

Diagnostic Instrument Design for the Start up Source & LEBT

Sam K. Mukherjee

This technical note is intended exclusively for internal use inside the SNS Front-End-Systems Group. The primary purpose of the technical note series is to promote rapid dissemination of results for work in progress. No formal review has taken place to ascertain the accuracy of its contents, or the consistency / compatibility of the information with other SNS work.

Diagnostic Equipment for the startup source and LEBT
Sam K. Mukherjee
LBNL Mechanical Engineering
September 20, 1999

Scope

The R&D test stand for the SNS source #1 has been built on the existing diagnostic spool. The spool contained the horizontal and vertical emittance measuring slits as well as the faraday cup.

The startup source and the LEBT assembly include a new diagnostic spool compatible with the RFQ layout. The diagnostic instruments have to be modified to fit this new spool.

This tech note describes the modifications made on the existing diagnostic equipment.

Description

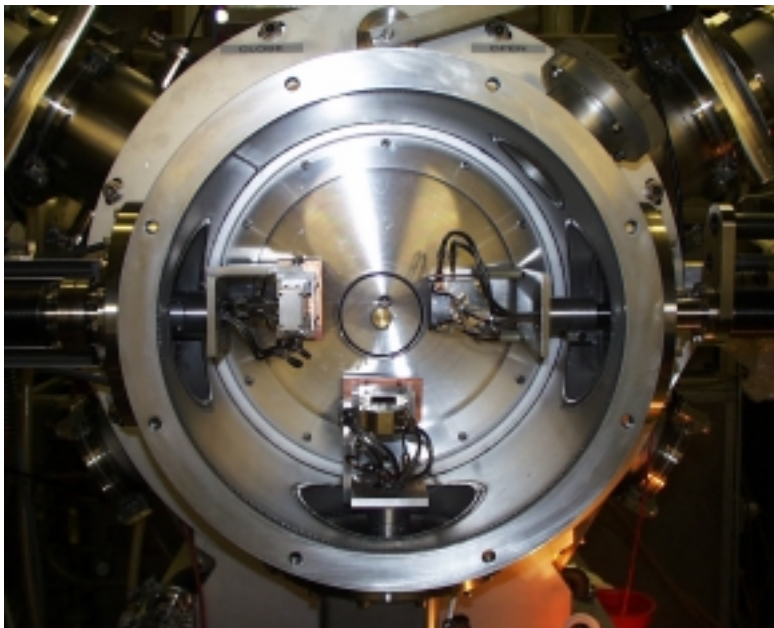


Photo shows the Emittance scanner and Faraday cup arrangement.

The new diagnostic spool has 18 inches inside diameter is smaller than the old setup. The individual scanner is modified to match the axial distance by special bracket plate. The face of the scanner shield block is set at 2 cm from the aperture of the last LEBT electrode. The axis alignment is maintained by positioning the scanner mounting flanges within close tolerances in X-Y direction, as well as right angle to each other. The BCD and dimensions of the last electrode plate are copied from the RFQ mounting flange design (Mat Hoff).

The Faraday cup was separated from the Y-axis scanner and mounted on a new manual actuator with 4 inches travel. These three instruments operate through electrical interlocks such that only one can be operated at one time.

This new vacuum vessel is pumped down by an existing CT-8 Cryo-pump and Vat valve setup, mounted on the end plate. An isolation valve (see ME Note M7770) separates the LEBT vacuum vessel and the diagnostic spool.

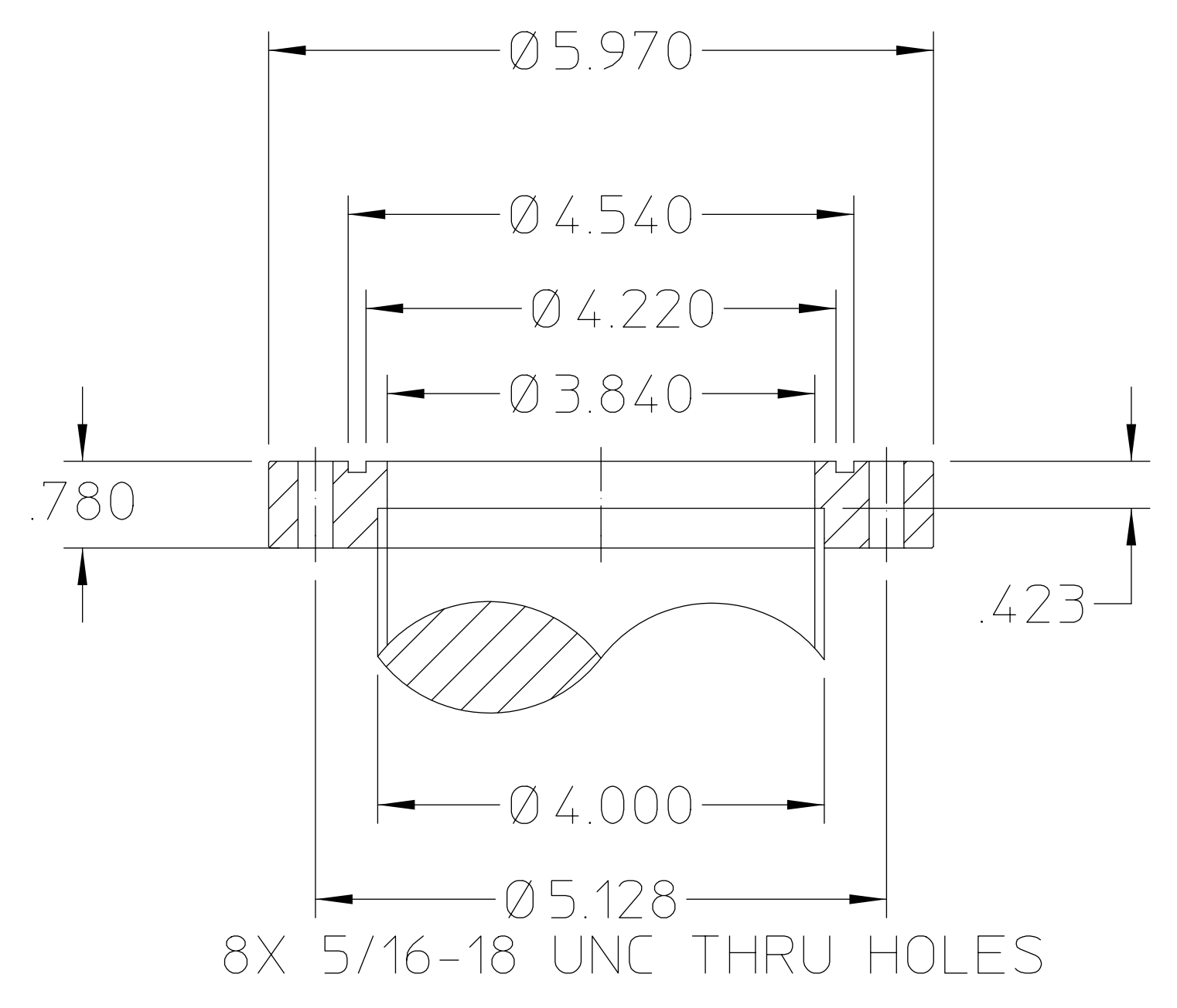
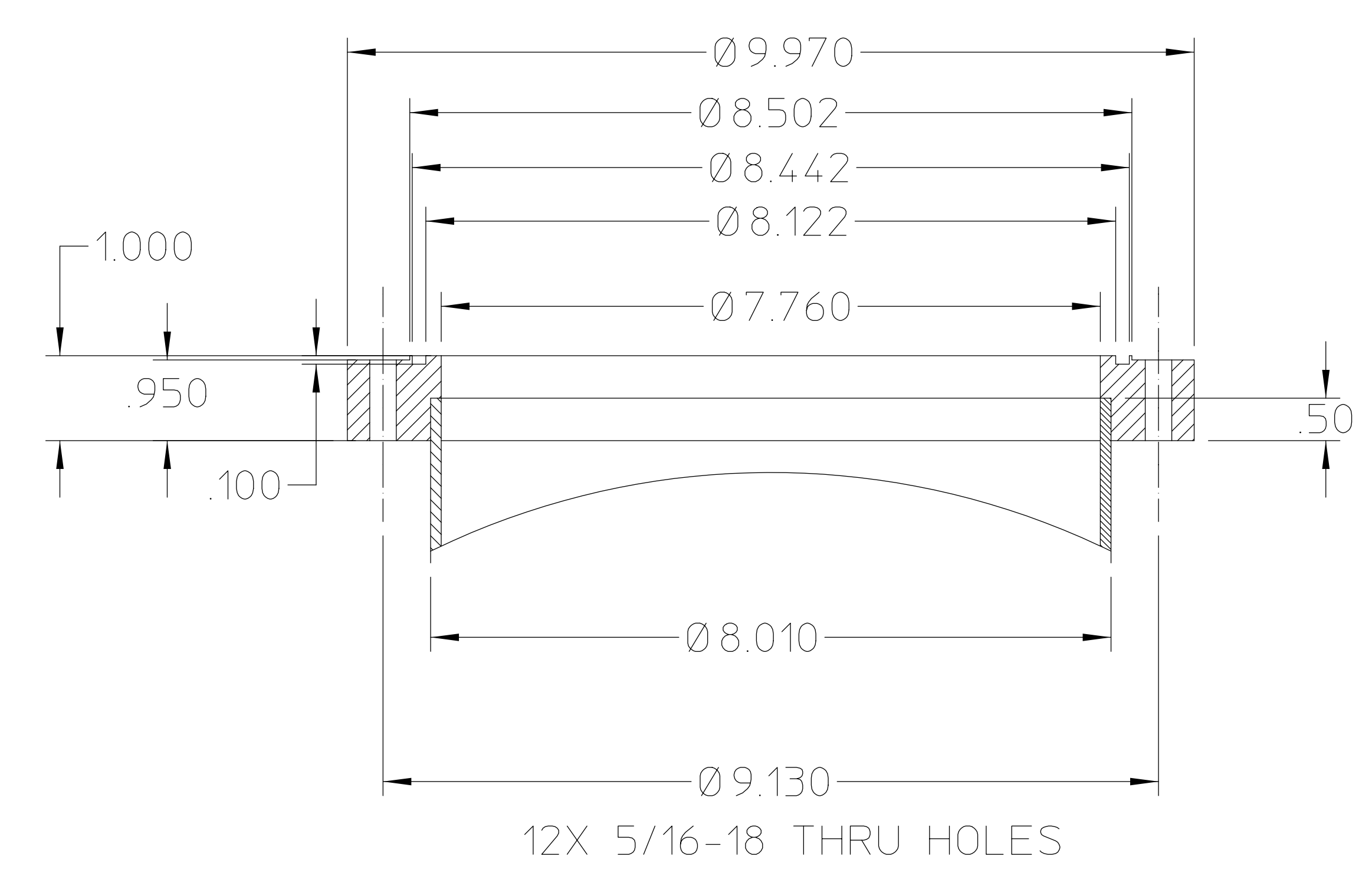
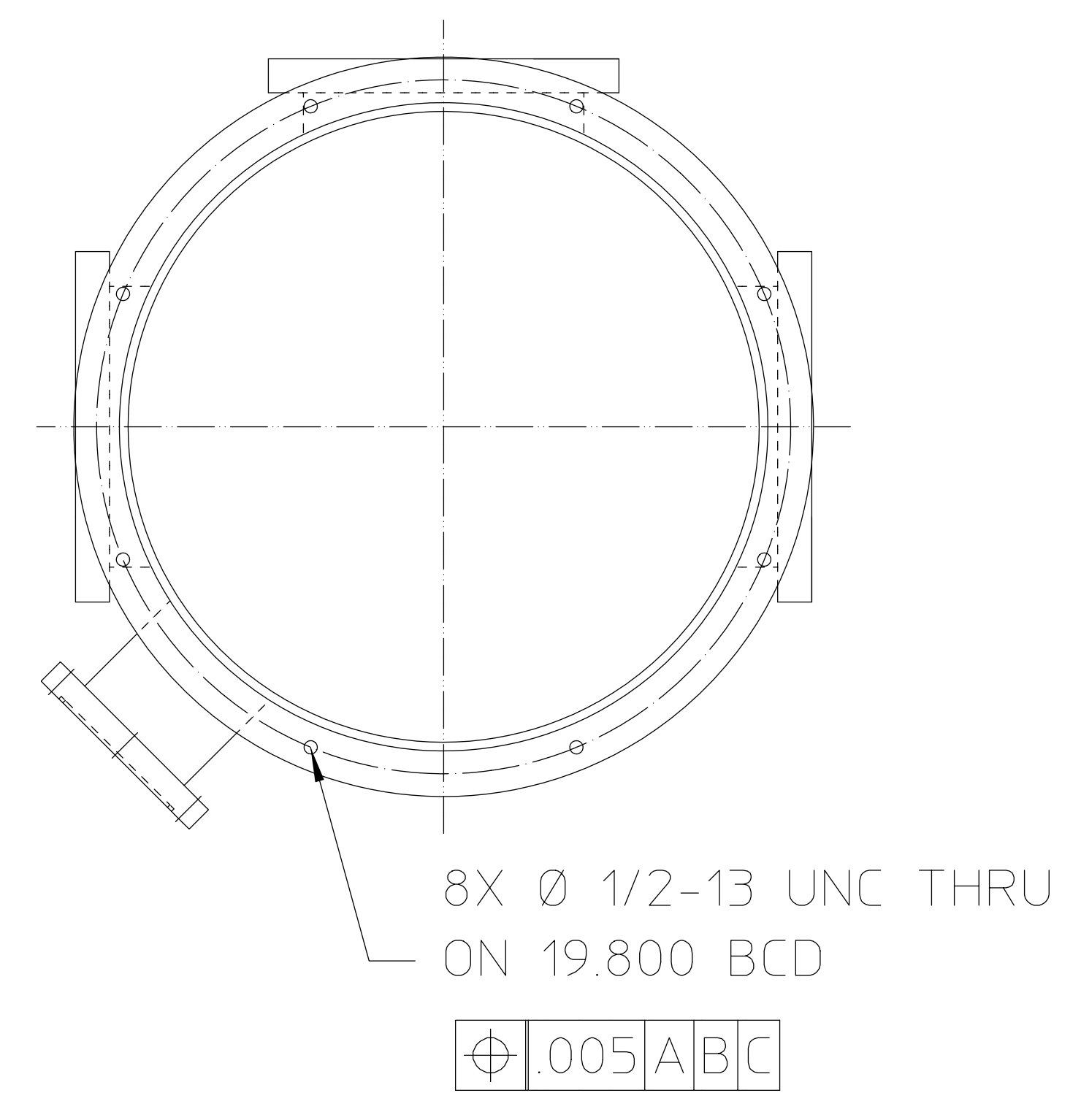
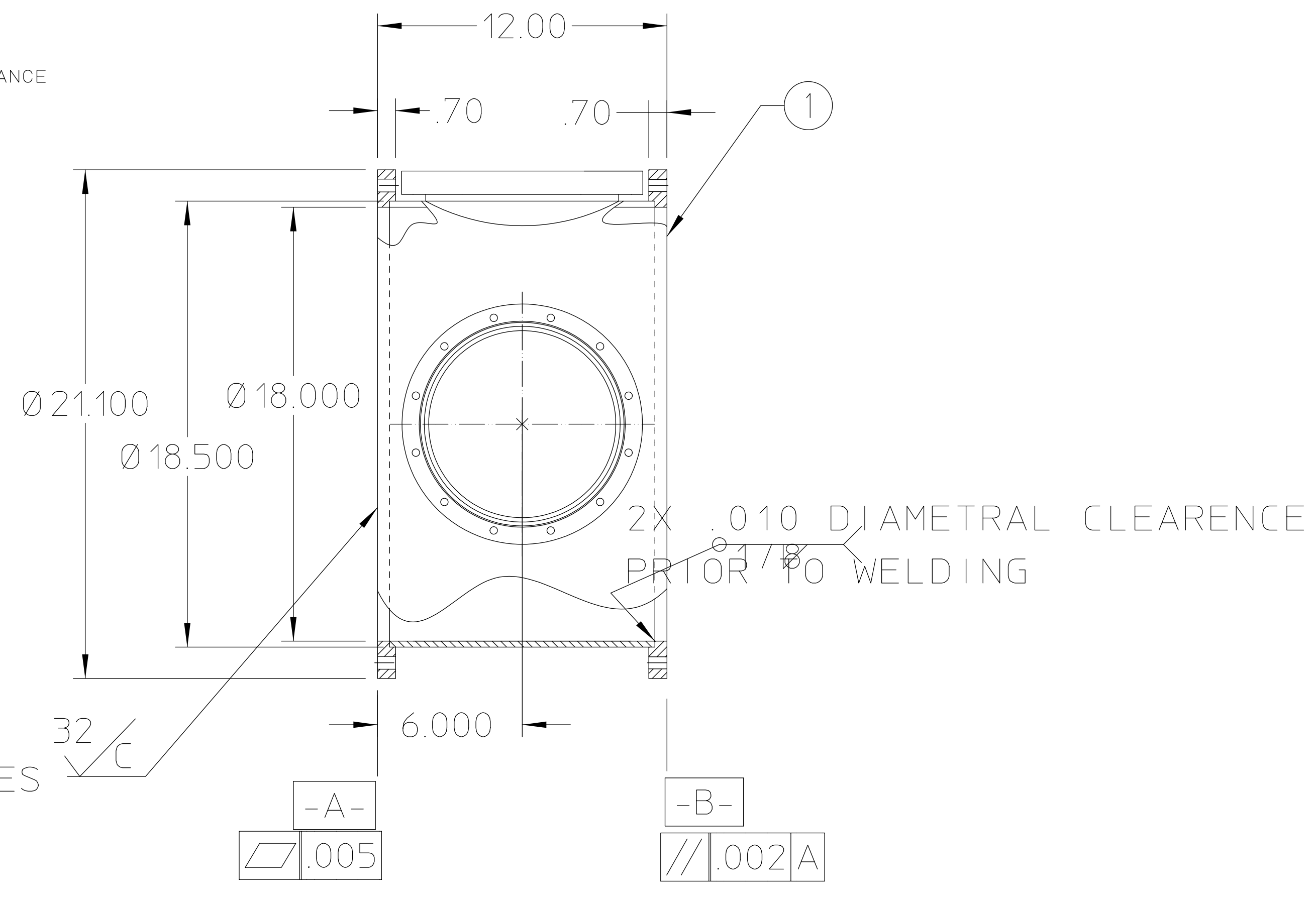
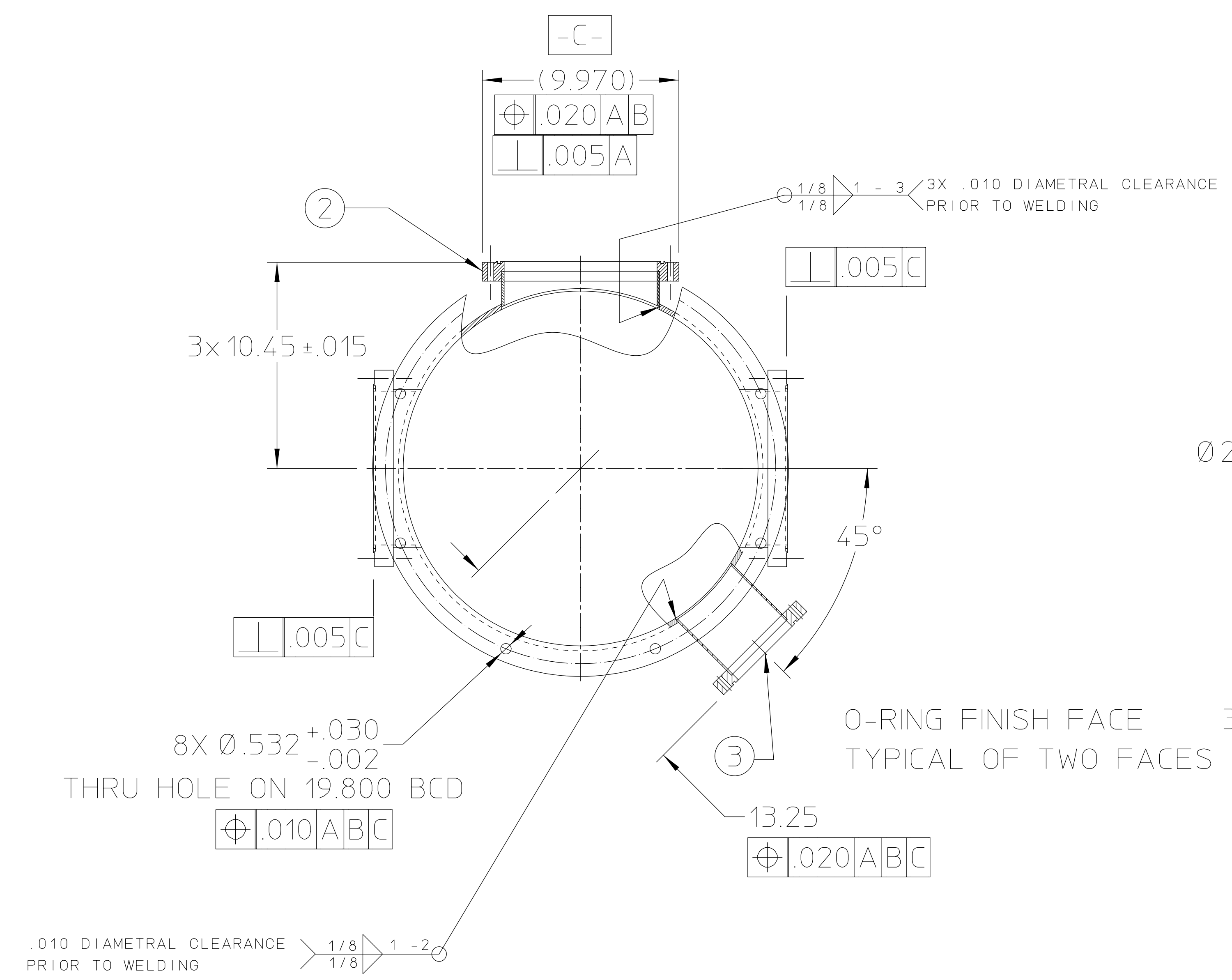
Testing

The new spool was tested for vacuum leak during LEBT system check. The scanner instrument translator was operated and no interference was noticed.

Drawings

21C9926	New Diagnostic Spool
21C9934	End Cover
25B0696	LEBT Vacuum Chamber
25B0726	Bulkhead Plate
21G8986	LEBT Last Electrode

- NOTES:
 1.THIS IS A VACUUM VESSEL
 2.ALL JOINTS TO BE LEAK TESTED
 ALLOWABLE LEAK RATE IS 1×10^{-7} T-L/SECOND
 3.BREAK ALL SHARP CORNERS
 4.MATERIAL IS 6061-T4 ALUMINUM



DETAIL OF ITEM 2
(SIZE 3X)

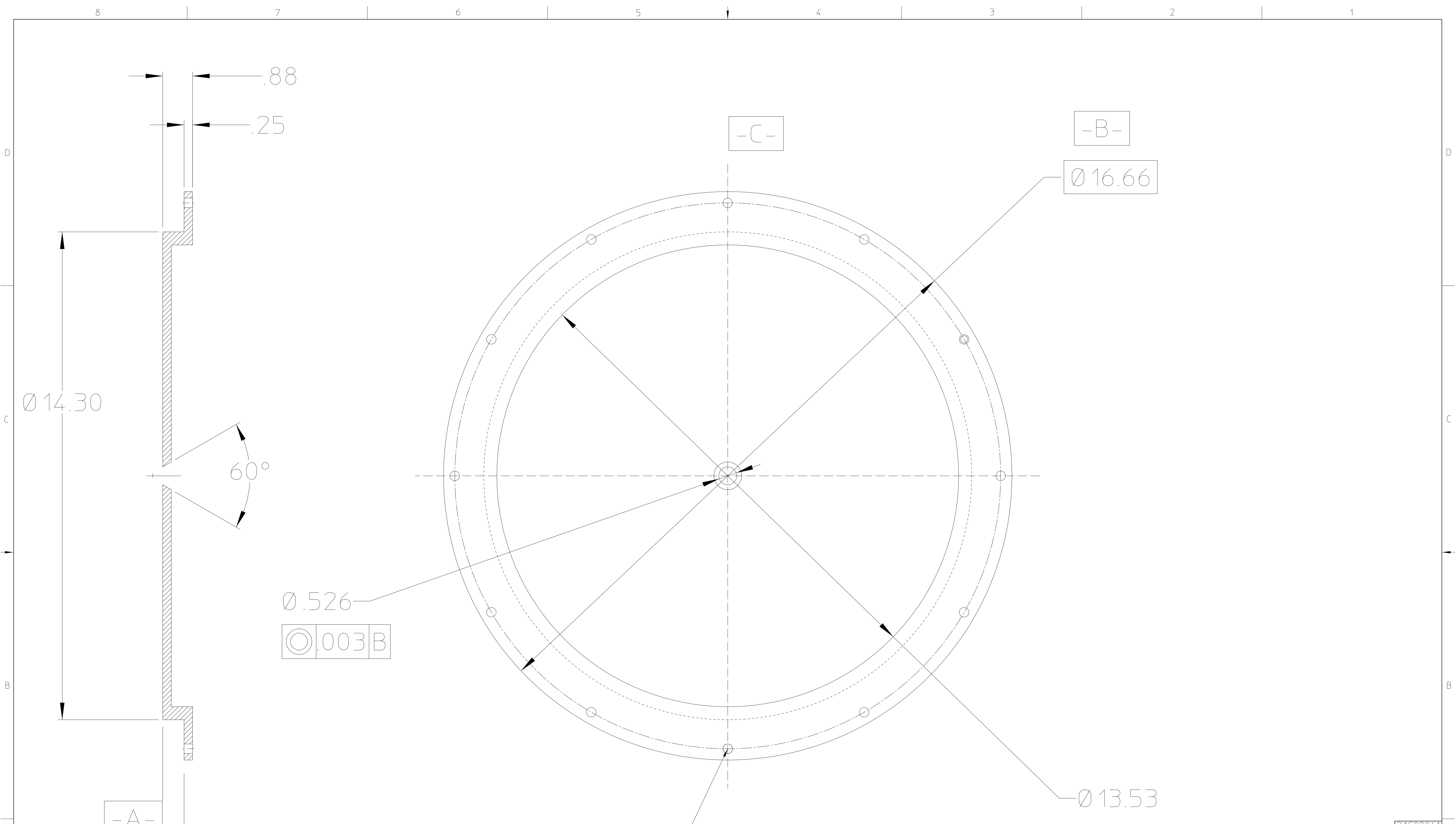
DETAIL OF ITEM-3
(SIZE 3X)

21C9926

1	3	-3	HALF NIPPLE WITH SPECIAL 6.00 OD FLANGE
3	2	-2	SPECIAL FLANGE, 10.00 OD, 6061-T4 ALUMINUM
1	1	-1	TUBE, 18.50 OD, 6061-T4 ALUMINUM
REVISION			DESCRIPTION
LAWRENCE BERKELEY LABORATORY			UNIVERSITY OF CALIFORNIA-BERKELEY
SNS-FRONT END SYSTEM			ION SOURCE PROTOTYPE DESIGN
NEW DIAGNOSTIC SPOOL			
IDENT. TAG	PATENT CLEAR	DWG. TYPE	SCALE
BY: S. MUKHERJEE	DATE: 03-25-99	PART	1:4
CHK: []	DATE: []	DWG. NO.	DO NOT SCALE
		8210-14 FE1100	1

UNLESS OTHERWISE SPECIFIED	FRAC. ± 1/64	ACCT. NO.	SHOP ORDERS
ANGLES ± 1°	FINISH 125.7	DATE	SERIAL NO.
THREADS ARE CLASS 2	CHAMFER ENDS OF ALL SREW THREADS 30°	ISSUE	NO.
CUT 1.5 PITCH AND RELIEF WITH BRAD NIPSE TOOL	ON MACHINE CUT THREADS	REVISION	NO.
BREAK EDGES .016 MAX. ON MACHINED WORK	REMOVE BURRS WELD SPATTER & LOOSE SCALE	DATE	NO.
REFERENCES: ANSI Y14.5 & B46.1			

REV	DWG	CHK	ZONE	DATE	CHANGES



-A-
 ▱.005
 // .005 A

12X Ø .281 THRU HOLE
 EQ SPD ON Ø16.000 BC

⊕.003 ABC
 ◎.003 BC

-B-
 Ø 16.66

Ø 13.53

-C-

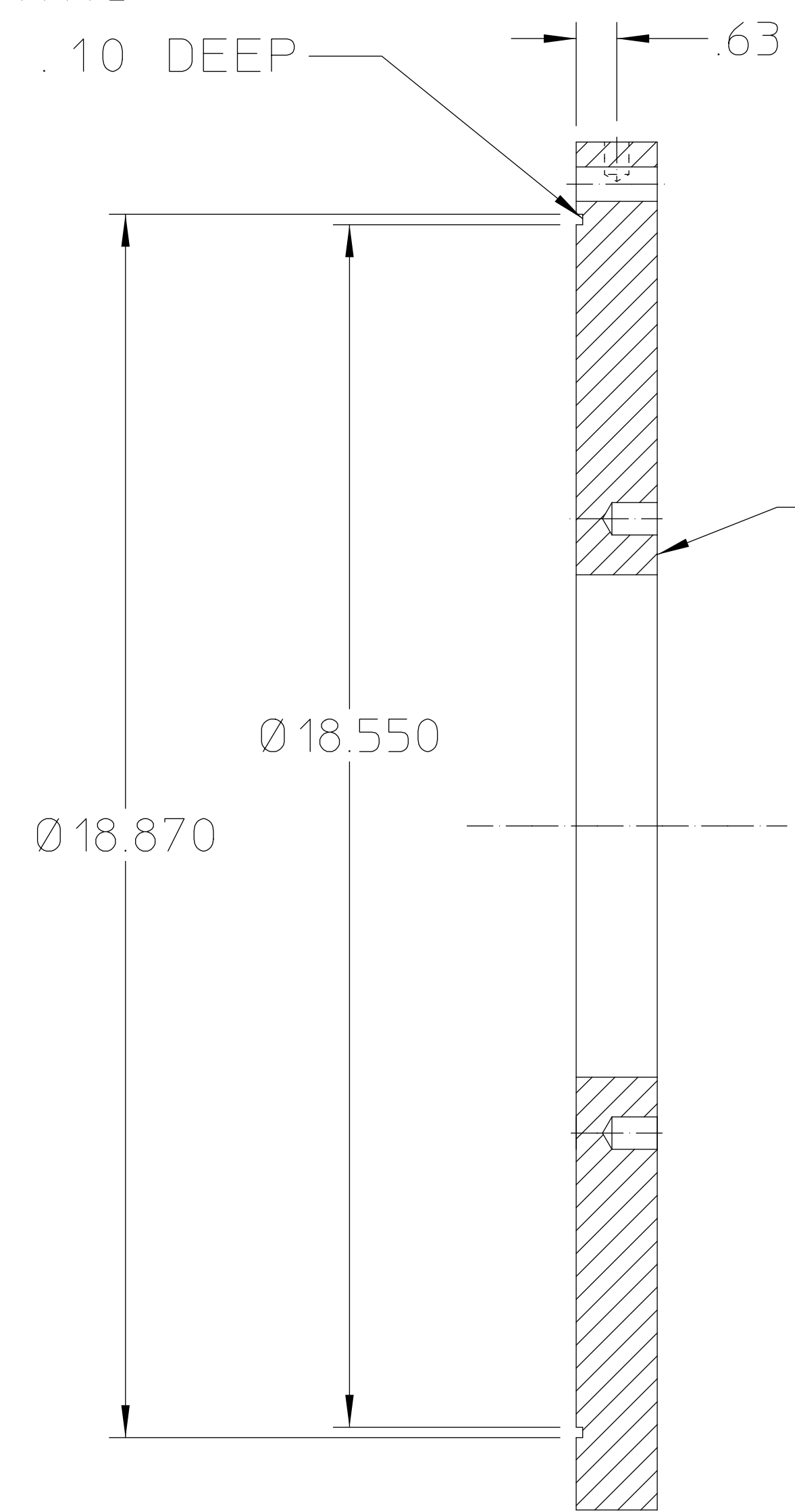
NOTE:
 THIS IS A TEMPORARY PART FOR
 STARTUP TESTING. A FINAL RFQ
 DIAGNOSTIC ASSEMBLY WILL REPLACE IT.

21G8986A

1		6061 - T4 ALUMINUM	
RECD		DESCRIPTION	
UNLESS OTHERWISE SPECIFIED		LAWRENCE BERKELEY LABORATORY	
X ± .1 FRACTION ± 1/64		UNIVERSITY OF CALIFORNIA-BERKELEY	
XX ± .01 ANGLES ± 1°		SNS - FRONT END SYSTEM	
XXX ± .001 FINISH 125/7		LEBT TEST STAND	
THREADS ARE CLASS 2		LEBT LAST ELECTRODE	
CHAMFER END OF ALL SCREW THREADS 30°		TREATMENT DEGREASE	
CUT 1/2 PITCH FRO RELIEF WITH ROUND NOSE TOOL		IDENT TAG	
ON MACHINE CUT THREADS		PATENT CLEAR	
BREAK EDGES .016 MAX. ON MACHINED WORK		DWG. TYPE	
REMOVE BURRS WELD SPATTER & LOOSE SCALE		BY S. MUKHERJEE	
REFERENCES: ANSI Y14.5 & B46.1		DATE 06-08-99	
REV DWG CHK ZONE DATE		BY DAN CHENG	
ADDED 'CHECKED BY' NAME		PRT OR FILTRD	
CHANGES		DESIGN ART. NO.	
		CATEGORY CODE	
		DWG. NO.	
		SCALE FULL	
		DO NOT SCALE	
		1 PRINTS	
		SIZE	
		REV	
		21G8986	
		A	

REQ	ITEM	PART NUMBER	DESCRIPTION
1			6061-T4 ALUMINUM PLATE (1.25 STOCK OK)

1/8 O-RING
GROOVE .10 DEEP



-A-
□ .005

∥ .005

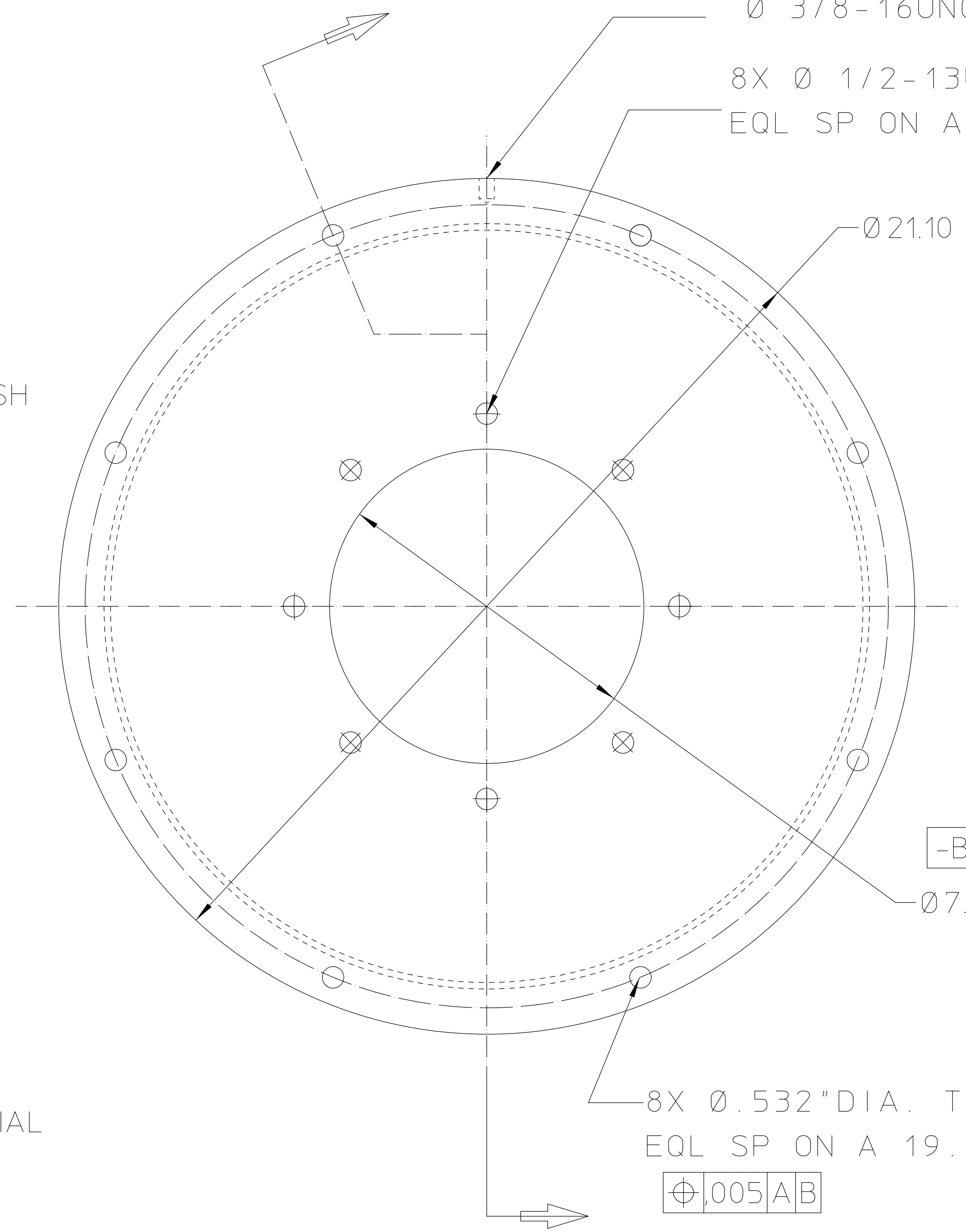
1.25
STOCK MATERIAL

O-RING FINISH

Ø 3/8-16UNC HOLE, .50 DEEP

8X Ø 1/2-13UNC HOLE, .70 DEEP

EQL SP ON A 9.500 B.C. □ .005 AB



-B-

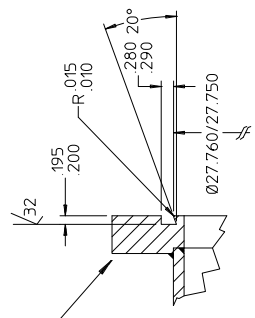
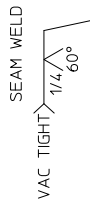
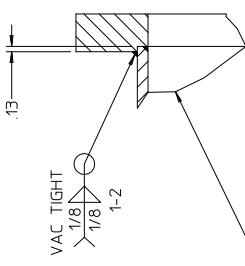
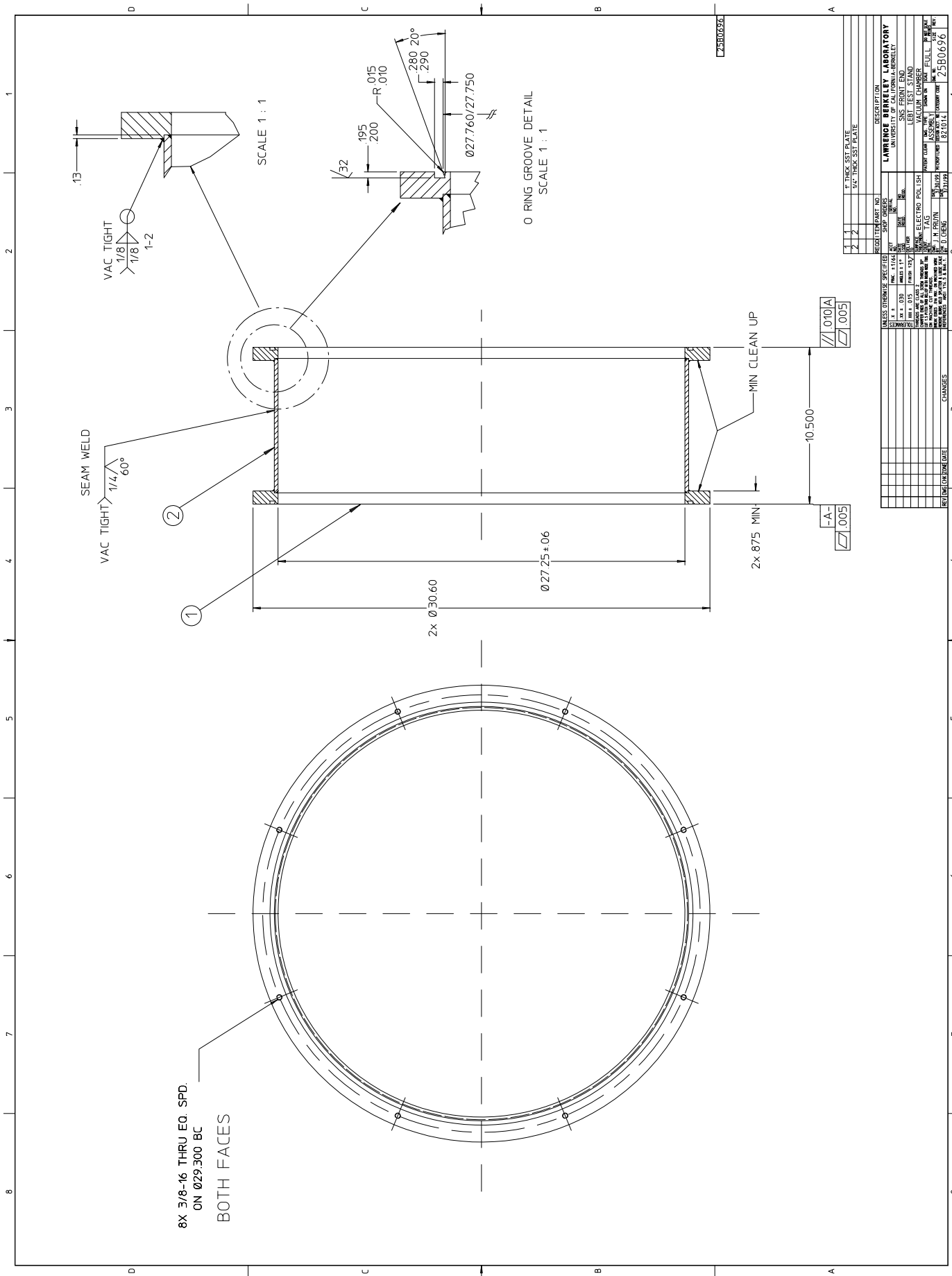
Ø7.75

8X Ø .532" DIA. THRU HOLE
EQL SP ON A 19.800 B.C.
□ .005 AB

NOTES:
BREAK ALL SHARP CORNERS
MATERIAL IS 6061-T4 AL.

21C9934

UNLESS OTHERWISE SPECIFIED				SHOP ORDERS			LAWRENCE BERKELEY LABORATORY					
TOLERANCES		.X ± .1	FRAC. ± 1/64	ACCT. NO.	SERIAL NO.		UNIVERSITY OF CALIFORNIA-BERKELEY					
		.XX ± .05	ANGLES ± 1°	DATE ISSD	DATE RECD	NO. RECD.	SNS - FRONT END SYSTEM					
		.XXX ± .005	FINISH 125√	DELIVER TO			ION SOURCE PROTOTYPE DESIGN					
THREADS ARE CLASS 2				SURFACE TREATMENT			DIAGNOSTIC SPOOL END COVER					
CHAMFER ENDS OF ALL SCREW THREADS 30°				DEGREASE			PATENT CLEAR	DWG. TYPE	SHOWN ON	SCALE	1:2	DO NOT SCALE PRINTS
CUT 1.5 PITCH THRO RELIEF WITH ROUND NOSE TOOL				TAG			DETAIL		DWG. NO.	21C9934	SIZE	REV.
ON MACHINING CUT THREADS				DATE			MICROFILMED		DESIGN ACCT. NO.	8210-14	CATEGORY CODE	FE1100
BREAK EDGES .016 MAX. ON MACHINED WORK				BY: S. MUKHERJEE			DATE		3-25-99			
REMOVE BURRS WELD SPLATTER & LOOSE SCALE				CHK: USUALLY NO ONE			DATE		4/10/99			
REFERENCES: ANSI Y14.5 & B46.1												
REV	DWG	CHK	ZONE	DATE	CHANGES							



8X 3/8-16 THRU EQ. SPD.
ON Ø29.300 BC
BOTH FACES

SCALE 1 : 1

O RING GROOVE DETAIL
SCALE 1 : 1

2x 875 MIN. MIN CLEAN UP

010A
005

-A-
005

REVISION	DATE	DESCRIPTION
1		1" THICK SST PLATE
2		1/4" THICK SST PLATE

REVISION	DATE	DESCRIPTION
1		1" THICK SST PLATE
2		1/4" THICK SST PLATE

REVISION	DATE	DESCRIPTION
1		1" THICK SST PLATE
2		1/4" THICK SST PLATE

REVISION	DATE	DESCRIPTION
1		1" THICK SST PLATE
2		1/4" THICK SST PLATE

REVISION	DATE	DESCRIPTION
1		1" THICK SST PLATE
2		1/4" THICK SST PLATE

REVISION	DATE	DESCRIPTION
1		1" THICK SST PLATE
2		1/4" THICK SST PLATE