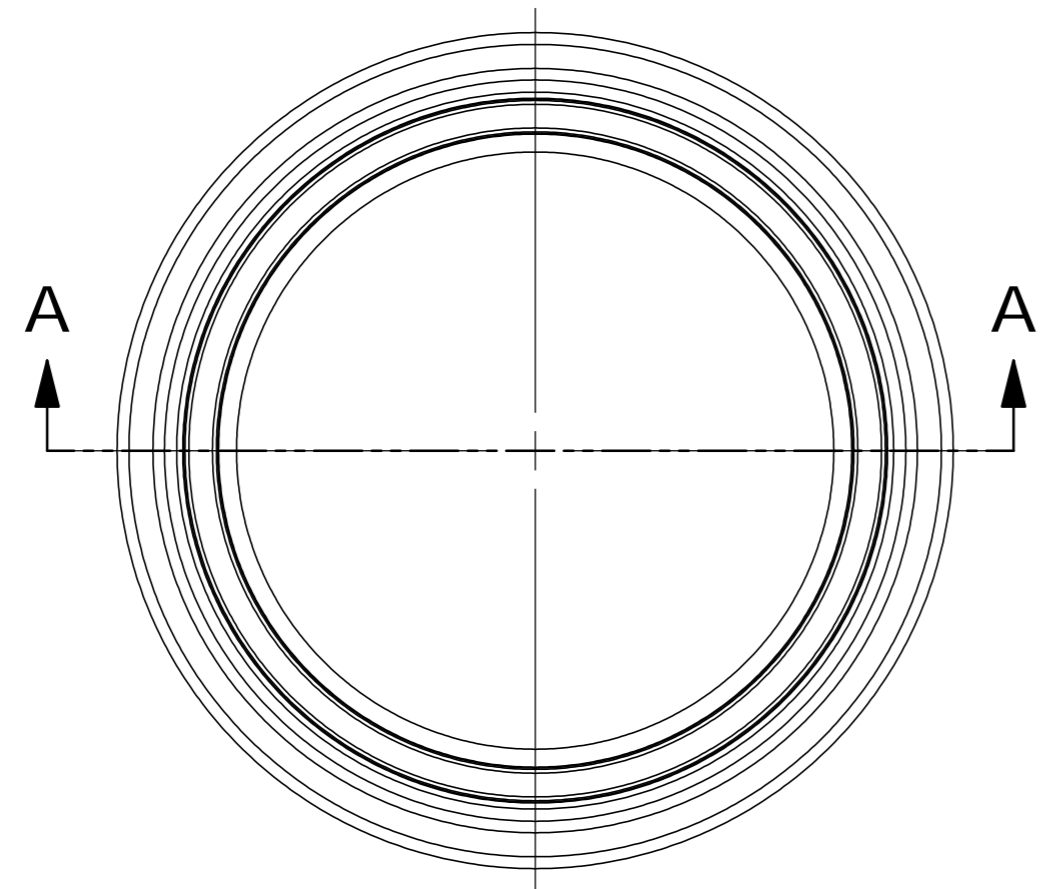
DO NOT SCALE PRINT

SCALE: 1:1

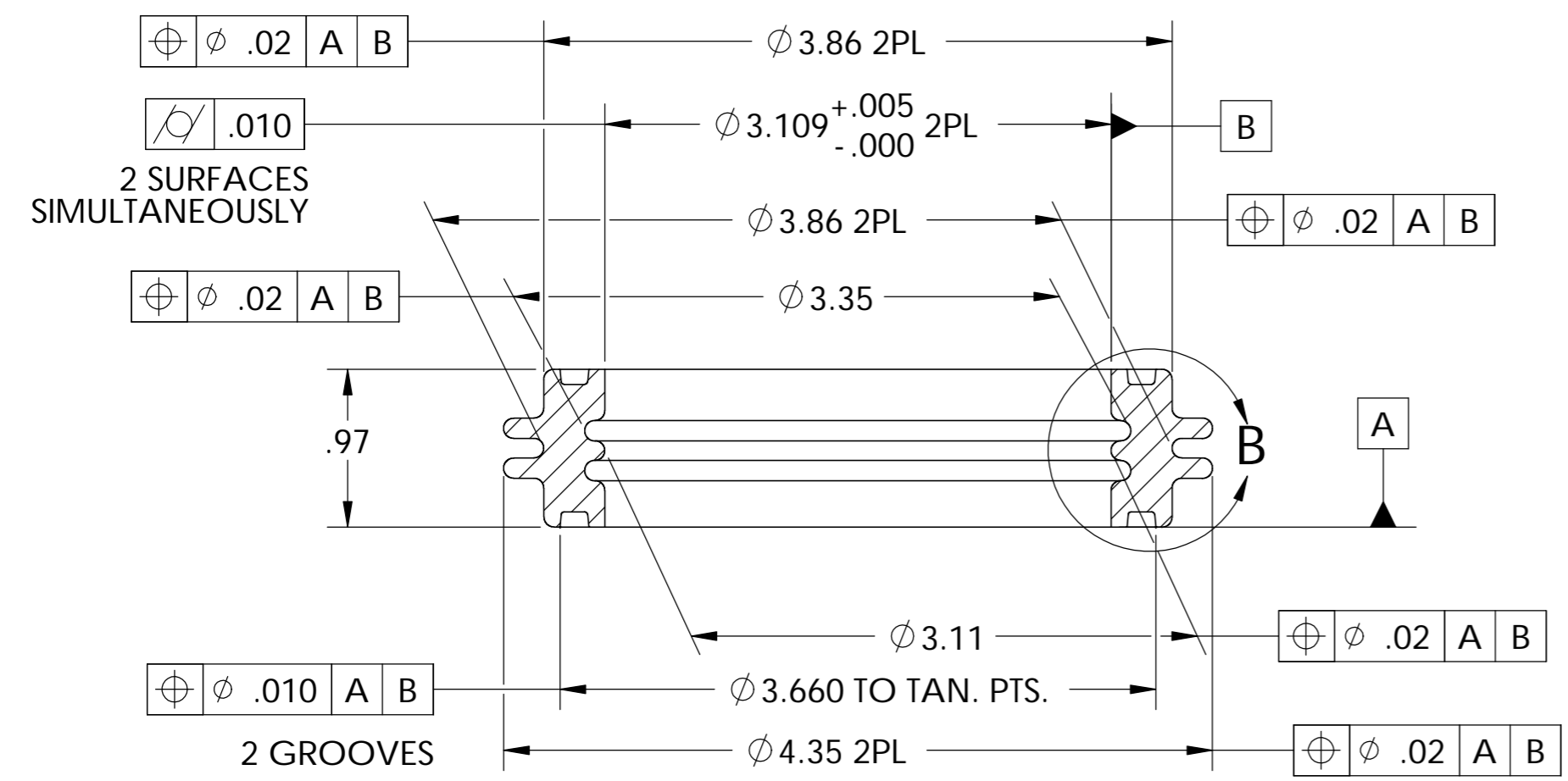
THIRD ANGLE PROJECTION



GLASS, VIEW PORT			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A341	REV B



DETAIL B
SCALE 4 : 1



SECTION A-A

A/R			VESPEL, SP1
REQD	ITEM	PART NO.	DESCRIPTION

REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/14/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED	
TOLERANCES	.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH
FRACTIONS:	-/--
ANGLES:	0.1° / INCH
MACH. SURFS.:	125 MICRO-INCH / OR BETTER
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.	
SCALE:	1:1
THIRD ANGLE PROJECTION	

PROJECT NAME: ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA

PROJECT NUMBER: 27A328

HYBRID ION SOURCE (HYBRIS)

INSULATOR, EXTRACTOR / CATHODE

CALC. WT. KG. 0.213 LB.

SCALE: 1:1

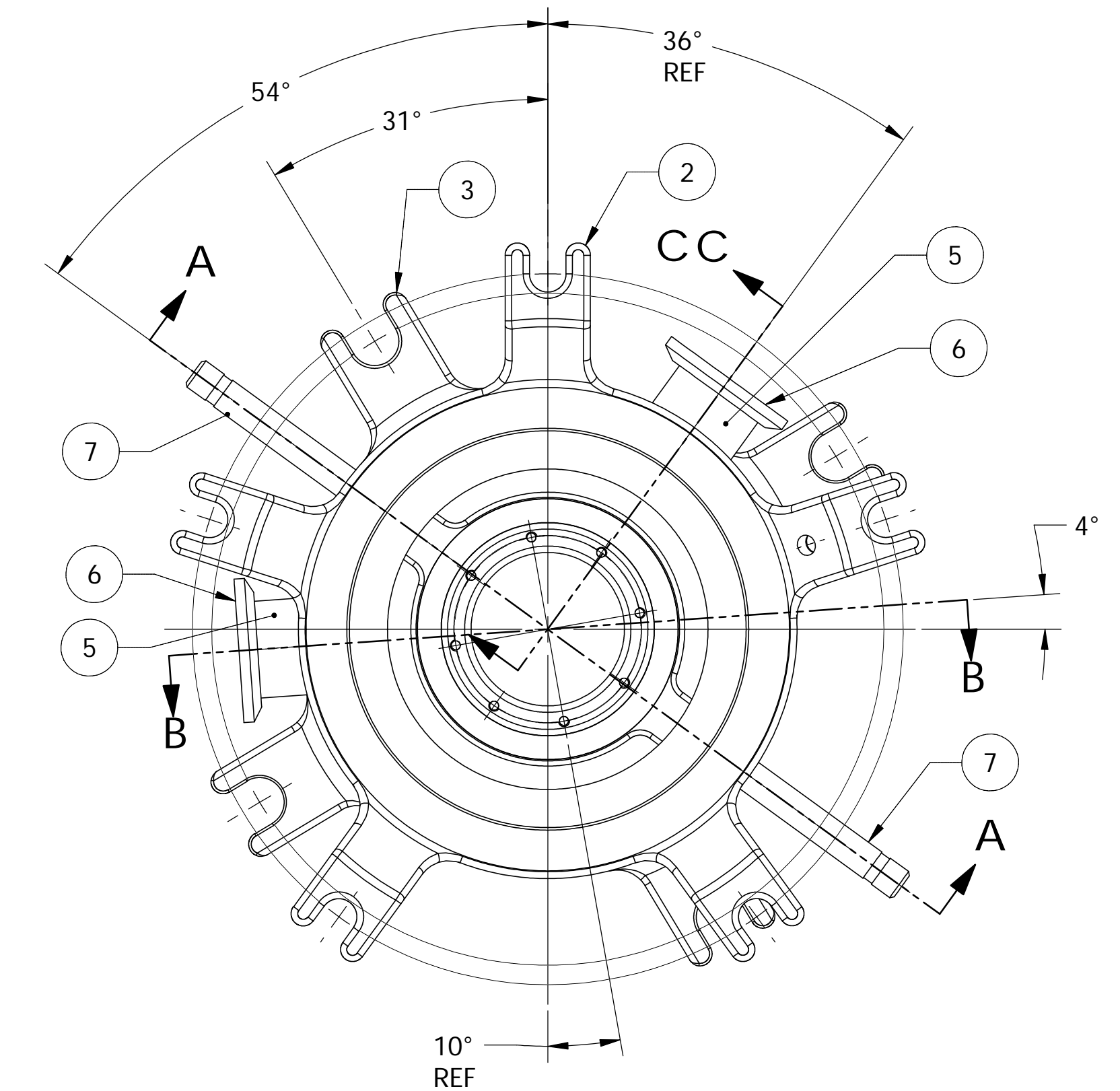
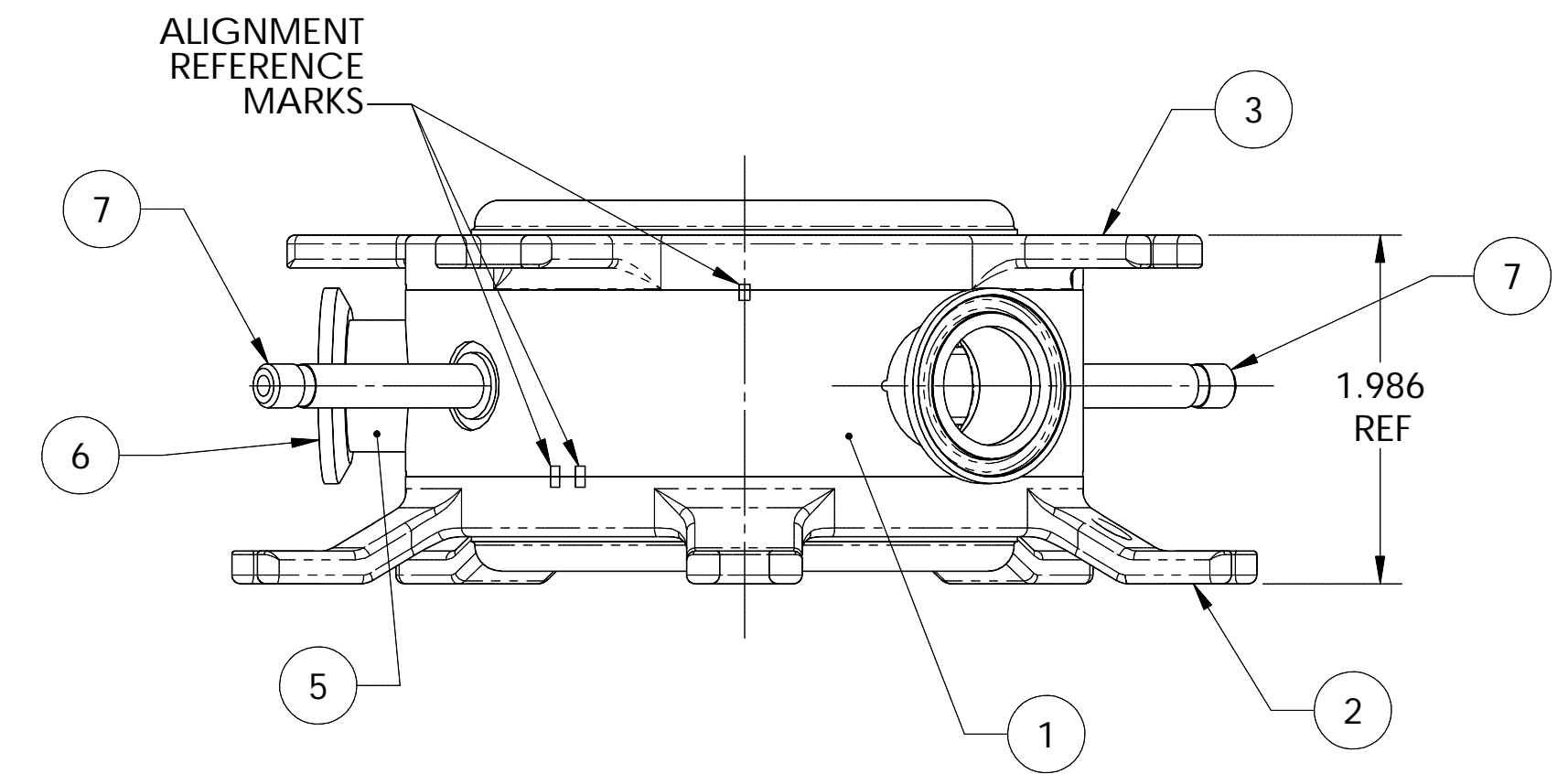
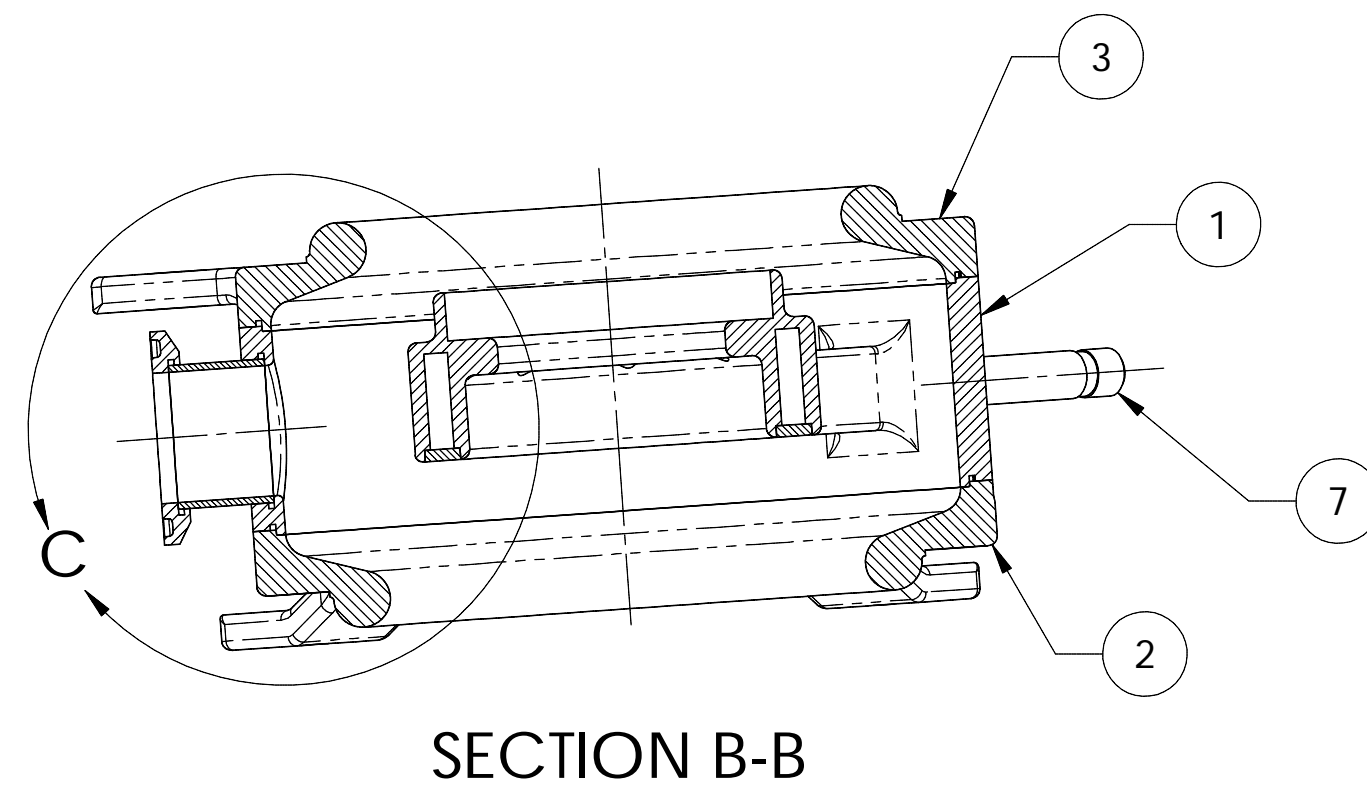
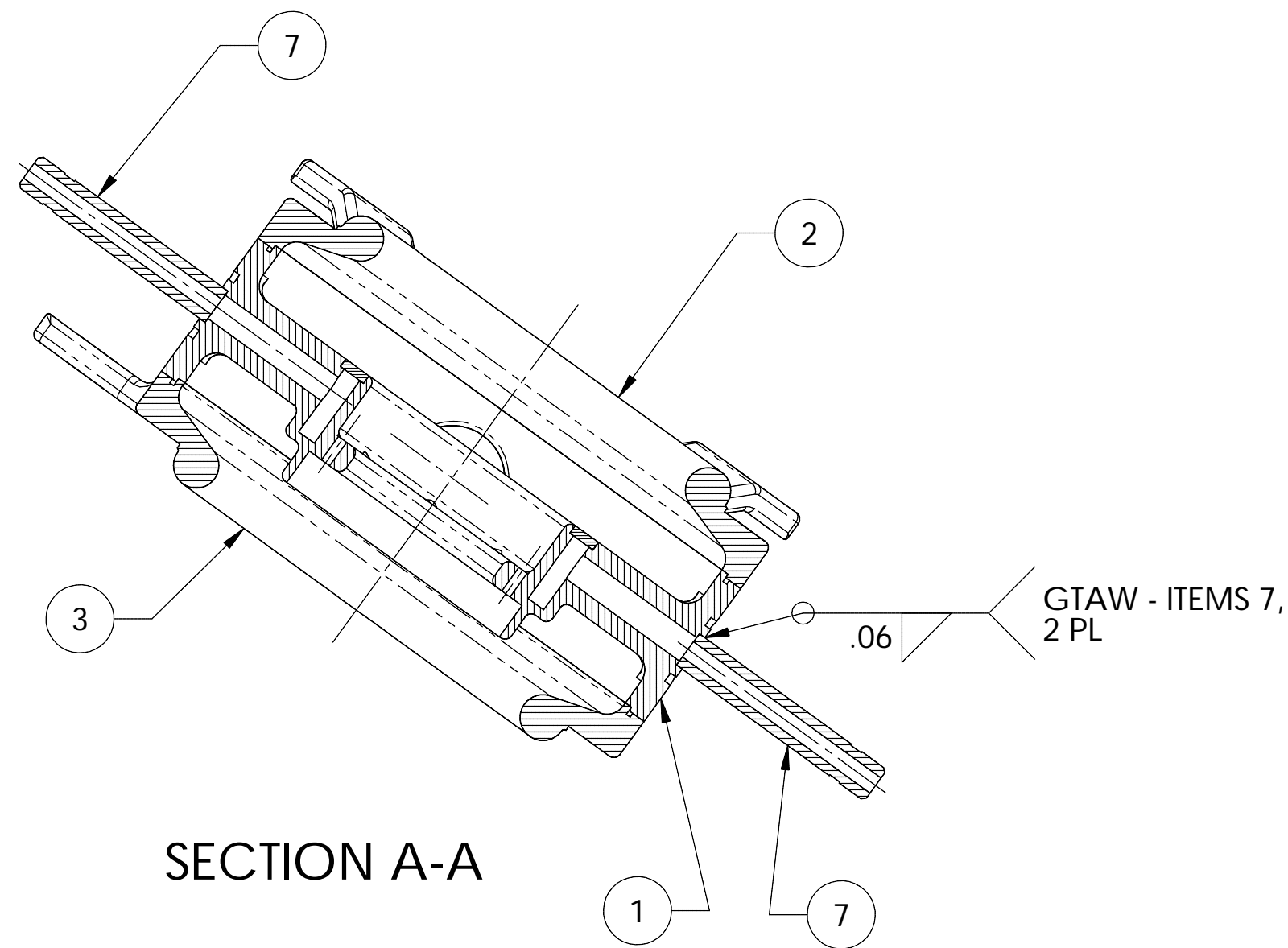
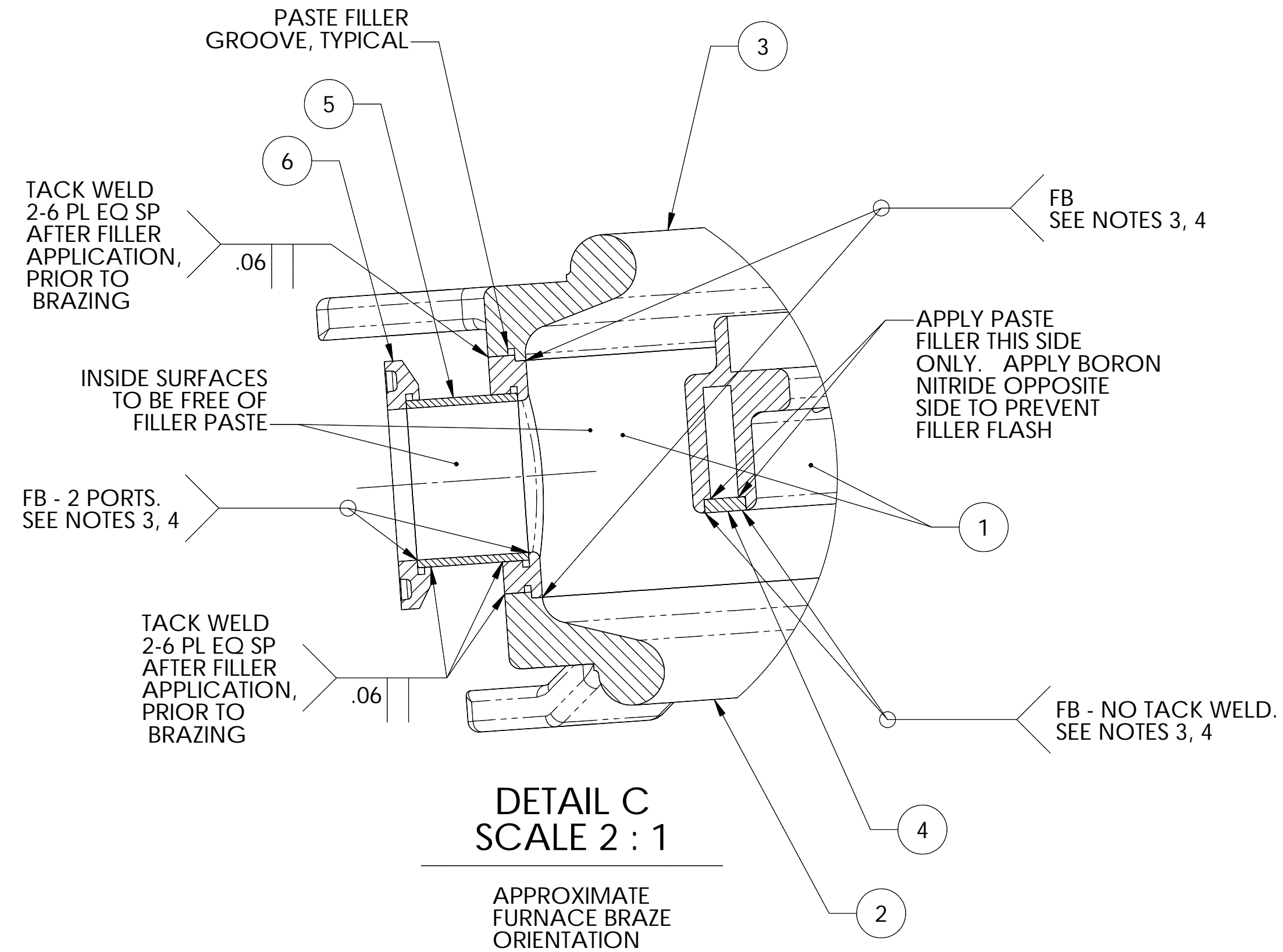
SHEET OF 1

SIZE: C DWG NO: 27A342

REV A

NOTES:

- 1) WELDED AND BRAZED JOINTS TO BE VACUUM TIGHT TO 10E-6 TORR.
- 2) CLEANING, WELDING AND VACUUM PROCEDURES PER LBNL ENGINEERING NOTE M8184.
- 3) BRAZE FILLER: NICKLE, SILVER OR COPPER BASED BRAZING ALLOY.
- 4) AFTER BRAZING, INSPECT JOINT VACUUM SIDE (ARROW SIDE) FOR SMOOTH PHYSICAL TRANSITION. POST-GRIND AS REQUIRED TO ACHIEVE 32 MICRO-INCH FINISH BLEND OR BETTER.



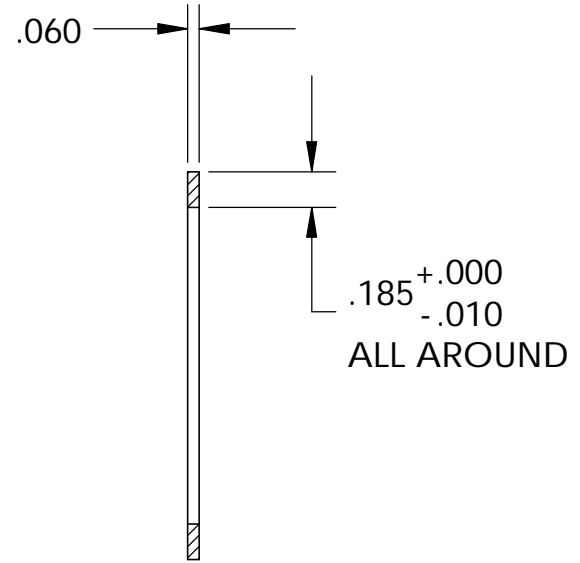
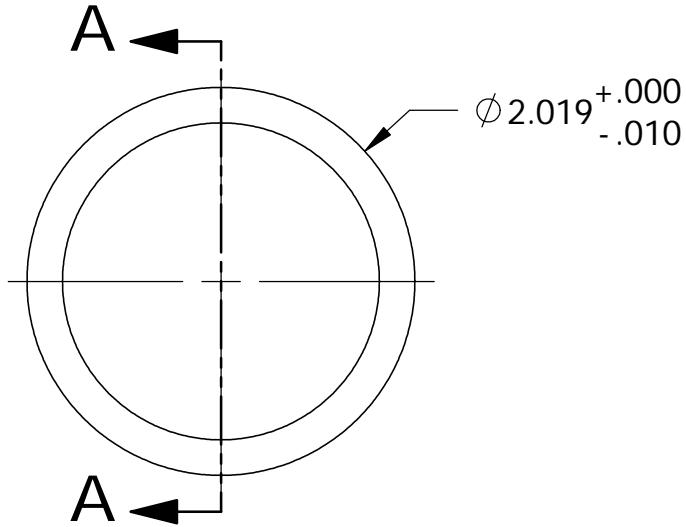
ITEM	QTY	PART NO.	DESCRIPTION
7	2	27A335	TUBE, WATER
6	2	27A349	FLANGE, VACUUM, EXTRACTOR
5	2	27A348	TUBE, VACUUM, EXTRACTOR
4	1	27A345	COVER, WATER, EXTRACTOR
3	1	27A346	FLANGE, EXTRACTOR / CATHODE
2	1	27A347	FLANGE EXTRACTOR / OUTLET
1	1	27A344	EXTRACTOR CORE MACHINING

REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/11/03	BRAZE JOINT DESIGN WAS EBW. ADDED SECTION C-C AND DETAIL D.
A	PAL	R. KELLER	11/25/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED		PROJECT NAME:	ERNEST ORLANDO LAWRENCE	
X ± .1_INCH .XX ± .01_INCH .XXX ± .005_INCH		PROJECT NUMBER:	BERKELEY NATIONAL LABORATORY	
FRACTIONS: -/-		NEXT ASSEMBLY:	UNIVERSITY OF CALIFORNIA	
ANGLES: 0.1° / INCH		CALC. WT.	KG.	2.3 LB.
MACH. SURFS.: 125 MICRO-INCH ✓		SCALE:	1:1	
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE GLASS. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.		THIRD ANGLE PROJECTION	WELDMENT, EXTRACTOR	

HYBRID ION SOURCE (HYBRIS)		SHEET 1 OF 1		SIZE: D	DWG NO: 27A343	REV B
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NOTES:
1) DO NOT BREAK EDGES.



SECTION A-A

A/R			SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:	
NEXT ASSY: 27A343	
CALC. WT.	KG. 0.02 LB.



DO NOT SCALE PRINT	CATEGORY CODE:
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SCALE: 1:1	
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THIRD ANGLE PROJECTION	
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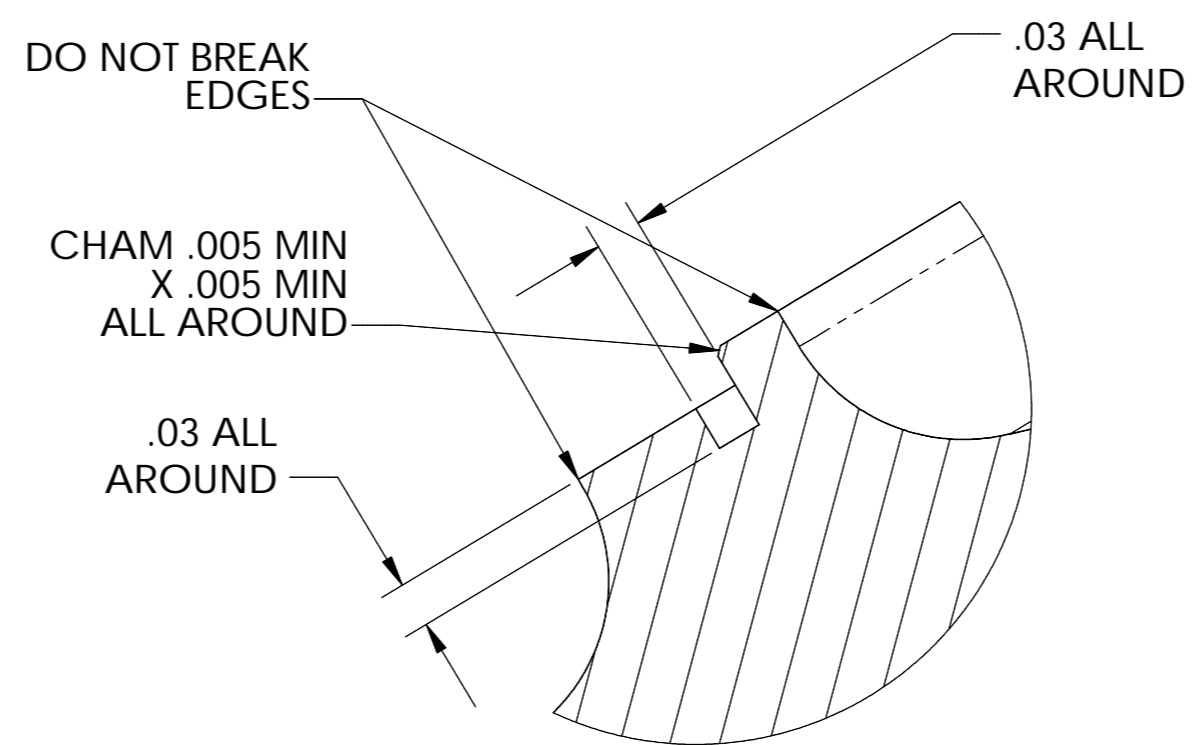
HYBRID ION SOURCE (HYBRIS)			
WELDMENT, EXTRACTOR			
COVER, WATER, EXTRACTOR			

REV	DWN.	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	ADDED NOTE 1. REVISED MATL.
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE

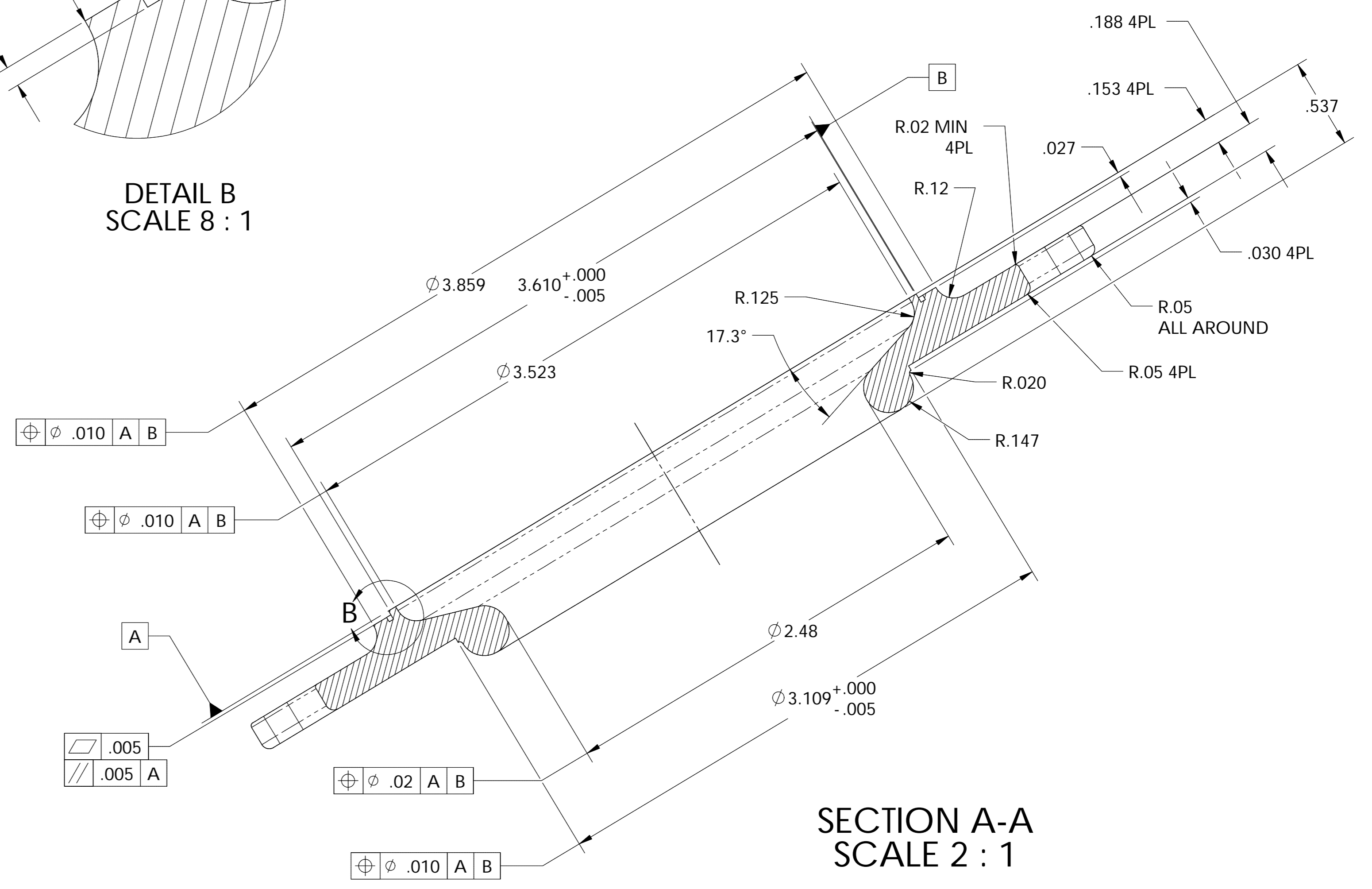
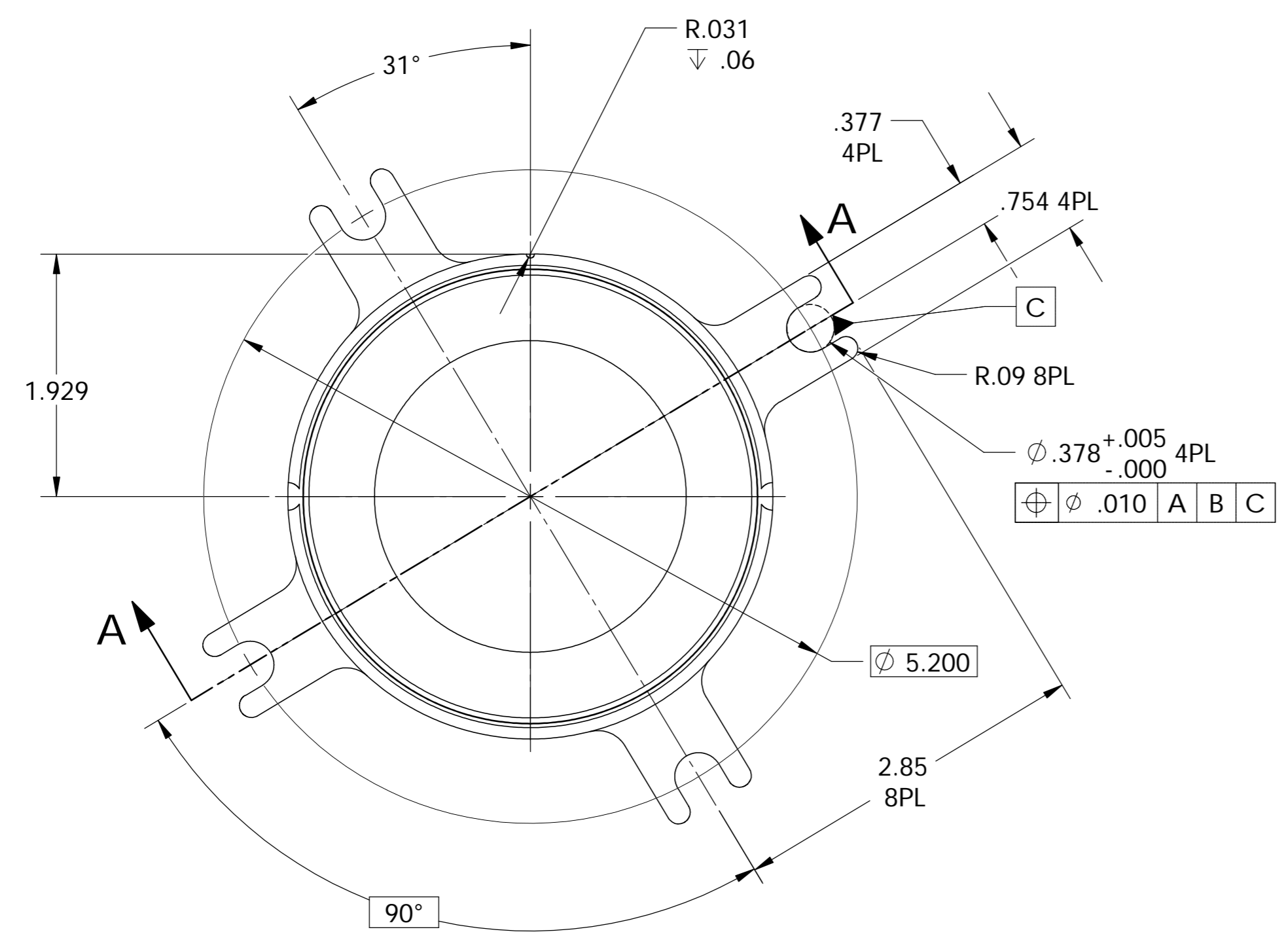
UNLESS OTHERWISE SPECIFIED =>
DO NOT SCALE DRAWING.
INTERPRET PER ASME Y14.5M-1994.
THREADS ARE CLASS 2.
BREAK MACHINED EDGES .016 MAX.
REMOVE BURRS, WELD SPLATTER &
LOOSE SCALE.

TOLERANCES	.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH
	FRACTIONS: -/--
	ANGLES: 0.1° / INCH
	MACH. SURFS. 125 MICRO-INCH <input checked="" type="checkbox"/> OR BETTER

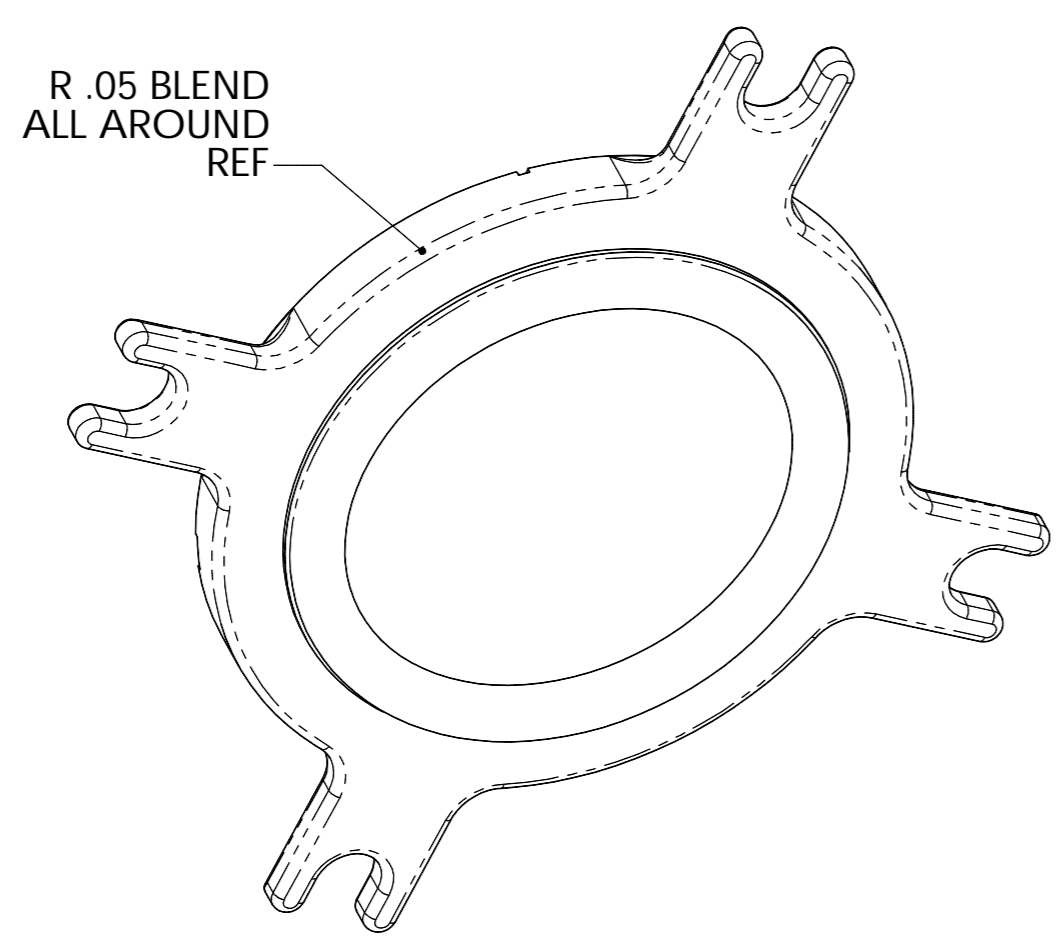
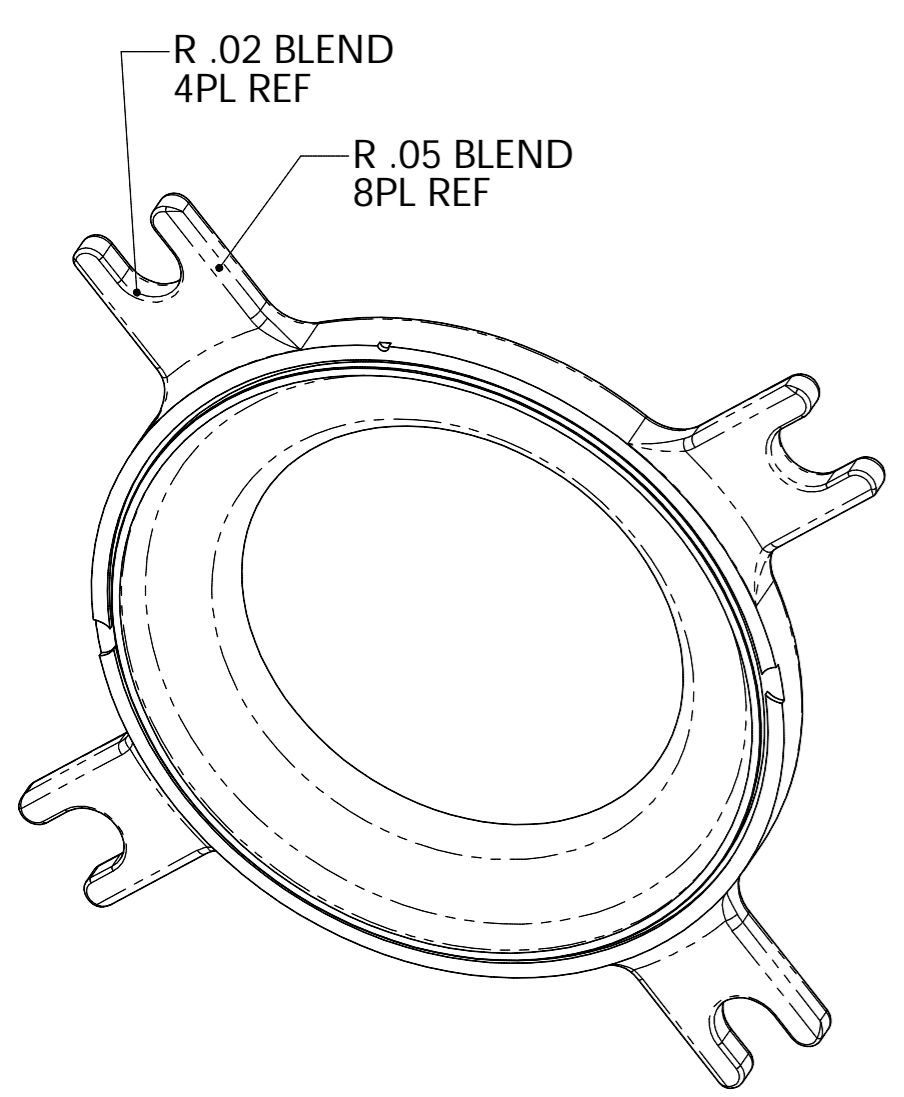
SHEET 1 OF 1	SIZE: A	DWG NO: 27A345	REV B
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DETAIL B
SCALE 8 : 1

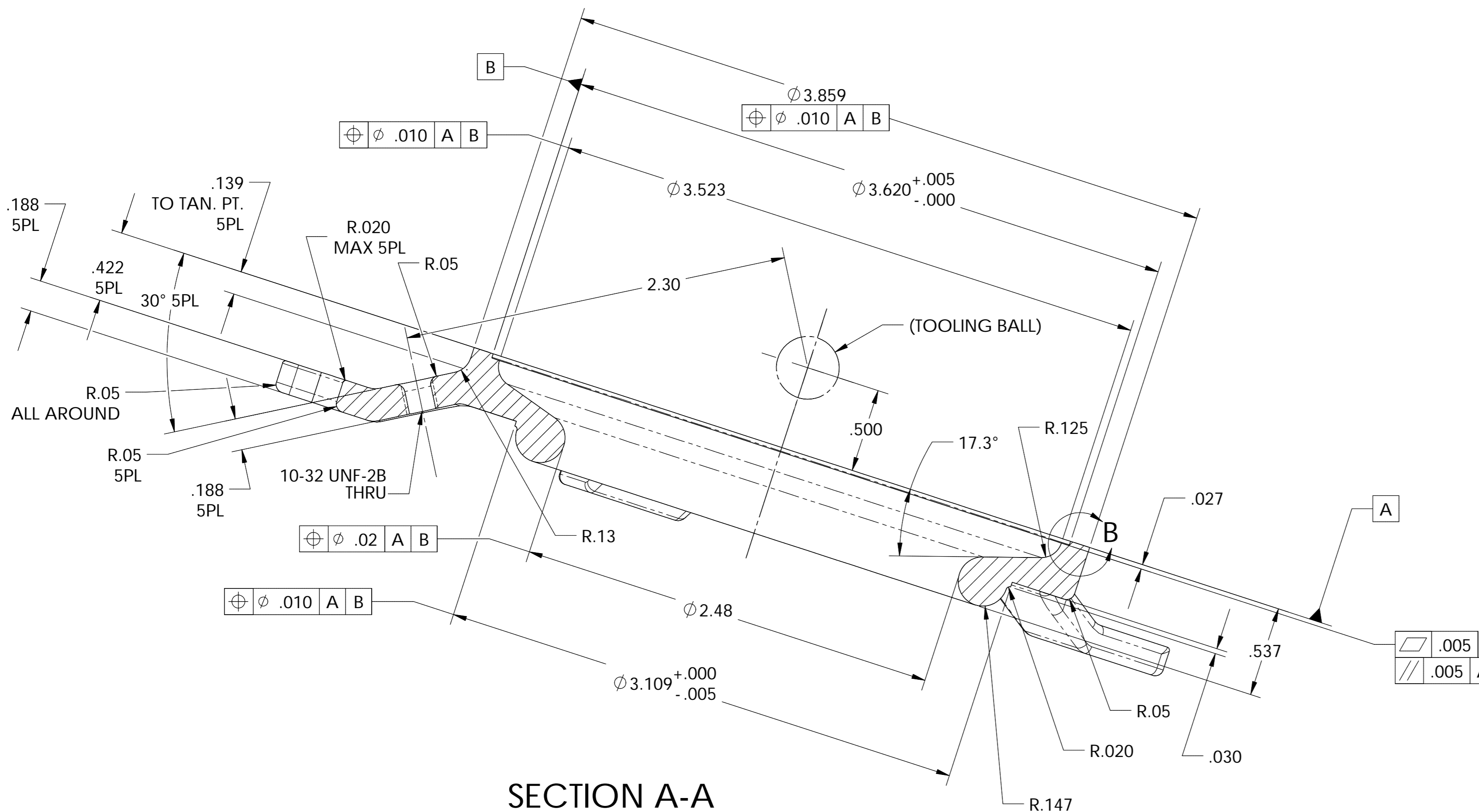


SECTION A-A
SCALE 2 : 1

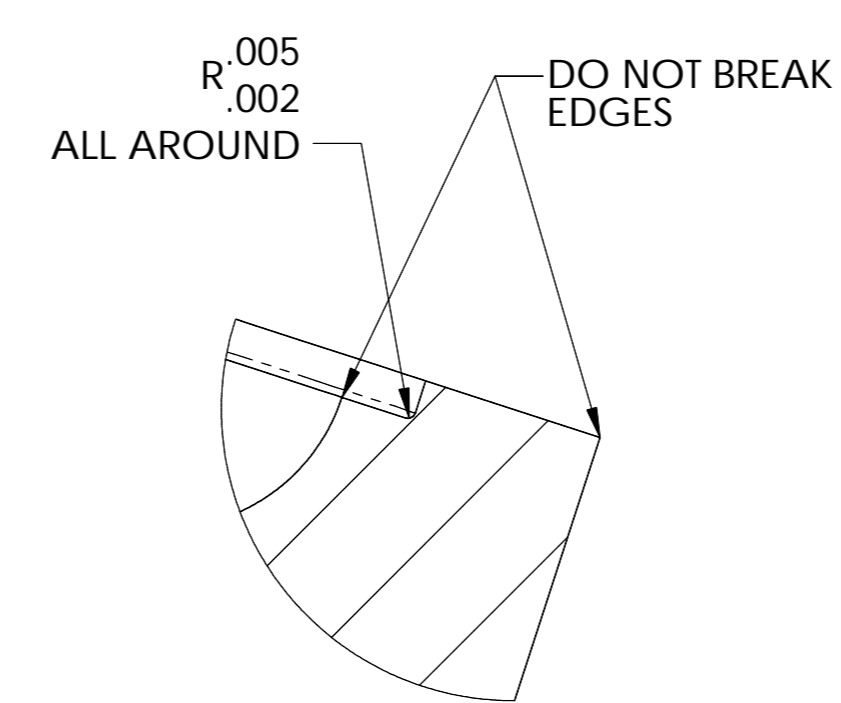
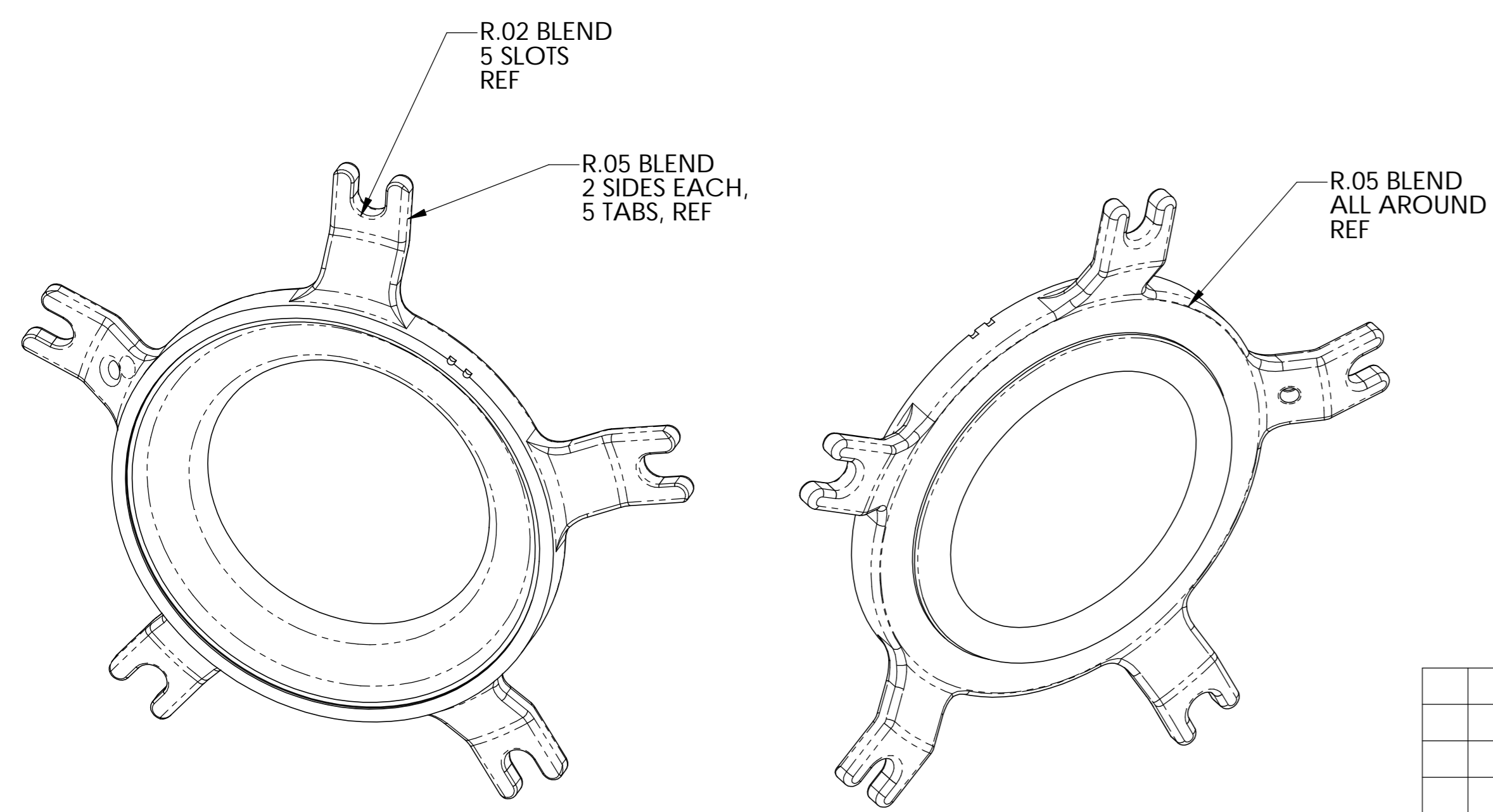
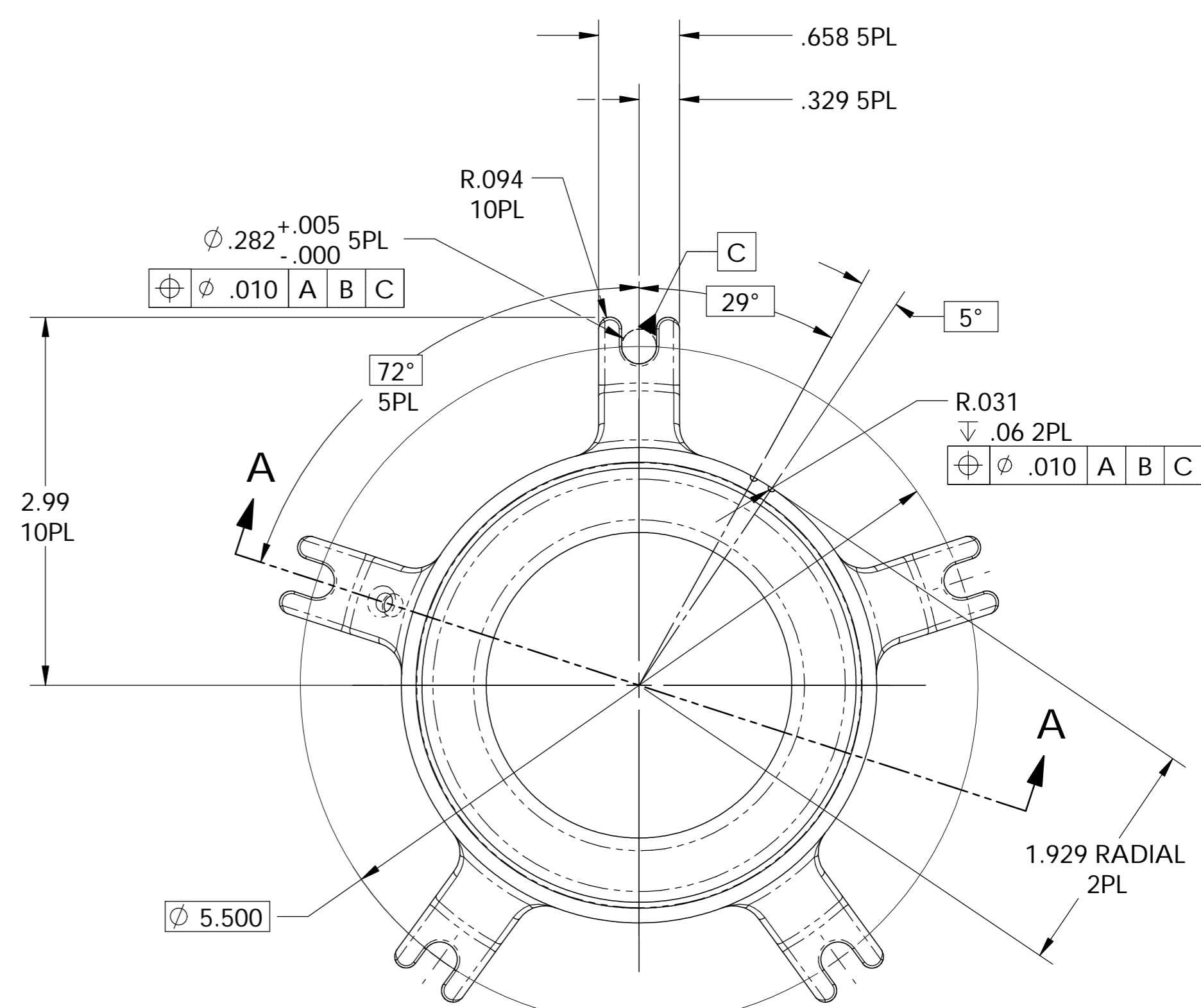


REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	CHANGED EBW JOINT DESIGN TO BRAZE. REVISED MATL.
A	PAL	R. KELLER	11/20/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED			PROJECT NAME:		SST, 304L	
.X ± 1_INCH .XX ± .01_INCH .XXX ± .005_INCH			PROJECT NUMBER:		DESCRIPTION	
FRACTIONS: -/-			NEXT ASSEMBLY:		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA	
ANGLES: 0.1° / INCH			CALC. WT. KG. 0.62 LB.		HYBRID ION SOURCE (HYBRIS)	
MACH. SURFS.: 125 MICRO-INCH ✓			SCALE: 1:1		WELDMENT, EXTRACTOR	
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.			THIRD ANGLE PROJECTION		FLANGE, EXTRACTOR / CATHODE	
			SHEET 1 OF 1		SIZE: D DWG NO: 27A346 REV B	



SECTION A-A
SCALE 2 : 1



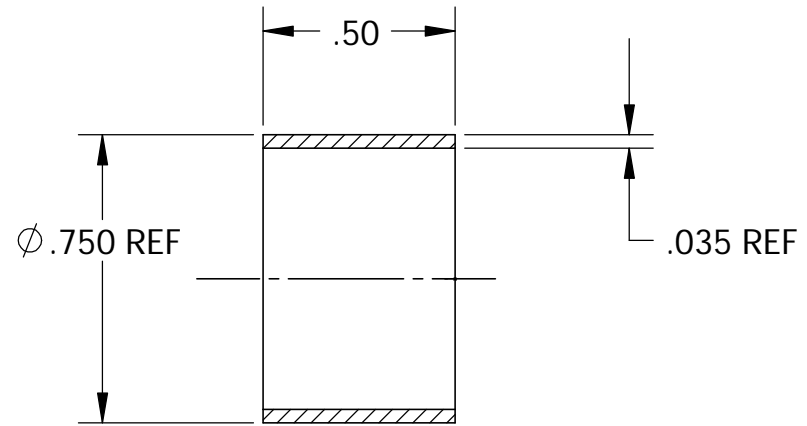
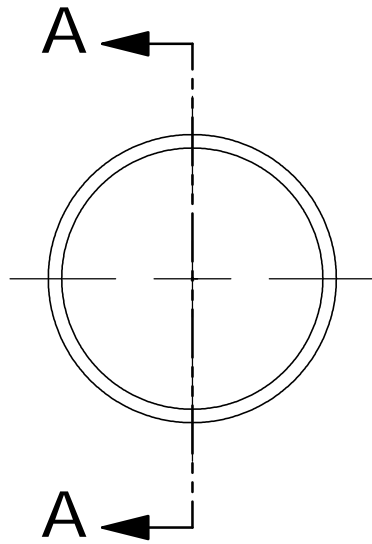
DETAIL B
SCALE 8 : 1

REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	EBW DESIGN CHANGED TO BRAZE. MATL MODIFIED.
A	PAL	R. KELLER	11/21/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED			PROJECT NAME:		SST, 304L	
.X ± 1_INCH .XX ± .01_INCH .XXX ± .005_INCH			PROJECT NUMBER:		RECD ITEM PART NO. DESCRIPTION	
FRACTIONS: -/-			NEXT ASSEMBLY:		27A343	
ANGLES: 0.1° / INCH			CALC. WT.		KG. 0.67 LB.	
MACH. SURFS.: 125 MICRO-INCH ✓			SCALE: 1:1		CATEGORY CODE:	
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES. 0.16 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.			THIRD ANGLE PROJECTION		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA HYBRID ION SOURCE (HYBRIS)	
			WELDMENT, EXTRACTOR		FLANGE EXTRACTOR / OUTLET	
			SHEET 1 OF 1		SIZE: D DWG NO: 27A347 REV B	

NOTES:

1) DO NOT BREAK EDGES.





SECTION A-A

A/R			TUBING, VACUUM, 3/4", SST, 304, MDC P/N 480003 OR EQL
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	
PROJECT NUMBER:	
NEXT ASSY:	27A343
CALC. WT.	KG. 0.01 LB.

ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY
 UNIVERSITY OF CALIFORNIA



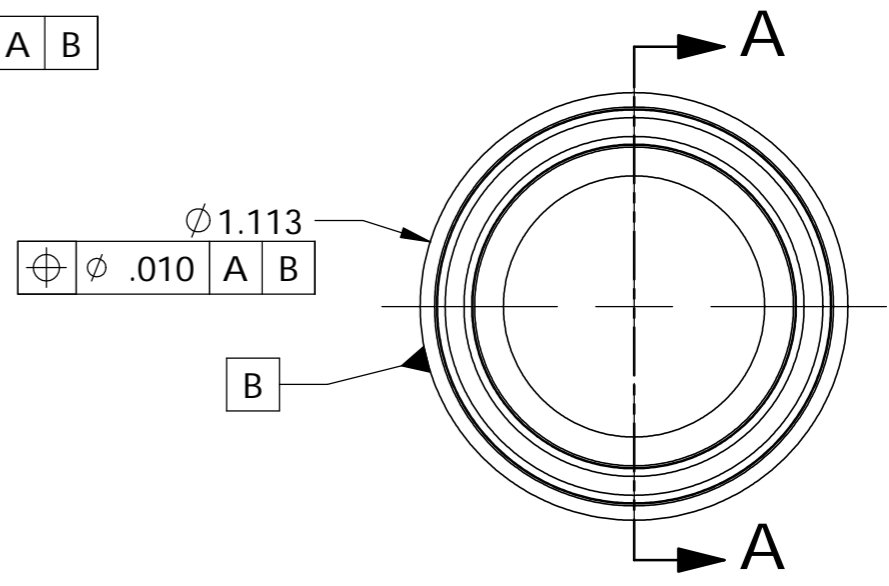
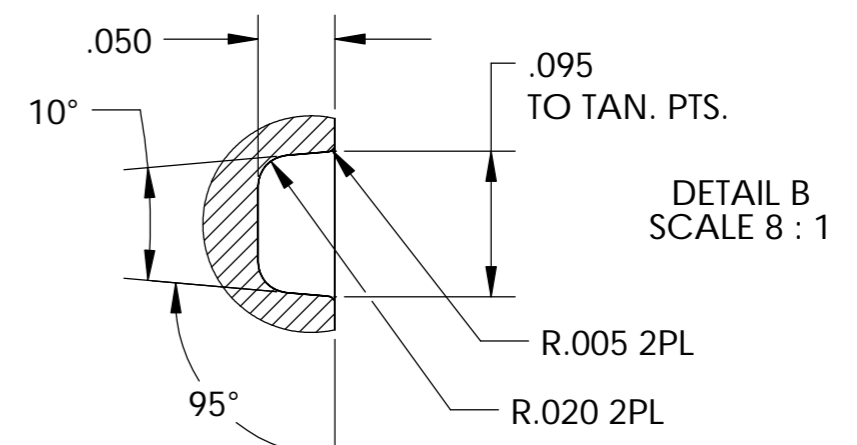
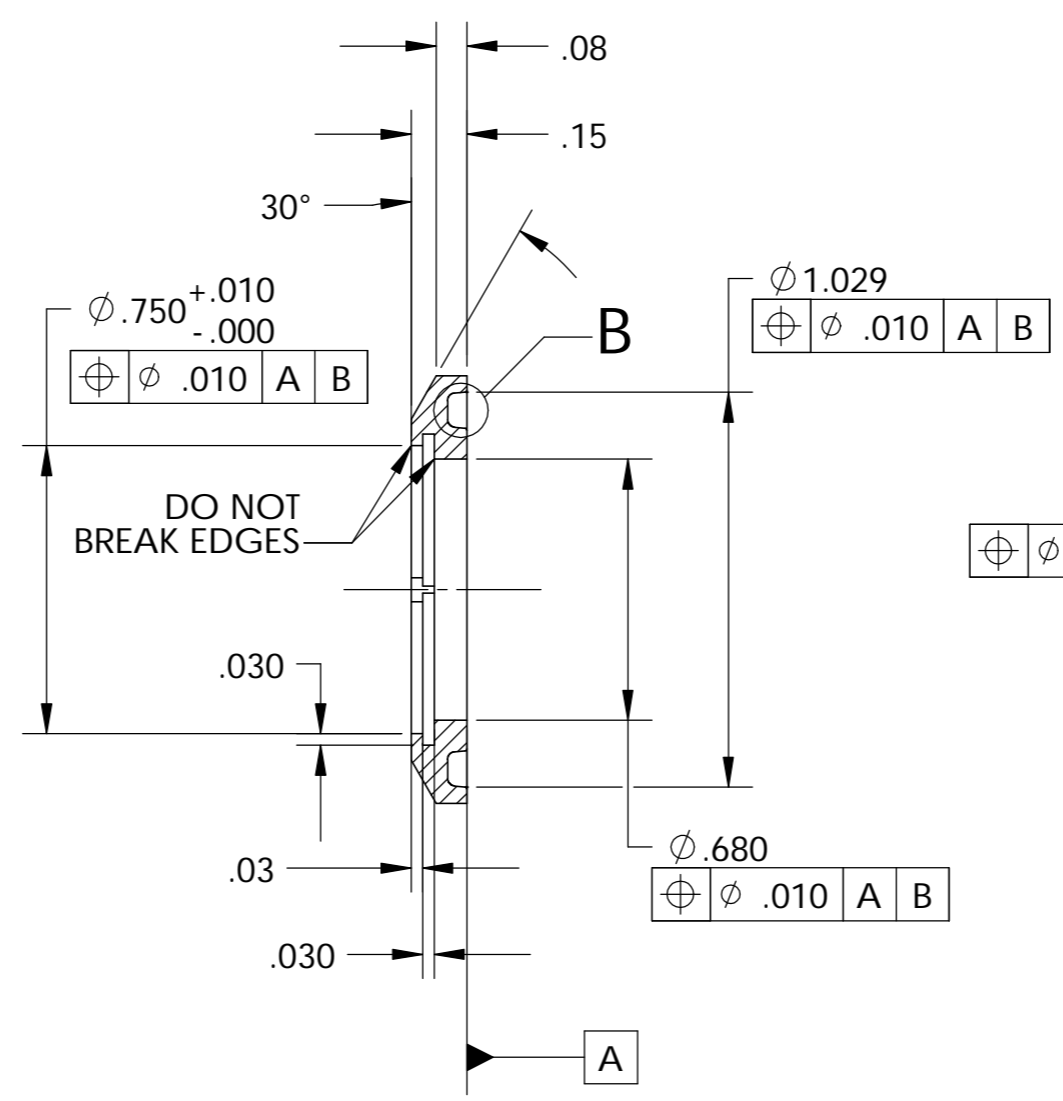
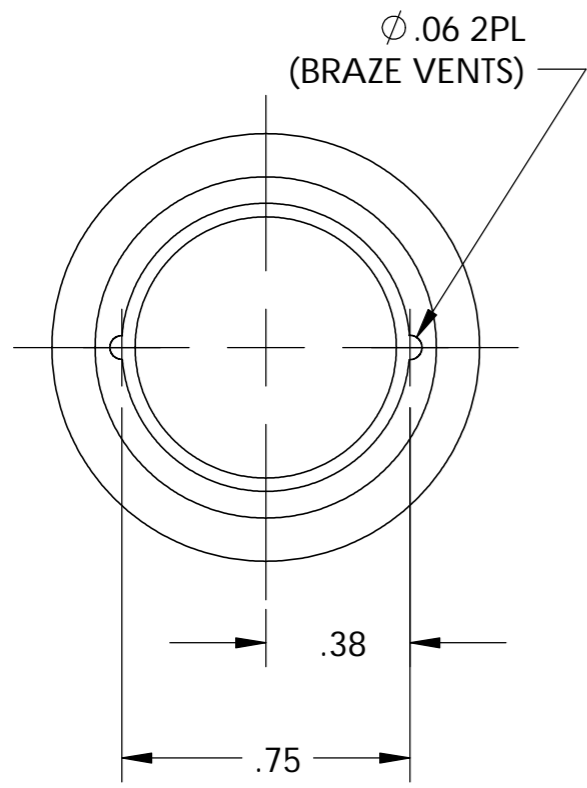
SCALE:	2:1
THIRD ANGLE PROJECTION	

HYBRID ION SOURCE (HYBRIS)			
WELDMENT, EXTRACTOR			
TUBE, VACUUM, EXTRACTOR			
SHEET	SIZE:	DWG NO:	REV
1 OF 1	A	27A348	B

REV	DWN.	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	ADDED NOTE 1.
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED =>		.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH	
TOLERANCES	FRACTIONS:	-/-	
	ANGLES:	0.1° / INCH	
	MACH. SURFS.	125 MICRO-INCH	✓ OR BETTER

DO NOT SCALE DRAWING.
 INTERPRET PER ASME Y14.5M-1994.
 THREADS ARE CLASS 2.
 BREAK MACHINED EDGES .016 MAX.
 REMOVE BURRS, WELD SPLATTER &
 LOOSE SCALE.



SECTION A-A

A/R			SST, 304L
REQD	ITEM	PART NO.	DESCRIPTION
PROJECT NAME:			ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:			
NEXT ASSY:			27A343
CALC. WT.	KG.	0.02	LB.
DO NOT SCALE PRINT		CATEGORY CODE:	
SCALE:	2:1		
THIRD ANGLE PROJECTION			
SHEET	1 OF 1	SIZE: B	DWG NO: 27A349
REV	B	REV B	

UNLESS OTHERWISE SPECIFIED				
TOLERANCES	X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH			
	FRACTIONS:	-/--		
	ANGLES:	0.1° / INCH		
	MACH. SURFS.:	125 MICRO-INCH <input checked="" type="checkbox"/> OR BETTER		
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.				
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	EBW DESIGN CHANGED TO BRAZE. MATERIAL MODIFIED.
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE

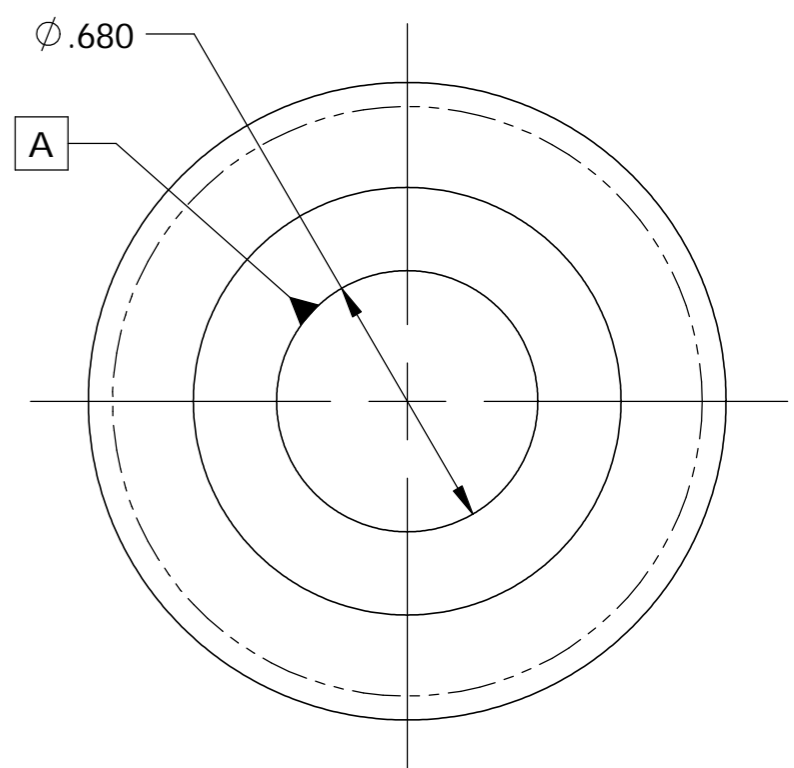
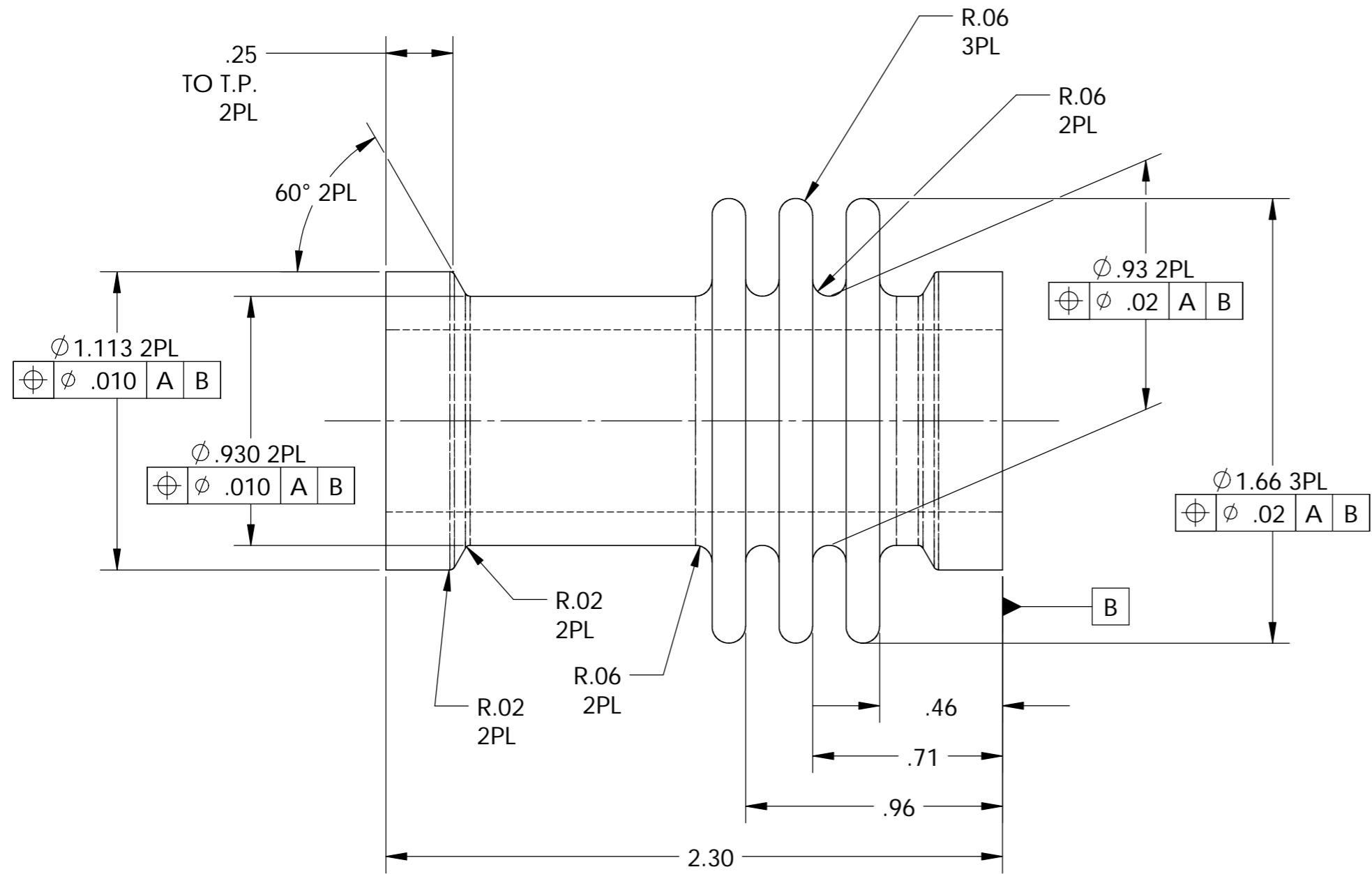
4 3 2 1

D D

C C

B B

A A



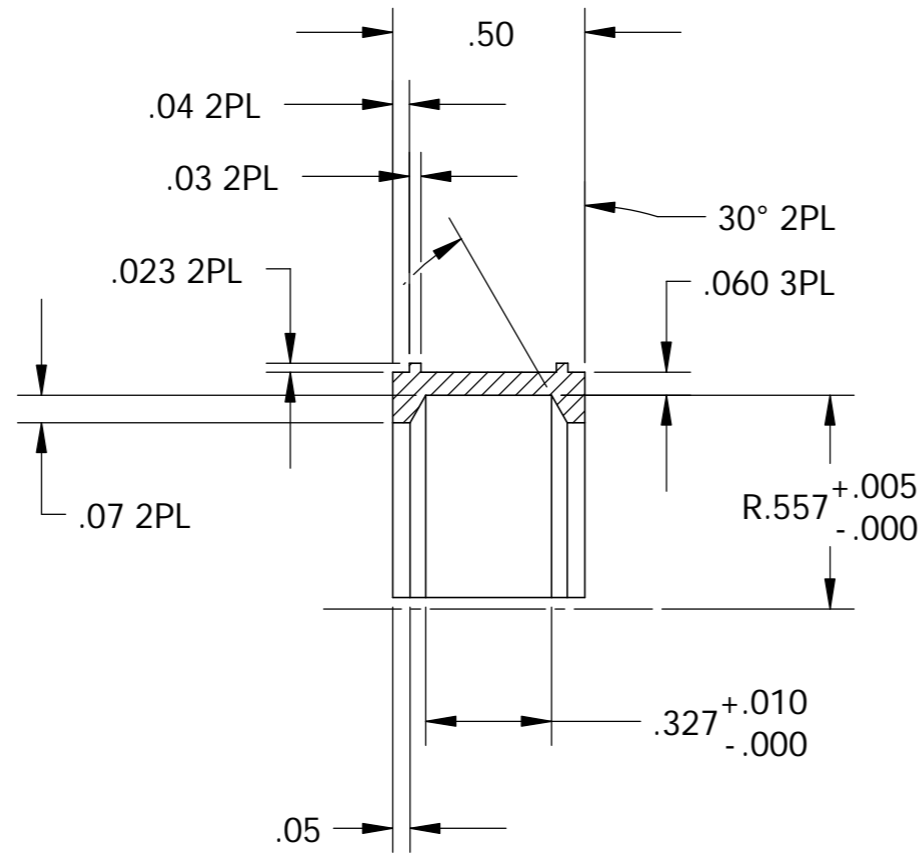
A/R			VESPEL, SP1
REQD	ITEM	PART NO.	DESCRIPTION
PROJECT NAME:			ERNEST ORLANDO LAWRENCE
PROJECT NUMBER:			BERKELEY NATIONAL LABORATORY
NEXT ASSY:			UNIVERSITY OF CALIFORNIA
CALC. WT.			HYBRID ION SOURCE (HYBRIS)
SCALE:			INSULATOR, EXTRACTOR VACUUM
THIRD ANGLE PROJECTION			SHEET 1 OF 1
			SIZE: B
			DWG NO: 27A350
			REV A

UNLESS OTHERWISE SPECIFIED				
X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH				
FRACTIONS: -/--				
ANGLES: 0.1° / INCH				
MACH. SURFS.: 125 MICRO-INCH OR BETTER				
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.				
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/18/03	INITIAL RELEASE

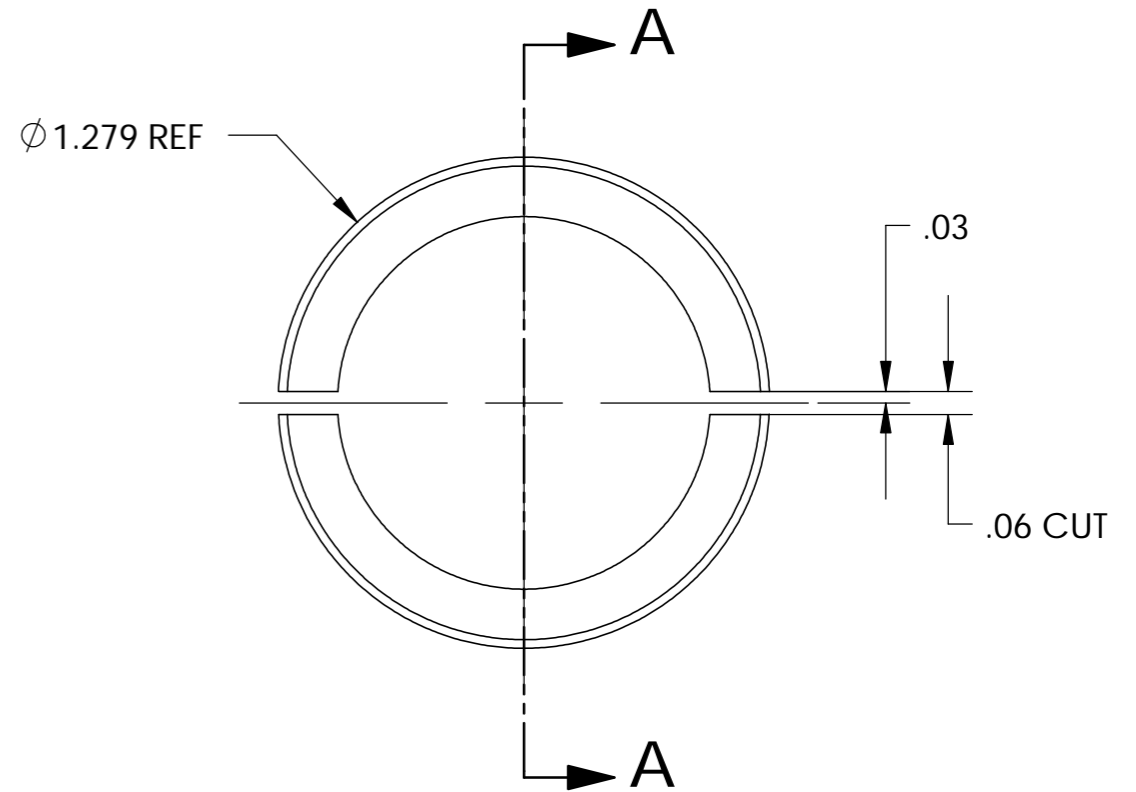
4 3 2

NOTES:

1) FURNISH AS A MATCHED SET.



SECTION A-A

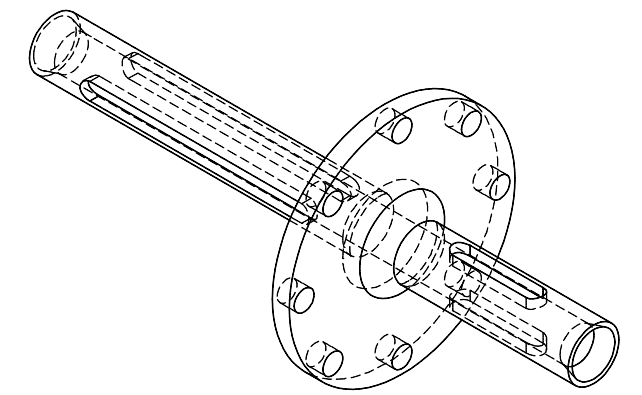
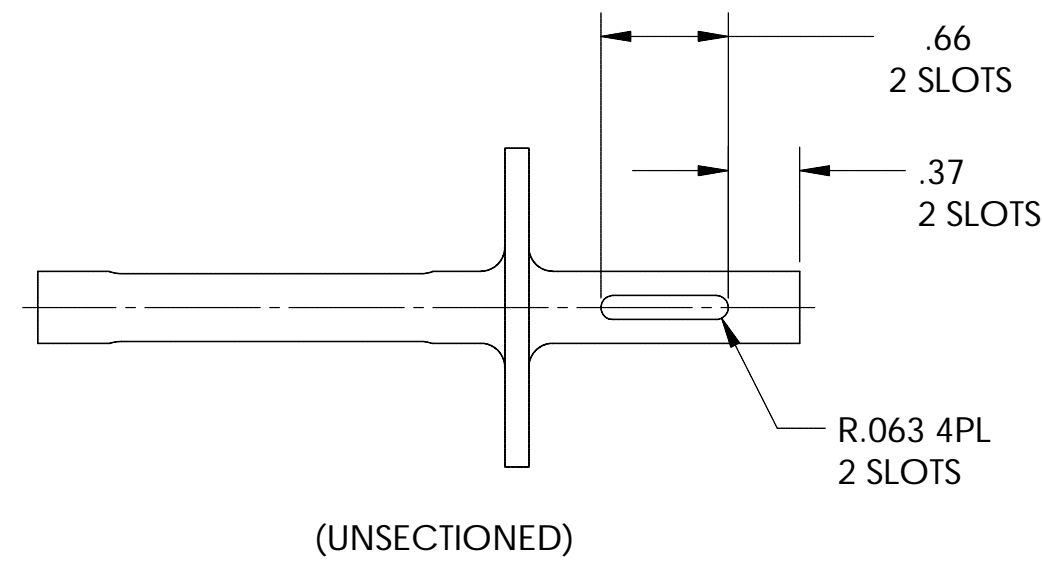
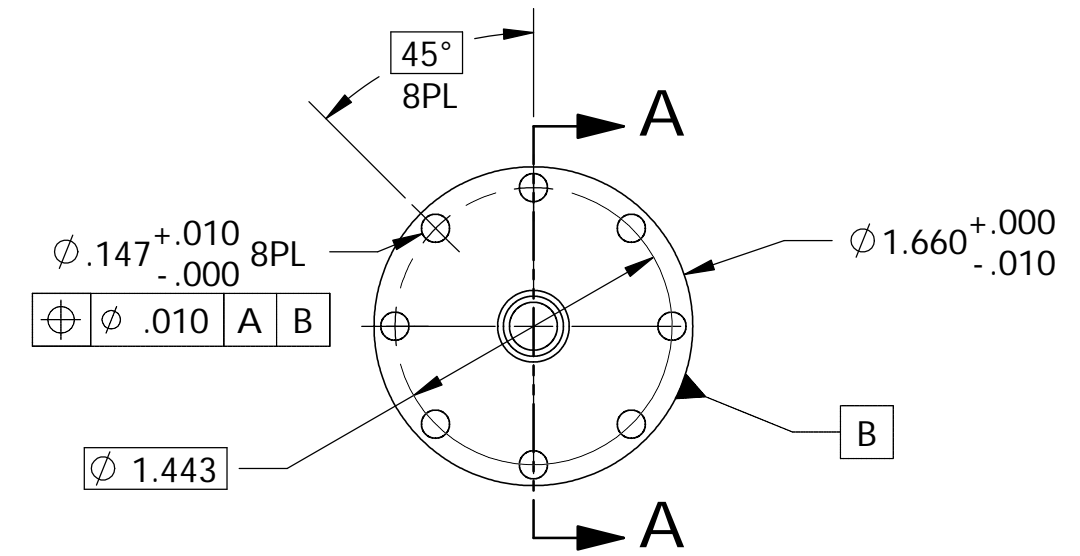
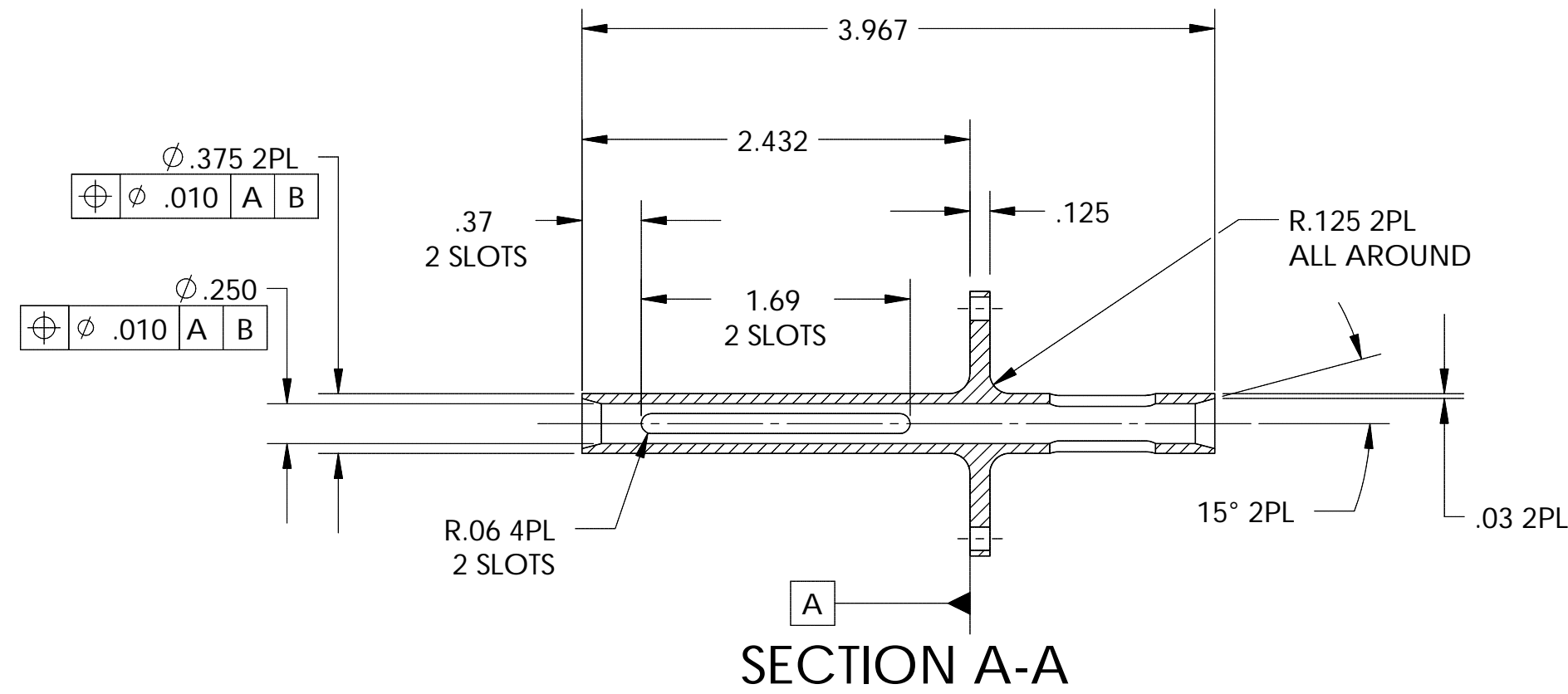


A/R		SST, 303/304	
REQD	ITEM	PART NO.	DESCRIPTION
PROJECT NAME:		ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY	
PROJECT NUMBER:		UNIVERSITY OF CALIFORNIA	
NEXT ASSY:		27A328	
CALC. WT.	KG.	0.04	LB.
DO NOT SCALE PRINT		CATEGORY CODE:	
SCALE:	2:1	CLAMSHELL, CLAMP, VACUUM, EXTRACTOR	
THIRD ANGLE PROJECTION		SHEET 1 OF 1	SIZE: B
DWG NO: 27A351		REV A	

UNLESS OTHERWISE SPECIFIED
 X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH
 FRACTIONS: -/--
 ANGLES: 0.1° / INCH
 MACH. SURFS.: 125 MICRO-INCH OR BETTER
 DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.

REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE





PRELIMINARY - NOT FOR FABRICATION

REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
B	PAL	R. KELLER	12/15/03	MODIFIED MATERIAL.
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE

TOLERANCES	
X ±.1_INCH	XX ±.01_INCH
XXX ±.005_INCH	
FRACTIONS:	-/--
ANGLES:	0.1° / INCH
MACH. SURFS.:	125 MICRO-INCH OR BETTER

UNLESS OTHERWISE SPECIFIED	
PROJECT NAME:	
PROJECT NUMBER:	
NEXT ASSEMBLY:	27A328
CALC. WT.	KG. 0.128 LB.
SCALE:	1:1
THIRD ANGLE PROJECTION	

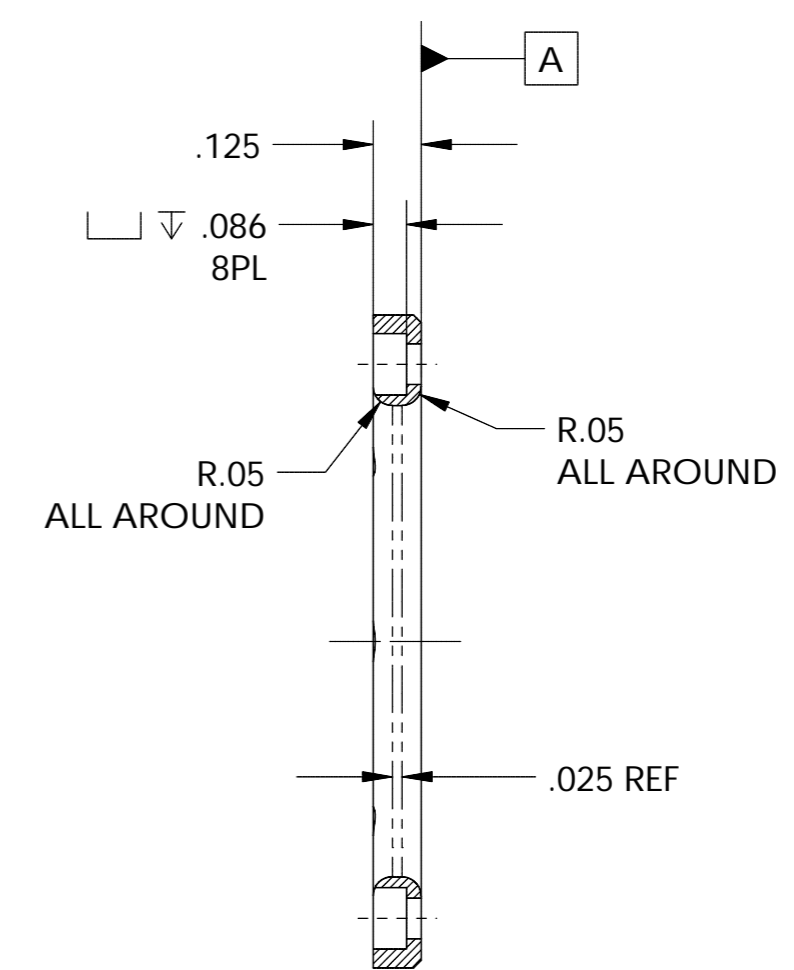
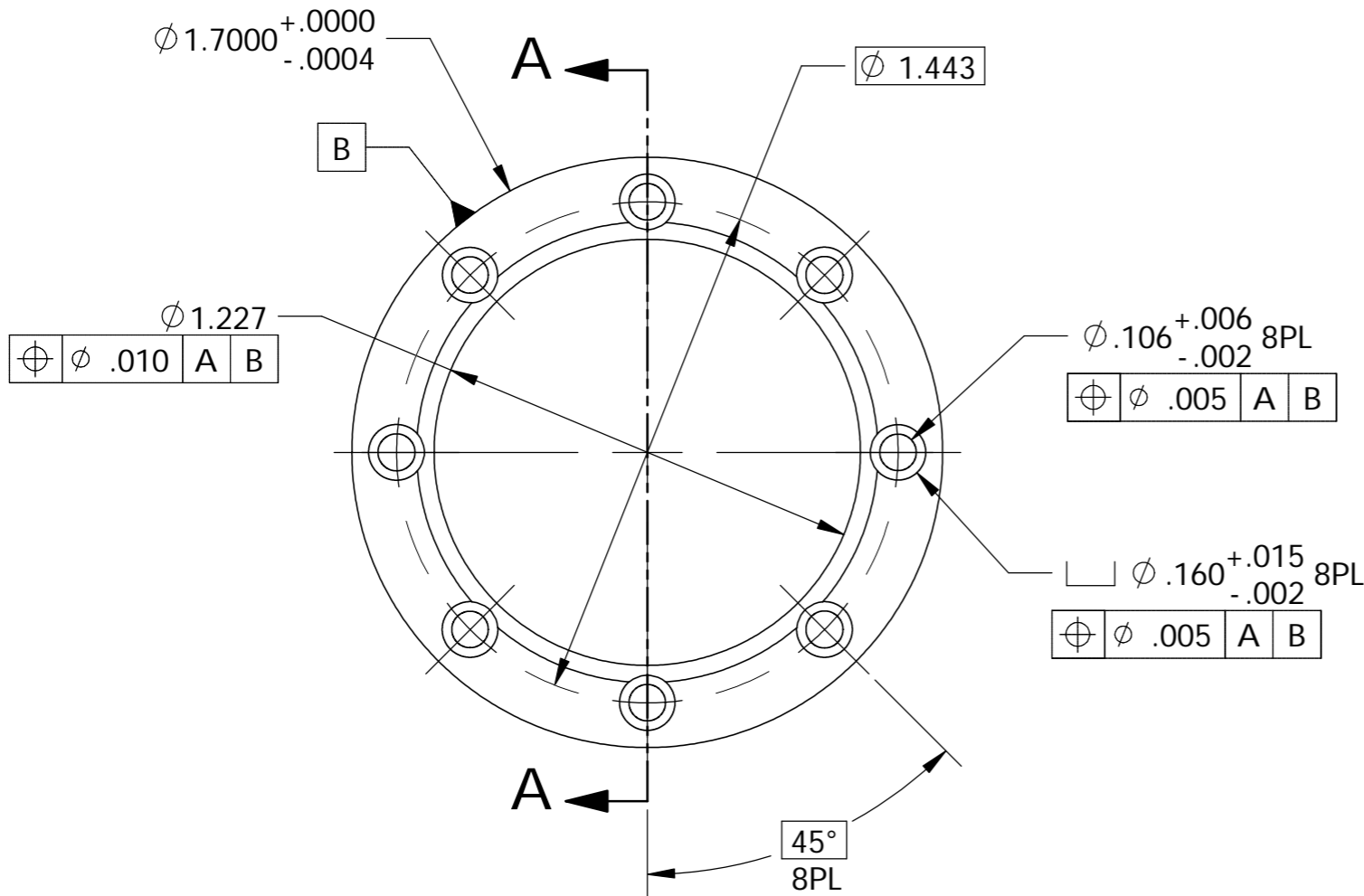
A/R		SST, 304L
REQD	ITEM	PART NO. DESCRIPTION
ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA 		
HYBRID ION SOURCE (HYBRIS)		
ELECTRODE, EXTRACTOR		
SHEET OF 1	SIZE: C	DWG NO: 27A352
1	REV B	

4 3 2 1

D D

C C

B B

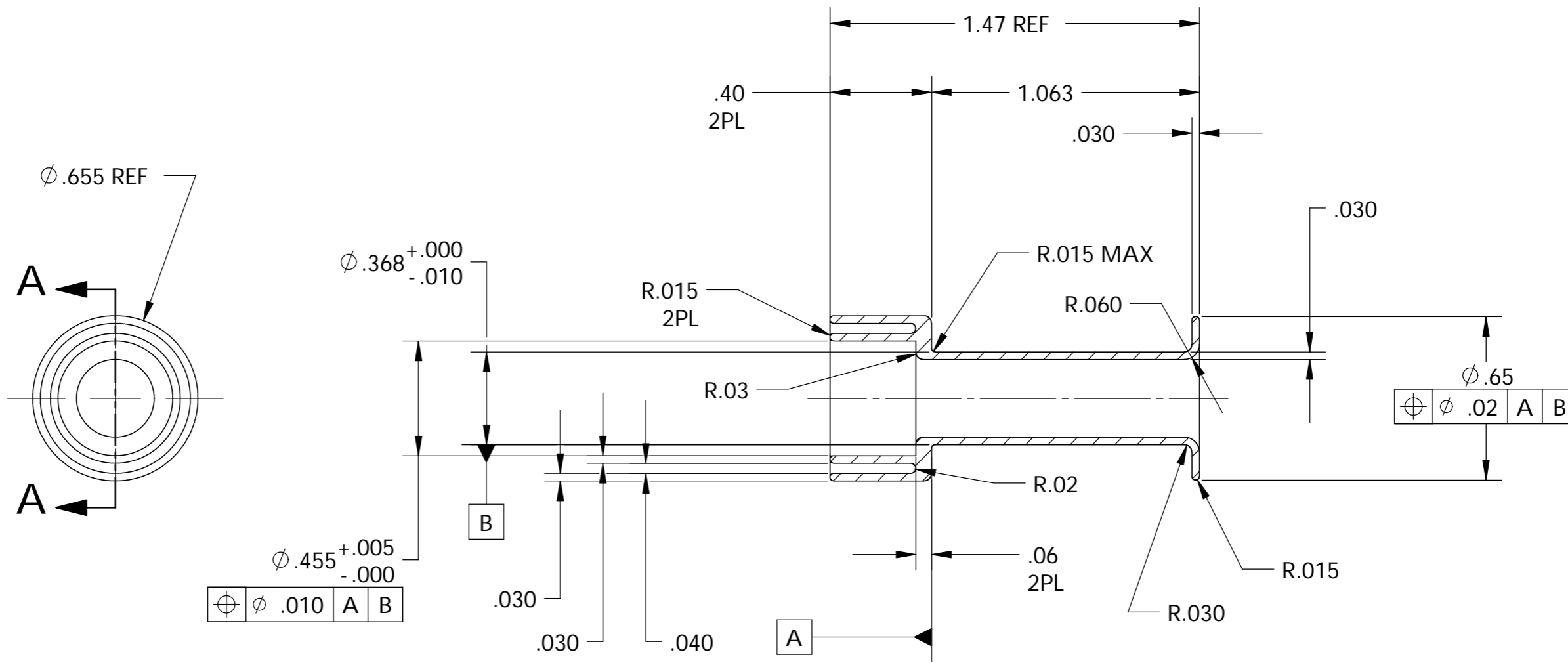


SECTION A-A

A A

					UNLESS OTHERWISE SPECIFIED				PROJECT NAME:		ERNEST ORLANDO LAWRENCE		
					X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH				PROJECT NUMBER:		BERKELEY NATIONAL LABORATORY		
					FRACTIONS: -/--				NEXT ASSY: 27A328		UNIVERSITY OF CALIFORNIA		
					ANGLES: 0.1° / INCH				CALC. WT. KG. 0.032 LB.		HYBRID ION SOURCE (HYBRIS)		
					MACH. SURFS.: 125 MICRO-INCH OR BETTER				DO NOT SCALE PRINT		CATEGORY CODE:		
					DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.				SCALE: 2:1		CLAMPING RING, ELECTRODE, EXTRACTOR		
									THIRD ANGLE PROJECTION		SHEET 1 OF 1		
											SIZE: B		
											DWG NO: 27A353		
											REV B		
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION									
B	PAL	R. KELLER	12/15/03	MODIFIED MATERIAL.									
A	PAL	R. KELLER	11/24/03	INITIAL RELEASE									

4 3 2 1



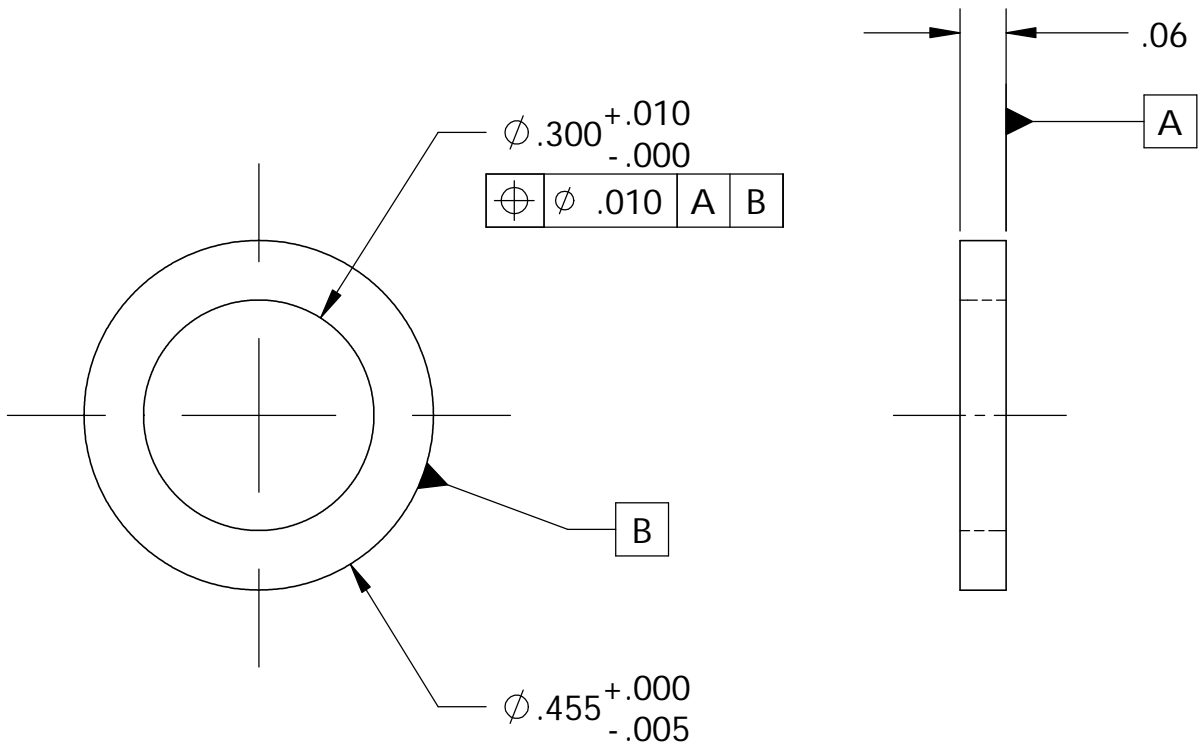
SECTION A-A

A/R			VESPEL, SP1
REQD	ITEM	PART NO.	DESCRIPTION
PROJECT NAME:			ERNEST ORLANDO LAWRENCE
PROJECT NUMBER:			BERKELEY NATIONAL LABORATORY
NEXT ASSY:			UNIVERSITY OF CALIFORNIA
CALC. WT.			HYBRID ION SOURCE (HYBRIS)
SCALE:			BUSHING, EXTRACTOR / CATHODE
THIRD ANGLE PROJECTION			SHEET 1 OF 1
DO NOT SCALE PRINT			SIZE: B
CATEGORY CODE:			DWG NO: 27A354
SCALE: 2:1			REV A

UNLESS OTHERWISE SPECIFIED				
X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH				
FRACTIONS: -/--				
ANGLES: 0.1° / INCH				
MACH. SURFS.: 125 MICRO-INCH OR BETTER				
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.				
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/20/03	INITIAL RELEASE

2

1



B

B


A

A

A/R			SST, 303/304
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	
PROJECT NUMBER:	
NEXT ASSY:	27A328

ERNEST ORLANDO LAWRENCE
 BERKELEY NATIONAL LABORATORY
 UNIVERSITY OF CALIFORNIA

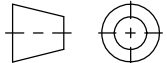


CALC. WT.	KG.	0.002	LB.
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HYBRID ION SOURCE (HYBRIS)

DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 4:1	

WASHER, BUSHING, 1/4"

THIRD ANGLE PROJECTION	
------------------------	--

SHEET 1 OF 1

SIZE: A

DWG NO: 27A355

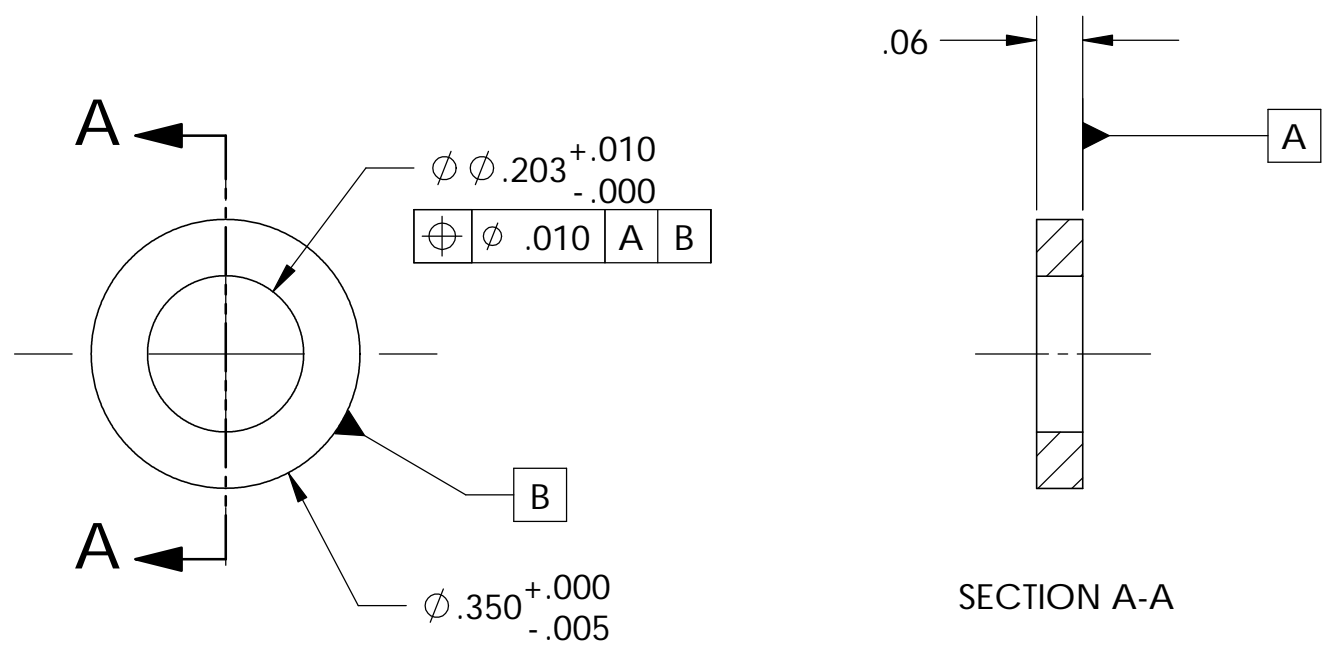
REV A

UNLESS OTHERWISE SPECIFIED =>
 DO NOT SCALE DRAWING.
 INTERPRET PER ASME Y14.5M-1994.
 THREADS ARE CLASS 2.
 BREAK MACHINED EDGES .016 MAX.
 REMOVE BURRS, WELD SPLATTER &
 LOOSE SCALE.

TOLERANCES	.X ± 1_INCH .XX ± 01_INCH .XXX ± 005_INCH
	FRACTIONS: -/--
	ANGLES: 0.1° / INCH
	MACH. SURFS. 125 MICRO-INCH <input checked="" type="checkbox"/> OR BETTER

2

1





SECTION A-A

A/R			SST, 303,304
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	
PROJECT NUMBER:	
NEXT ASSY:	27A328
CALC. WT.	KG. 0.001 LB.

ERNEST ORLANDO LAWRENCE
 BERKELEY NATIONAL LABORATORY
 UNIVERSITY OF CALIFORNIA

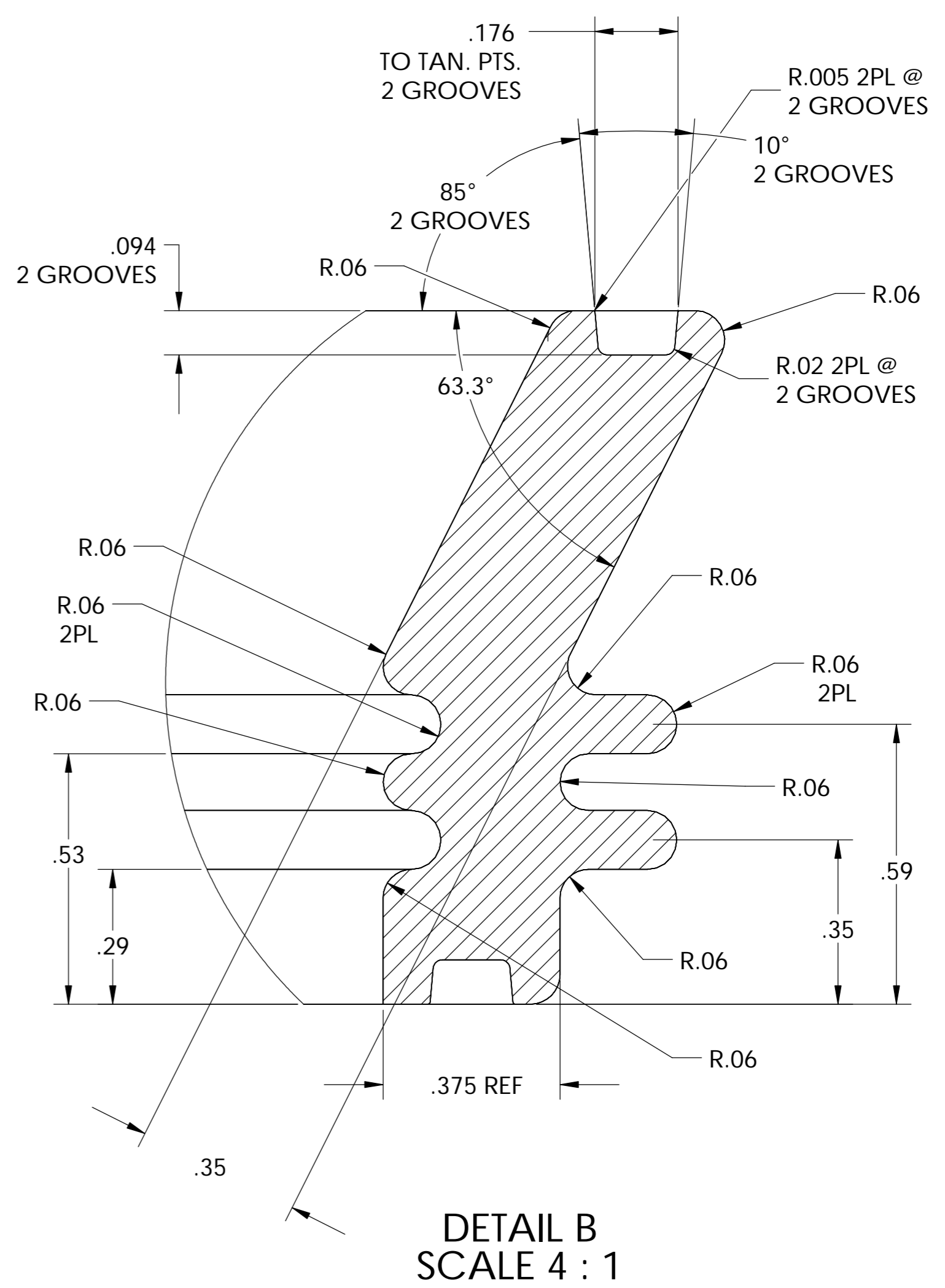
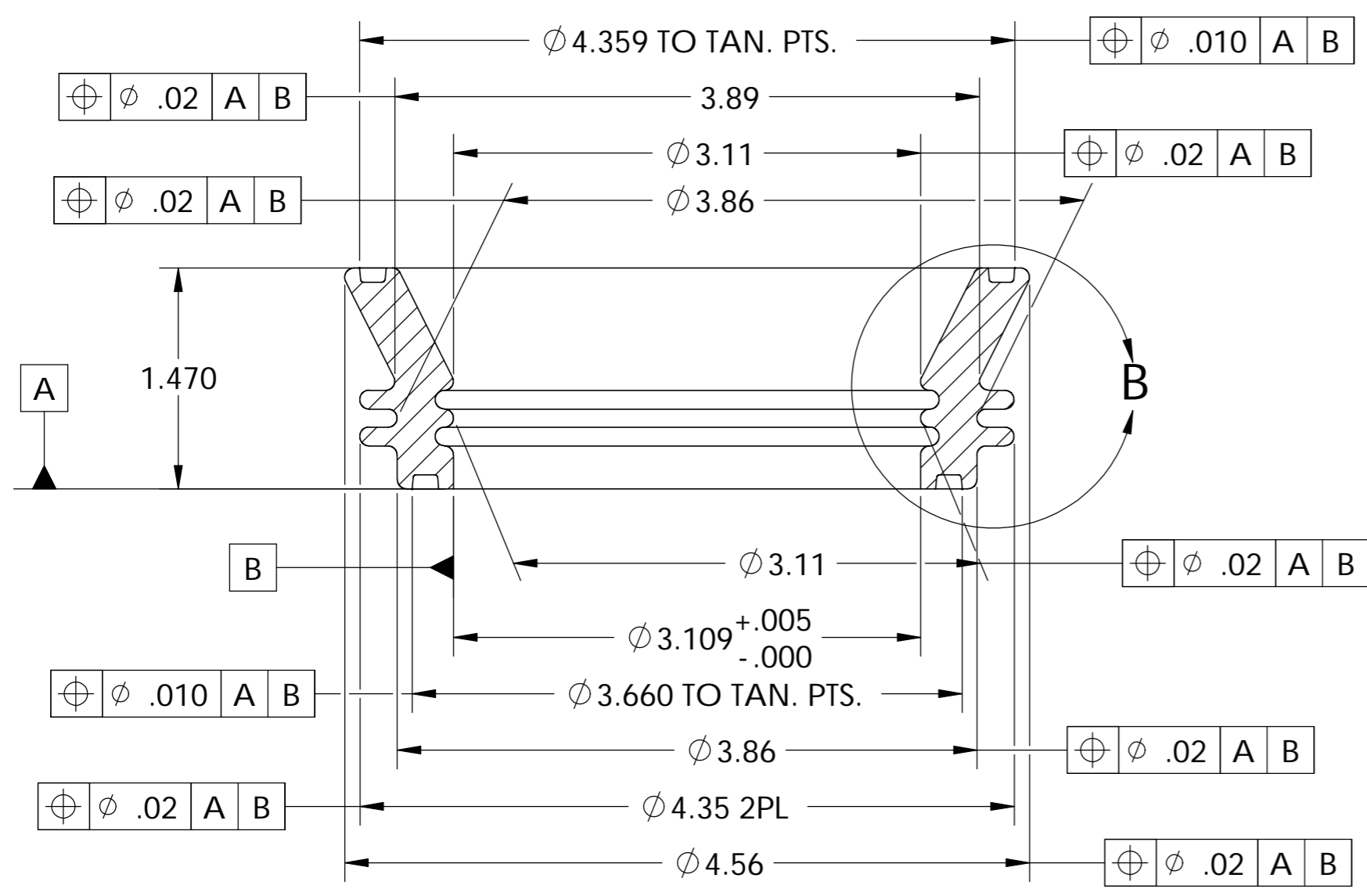
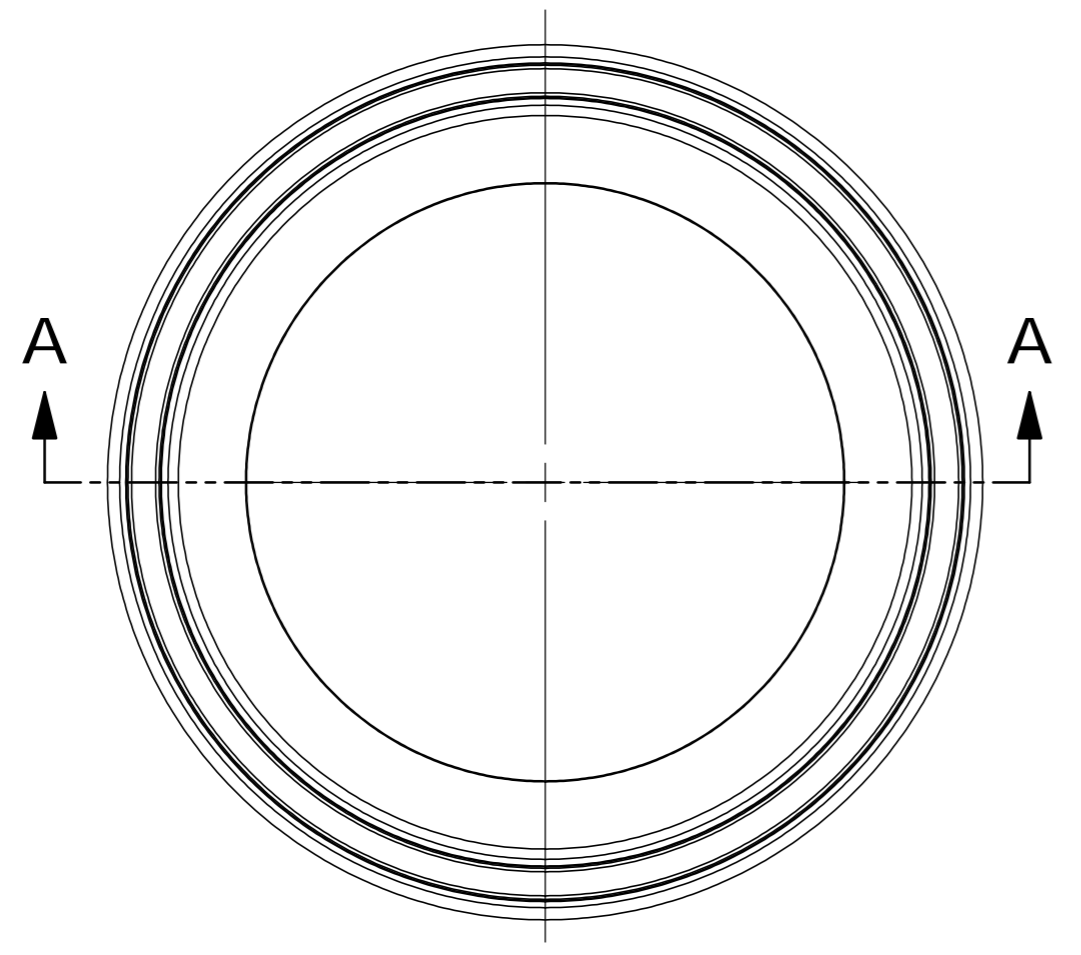


DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 4:1	
THIRD ANGLE PROJECTION	

HYBRID ION SOURCE (HYBRIS)			
WASHER, BUSHING, #8			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A357	REV A

UNLESS OTHERWISE SPECIFIED =>	.X ± 1_INCH .XX ± 01_INCH .XXX ± 005_INCH
FRACTIONS: -/--	
ANGLES: 0.1° / INCH	
MACH. SURFS. 125 MICRO-INCH	<input checked="" type="checkbox"/> OR BETTER

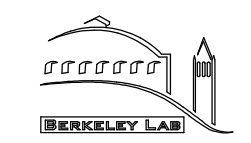
DO NOT SCALE DRAWING.
 INTERPRET PER ASME Y14.5M-1994.
 THREADS ARE CLASS 2.
 BREAK MACHINED EDGES .016 MAX.
 REMOVE BURRS, WELD SPLATTER &
 LOOSE SCALE.

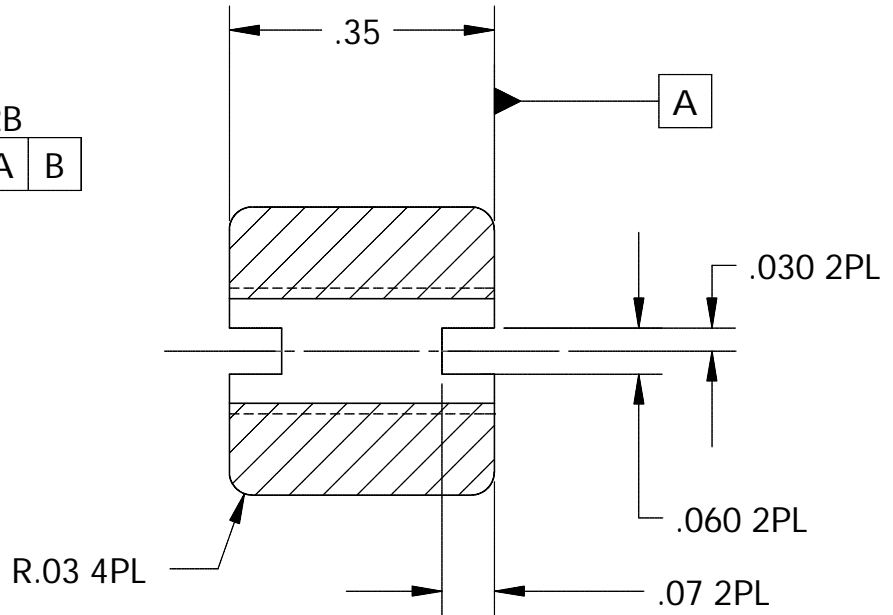
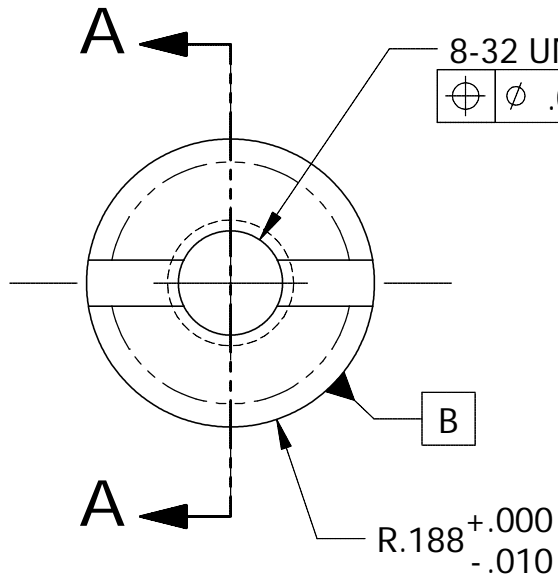


SECTION A-A

A/R			VESPEL, SP1
REQD	ITEM	PART NO.	DESCRIPTION

REV	DRAWN BY	APPVD.	DATE	DESCRIPTION
A	PAL	R. KELLER	11/17/03	INITIAL RELEASE

UNLESS OTHERWISE SPECIFIED		PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA 
TOLERANCES	.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH	PROJECT NUMBER:	
	FRACTIONS: -/--	NEXT ASSEMBLY:	
	ANGLES: 0.1° / INCH	27A328	
	MACH. SURFS.: 125 MICRO-INCH OR BETTER	CALC. WT. KG.	0.336 LB.
DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.		SCALE: 1:1	INSULATOR, EXTRACTOR / OUTLET
		THIRD ANGLE PROJECTION	SHEET OF 1 SIZE: C DWG NO: 27A358 REV A




SECTION A-A

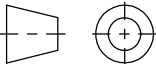
A/R			SST, 303/304
REQD	ITEM	PART NO.	DESCRIPTION

PROJECT NAME:	ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY UNIVERSITY OF CALIFORNIA
PROJECT NUMBER:	
NEXT ASSY:	
CALC. WT.	KG. 0.009 LB.

ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA



HYBRID ION SOURCE (HYBRIS)

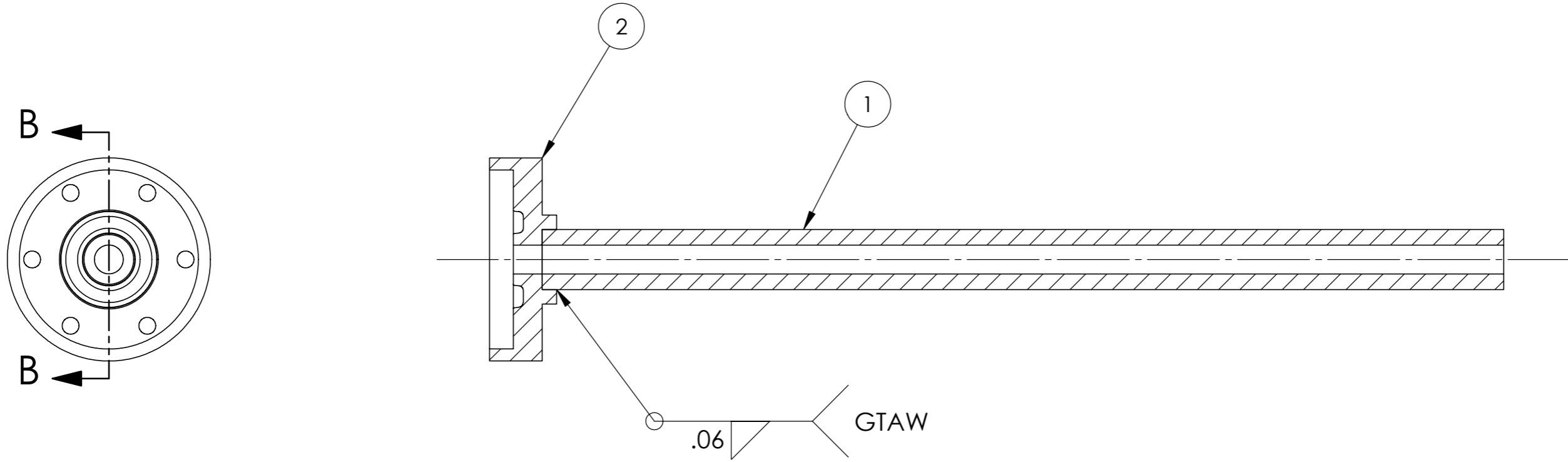
DO NOT SCALE PRINT	CATEGORY CODE:
SCALE: 4:1	
THIRD ANGLE PROJECTION	

THREADED INSERT, OUTLET			
SHEET 1 OF 1	SIZE: A	DWG NO: 27A359	REV A

UNLESS OTHERWISE SPECIFIED =>	.X ± 1_INCH .XX ± 01_INCH .XXX ± 005_INCH
FRACTIONS: -/--	
ANGLES: 0.1° / INCH	
MACH. SURFS. 125 MICRO-INCH	<input checked="" type="checkbox"/> OR BETTER

DO NOT SCALE DRAWING.
INTERPRET PER ASME Y14.5M-1994.
THREADS ARE CLASS 2.
BREAK MACHINED EDGES .016 MAX.
REMOVE BURRS, WELD SPLATTER &
LOOSE SCALE.

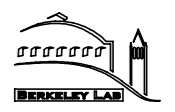
NOTES:
 1) VACUUM TIGHT TO 10E-6 TORR.
 2) CLEANING, WELDING AND VACUUM PROCEDURES
 PER LBNL ENGINEERING NOTE M8184.

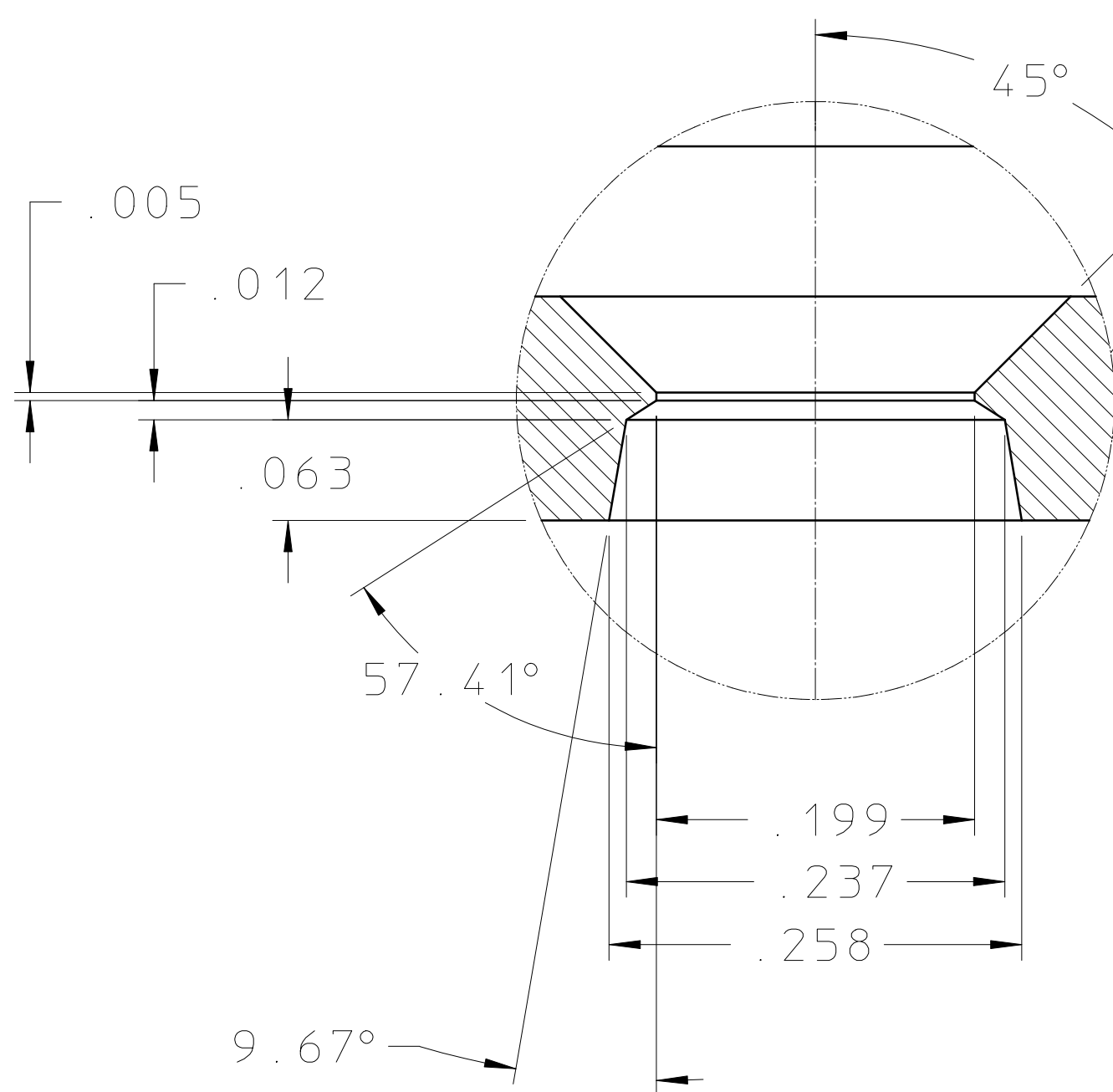
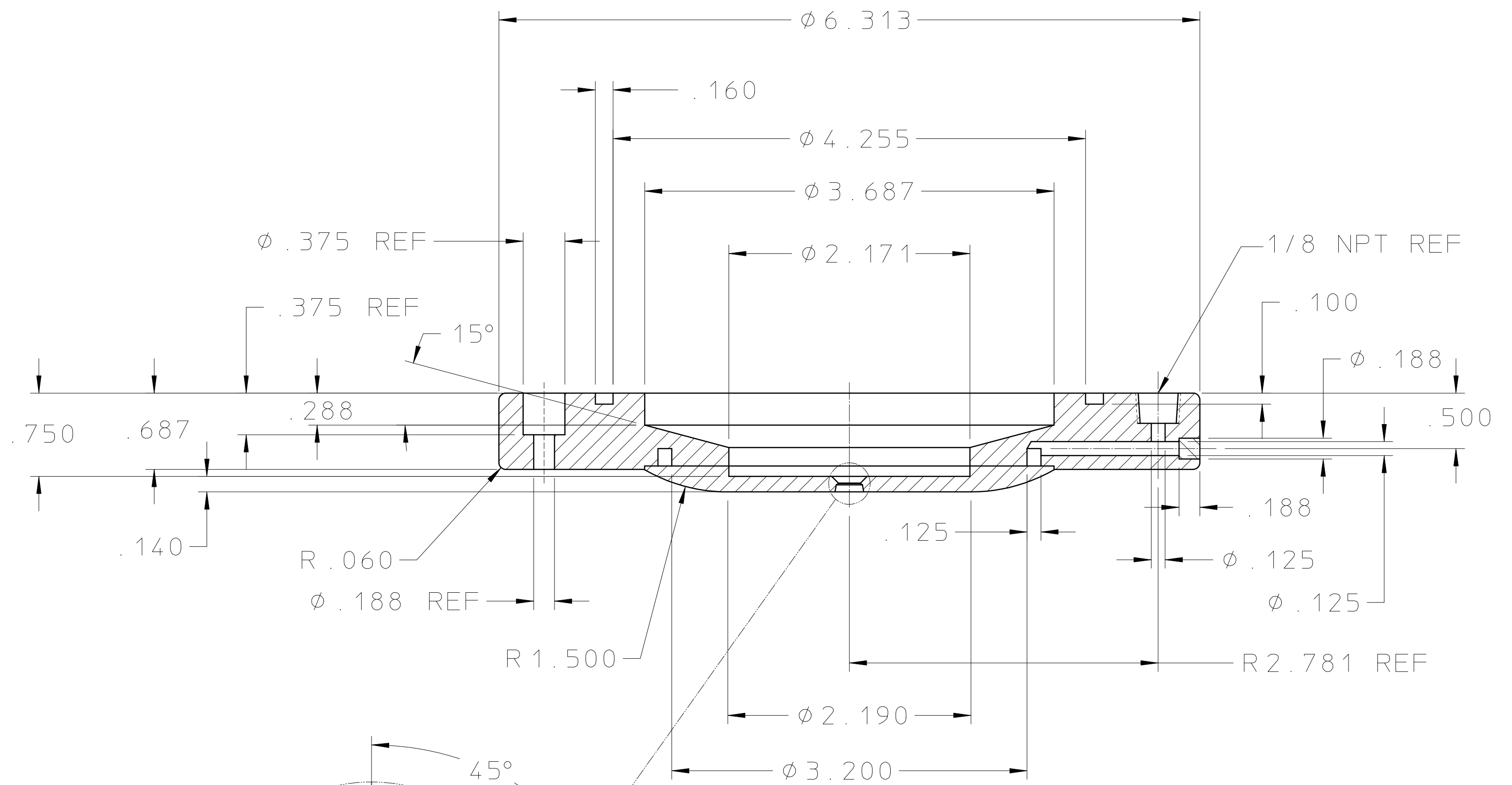
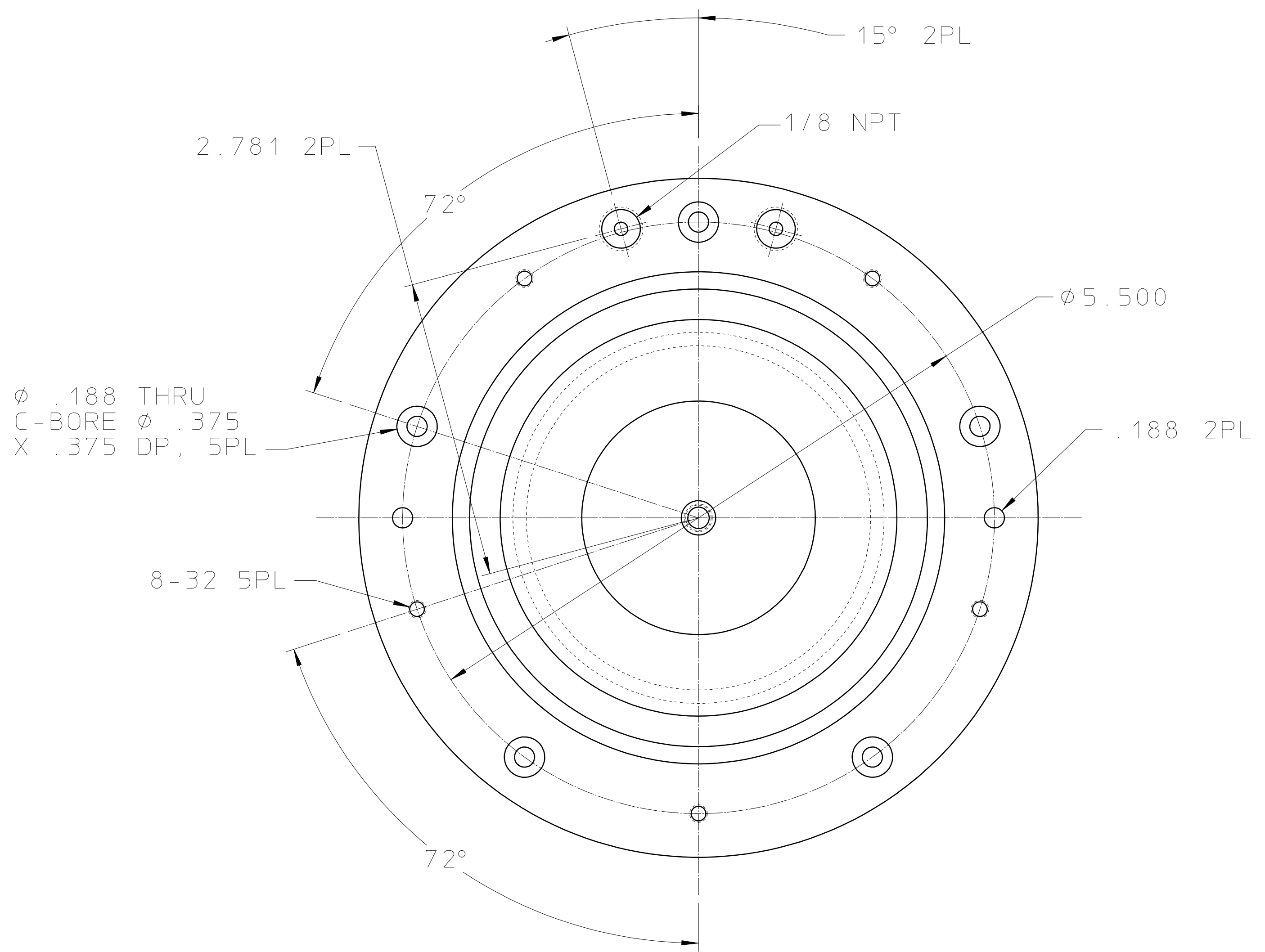


SECTION B-B

ITEM	QTY	PART NO.	DESCRIPTION
2	1	27A338	FLANGE, VIEW PORT, CATHODE
1	1	27A337	TUBE, VIEW PORT, CATHODE

					UNLESS OTHERWISE SPECIFIED		PROJECT NAME:		ERNEST ORLANDO LAWRENCE				
					.X ±.1_INCH .XX ±.01_INCH .XXX ±.005_INCH		PROJECT NUMBER:		BERKELEY NATIONAL LABORATORY				
					FRACTIONS: -/--		NEXT ASSY: 27A330		UNIVERSITY OF CALIFORNIA				
					ANGLES: 0.1° / INCH		CALC. WT. KG. 0.06 LB.		HYBRID ION SOURCE (HYBRIS)				
					MACH. SURFS.: 125 MICRO-INCH ✓ OR BETTER		DO NOT SCALE PRINT		CATEGORY CODE:		WELDMENT, CATHODE FLANGE		
					DO NOT SCALE DRAWING. INTERPRET PER ASME Y14.5M-1994. THREADS ARE CLASS 2. BREAK MACHINED EDGES .016 MAX. REMOVE BURRS, WELD SPLATTER & LOOSE SCALE.		SCALE: 2:1				WELDMENT, VIEW PORT		
REV	DRAWN BY	APPVD.	DATE	DESCRIPTION			THIRD ANGLE PROJECTION		SHEET 1 OF 1		SIZE: B	DWG NO: 27A360	REV A





ARGONNE NAT. LAB
ION SOURCE

DIMENSIONS IN INCHES.
THIS LAYOUT IS FOR
REFERENCE ONLY.