

USED ON		F10041054	
MATERIAL			
SEE PARTS LIST			
GROUP:	Technical Division - Design and Drafting	CAGE CODE:	OU5R6

SCALE 1:5 & AS SHOWN	SIZE A2	DRAWING NUMBER F10023864	SHEET 1 OF 3	REV P
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REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
		22-Dec-2021	DRAWN	B.TREVINO	
P	F10023864-P-RCD	07-Feb-2022	APPROVED	B.HARTSELL	

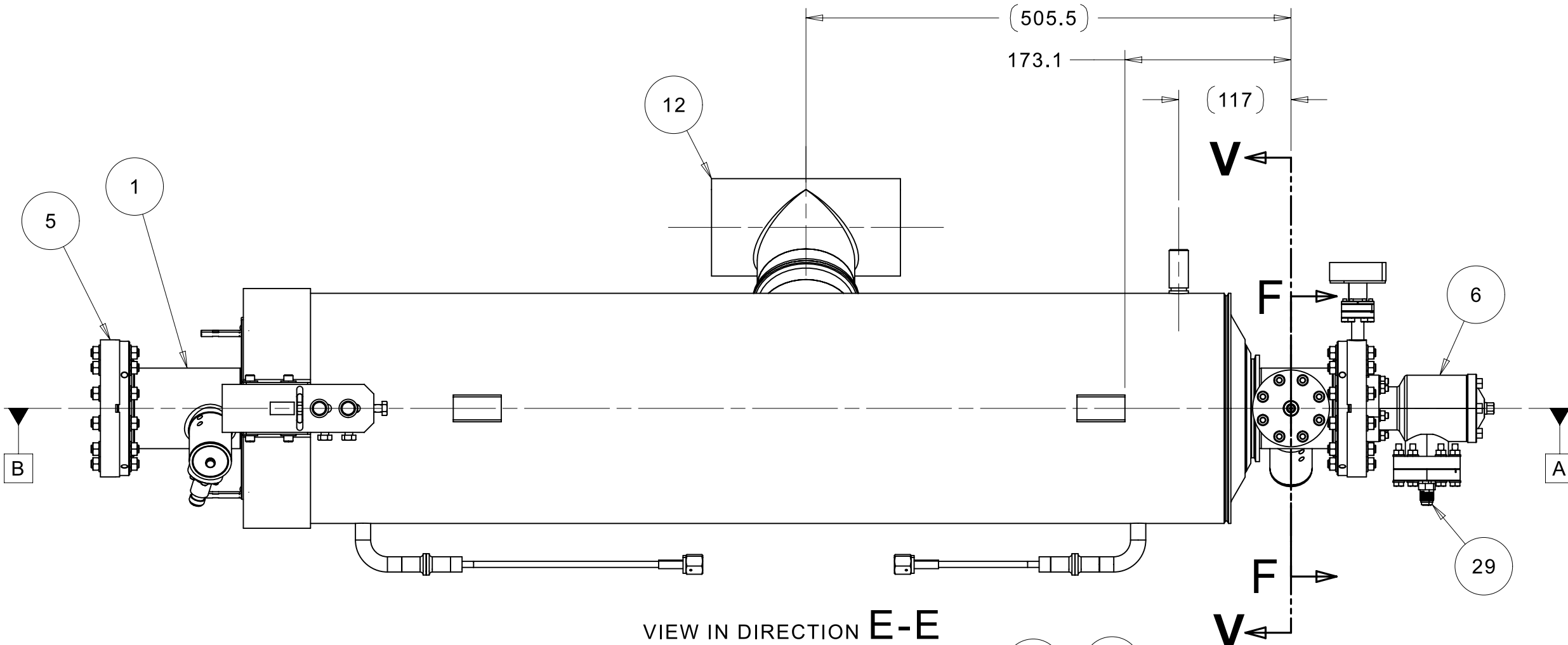
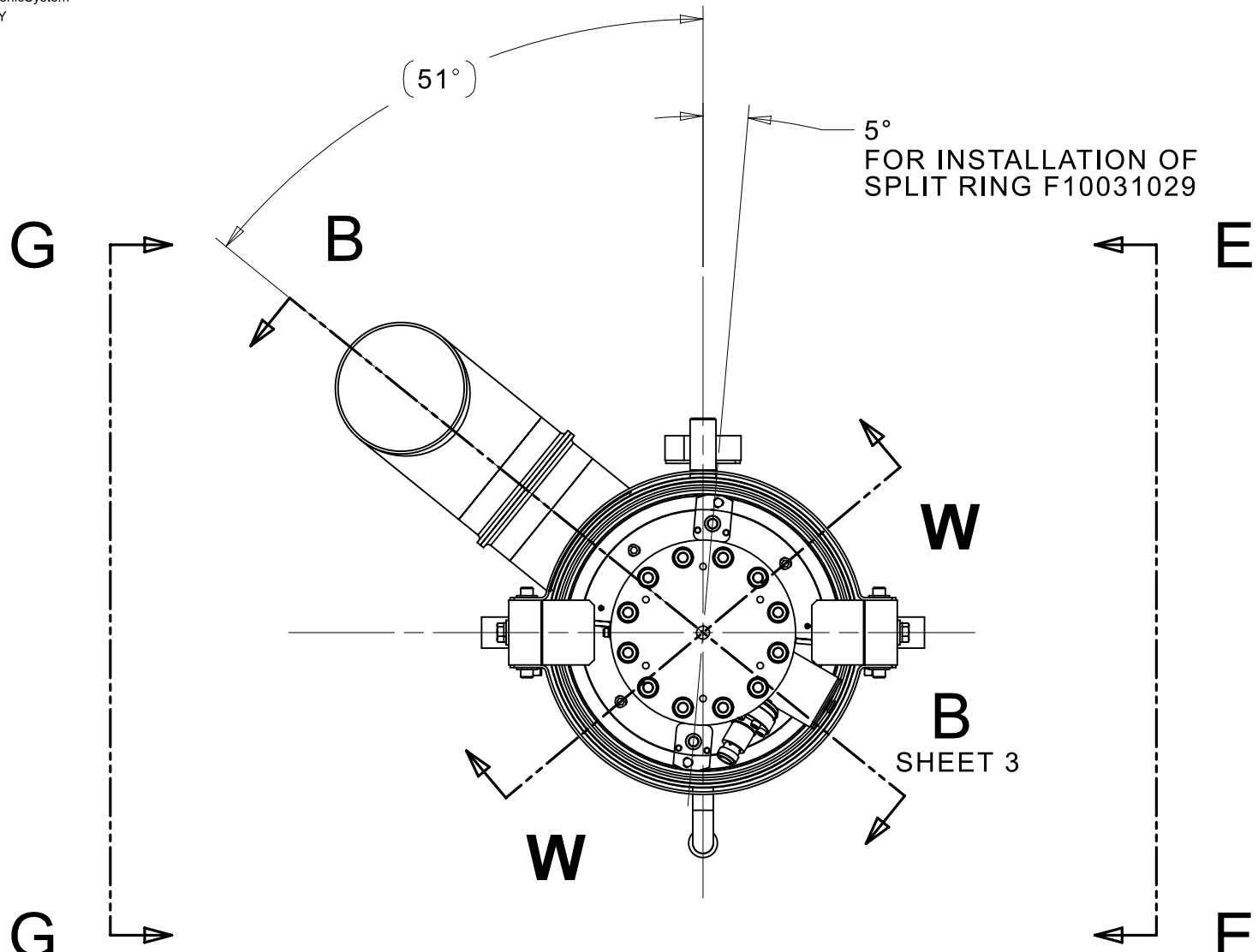
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C

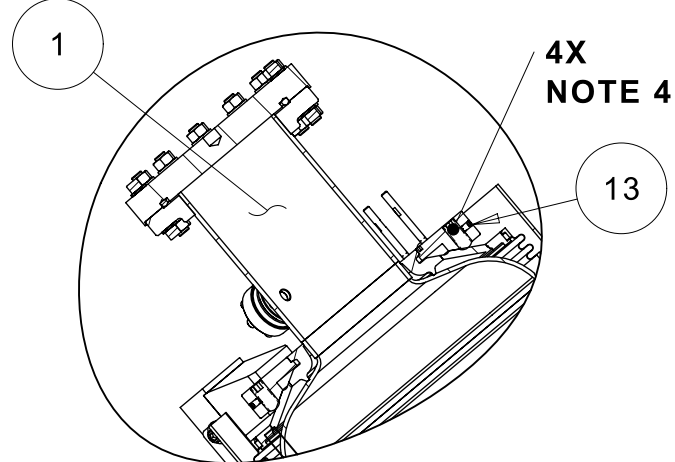
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A

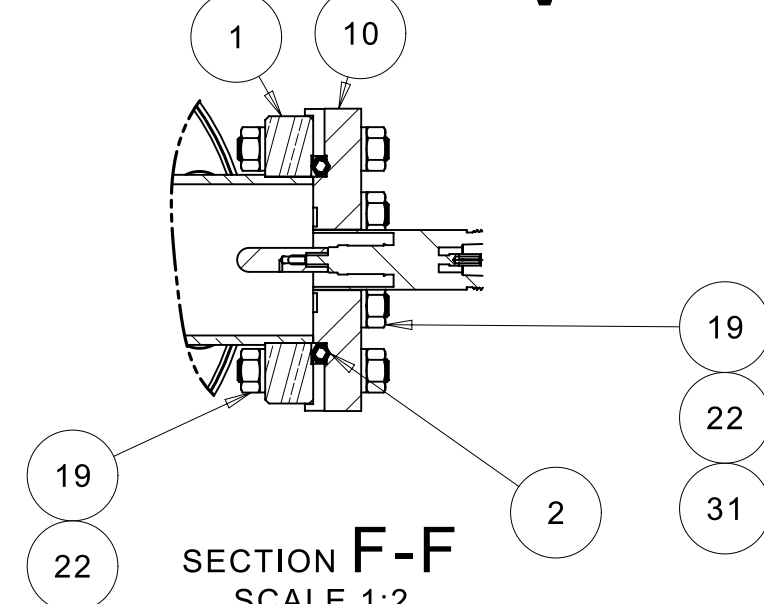
TEMPLATE VERSION: 2021.08.02



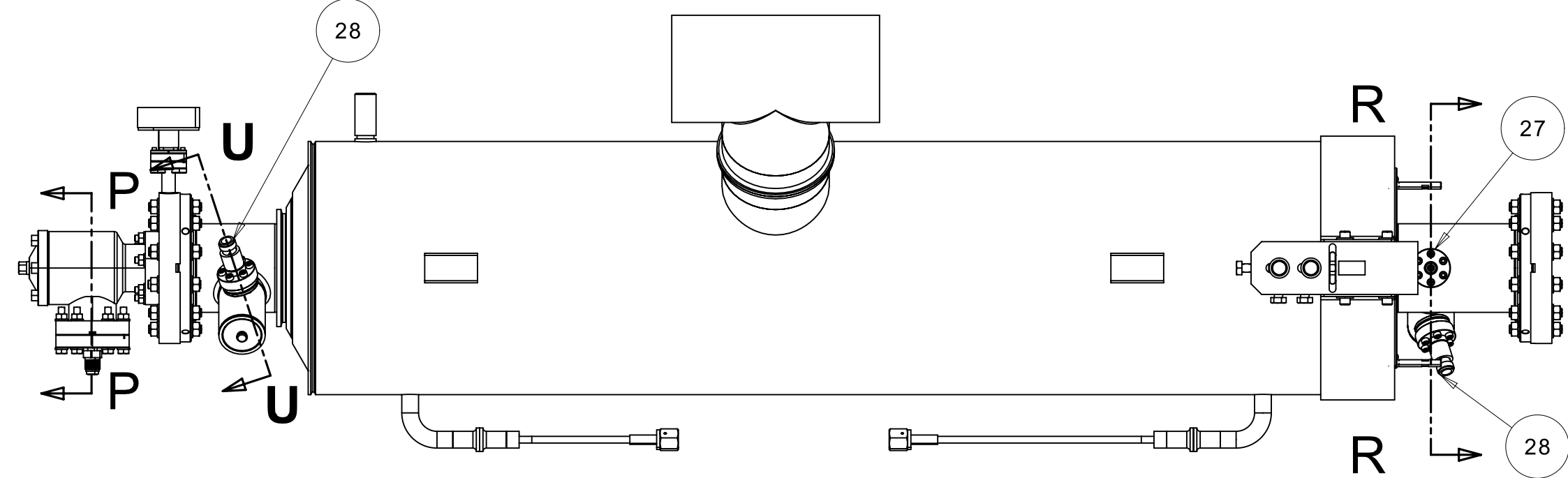
VIEW IN DIRECTION E-E



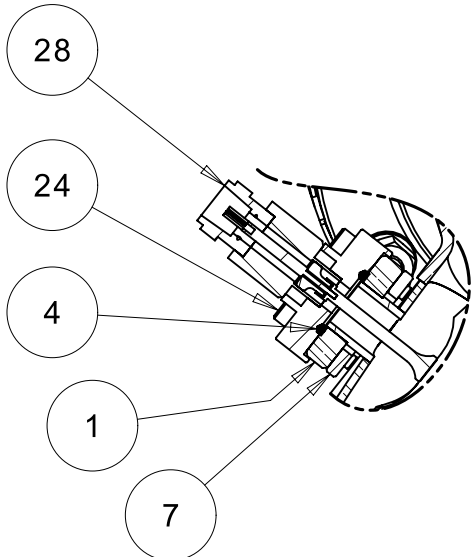
SECTION W-W



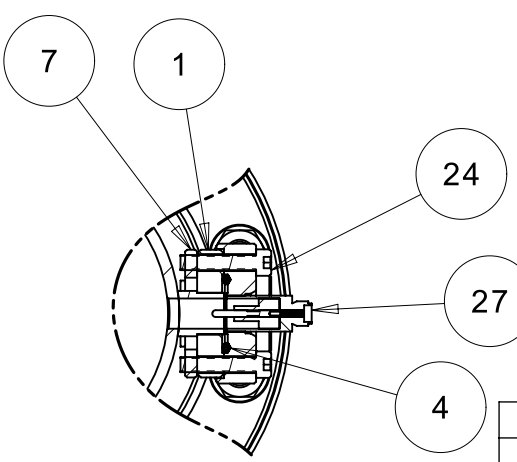
SECTION F-F
SCALE 1:2



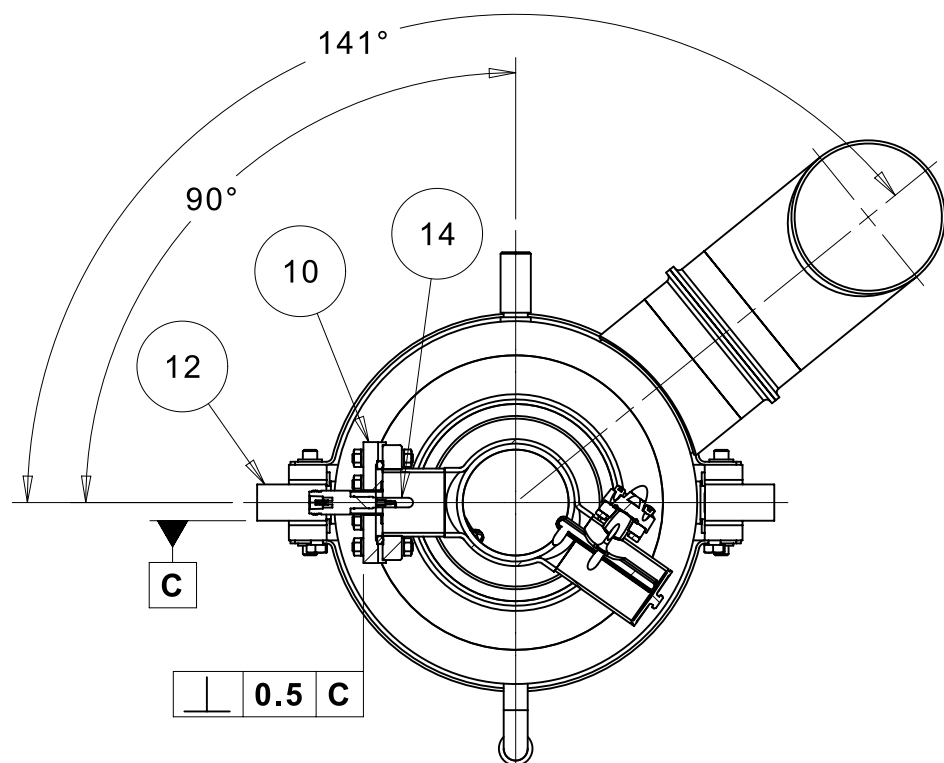
VIEW IN DIRECTION G-G



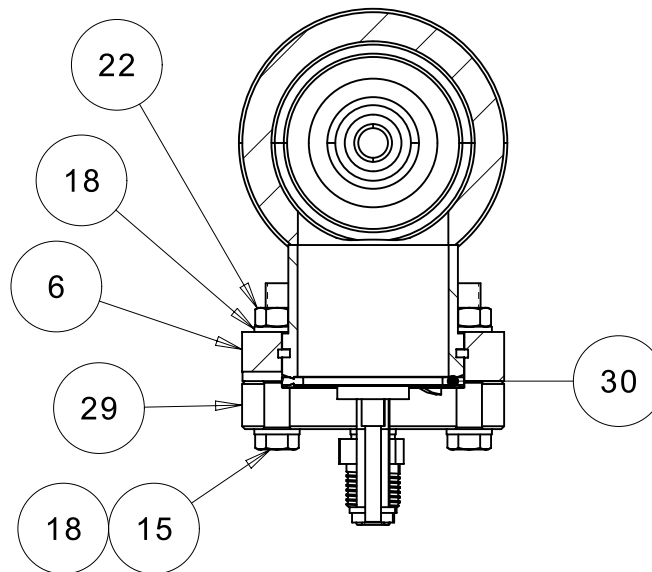
SECTION U-U
SCALE 1:2
2 PLACES



SECTION R-R
SCALE 1:2

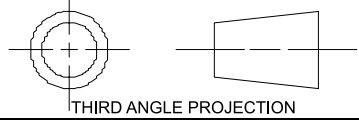


SECTION V-V
SCALE 1:5

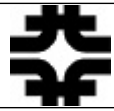


SECTION P-P
SCALE 1:2

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	01-Jul-2014
±X	±X.X	±X.XX	±X/X	±X"	CHECKED	M.KRAMP	DATE	15-Jul-2014
2	0.3	0.12	N/A	1	APPROVED	C.GRIMM	DATE	16-Jul-2014
BREAK ALL SHARP EDGES, MAX: .015 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES, Ra: 3.2 DRAWING UNITS: MM					USED ON			
					F10041054			
					MATERIAL			
					SEE PARTS LIST			
					GROUP: Technical Division - Design and Drafting			
					CAGE CODE: OUSR6			



THIRD ANGLE PROJECTION

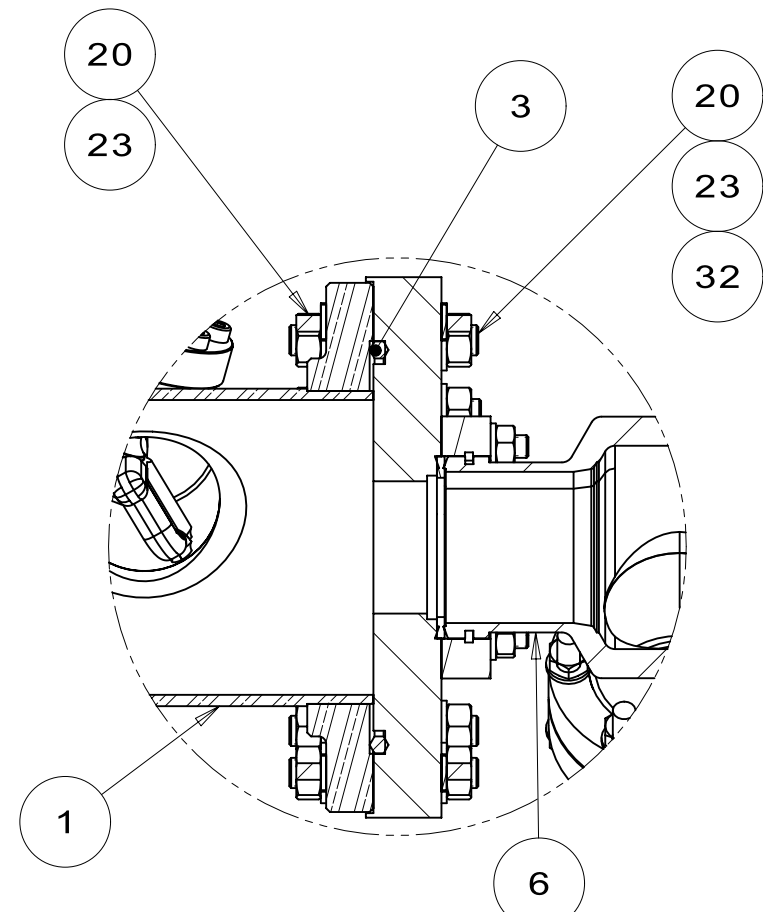
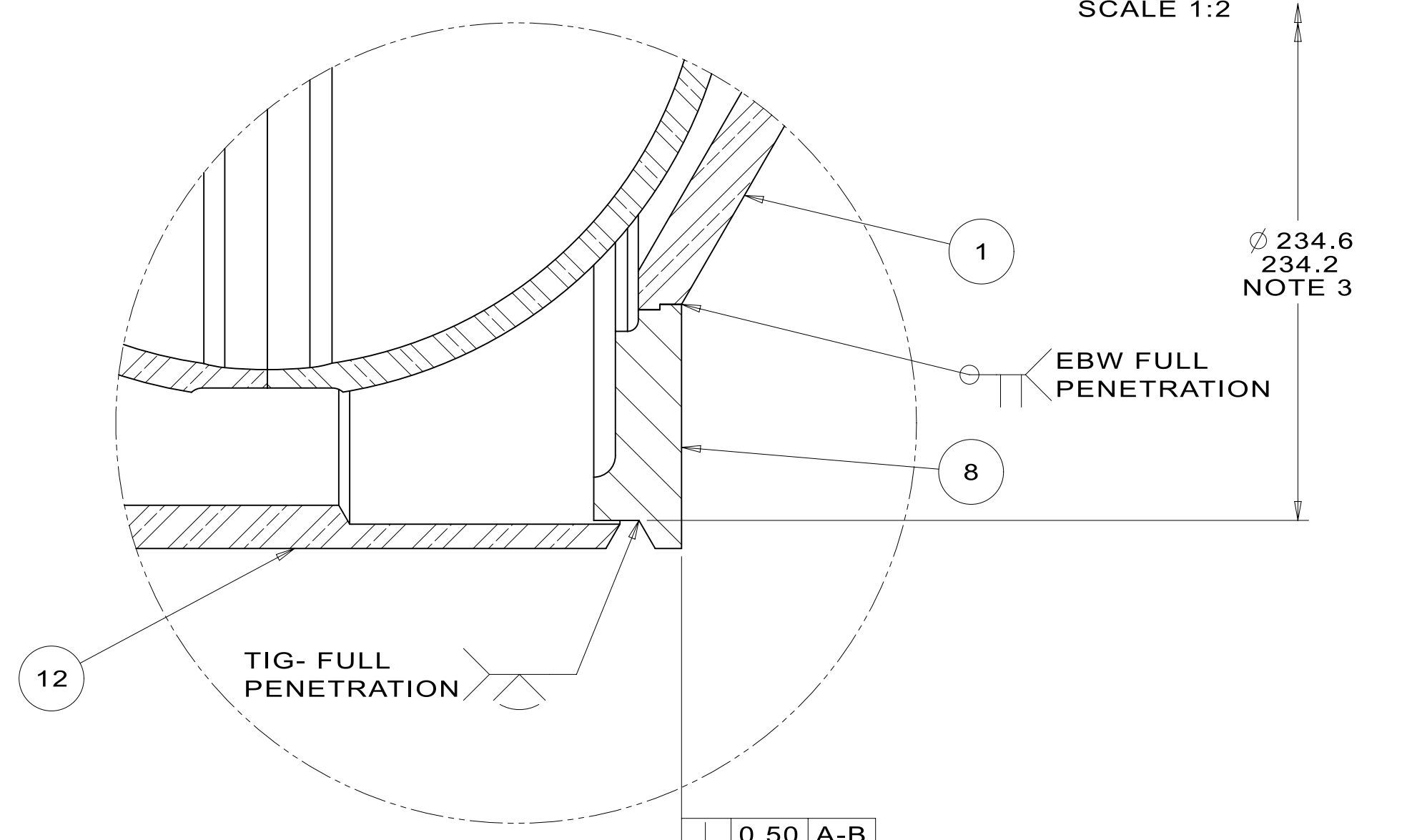
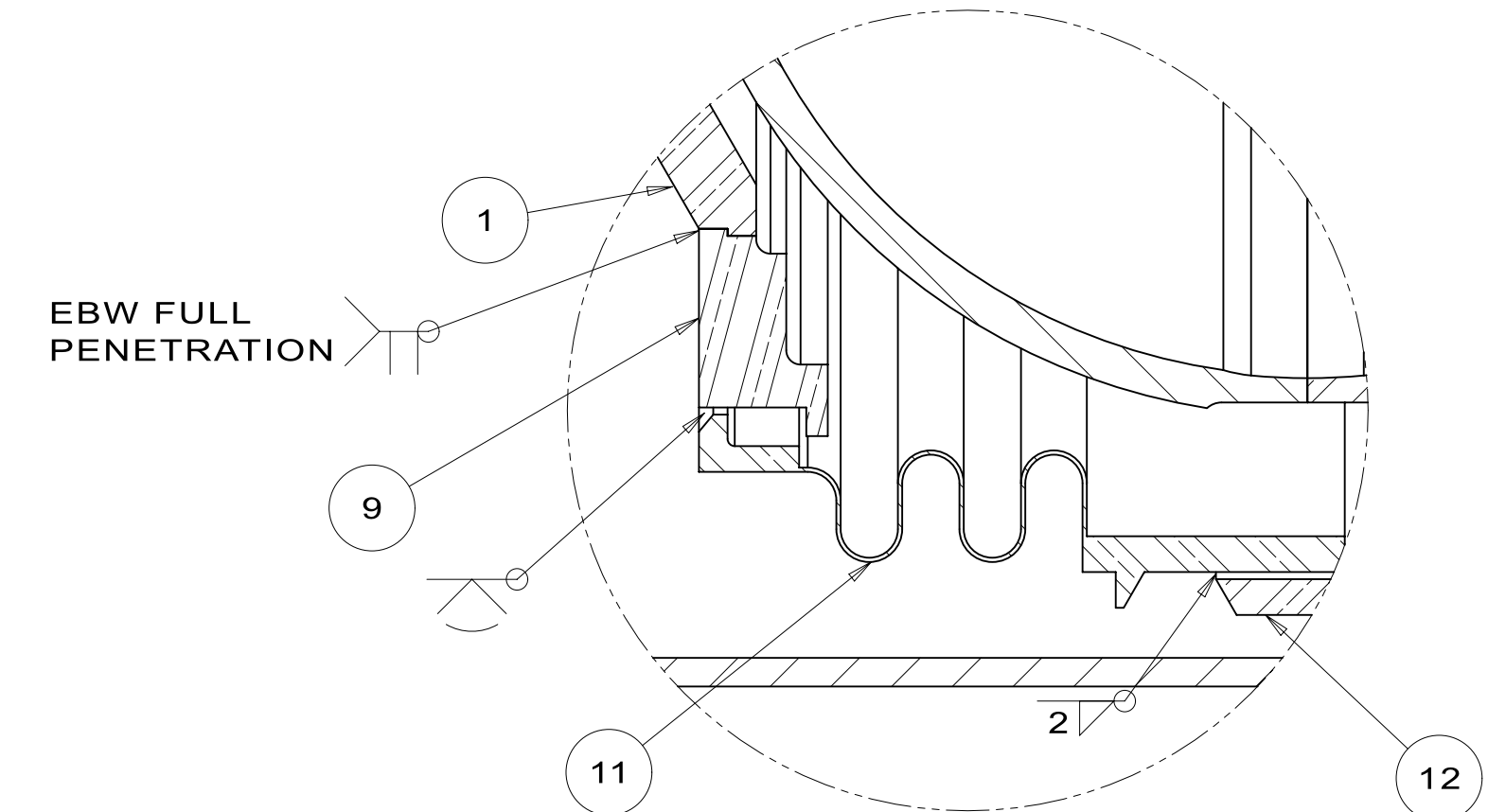
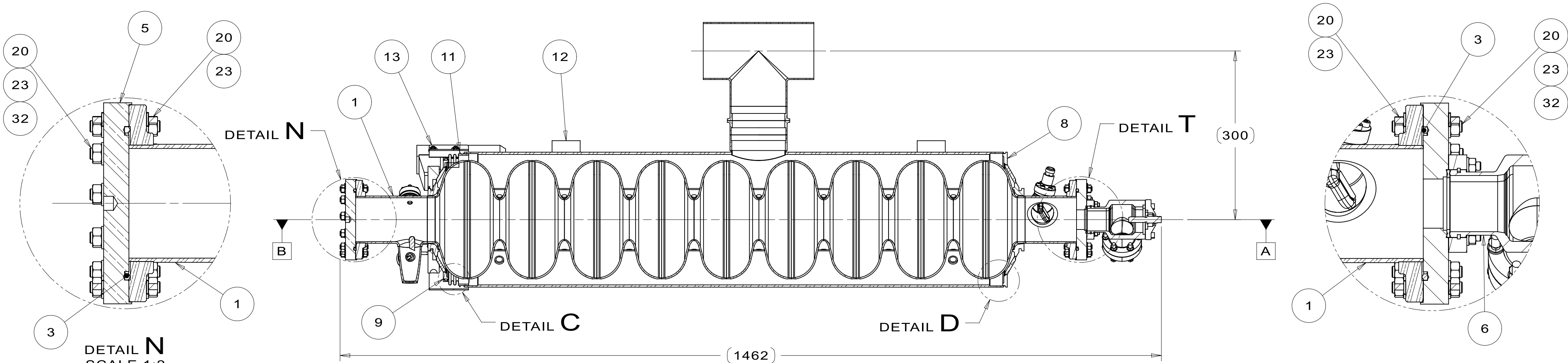


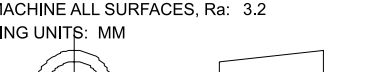
FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

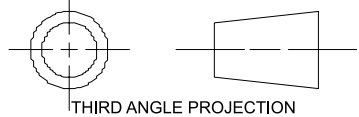
ASSEMBLY, LCLS-II PRODUCTION CAVITY

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
1:5 & AS SHOWN	A2	F10023864	2 OF 3	P

REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
		22-Dec-2021	DRAWN	B.TREVINO	
P	F10023864-P-RCD	07-Feb-2022	APPROVED	B.HARTSELL	

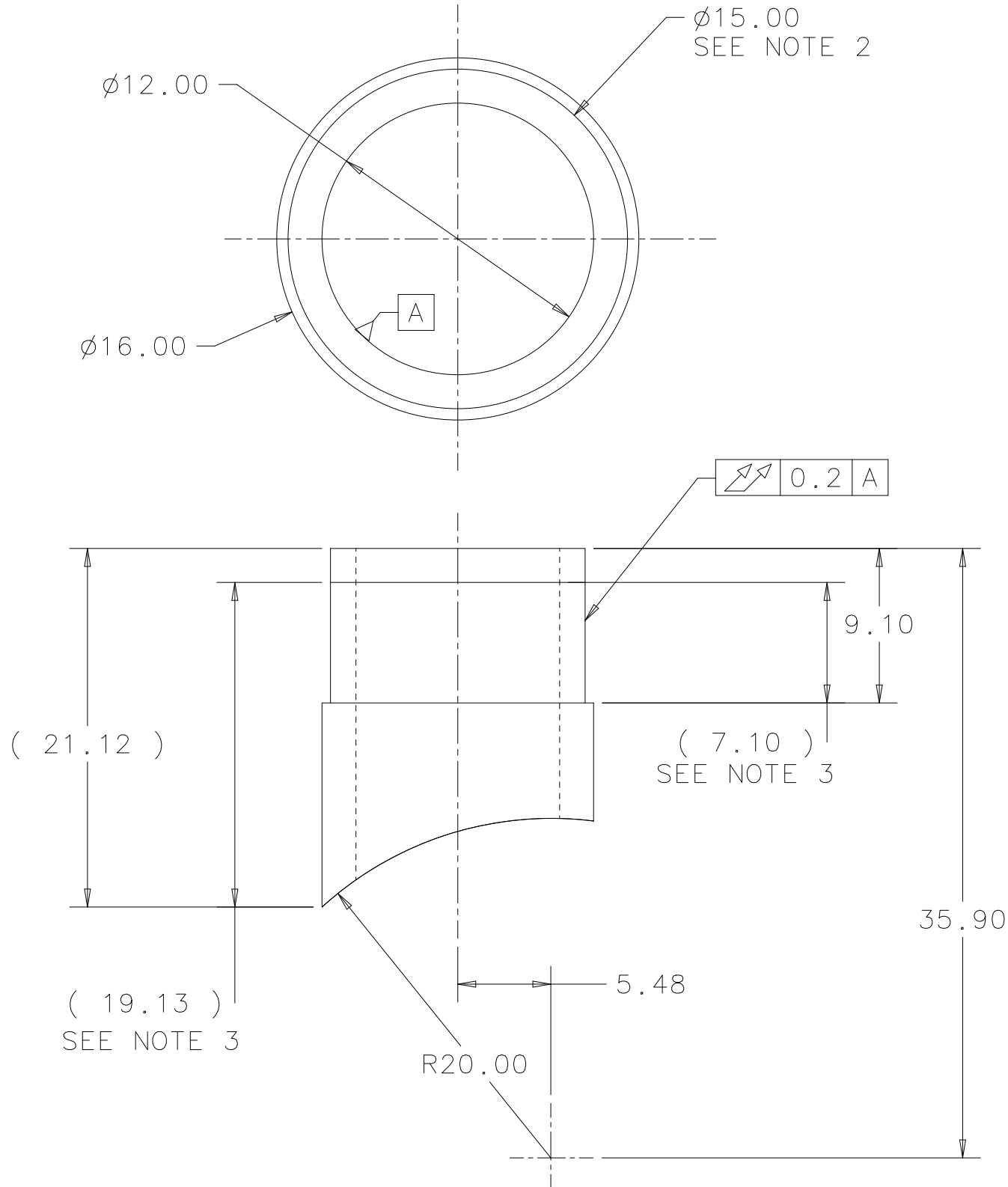


UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	01-Jul-2014		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X"	CHECKED	M.KRAMP	DATE	15-Jul-2014						
2	0.3	0.12	N/A	1	APPROVED	C.GRIMM	DATE	16-Jul-2014						
BREAK ALL SHARP EDGES, MAX: .015 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES, Ra: 3.2 DRAWING UNITS: MM									NAME	ASSEMBLY, LCLS-II PRODUCTION CAVITY				
														
THIRD ANGLE PROJECTION														
USED ON														
F10041054														
MATERIAL														
SEE PARTS LIST														
GROUP: Technical Division - Design and Drafting									SCALE 1:5 AS SHOWN	SIZE A2	DRAWING NUMBER F10023864		SHEET 3 OF 3	REV P
CAGE CODE: OUSR6														



THIRD ANGLE PROJECTION

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F00439150-A-RCD	15-Jul-2015	DRAWN	G. LANGLOIS
		18-Aug-2015	APPROVED	C. GRIMM



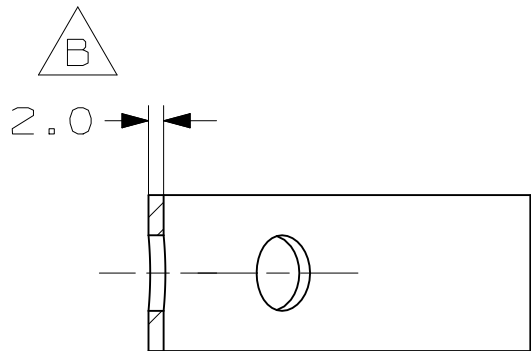
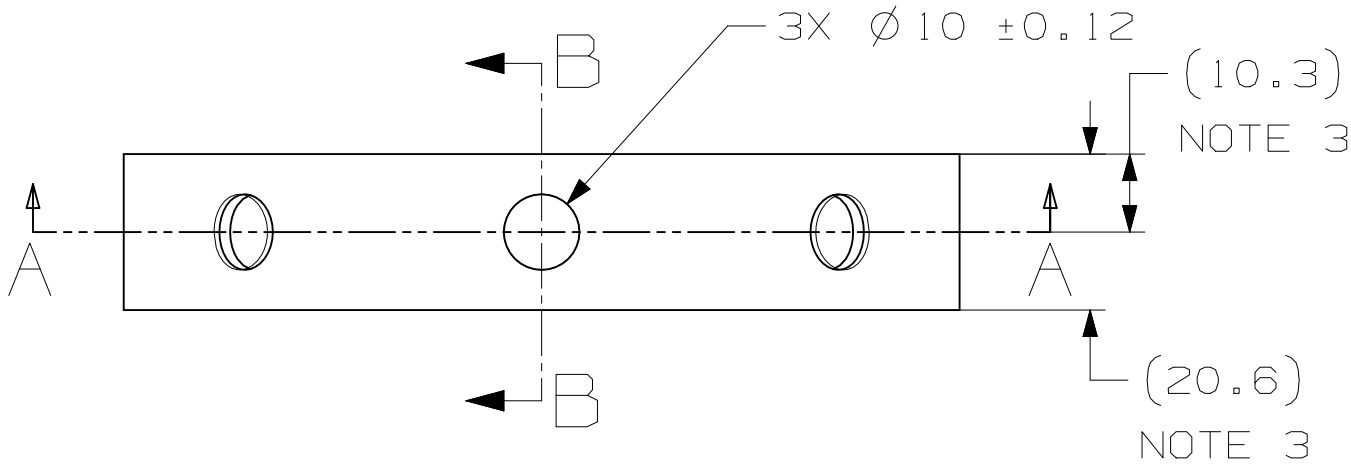
NOTES :

- 1) SURFACE IS TO BE FREE OF DAMAGE
- 2) DIMENSION COORESPONDS WITH PART NUMBER F00439157. TOLERANCE IS TO BE COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS
- 3) FINAL LENGTH AFTER MACHINING OPERATION DETAILED ON DRAWING NUMBER F00439174 AND F00439175
- 4) TRAILING ZEROS DENOTE TOLERANCE.

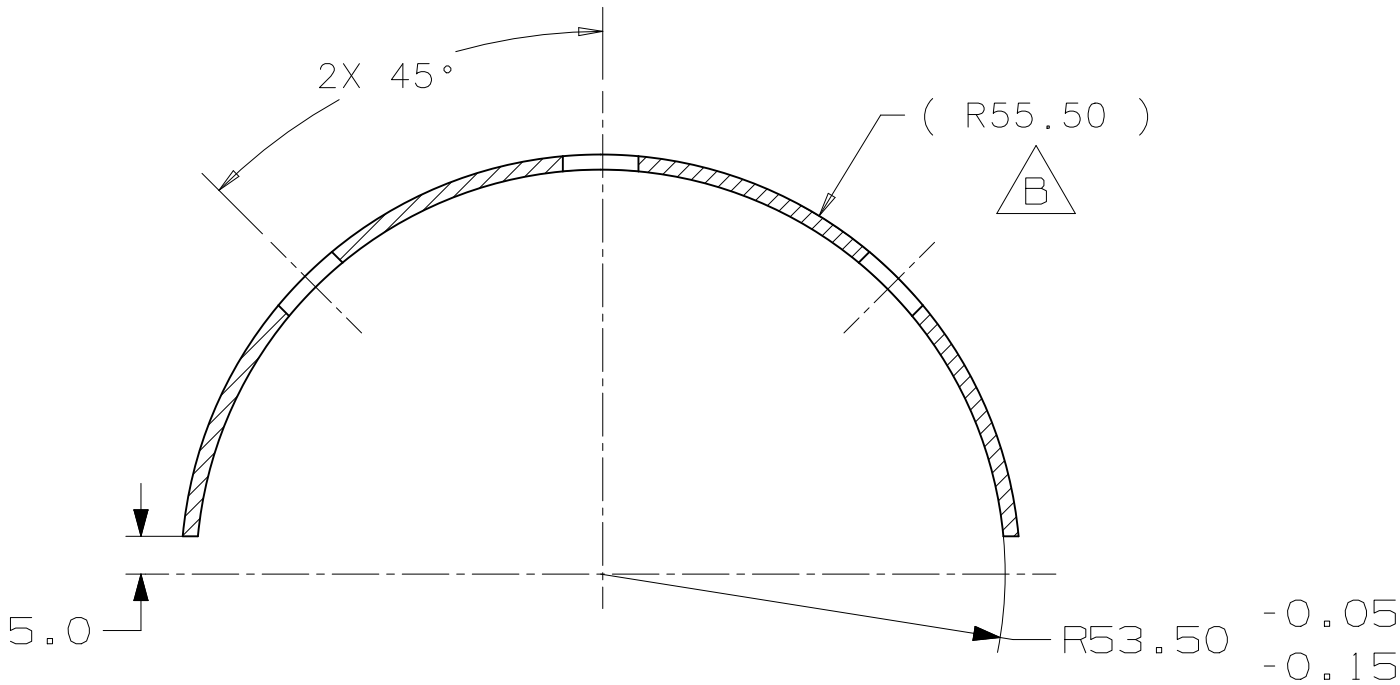
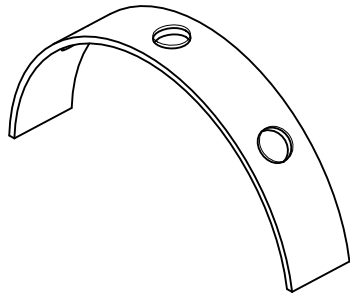
UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D.RICHARDSON		DATE	16-Sep-2005					
2	0.3	0.12	N/A	1°	APPROVED	D.RICHARDSON		DATE	16-Sep-2005		NAME 1.3GHZ RF CAVITY HOM SPOOL PIECE			
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON F00439174									
					MATERIAL NIOBIUM RRR GRADE									
					GROUP: Accelerator Mechanical Support		CAGE CODE: QUSR6							
					SCALE 4:1		SIZE A3	DRAWING NUMBER F00439150		SHEET 1 OF 1	REV A			

DESCRIPTION: DESY 1.3GHZ TESLA RF CAVITY HALF SUPPORT RING
CATEGORY: RING PROJECT: ILCCryoModules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00439151-B-RCD	07-Jul-2015	DRAWN	G. LANGLOIS
		18-Aug-2015	APPROVED	C. GRIMM

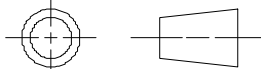


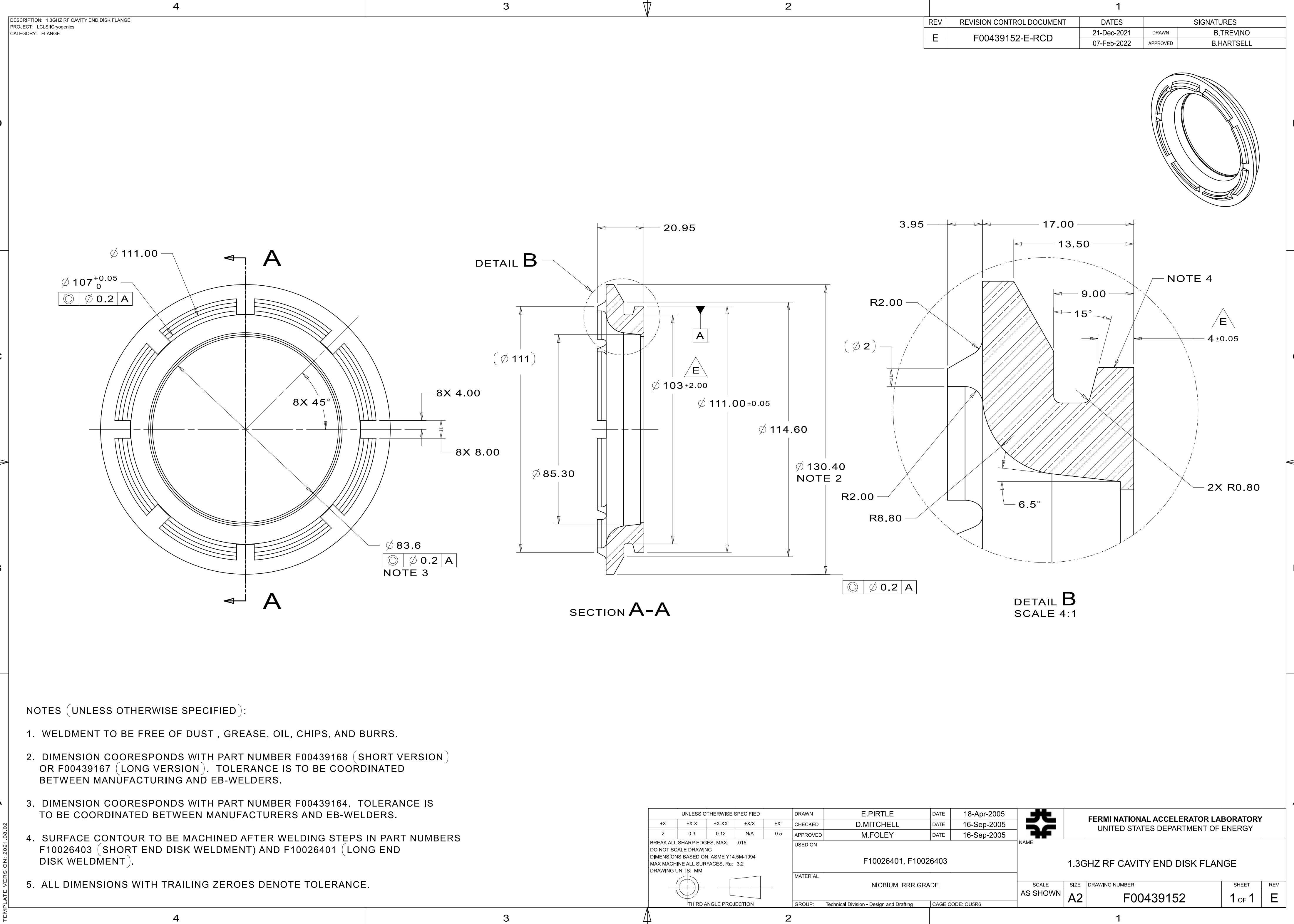
SECTION B-B

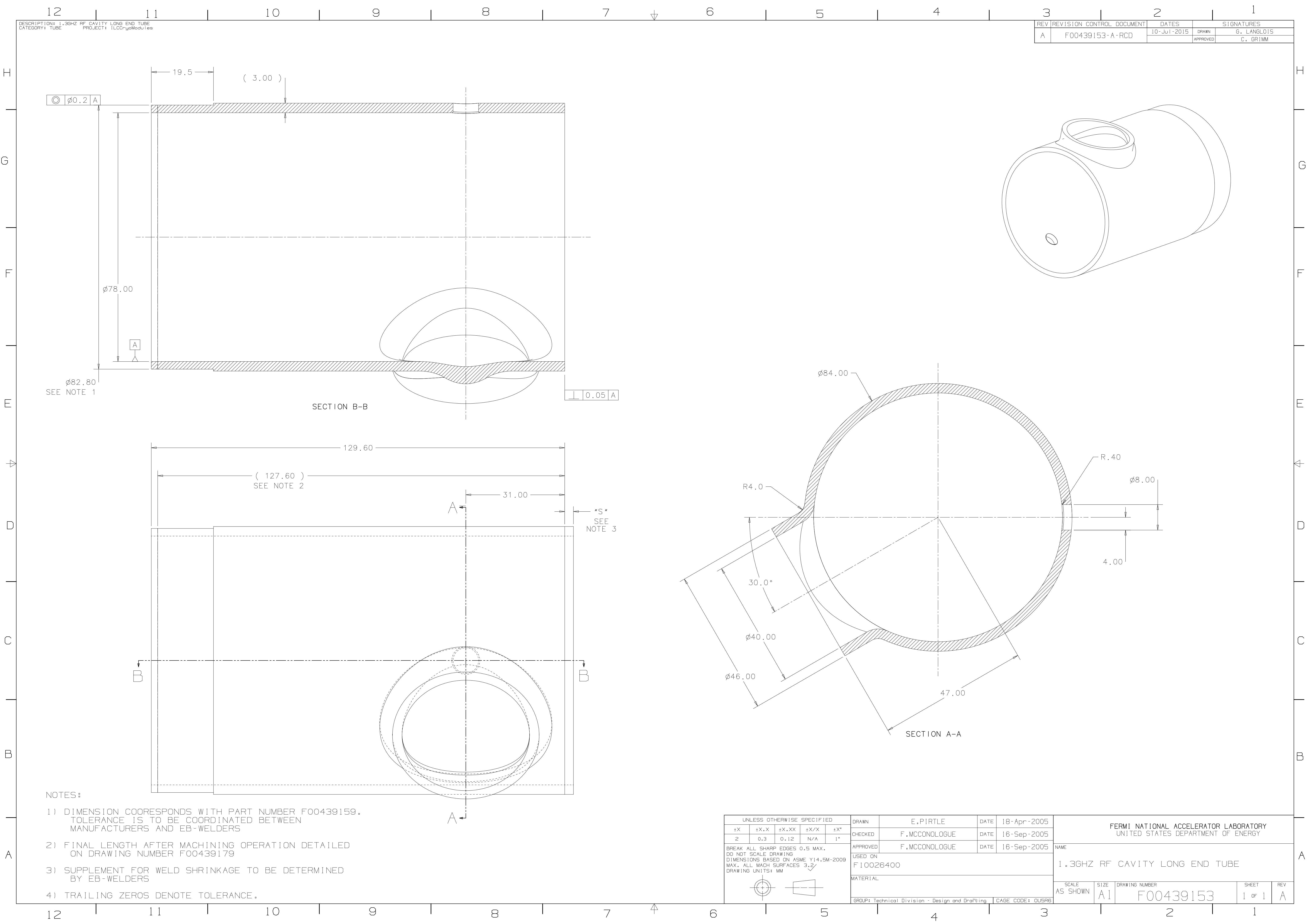


SECTION A-A

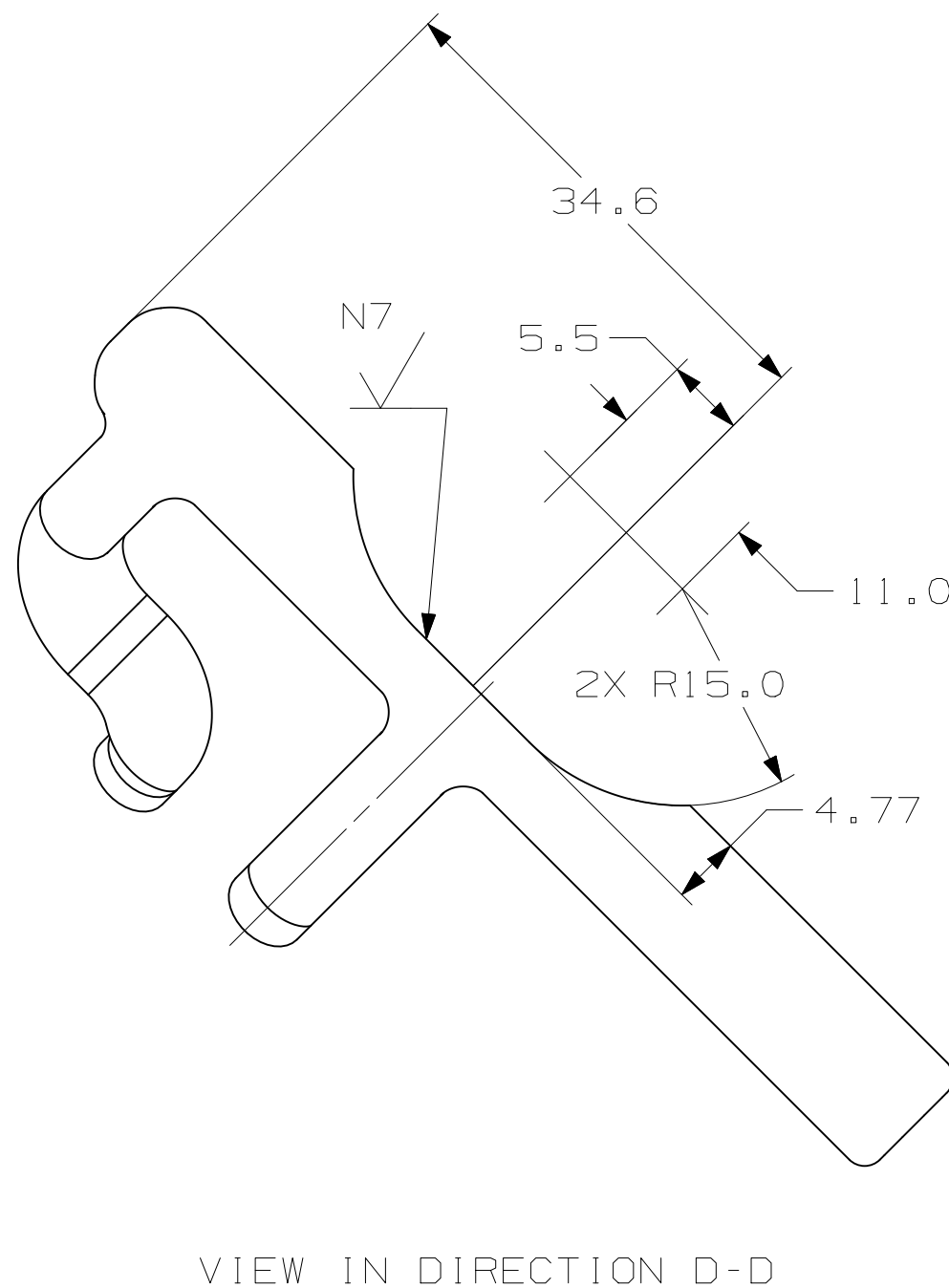
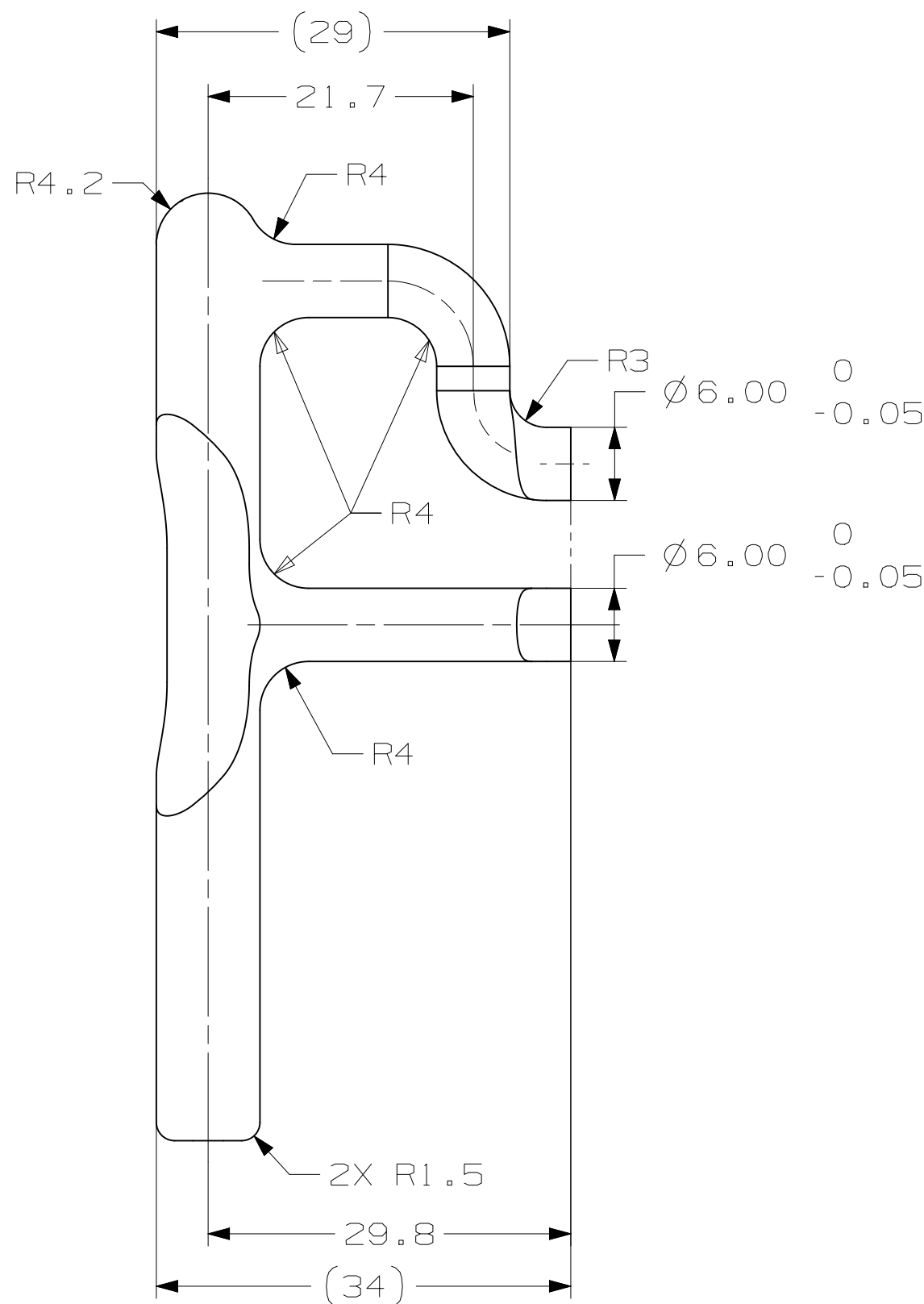
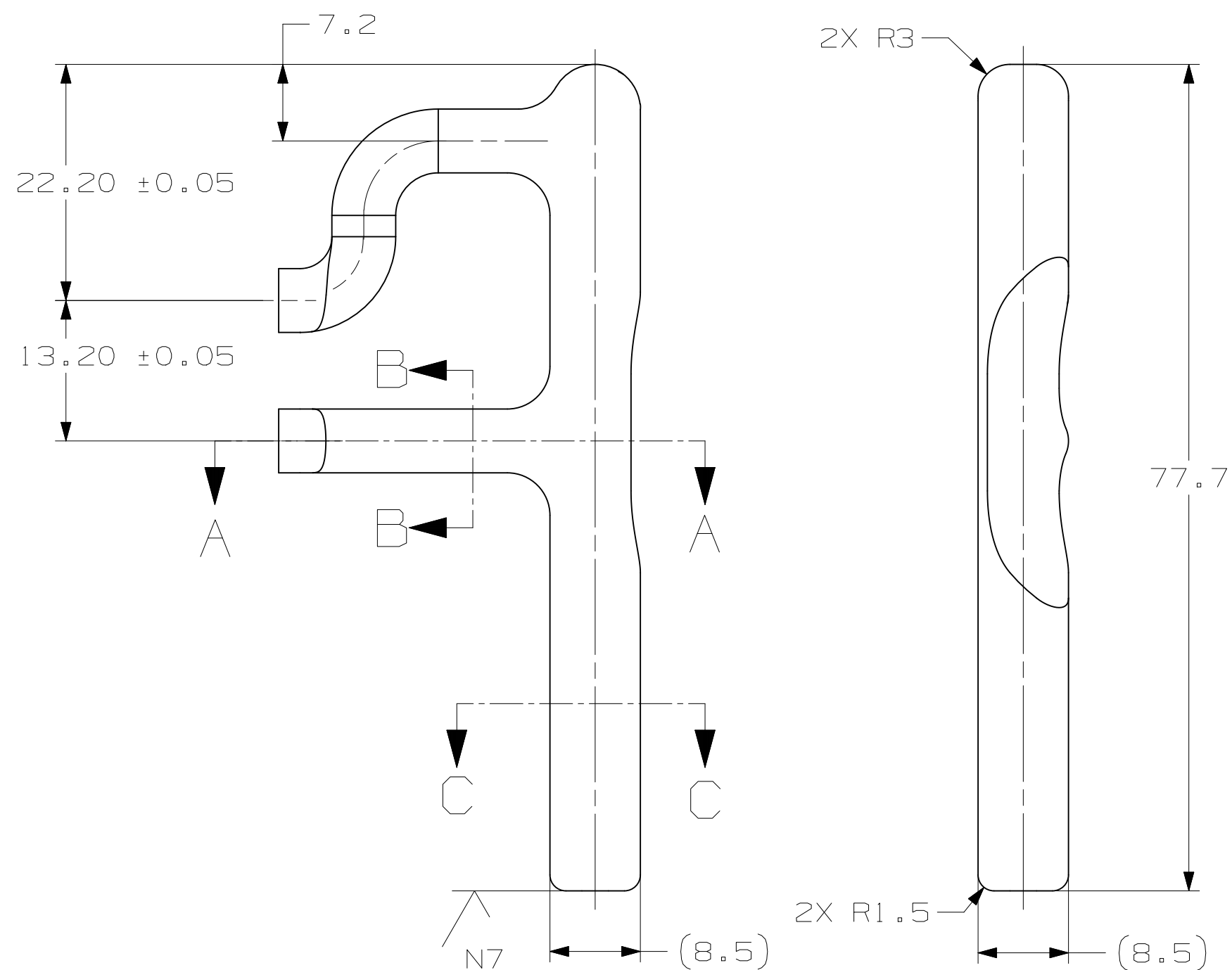
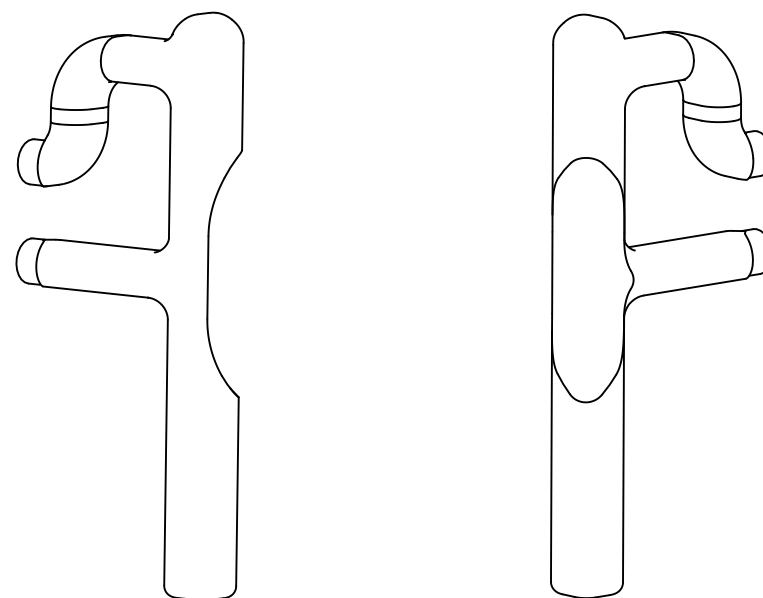
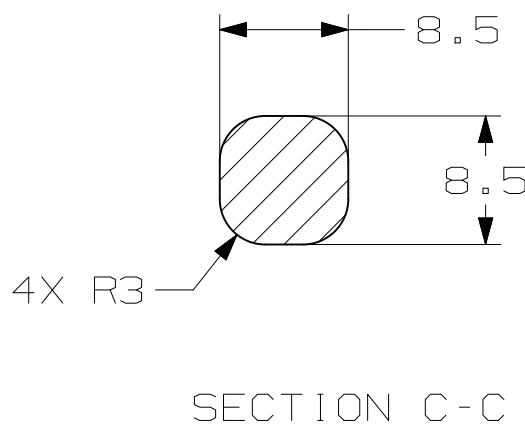
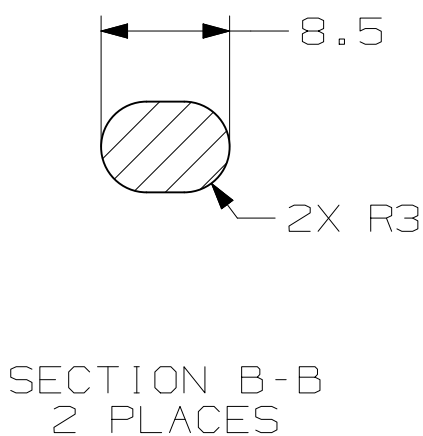
- PART TO BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS.
- DIMENSIONS TO BE DETERMINED BY THE MANUFATURER TO ALLOW FOR FUTURE EB-WELDING CONTRACTION.
- TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D.MITCHELL		DATE	16-Sep-2005		NAME 1.3GHZ BARBELL SUPPORT RING				
2	0.3	0.12	N/A	1°	APPROVED	M.FOLEY		DATE	16-Sep-2005						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON		F00439172								
					MATERIAL		NIOBIUM, RRR GRADE								
					GROUP: Technical Division - Design and Drafting		CAGE CODE: 0U5R6		SCALE 1:1		SIZE A3	DRAWING NUMBER F00439151		SHEET 1 OF 1	REV B



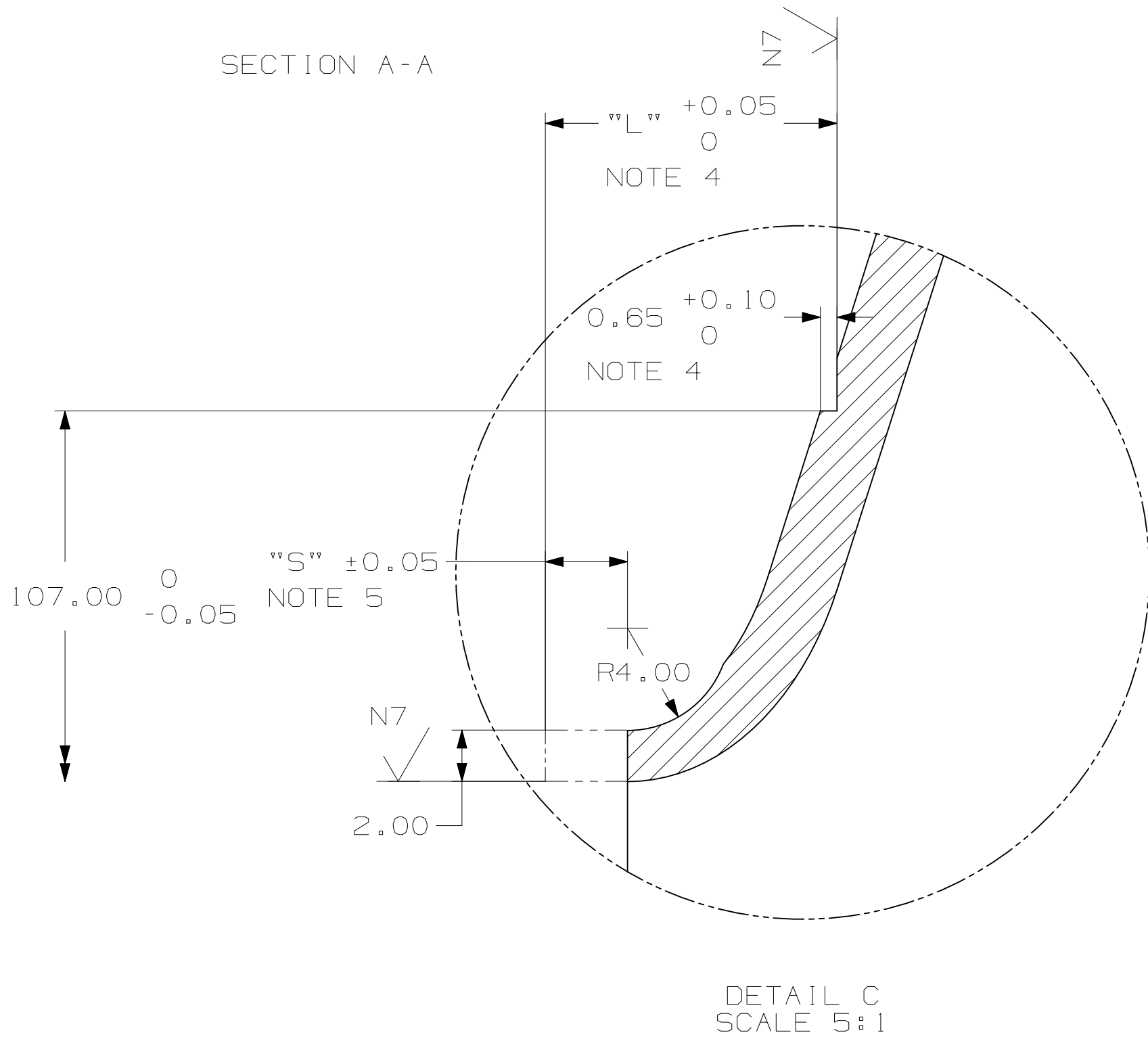
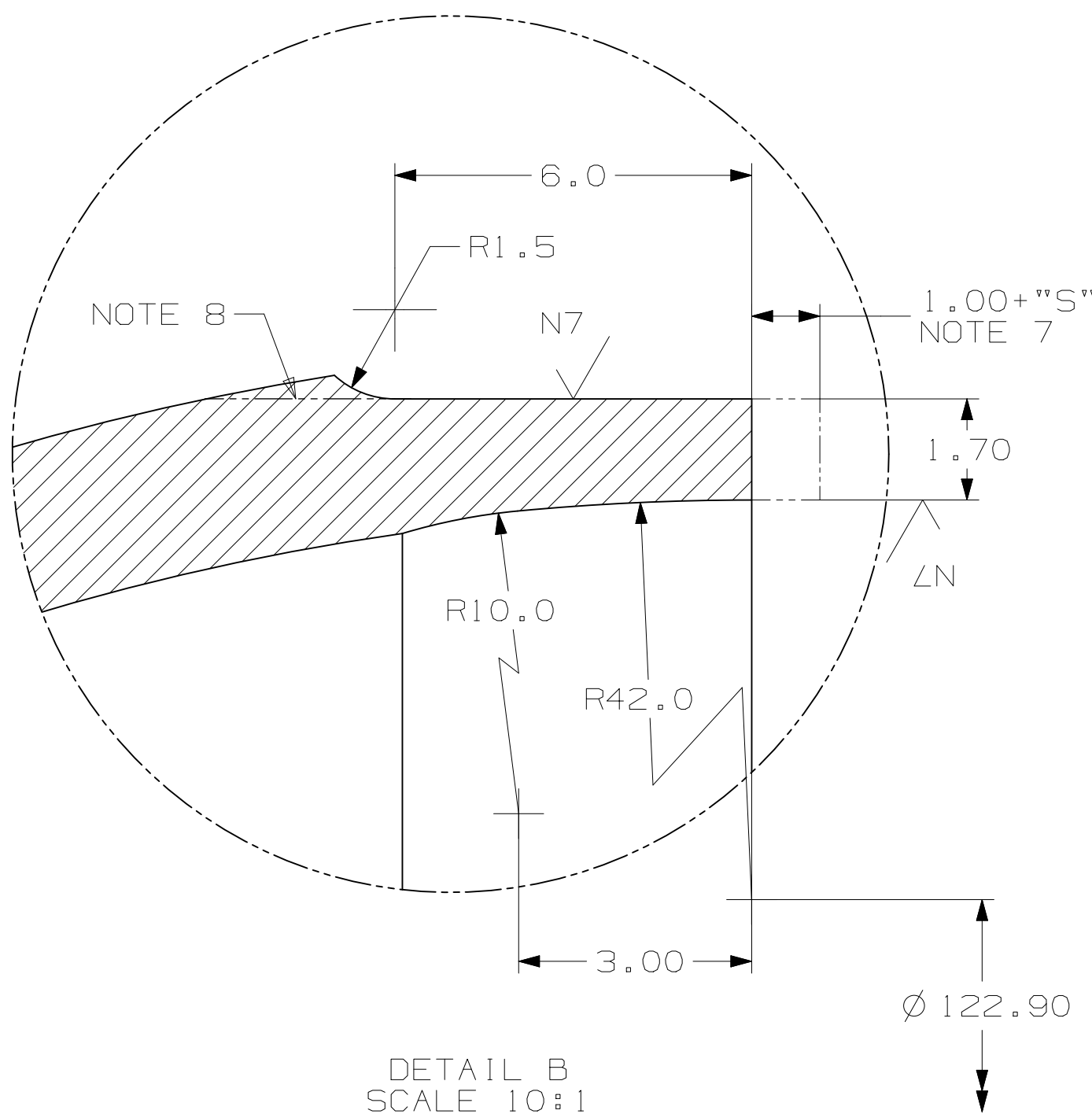
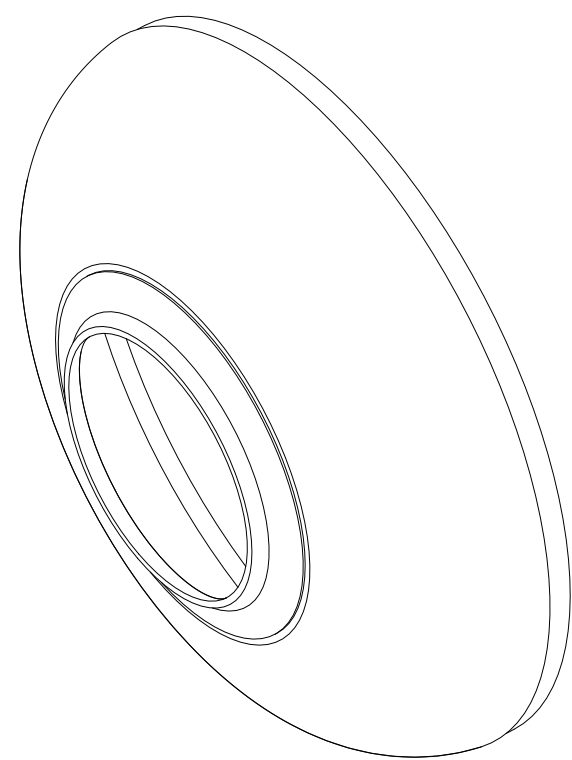
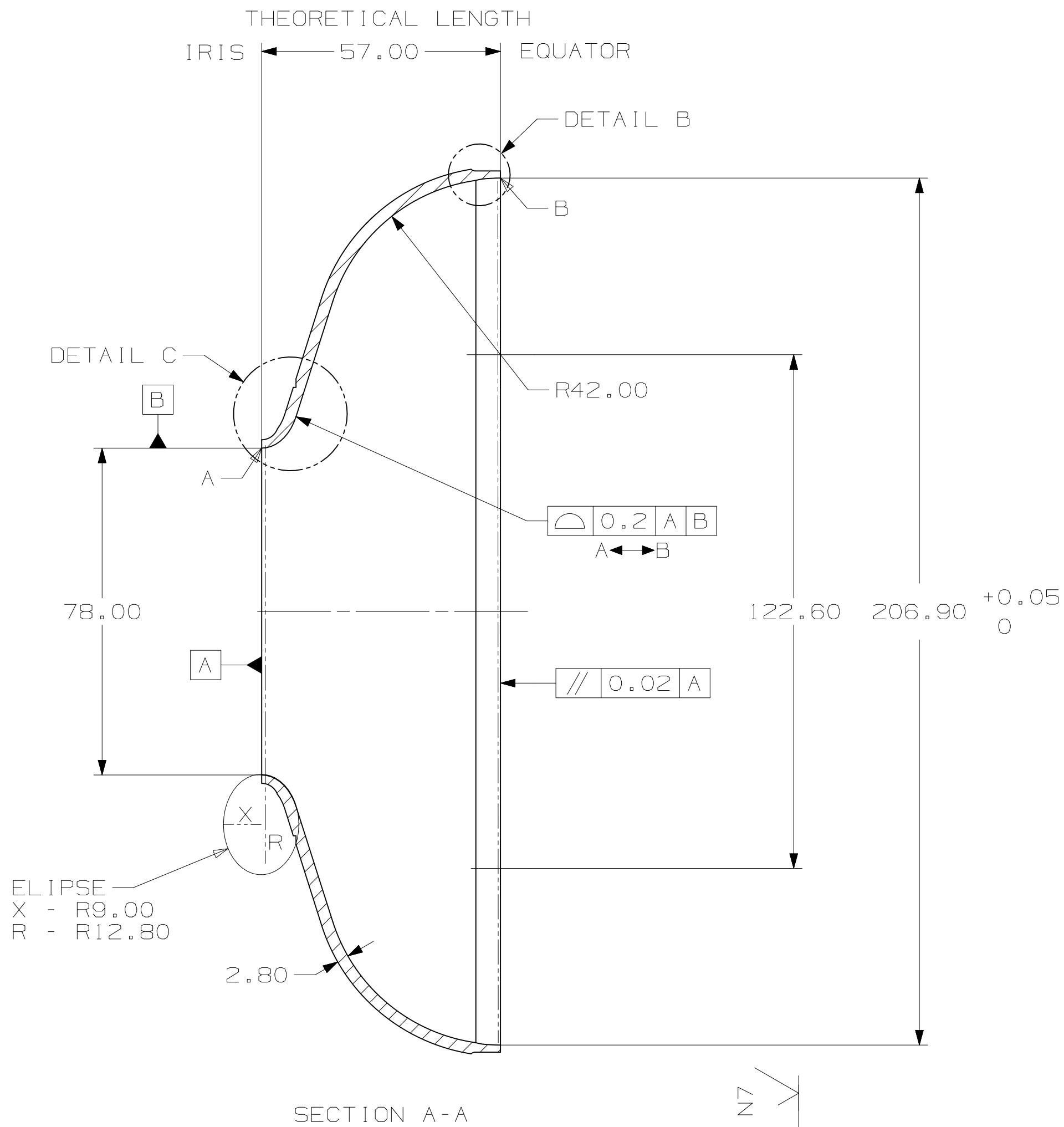
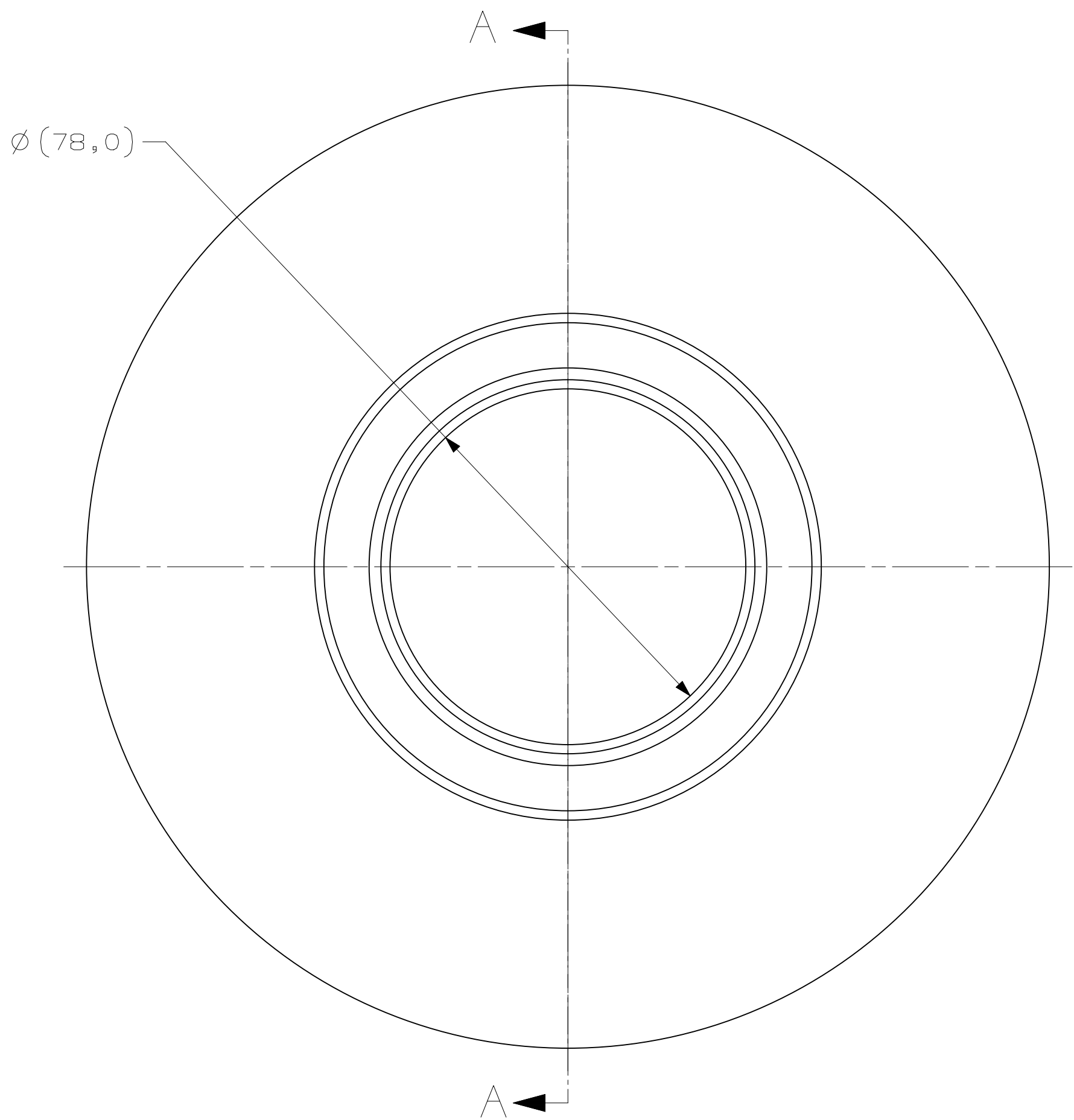


REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
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		18-Aug-2015	APPROVED	C. GRIMM



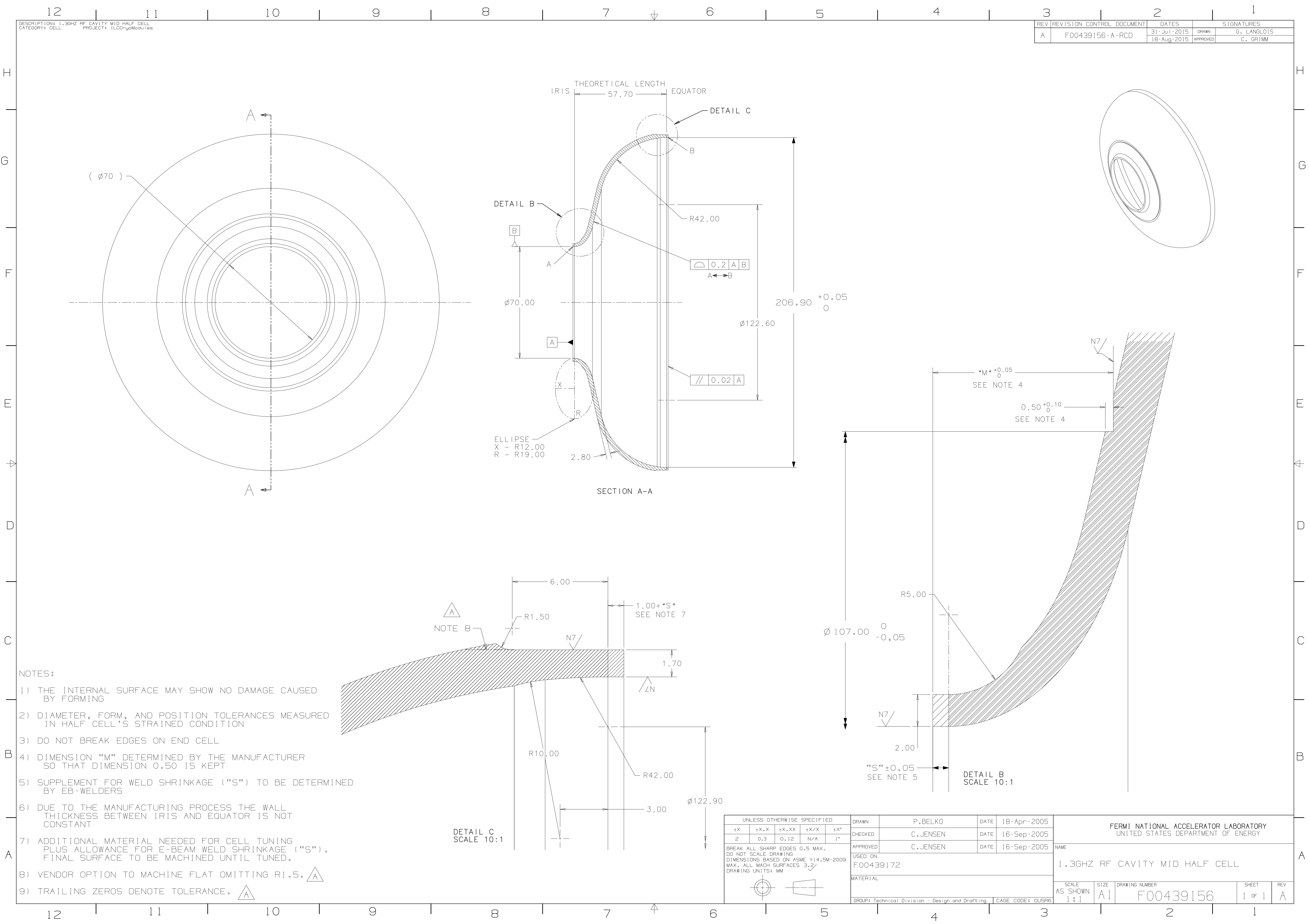
- NOTES (UNLESS OTHERWISE SPECIFIED):
1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 2. PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 3. VENDOR SHALL SUPPLY THE PART SUFFICIENTLY PACKAGED TO PROTECT THE FINISH AND INTEGRITY DURING SHIPMENT AND STORAGE.
 4. TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY					
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	F.MCCONOLOGUE		DATE	16-Sep-2005							
Z	0.3	0.12	N/A		I*	APPROVED	F.MCCONOLOGUE		DATE	16-Sep-2005		NAME 1.3GHZ RF CAVITY LONG END HOM FORMTEIL				
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM						USED ON F00439174										
						MATERIAL NIOBIUM, RRR GRADE										
						GROUP: Technical Division - Design and Drafting					CAGE CODE: 0U5R6					
SCALE 2:1		SIZE A2		DRAWING NUMBER F00439154				SHEET 1 OF 1		REV A						



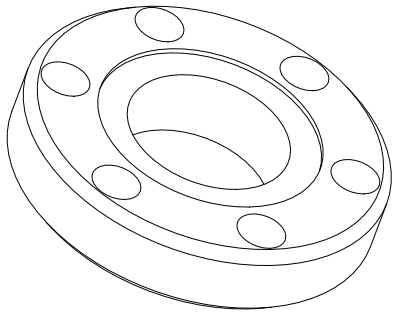
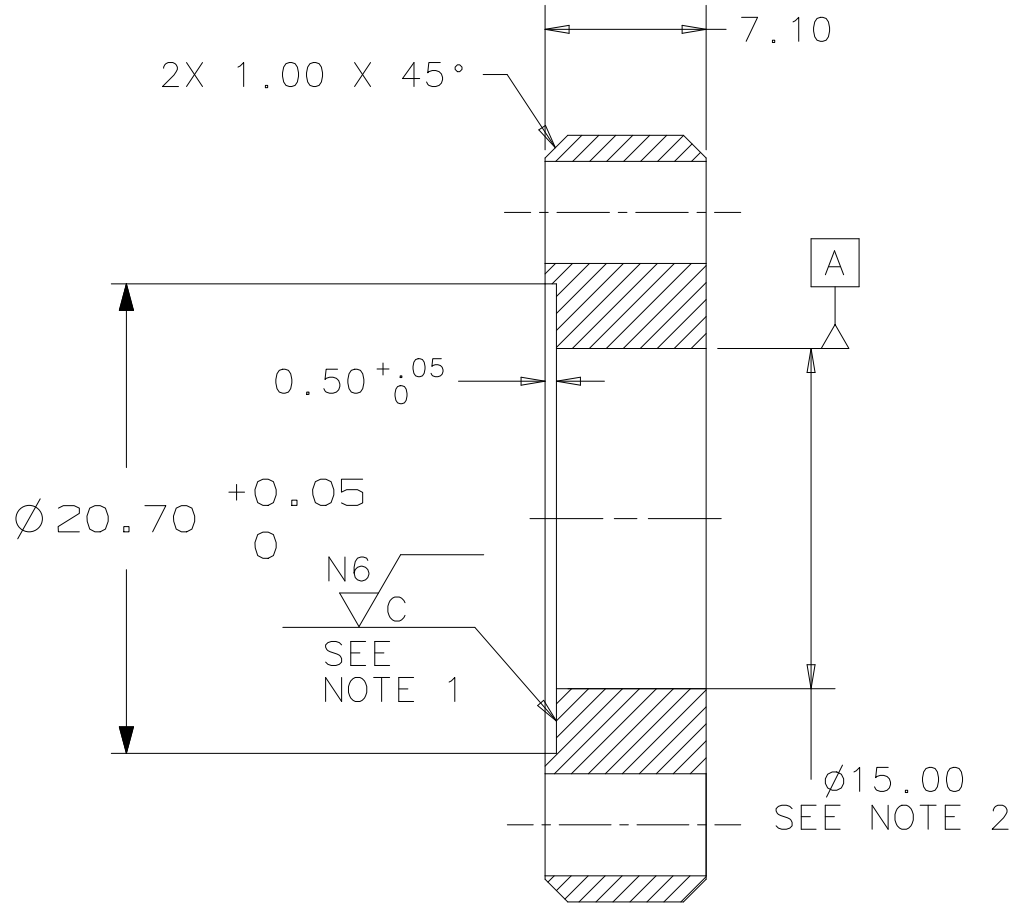
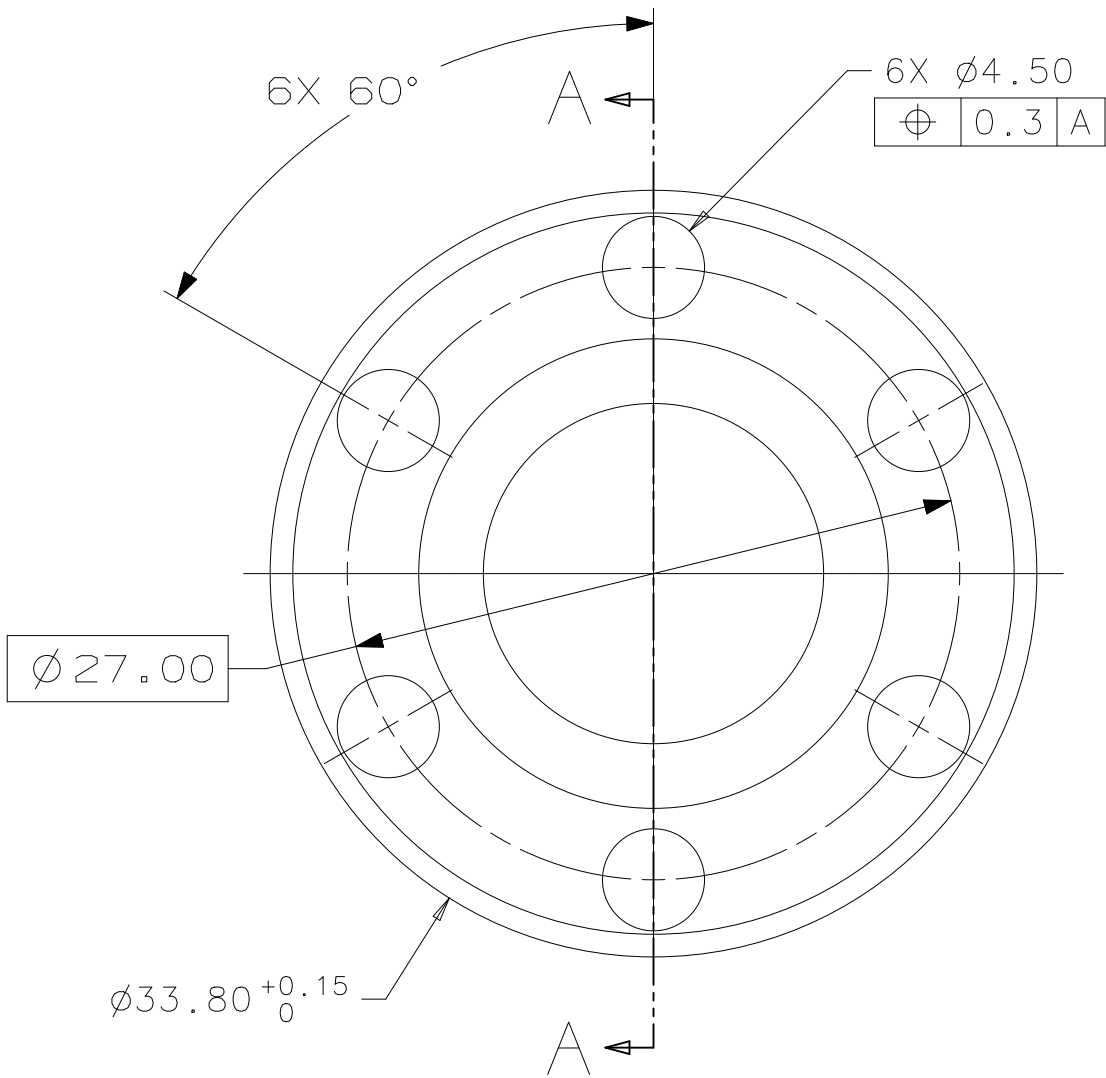
- NOTES:
- 1) THE INTERNAL SURFACE MAY SHOW NO DAMAGE CAUSED BY FORMING
 - 2) DIAMETER, FORM, AND POSITION TOLERANCES MEASURED IN HALF CELL'S STRAINED CONDITION
 - 3) DO NOT BREAK EDGES ON END CELL
 - 4) DIMENSION "L" DETERMINED BY THE MANUFACTURER SO THAT DIMENSION 0.65 IS KEPT
 - 5) SUPPLEMENT FOR WELD SHRINKAGE ("S") TO BE DETERMINED BY EB-WELDERS
 - 6) DUE TO THE MANUFACTURING PROCESS THE WALL THICKNESS BETWEEN IRIS AND EQUATOR IS NOT CONSTANT
 - 7) ADDITIONAL MATERIAL NEEDED FOR CELL TUNING PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE ("S"). FINAL SURFACE TO BE MACHINED UNTIL TUNED.
 - 8) VENDOR OPTION TO MACHINE FLAT OMITTING R1.5
 - 9) TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY						
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D.RICHARDSON		DATE	16-Sep-2005								
2	0.3	0.12	N/A	1°	APPROVED	D.RICHARDSON		DATE	16-Sep-2005		NAME						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON		F00439178		1.3GHZ RF CAVITY LONG END HALF CELL								
					MATERIAL		NIOBIUM RRR GRADE										
					GROUP: Technical Division - Design and Drafting				CAGE CODE: QUSR6		SCALE 1:1 AS SHOWN		SIZE A1	DRAWING NUMBER F00439155		SHEET 1 of 1	REV A



DESCRIPTION: 1.3GHZ RF CAVITY NW 12 FLANGE
CATEGORY: FLANGE PROJECT: 1LCCryoModules

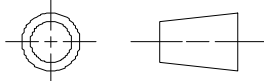
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00439157-B-RCD	05-Oct-2015	DRAWN	G. LANGLOIS
		05-Oct-2015	APPROVED	C. GRIMM



SECTION A-A

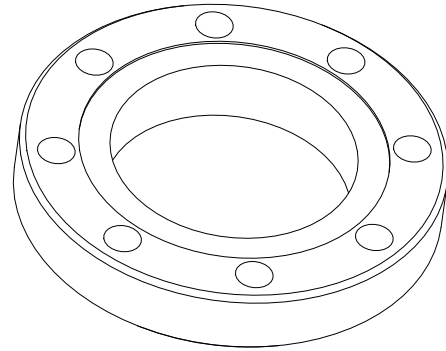
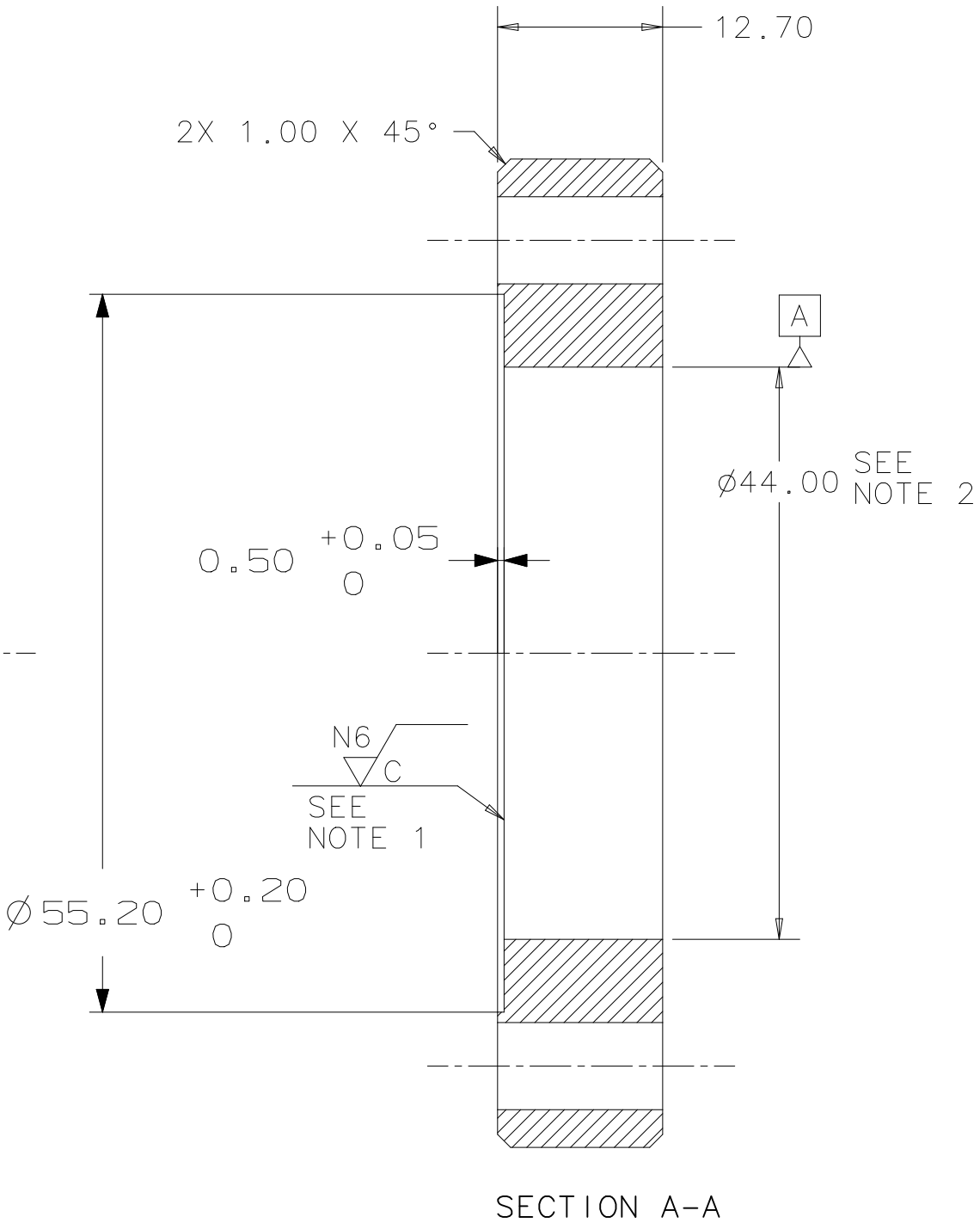
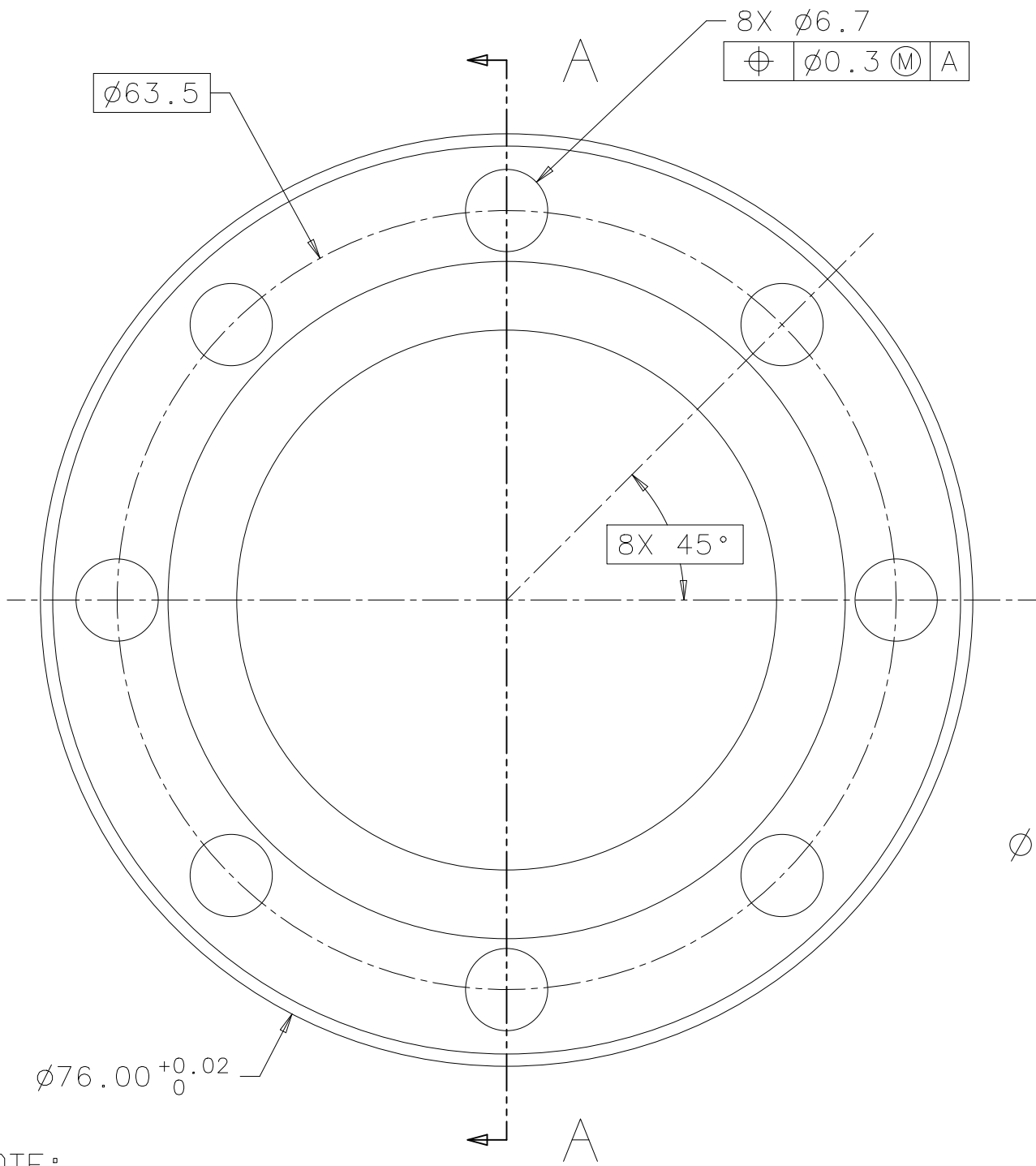
NOTE:

- 1) SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING
- 2) DIMENSION COORESponds WITH PART NUMBER F00439150. TOLERANCE IS TO BE COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS
- 3) USE PRIMARY MILLIMETER DIMENSIONS TO MAKE PART. [INCHES] SHOWN FOR REFERENCE
- 4) TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	C.REID		DATE	16-Sep-2005		NAME 1.3GHZ RF CAVITY NW 12 FLANGE				
2	0.3	0.12	N/A	1°	APPROVED	C.REID		DATE	16-Sep-2005						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM 					USED ON		F00439179, F00439180								
					MATERIAL		Nb55Ti 								
					GROUP: Technical Division - Design and Drafting		CAGE CODE: 0U5R6								
					SCALE 3:1		SIZE A3	DRAWING NUMBER F00439157		SHEET 1 OF 1	REV B				

DESCRIPTION: 1.3GHZ RF CAVITY NW 40 FLANGE
CATEGORY: FLANGE PROJECT: 1LCCryoModules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00439158-B-RCD	05-Oct-2015	DRAWN	G. LANGLOIS
		05-Oct-2015	APPROVED	C. GRIMM

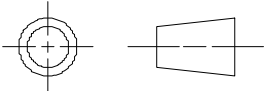


NOTE:

- 1) SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING
- 2) DIMENSION COORESPONDS WITH PART NUMBER F00439171. TOLERANCE IS TO BE COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS
- 3) TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED				
$\pm X$	$\pm X.X$	$\pm X.XX$	$\pm X/X$	$\pm X^\circ$
2	0.3	0.12	N/A	1°

BREAK ALL SHARP EDGES 0.5 MAX.
DO NOT SCALE DRAWING
DIMENSIONS BASED ON ASME Y14.5M-2009
MAX. ALL MACH SURFACES 3.2
DRAWING UNITS: MM

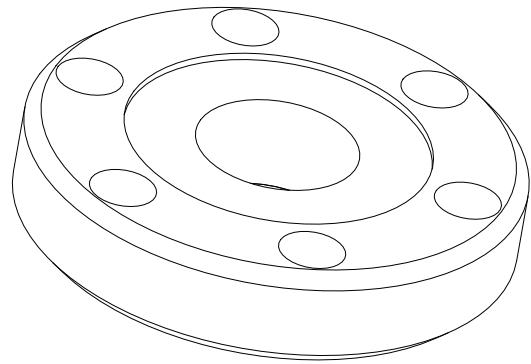
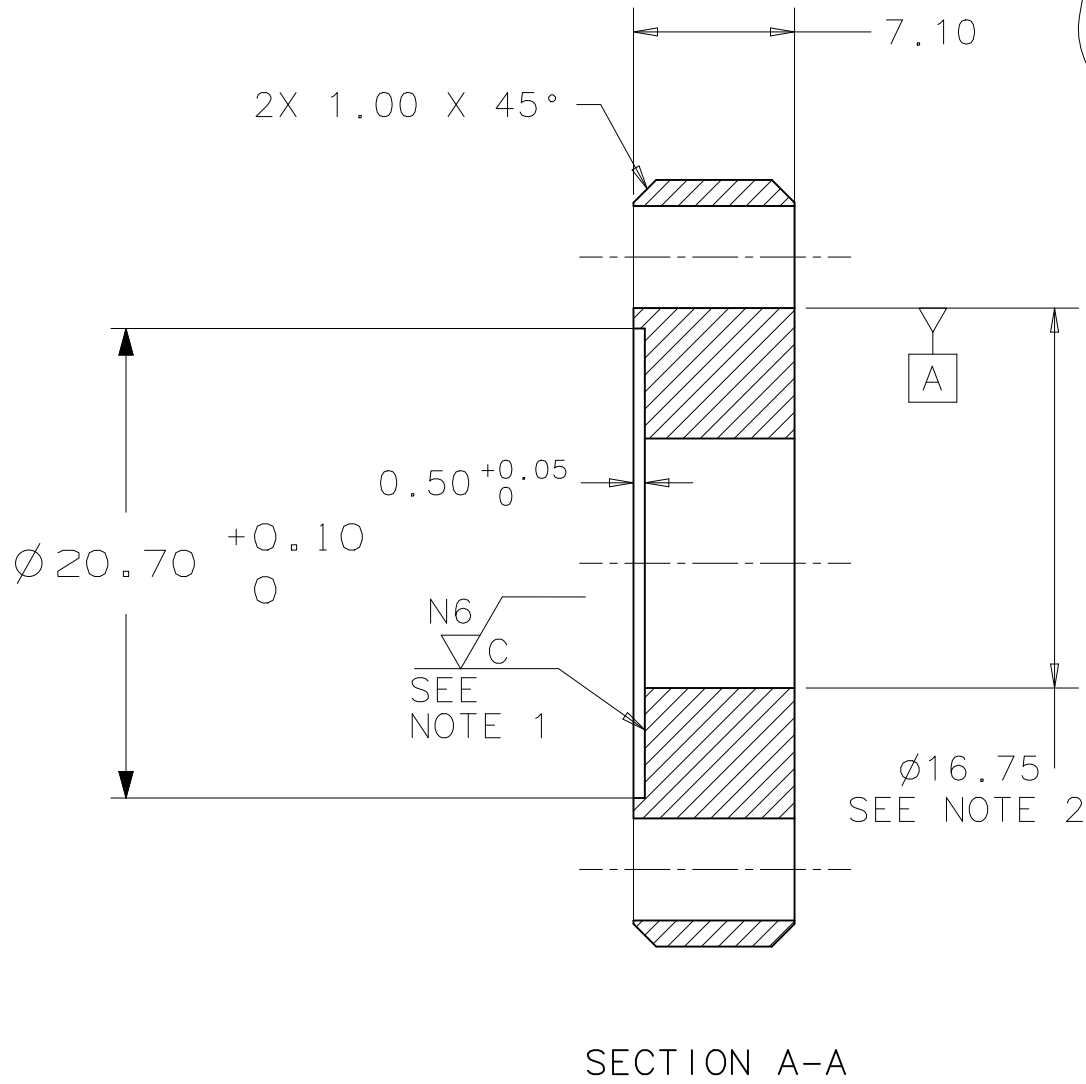
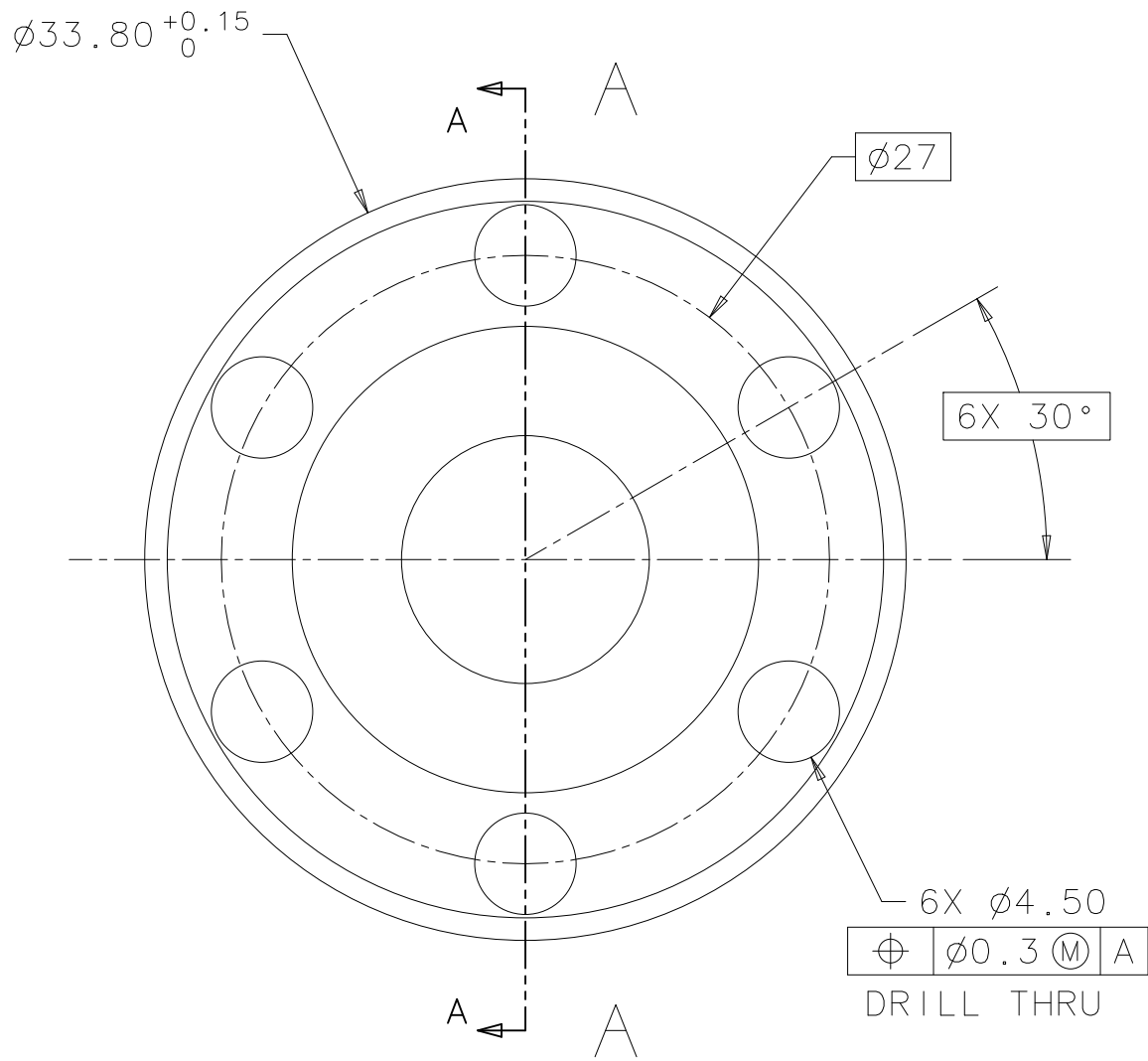


DRAWN	E.PIRTLE	DATE	18-Apr-2005
CHECKED	D.RICHARDSON	DATE	16-Sep-2005
APPROVED	D.RICHARDSON	DATE	16-Sep-2005
USED ON			
F00739180			
MATERIAL		Nb55Ti	
GROUP: Technical Division - Design and Drafting			CAGE CODE: 0U5R6

FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
NAME 1.3GHZ RF CAVITY NW 40 FLANGE				
SCALE AS SHOWN	SIZE A3	DRAWING NUMBER F00439158	SHEET 1 OF 1	REV B

DESCRIPTION: 1.3GHZ RF CAVITY NW 8 FLANGE
CATEGORY: FLANGE PROJECT: 1LCCryoModules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00439160-B-RCD	05-Oct-2015	DRAWN	G. LANGLOIS
		05-Oct-2015	APPROVED	C. GRIMM

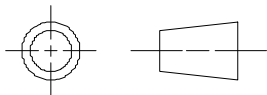


NOTE:

- 1) SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING
- 2) DIMENSION COORESPONDS WITH PART NUMBER F00439170. TOLERANCE IS TO BE COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS
- 3) TRAILING ZEROS DENOTE TOLERANCE.

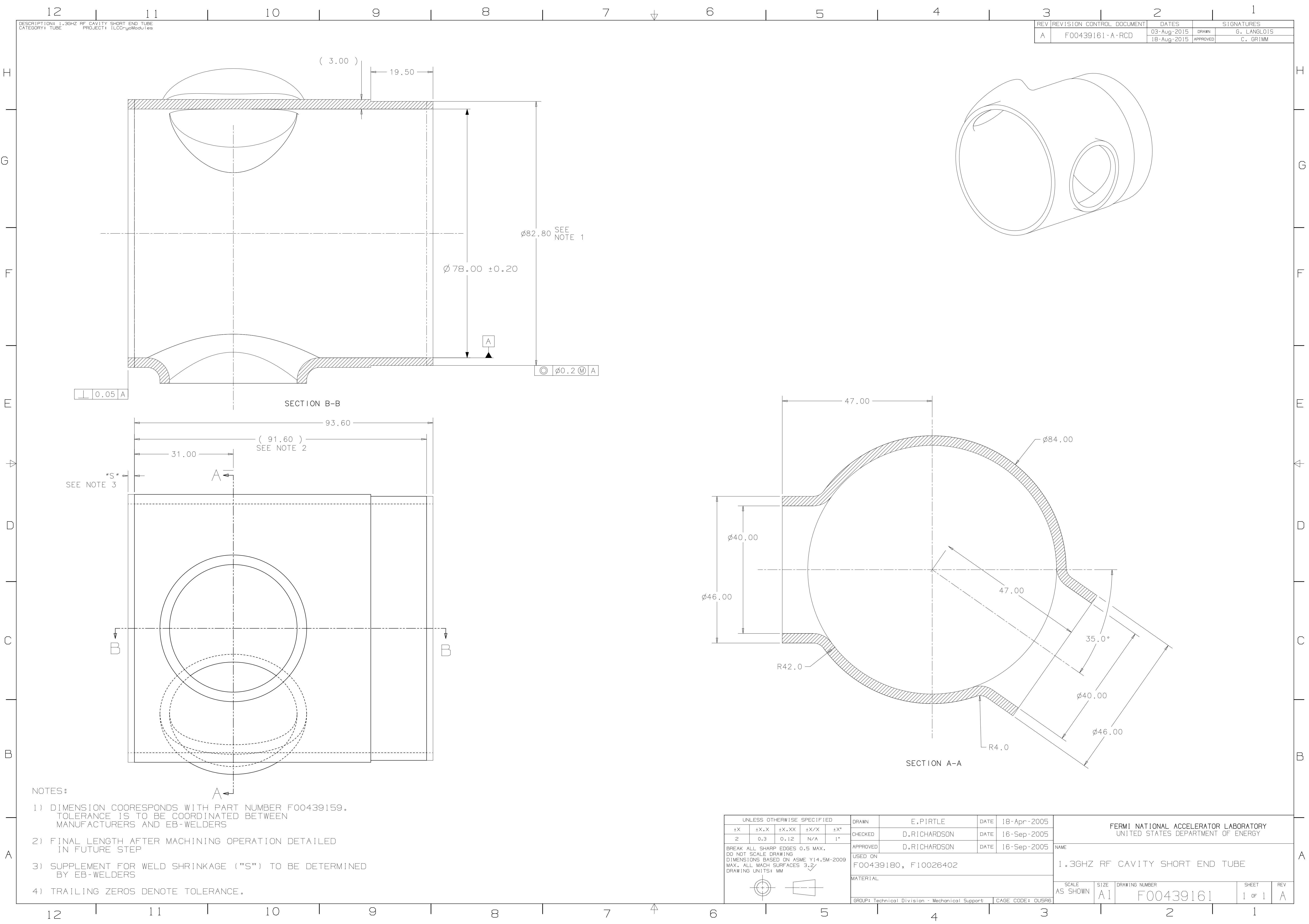
UNLESS OTHERWISE SPECIFIED				
$\pm X$	$\pm X.X$	$\pm X.XX$	$\pm X/X$	$\pm X^\circ$
2	0.3	0.12	N/A	1°

BREAK ALL SHARP EDGES 0.5 MAX.
DO NOT SCALE DRAWING
DIMENSIONS BASED ON ASME Y14.5M-2009
MAX. ALL MACH SURFACES 3.2
DRAWING UNITS: MM

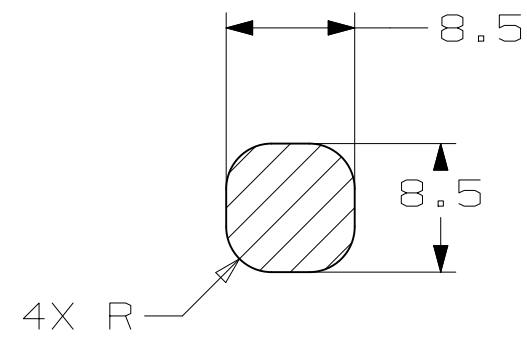


DRAWN	E. PIRTLE	DATE	18-Apr-2005
CHECKED	D. MITCHELL	DATE	16-Sep-2005
APPROVED	M. FLOLEY	DATE	16-Sep-2005
USED ON			
F00439181			
MATERIAL			
Nb55Ti			
			
GROUP: Technical Division - Design and Drafting			CAGE CODE: 0U5R6

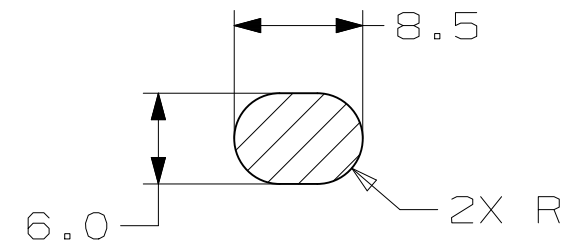
FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
NAME 1.3GHZ RF CAVITY NW 8 FLANGE				
SCALE 3:1	SIZE A3	DRAWING NUMBER F00439160	SHEET 1 OF 1	REV B



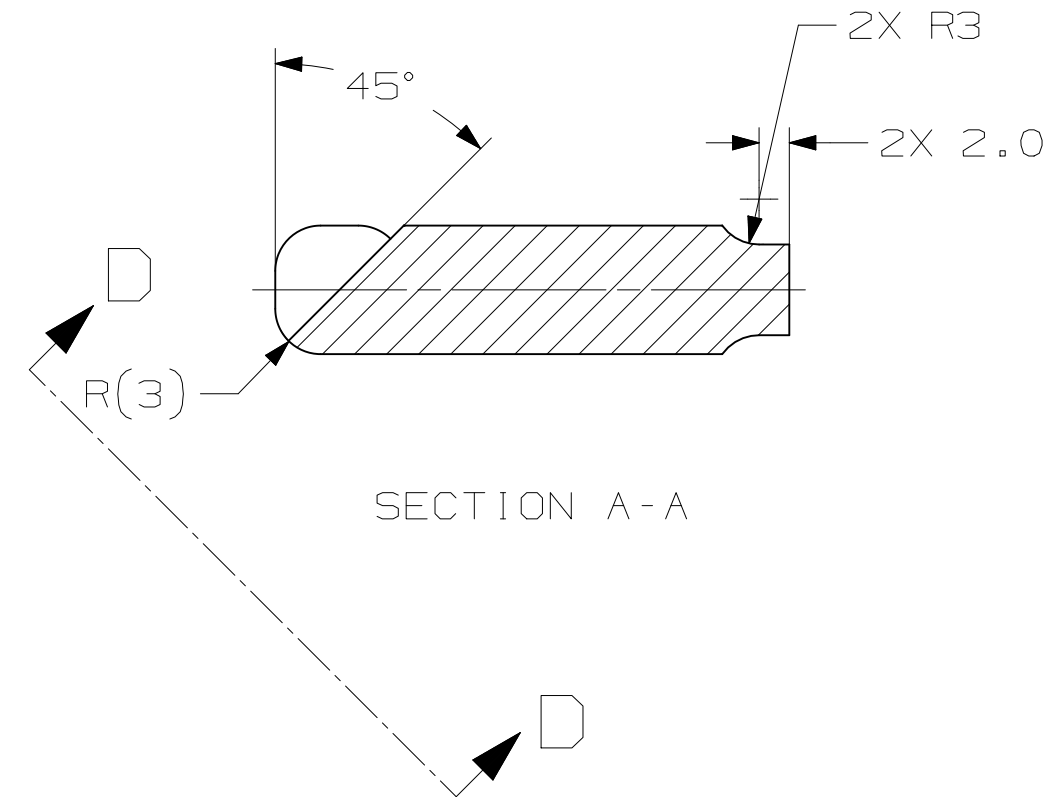
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F00439162-A-RCD	04-Aug-2015	DRAWN	G. LANGLOIS
			APPROVED	C. GRIMM



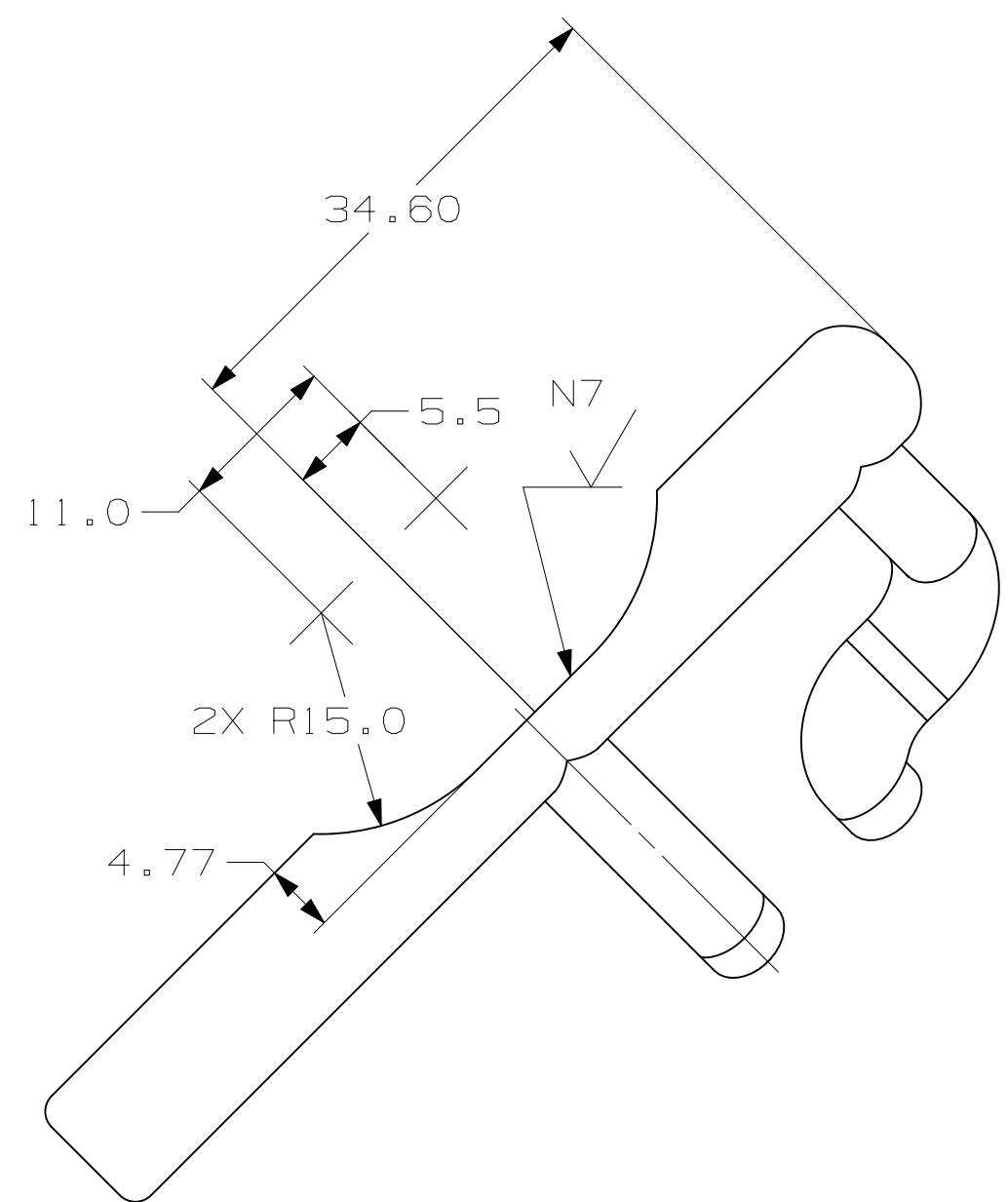
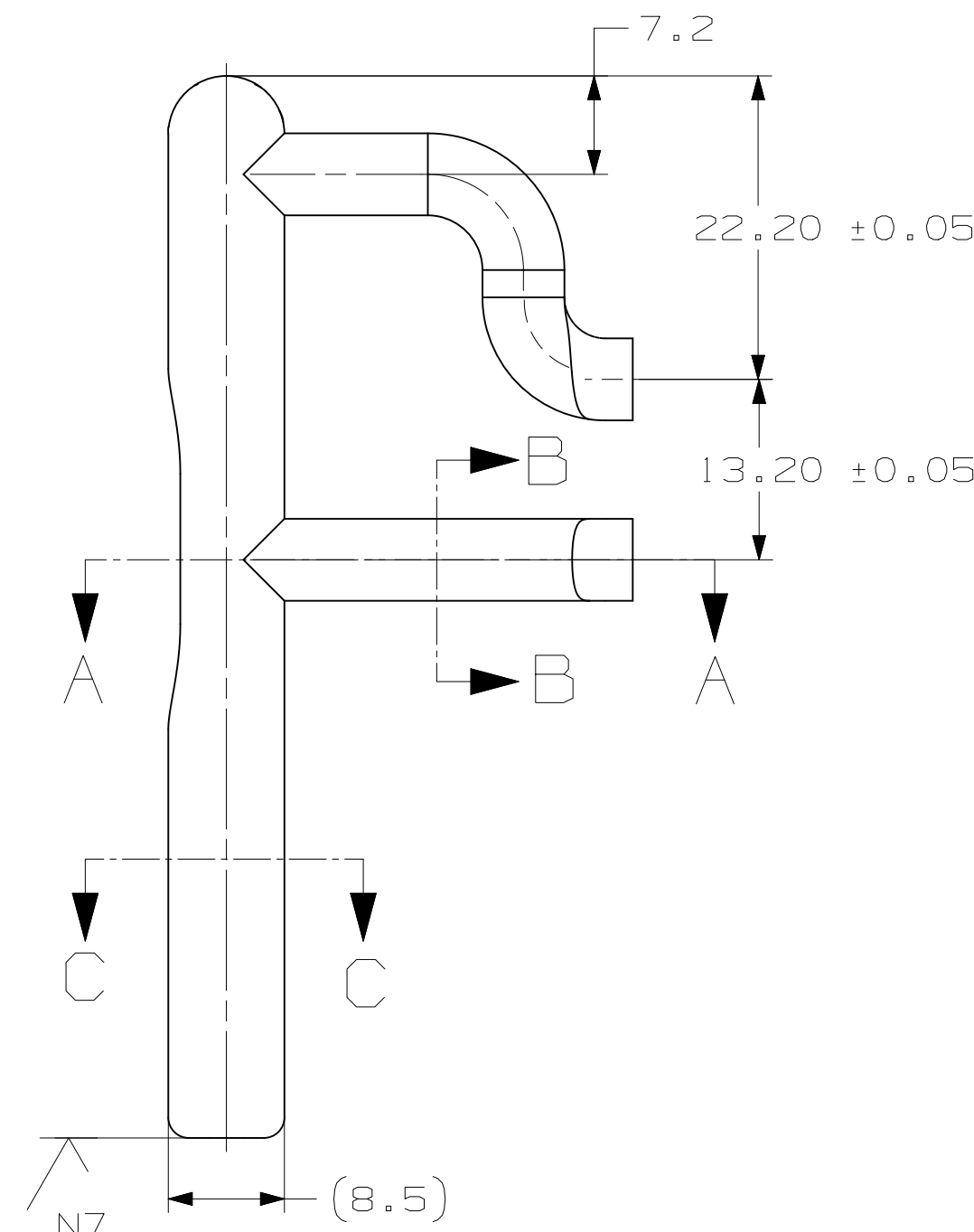
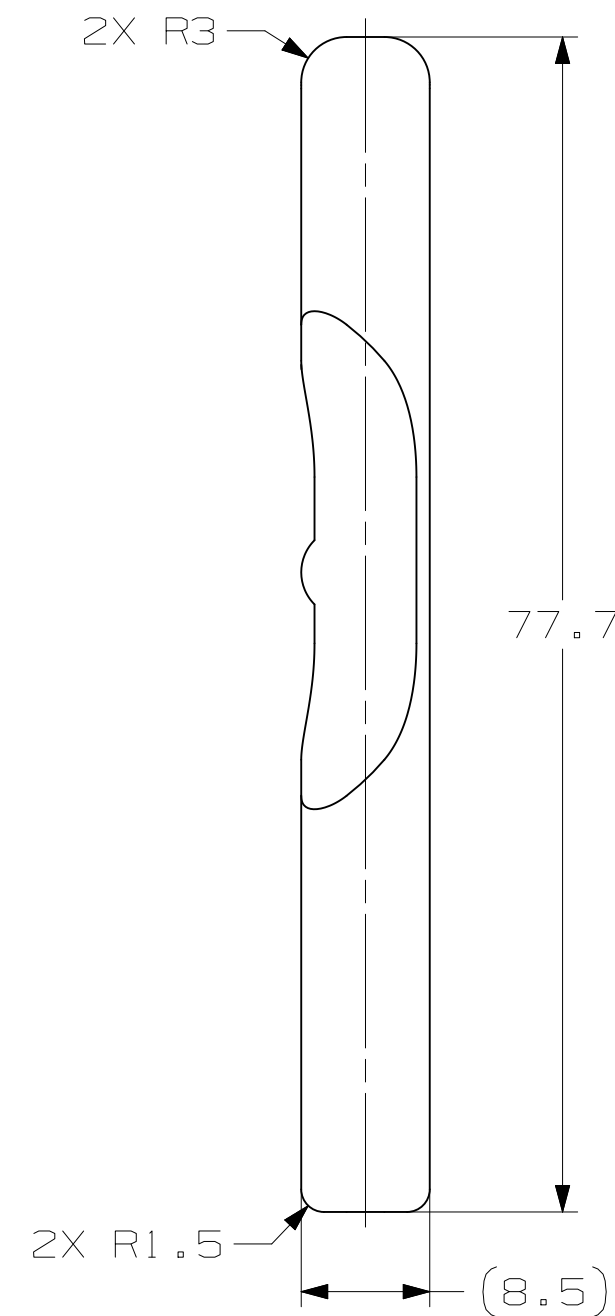
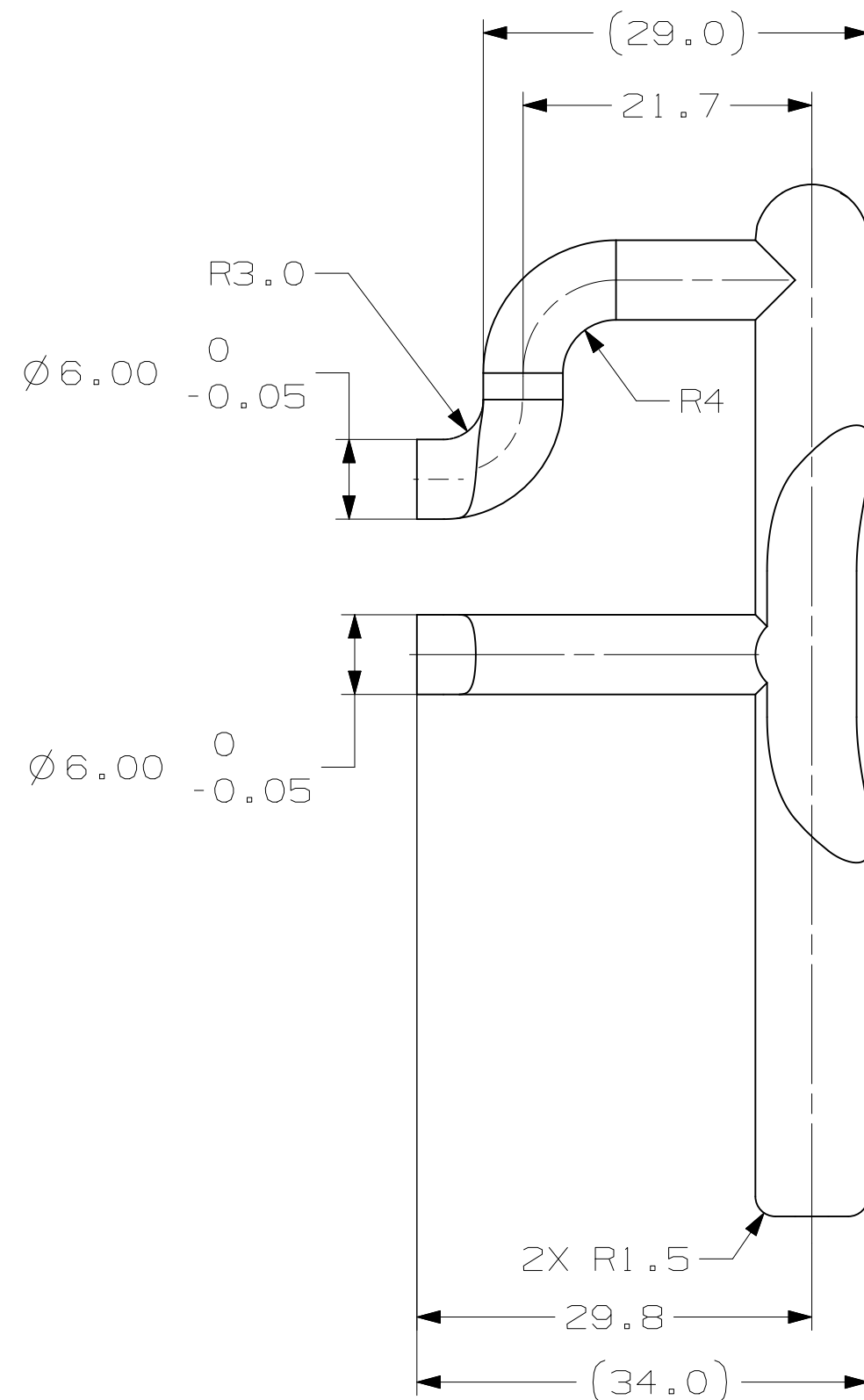
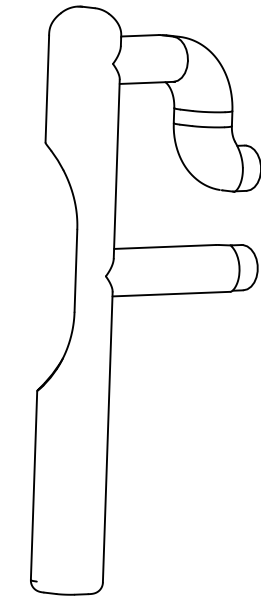
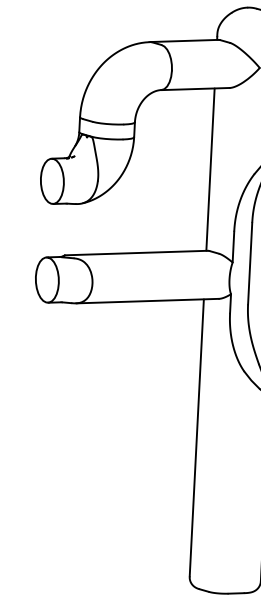
SECTION C-C



SECTION B-B



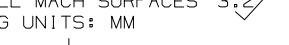
SECTION A-A



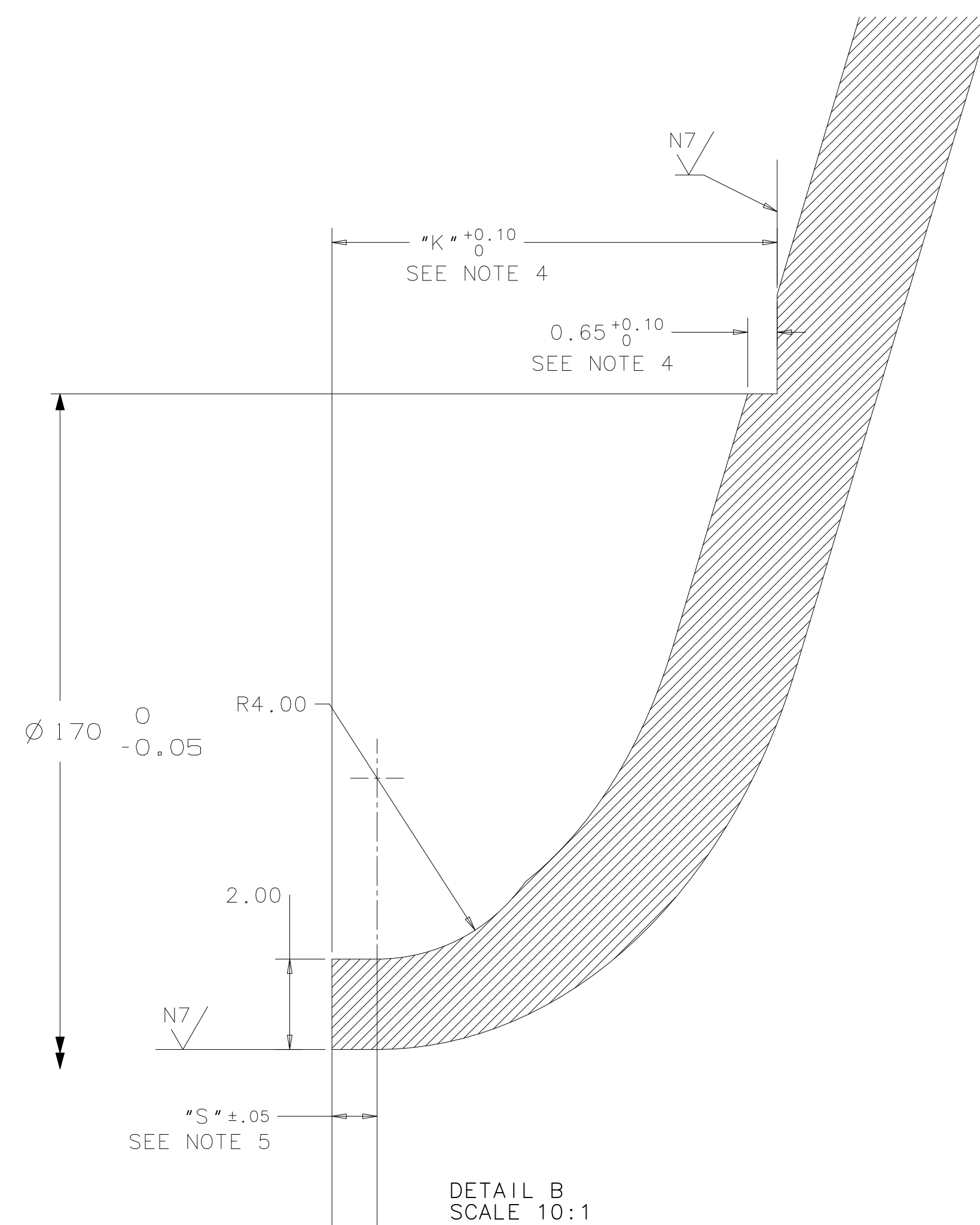
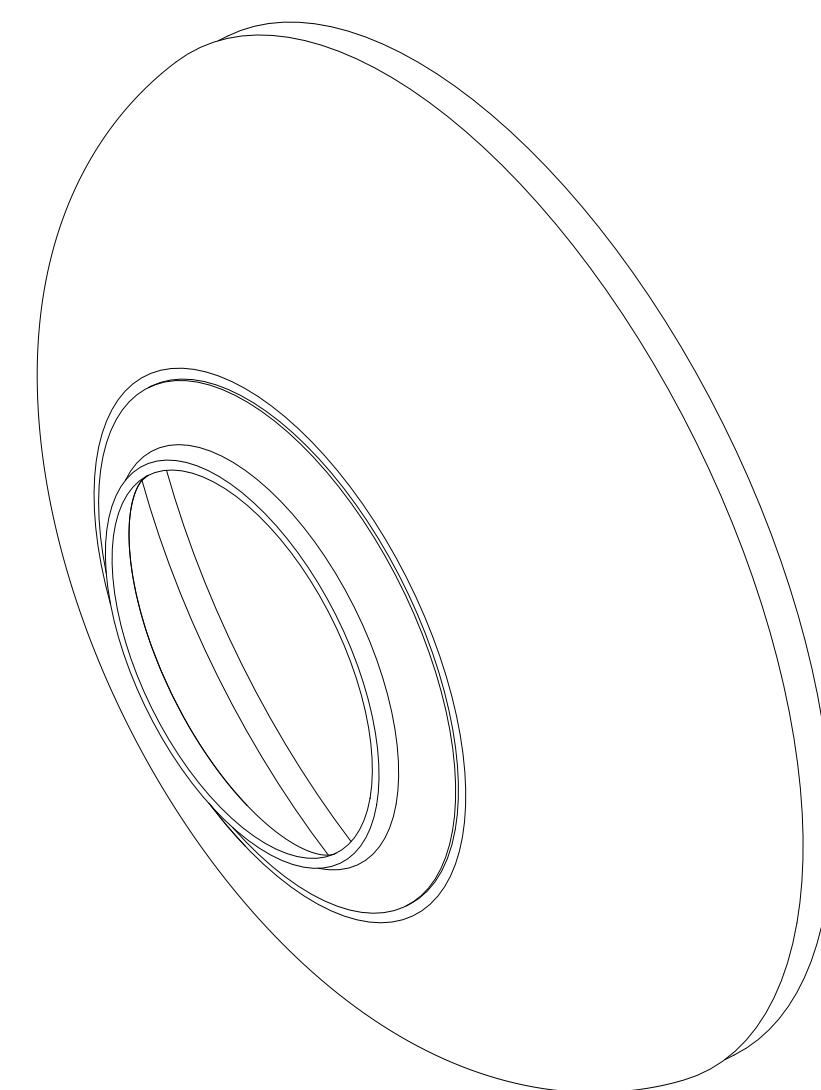
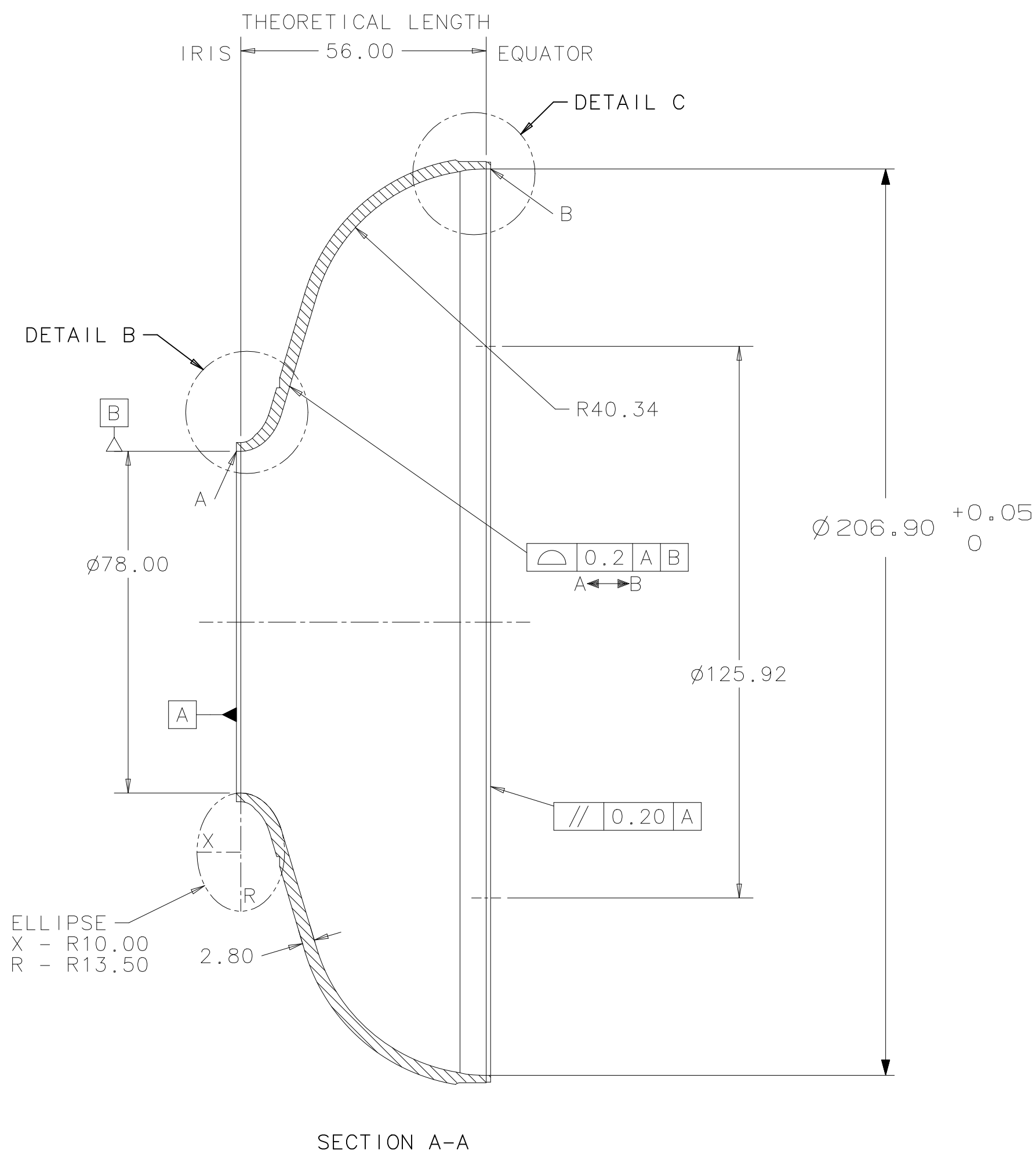
VIEW IN DIRECTION D-D

NOTES (UNLESS OTHERWISE SPECIFIED):

1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
2. PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
3. VENDOR SHALL SUPPLY THE PART SUFFICIENTLY PACKAGED TO PROTECT THE FINISH AND INTEGRITY DURING SHIPMENT AND STORAGE.
4. TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E. PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY					
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	D. MITCHELL		DATE	16-Sep-2005							
Z	0.3	0.12	N/A	1*	APPROVED	M. FOLEY		DATE	16-Sep-2005							
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM					USED ON F00439175		NAME 1.3GHZ RF CAVITY SHORT END HOM FORMTEIL									
					MATERIAL		SCALE 2:1		SIZE A2		DRAWING NUMBER F00439162		SHEET 1 of 1		REV A	
GROUP: Technical Division - Design and Drafting					CAGE CODE: 01U5R6											

3		2		1	
REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
A	F00439163-A-RCD	04-Aug-2015		DRAWN	G. LANGLOIS
		18-Aug-2015		APPROVED	C. GRIMM



- 1) THE INTERNAL SURFACE MUST SHOW NO DAMAGE CAUSED BY FORMING.
- 2) DIAMETER, FORM, AND POSITION TOLERANCES MEASURED IN THE HALF CELL'S STRAINED CONDITION
- 3) DO NOT BREAK EDGES ON END CELL
- 4) DIMENSION "K" DETERMINED BY THE MANUFACTURER SO THAT DIMENSION 0.65 IS KEPT
- 5) SUPPLEMENT FOR WELD SHRINKAGE ("S") TO BE DETERMINED BY EB-WELDERS
- 6) DUE TO THE MANUFACTURING PROCESS THE WALL THICKNESS BETWEEN THE IRIS AND EQUATOR IS NOT CONSTANT
- 7) ADDITIONAL MATERIAL NEEDED FOR CELL TUNING PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE ("S"). FINAL SURFACE TO BE MACHINED UNTIL TUNED.
- 8) VENDOR OPTION TO MACHINE FLAT OMITTING R1.5 
- 9) TRAILING ZEROS DENOTE TOLERANCE. 
- 10) DIMENSIONS IN [X.X] ARE IN INCHES. 

UNLESS OTHERWISE SPECIFIED					DRAWN	E. PIRTLE	DATE	18-Apr-2005	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY							
±X ±X.X ±X..XX ±X/X ±X* 2 0.3 0.12 N/A 1*					CHECKED	D. MITCHELL	DATE	16-Sep-2005								
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					APPROVED	M. FOLEY	DATE	16-Sep-2005						NAME		
					USED ON F00439180, F10026403					1.3GHZ RF CAVITY SHORT END HALF CELL						
					MATERIAL					SCALE		SIZE	DRAWING NUMBER		SHEET	REV
					GROUP: Technical Division - Design and Drafting CAGE CODE: 04US6					AS SHOWN 1:1		A1	F00439163		1 OF 1	A

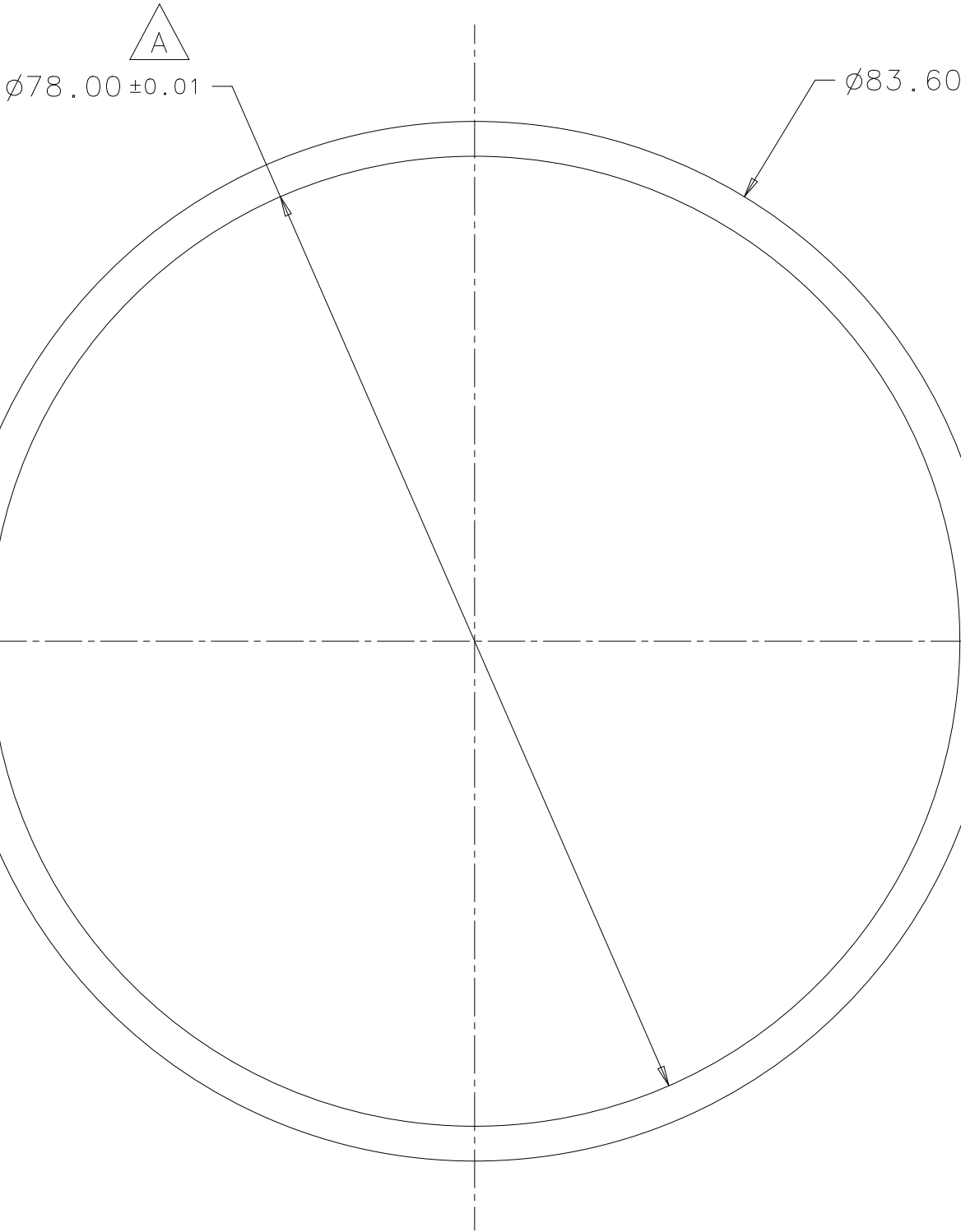
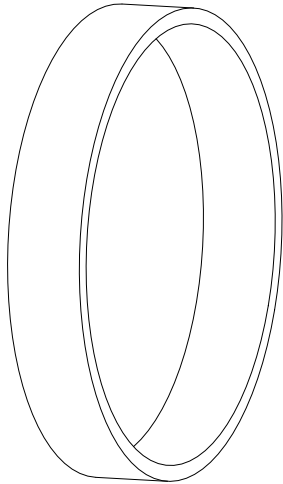
DESCRIPTION: DESY 1.3GHZ TESLA RF CAVITY END TUBE SPOOL PIECE
CATEGORY: SPOOL PROJECT: ILC CryoModules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00439164-B-RCD	04-Aug-2015	DRAWN	G. LANGLOIS
		18-Aug-2015	APPROVED	C. GRIMM

A

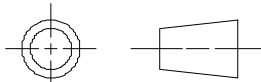
14.00

// 0.05 A

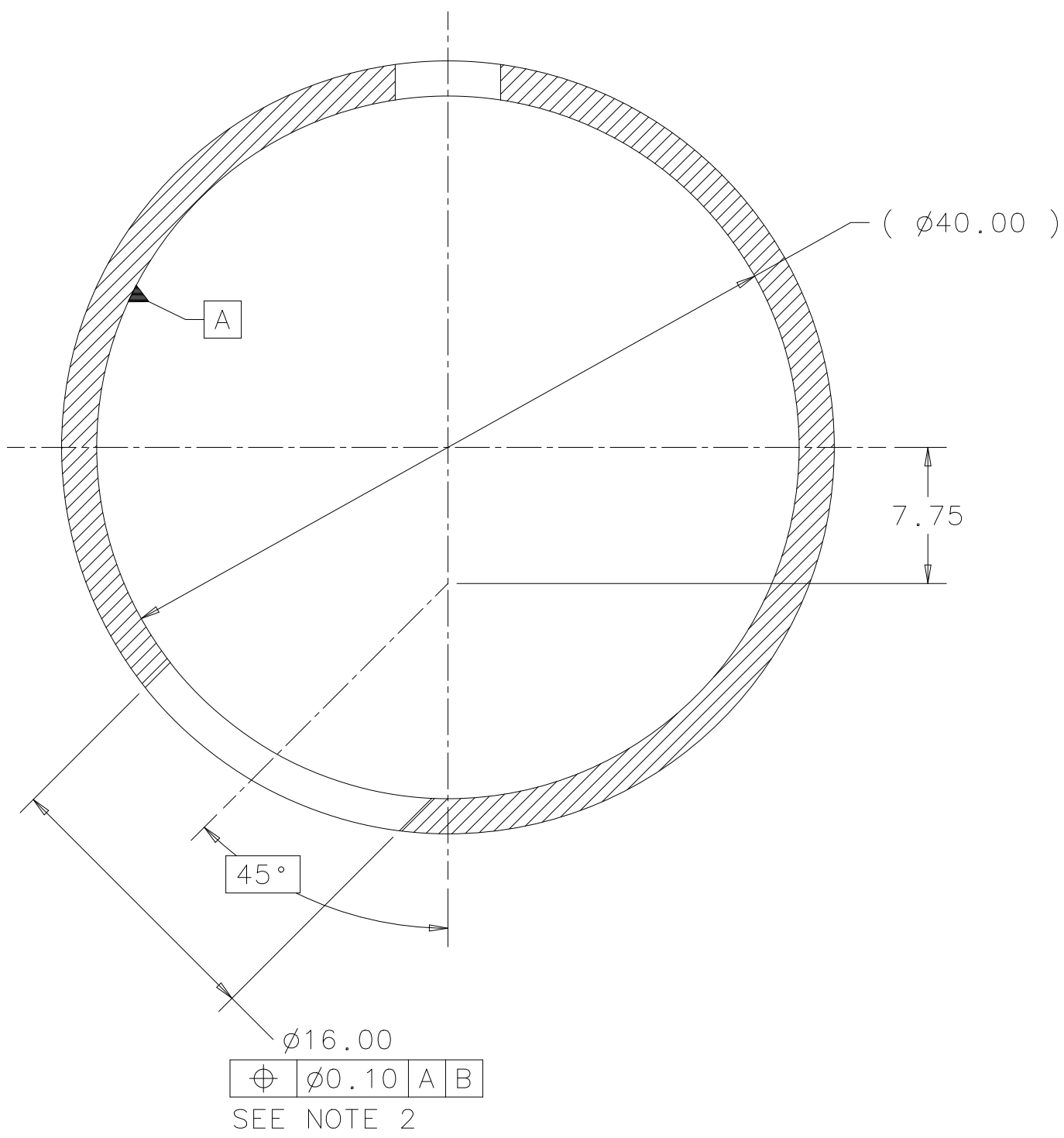
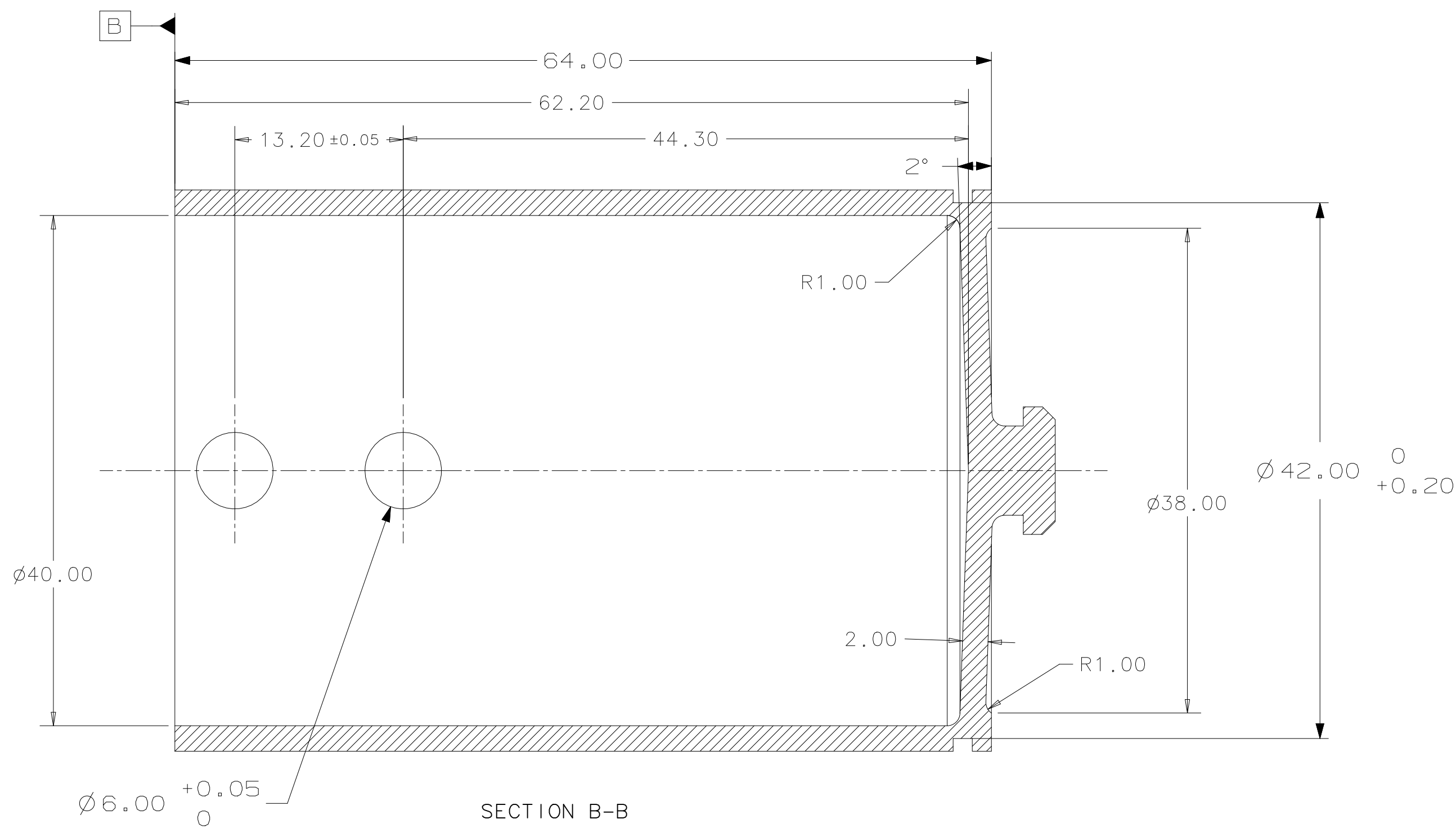
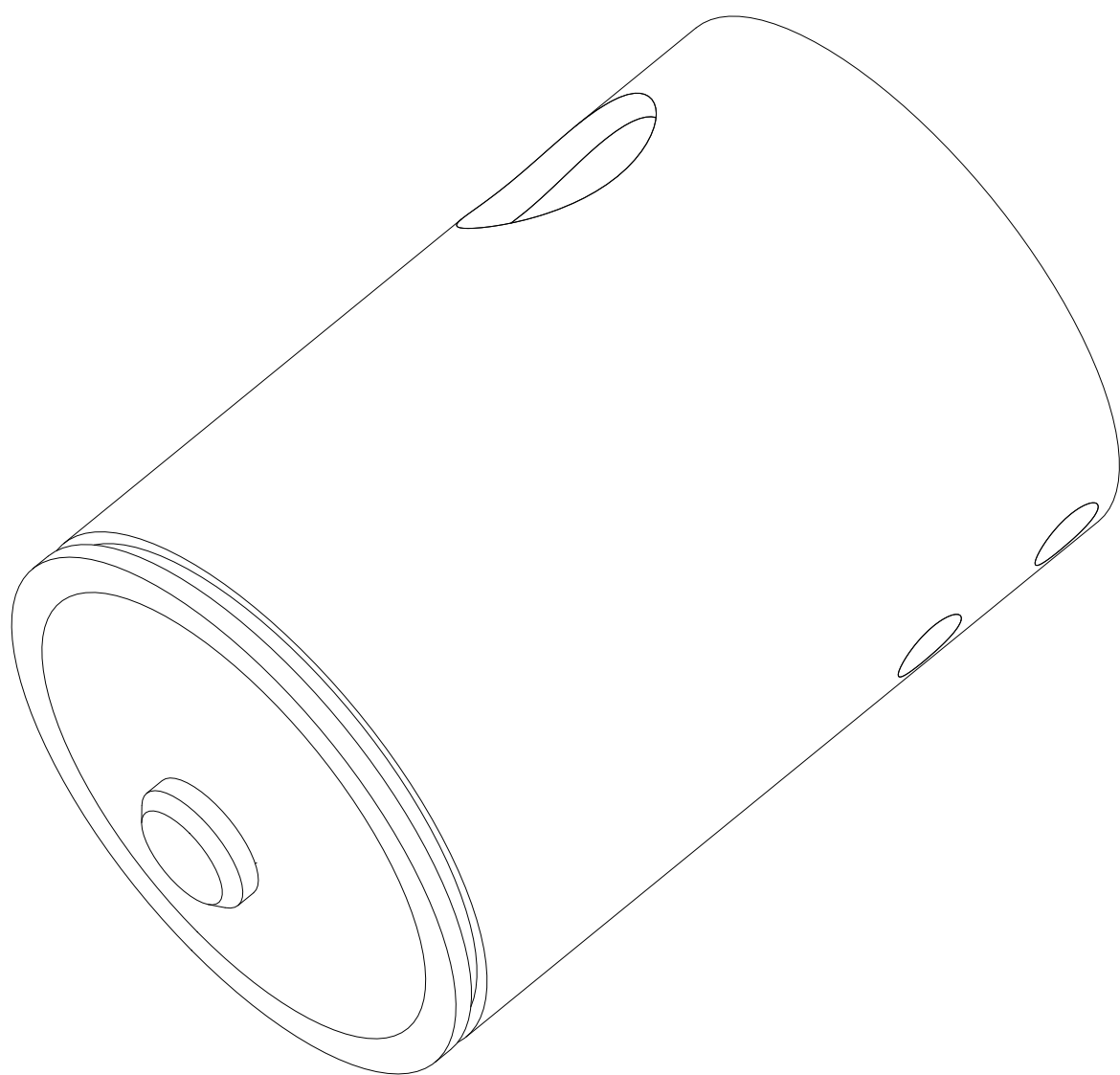
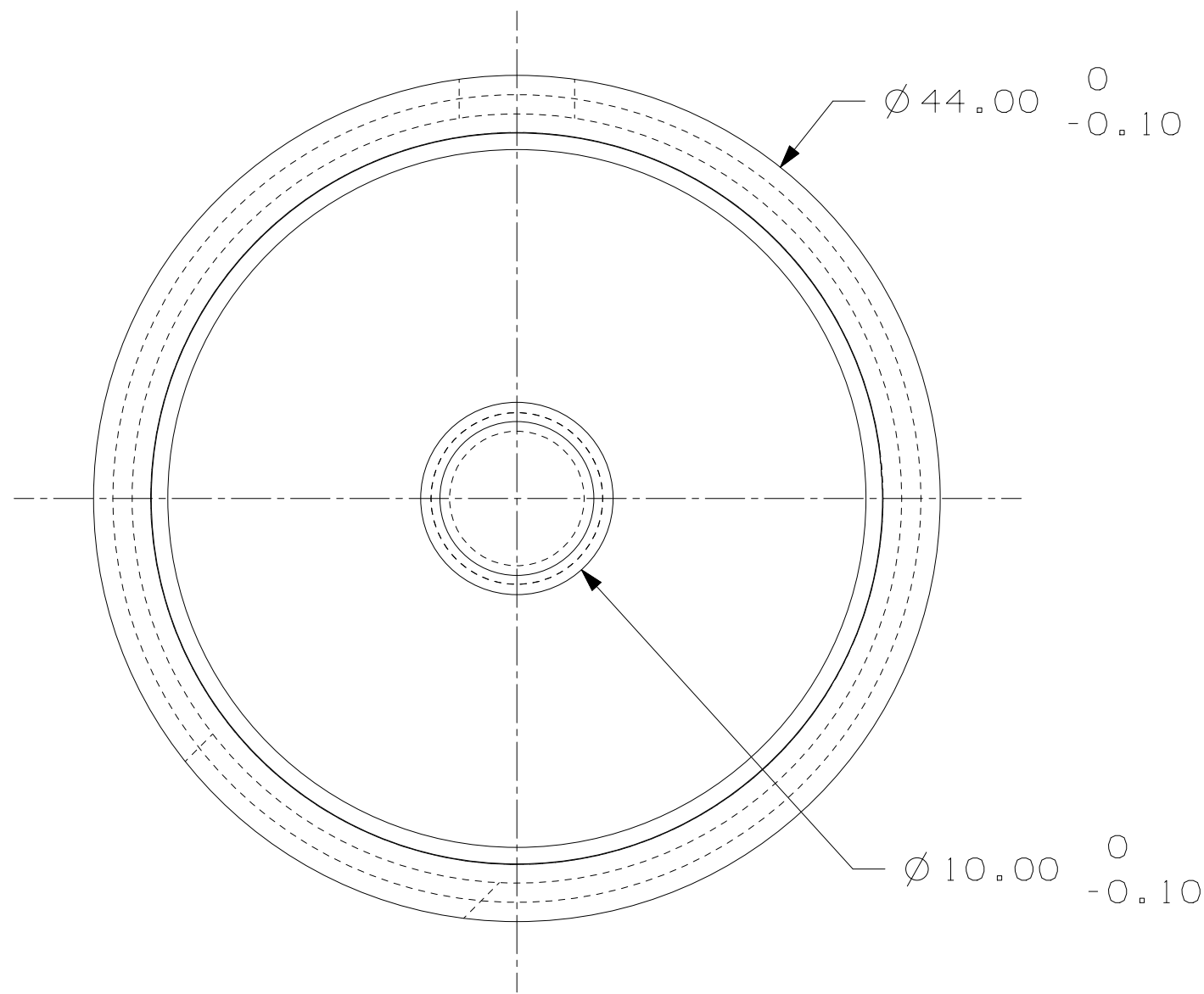
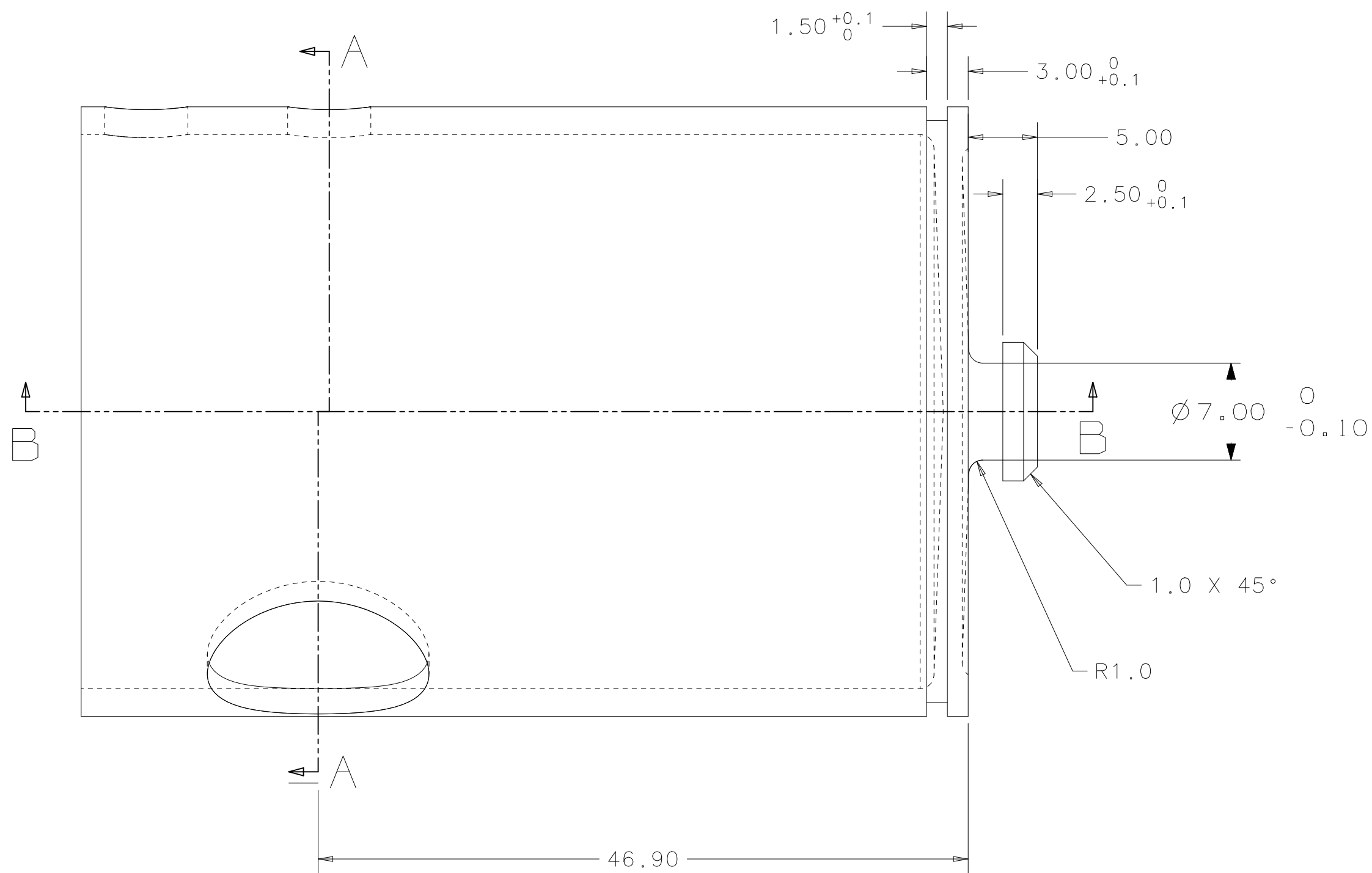


NOTE :

- 1) SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING
- 2) SUPPLEMENT FOR WELD SHRINKAGE ("S") TO BE DETERMINED BY E-BEAM WELDERS
- 3) TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE	DATE	18-Apr-2005	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D.MITCHELL	DATE	16-Sep-2005	NAME 1.3GHZ END TUBE SPOOL PIECE				
2	0.3	0.12	N/A	1°	APPROVED	M.FOLEY	DATE	16-Sep-2005					
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON			F00440003, F10026401, F10026403					
					MATERIAL								
					GROUP: Technical Division - Design and Drafting					CAGE CODE: 0U5R6			SCALE 2:1

REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
		14-Jul-2015	DRAWN	G. LANGLOIS	
A	F00439165-A-RCD	18-Aug-2015	APPROVED	C. GRIMM	



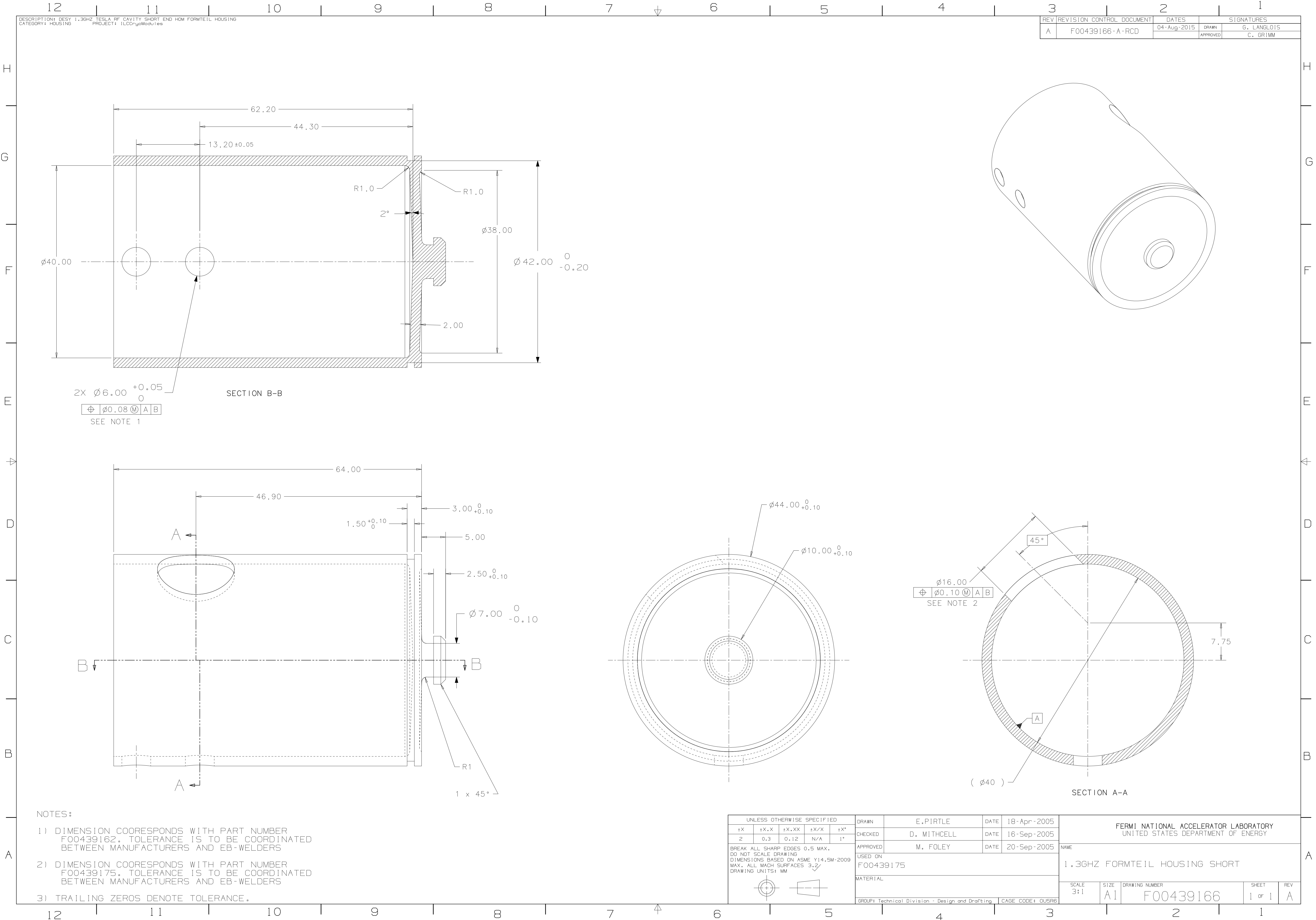
$\varnothing 0.08$ A B
SEE NOTE 1

$\varnothing 0.10$ A B
SEE NOTE 2

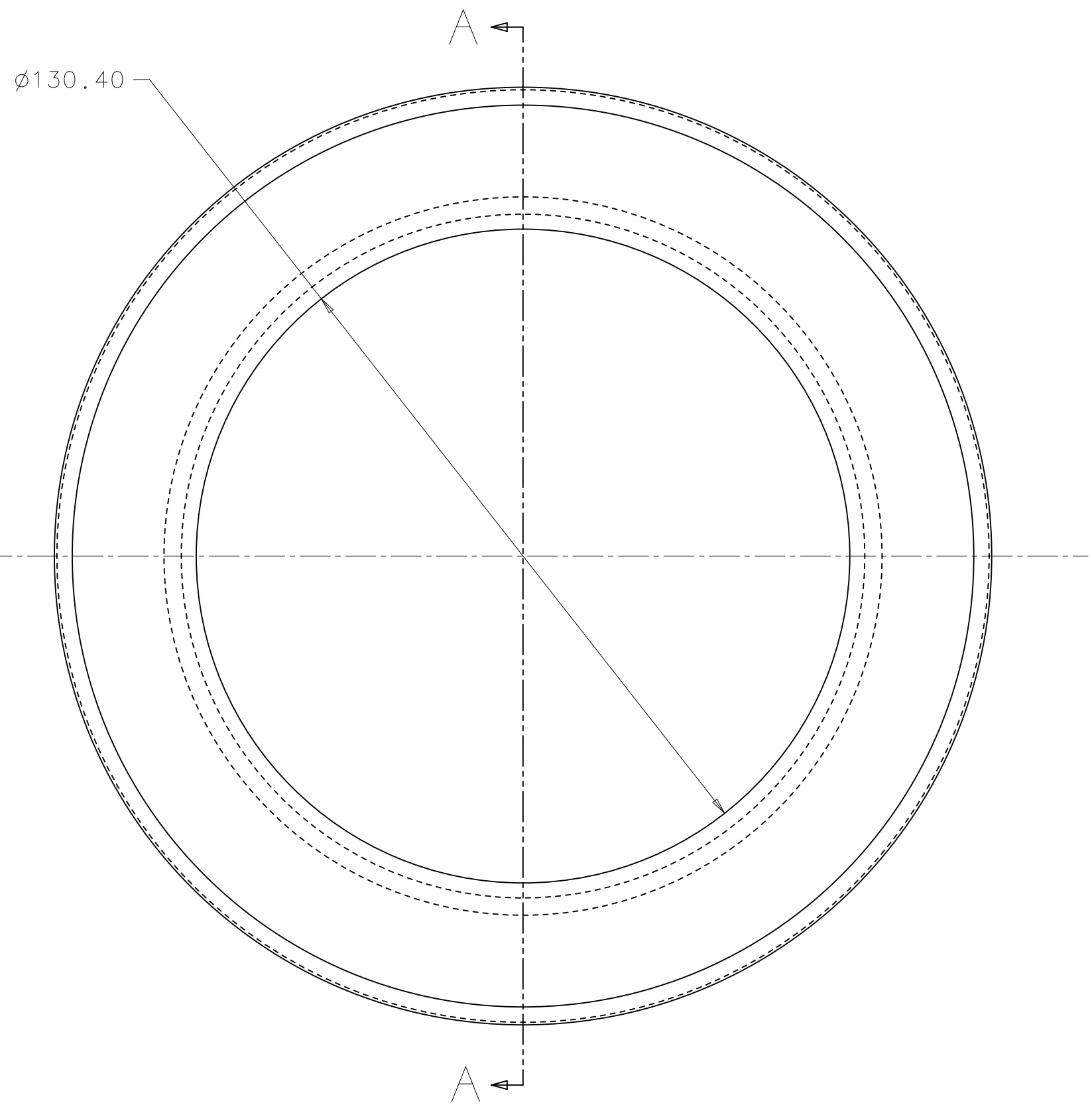
NOTES:

- 1) DIMENSION COORESponds WITH PART NUMBER MD-439154.
TOLERANCE IS TO BE COORDINATED BETWEEN
MANUFACTURERS AND EB-WELDERS
- 2) DIMENSION COORESponds WITH PART NUMBER MB-439157.
TOLERANCE IS TO BE COORDINATED BETWEEN
MANUFACTURERS AND EB-WELDERS
- 3) TRAILING ZEROS DENOTE TOLERANCE.

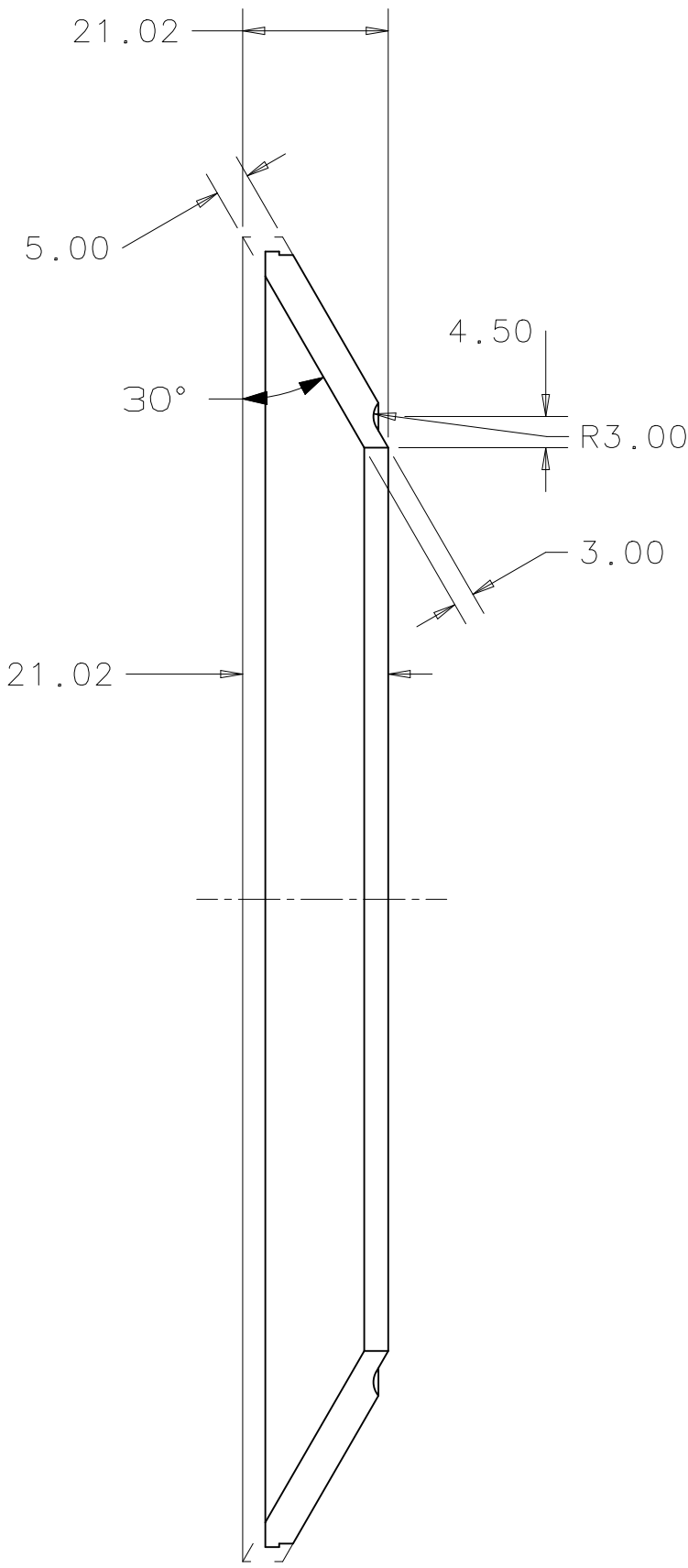
UNLESS OTHERWISE SPECIFIED					DRAWN	E. PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D. MITCHELL		DATE	16-Sep-2005						
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY		DATE	16-Sep-2005		NAME				
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON		F00439174		1.3GHZ RF CAVITY LONG END HOM FORMTEIL HOUSING						
					MATERIAL		NIOBIUM RRR GRADE								
					GROUP: Technical Division - Design and Drafting		CAGE CODE: QUSR6		SCALE AS SHOWN		SIZE A1	DRAWING NUMBER F00439165		SHEET 1 OF 1	REV A



3		2		1			
REV		REVISION CONTROL DOCUMENT		DATES		SIGNATURES	
B	F00439167-B-RCD		05-Oct-2015		DRAWN	G. LANGLOIS	
			05-Oct-2015		APPROVED	C. GRIMM	

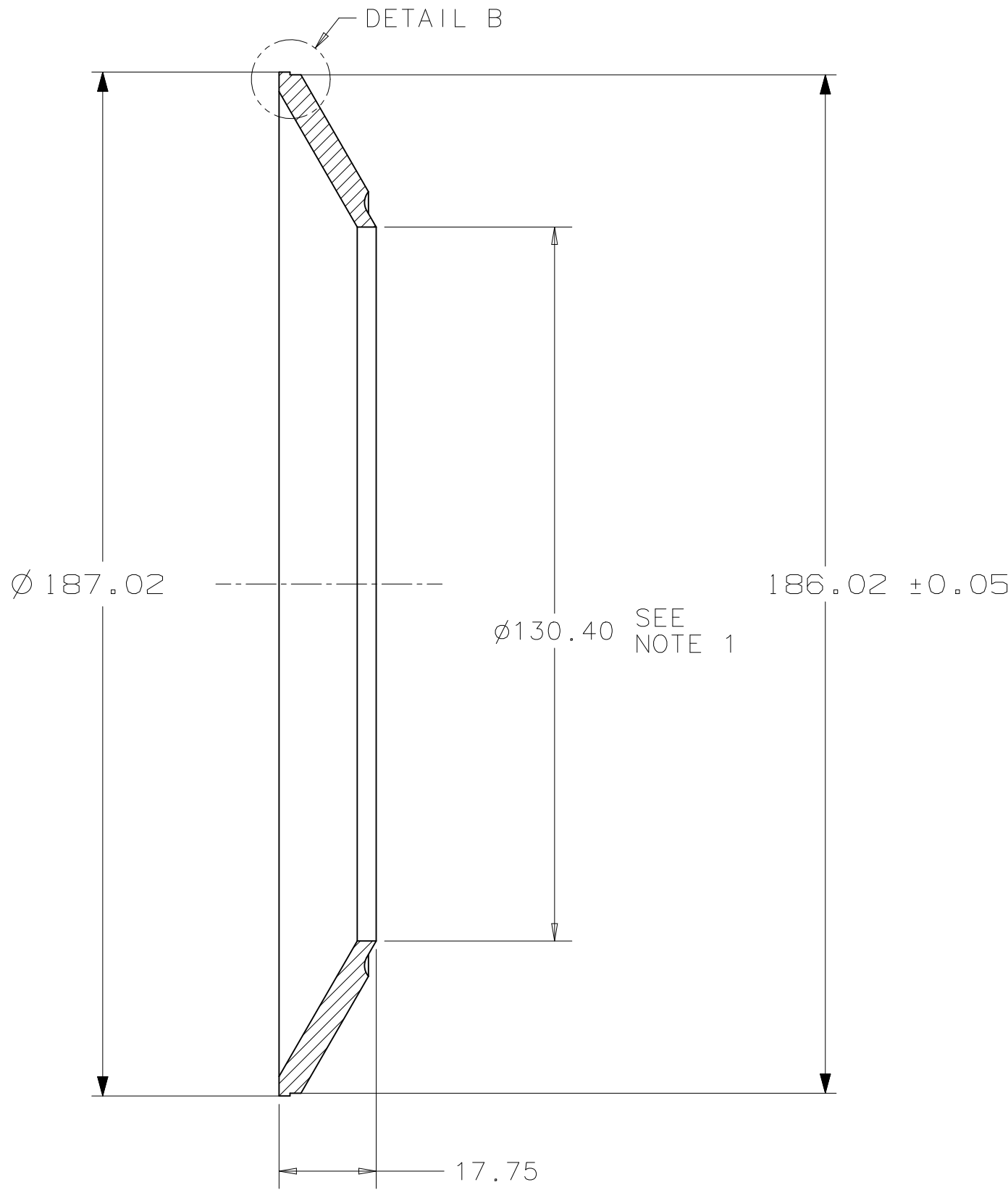


CONTOUR BEFORE THE MACHINING
OPERATION IN DRAWING NUMBER F10026401

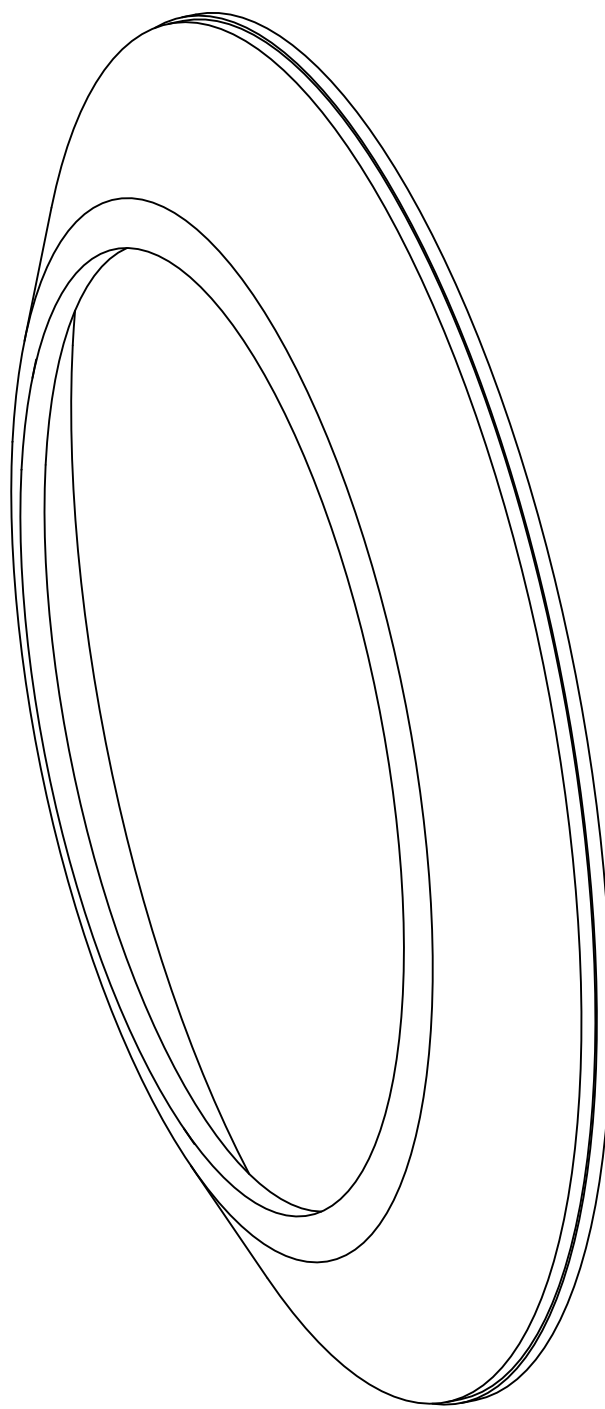


SECTION A-A

CONTOUR AFTER THE MACHINING
OPERATION IN DRAWING NUMBER F10026401



SECTION A-A



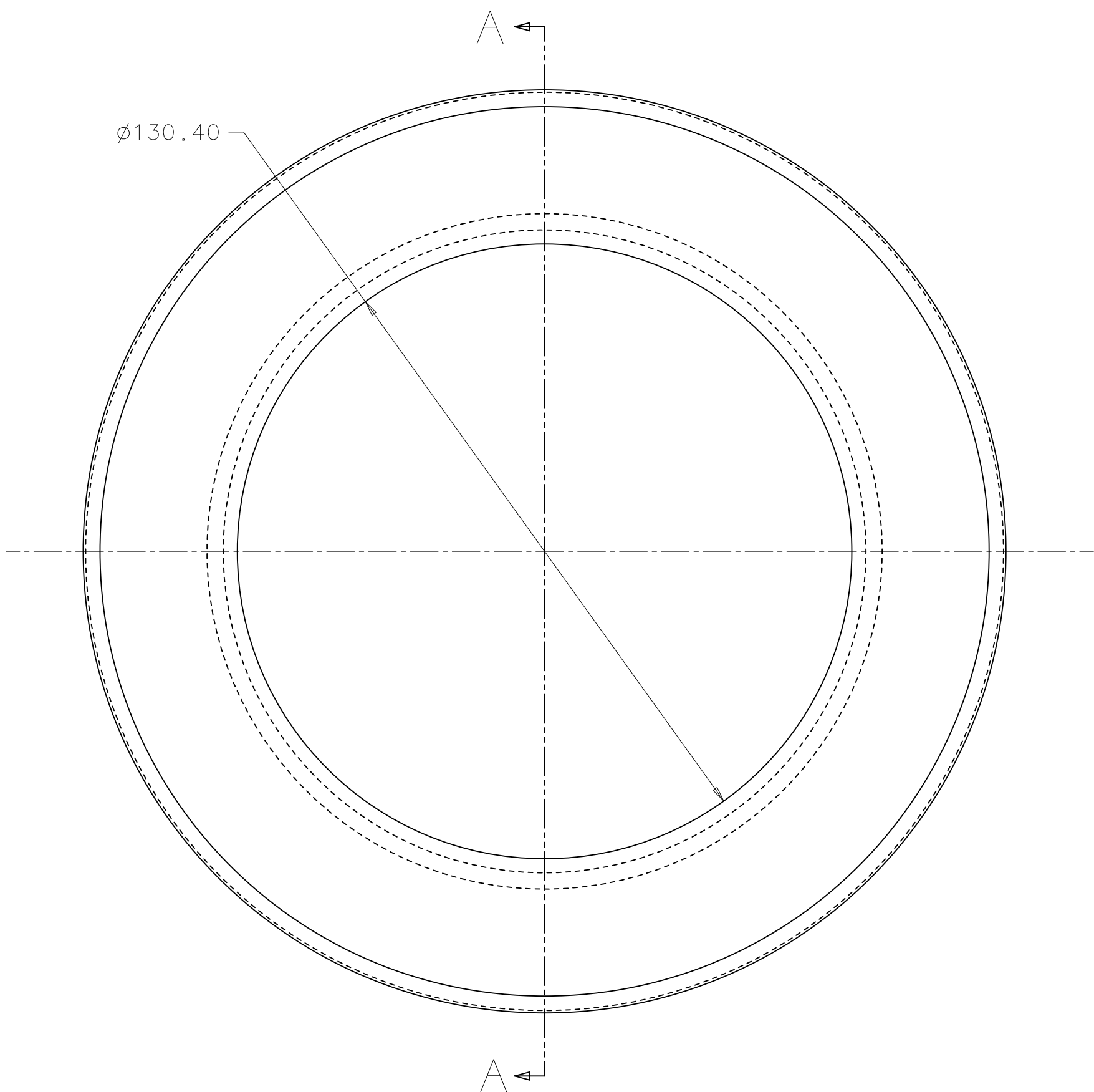
NOTE :
1) DIMENSION COORESponds WITH PART NUMBER F00439152.
TOLERANCE IS TO BE COORDINATED BETWEEN
MANUFACTURERS AND EB-WELDERS
2. TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE	DATE	18-Apr-2005	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	T.PARKER	DATE	16-Sep-2005					
2	0.3	0.12	N/A	1°	APPROVED	T.PARKER	DATE	16-Sep-2005	NAME				
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON F00440003, F10026401				1.3GHZ LONG END CAP DISK				
					MATERIAL Nb55Ti 								
					GROUP: Technical Division - Design and Drafting				SCALE 1:1 AS SHOWN	SIZE A1	DRAWING NUMBER F00439167	SHEET 1 OF 1	REV B

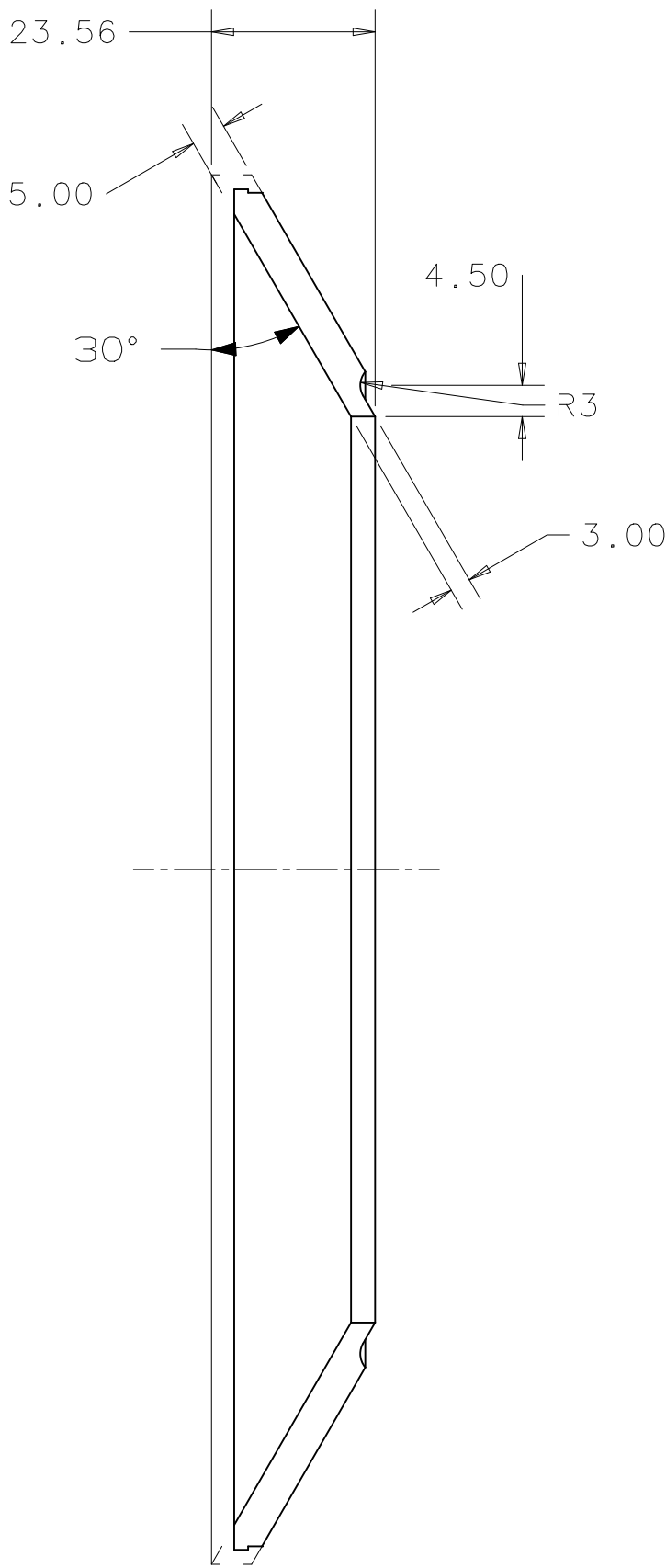
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
B	F00439168-B-RCD	05-Oct-2015 05-Oct-2015	DRAWN APPROVED
			G. LANGLOIS C. GRIMM

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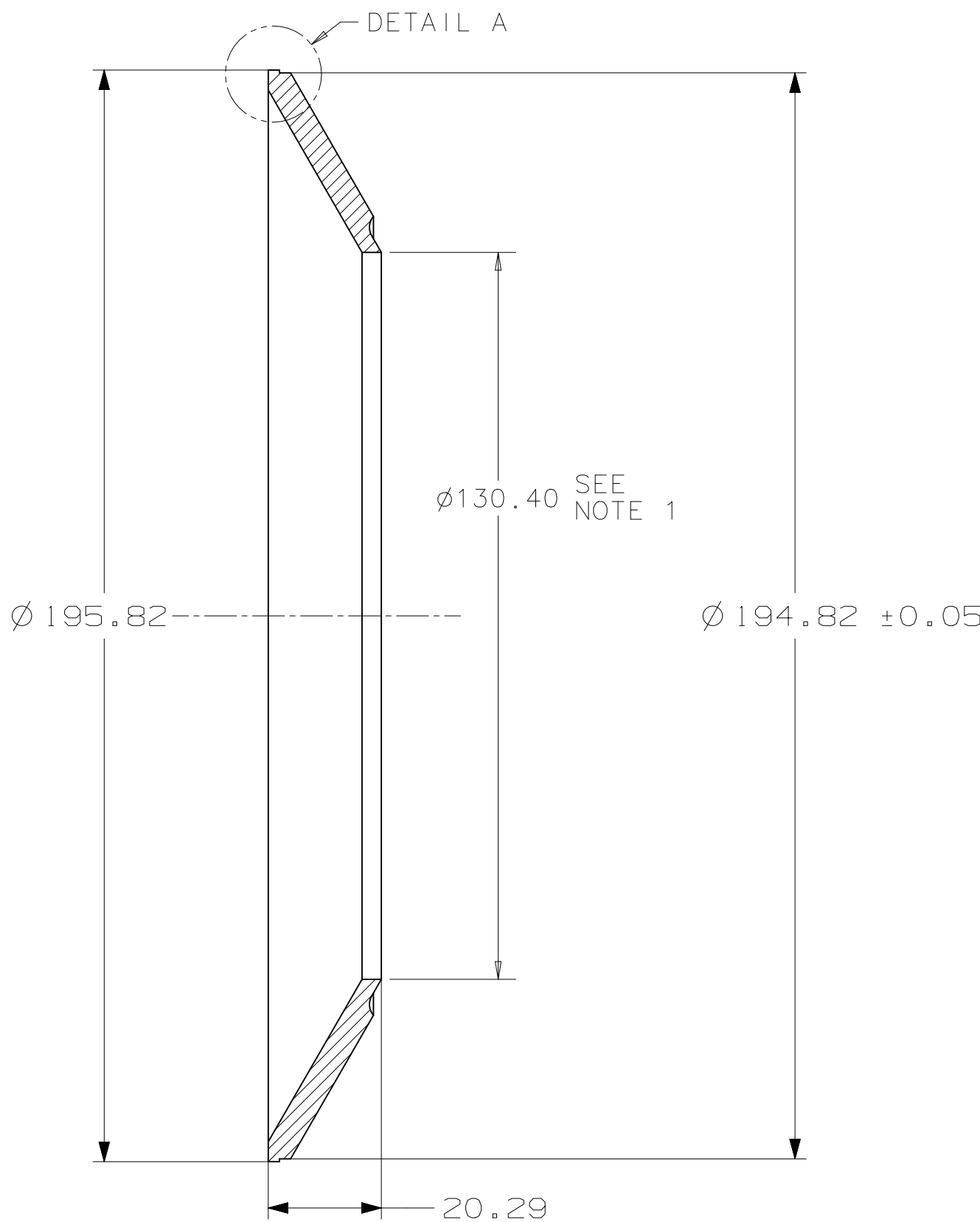


CONTOUR BEFORE THE MACHINING
OPERATION IN DRAWING NUMBER F10026403

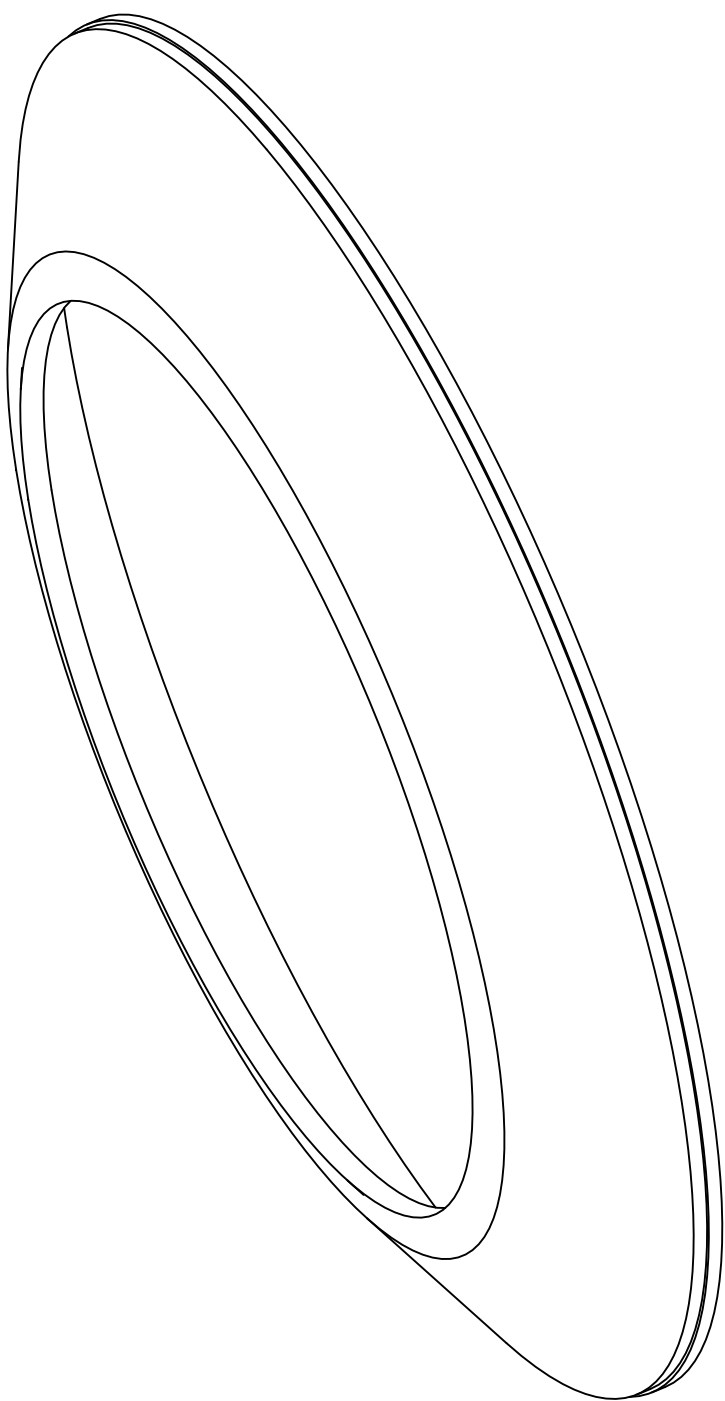


SECTION A-A

CONTOUR AFTER THE MACHINING
OPERATION IN DRAWING NUMBER F10026403



SECTION A-A

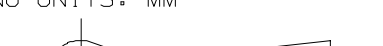


NOTE:

1) DIMENSION COORESponds WITH PART NUMBER F00439152.
TOLERANCE IS TO BE COORDINATED BETWEEN
MANUFACTURERS AND EB-WELDERS

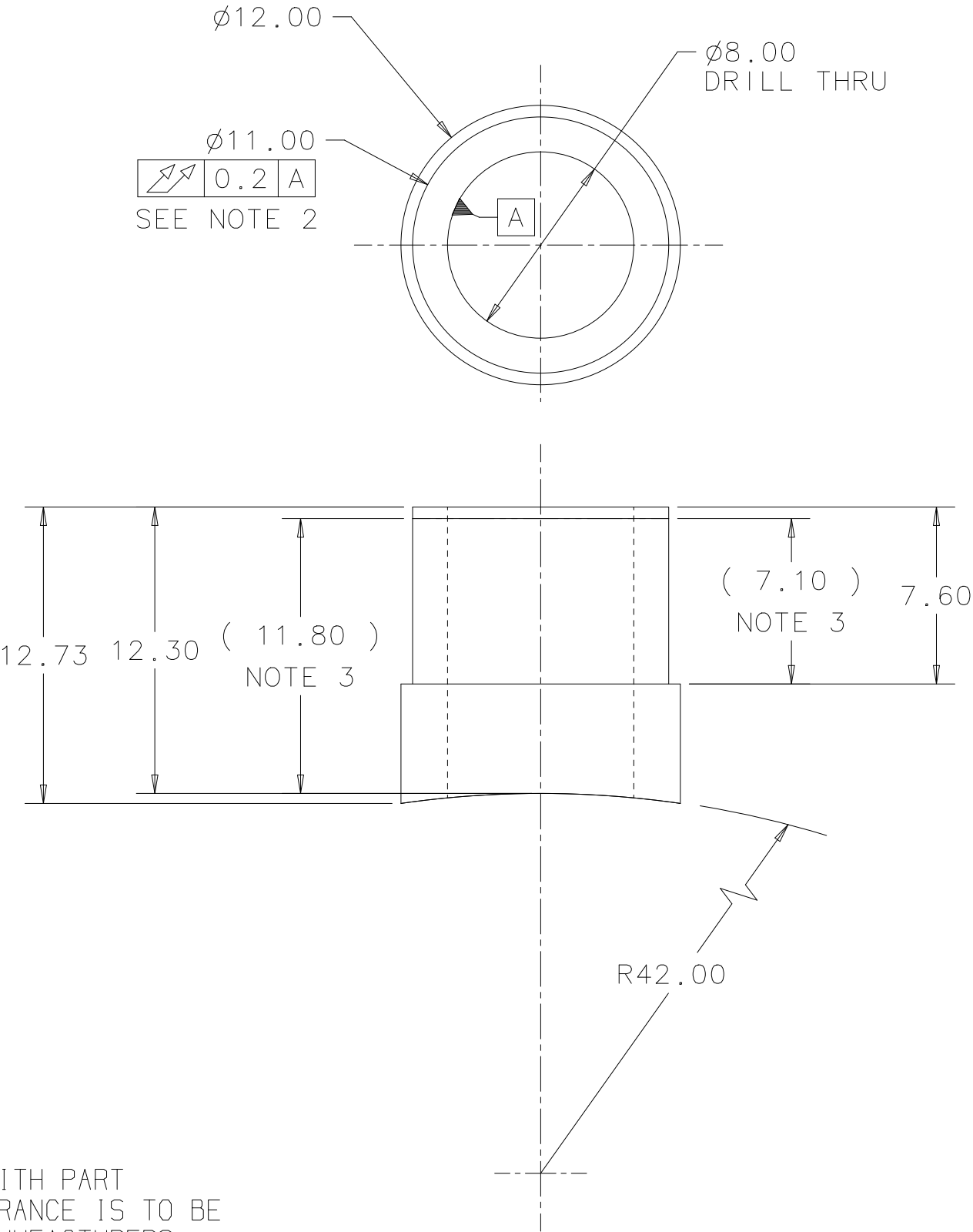
2) TRAILING ZEROS DENOTE TOLERANCE.



UNLESS OTHERWISE SPECIFIED					DRAWN	E. PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D. MITCHELL		DATE	16-Sep-2005					
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY		DATE	16-Sep-2005		NAME			
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON		1.3GHZ SHORT END CAP DISK							
					F10026403									
					MATERIAL		Nb55Ti							
														
					GROUP: Technical Division - Design and Drafting		CAGE CODE: OUSR6							
SCALE AS SHOWN 1:1		SIZE A1	DRAWING NUMBER F00439168			SHEET 1 OF 1		REV B						

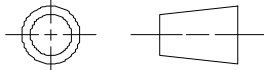
DESCRIPTION: 1.3GHZ CAVITY LONG END ANTENNA SPOOL PIECE
CATEGORY: SPOOL PROJECT: 1LCCryoModules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00439170-B-RCD	10-Jul-2015	DRAWN	G. LANGLOIS
		18-Aug-2015	APPROVED	C. GRIMM



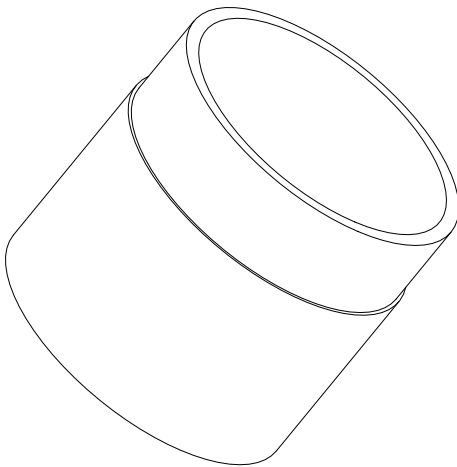
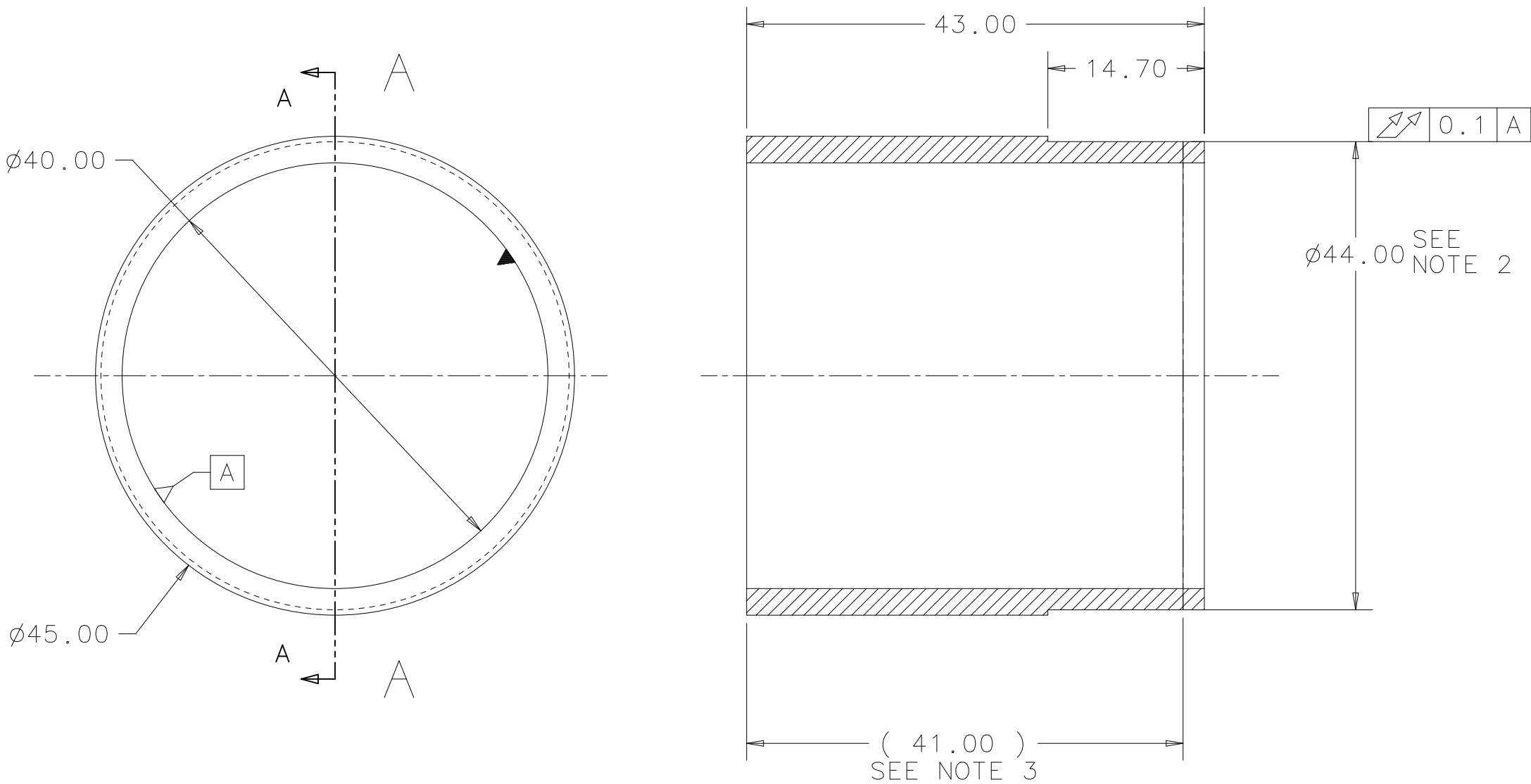
NOTE:

- 1) SURFACE FREE OF DAMAGE
- 2) DIMENSION COORESPONDS WITH PART NUMBER F00439160. TOLERANCE IS TO BE COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS
- 3) FINAL LENGTH AFTER MACHINING OPERATION DETAILED ON DRAWING NUMBER F00439179
- 4) TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY						
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D.MITCHELL		DATE	16-Sep-2005								
2	0.3	0.12	N/A	1°	APPROVED	M.FOLEY		DATE	20-Sep-2005		NAME 1.3GHZ CAVITY LONG END ANTENNA SPOOL PIECE						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM 					USED ON F10026400												
					MATERIAL						SCALE 4:1		SIZE A3	DRAWING NUMBER F00439170		SHEET 1 OF 1	REV B
					GROUP: Technical Division - Design and Drafting						CAGE CODE: 0U5R6						

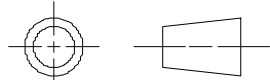
DESCRIPTION: 1.3GHZ RF CAVITY COUPLER SPOOL PIECE
CATEGORY: SPOOL PROJECT: ILCCryoModules

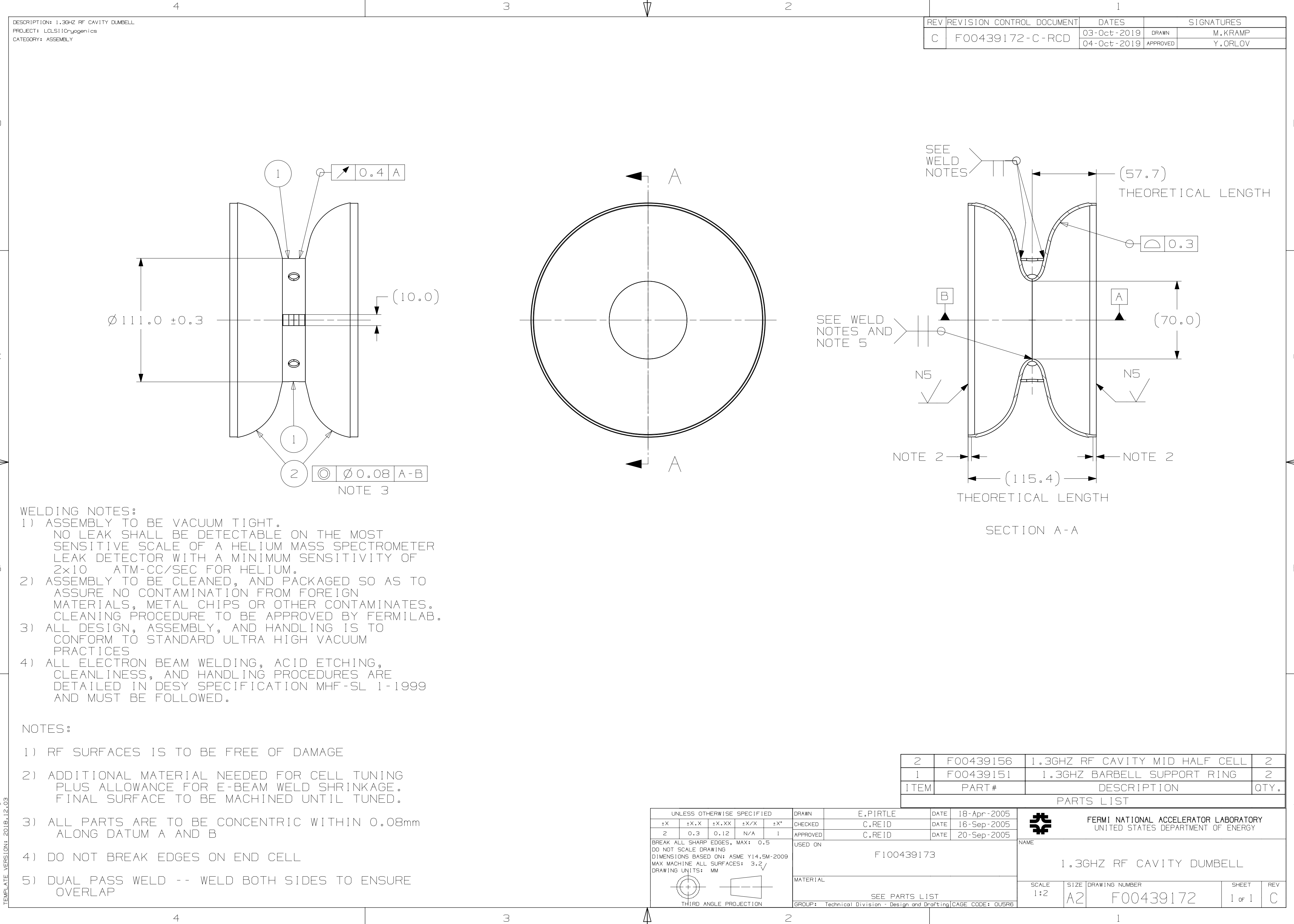
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F00439171-A-RCD	03-Aug-2015	DRAWN	G. LANGLOIS
		18-Aug-2015	APPROVED	C.GRIMM



NOTES:

- 1) SURFACE FREE OF DAMAGE
- 2) DIMENSION COORESponds WITH PART NUMBER F00439158. TOLERANCE IS TO BE COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS
- 3) FINAL LENGTH AFTER MACHINING OPERATION DETAILED ON DRAWING NUMBER F00439180
- 4) TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE	DATE	18-Apr-2005	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY								
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	T.PARKER	DATE	16-Sep-2005									
2	0.3	0.12	N/A	1°	APPROVED	T.PARKER	DATE	16-Sep-2005									
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON F00439180, F10026402				NAME 1.3GHZ RF CAVITY COUPLER SPOOL PIECE								
					MATERIAL												
					GROUP: Accelerator Mechanical Support				CAGE CODE: 0U5R6				SCALE AS SHOWN	SIZE A3	DRAWING NUMBER F00439171	SHEET 1 OF 1	REV A



DESCRIPTION: 1.3GHZ RF CAVITY DUMBELL
PROJECT: LCLSII Cryogenics
CATEGORY: ASSEMBLY

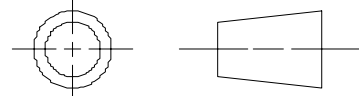
REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
C	F00439172-C-RCD	03-Oct-2019	DRAWN	M.KRAMP	
		04-Oct-2019	APPROVED	Y.ORLOV	

- WELDING NOTES:
- 1) ASSEMBLY TO BE VACUUM TIGHT.
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM-CC/SEC FOR HELIUM.
 - 2) ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FROM FOREIGN MATERIALS, METAL CHIPS OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - 3) ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES
 - 4) ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL 1-1999 AND MUST BE FOLLOWED.

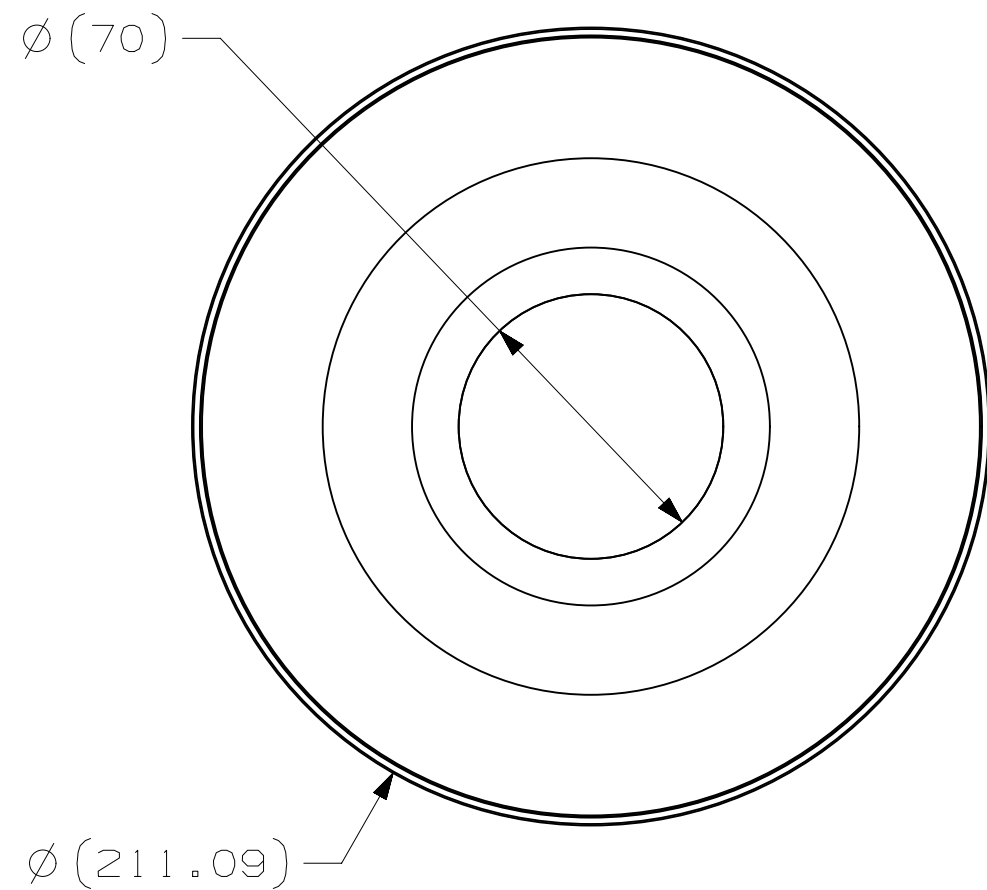
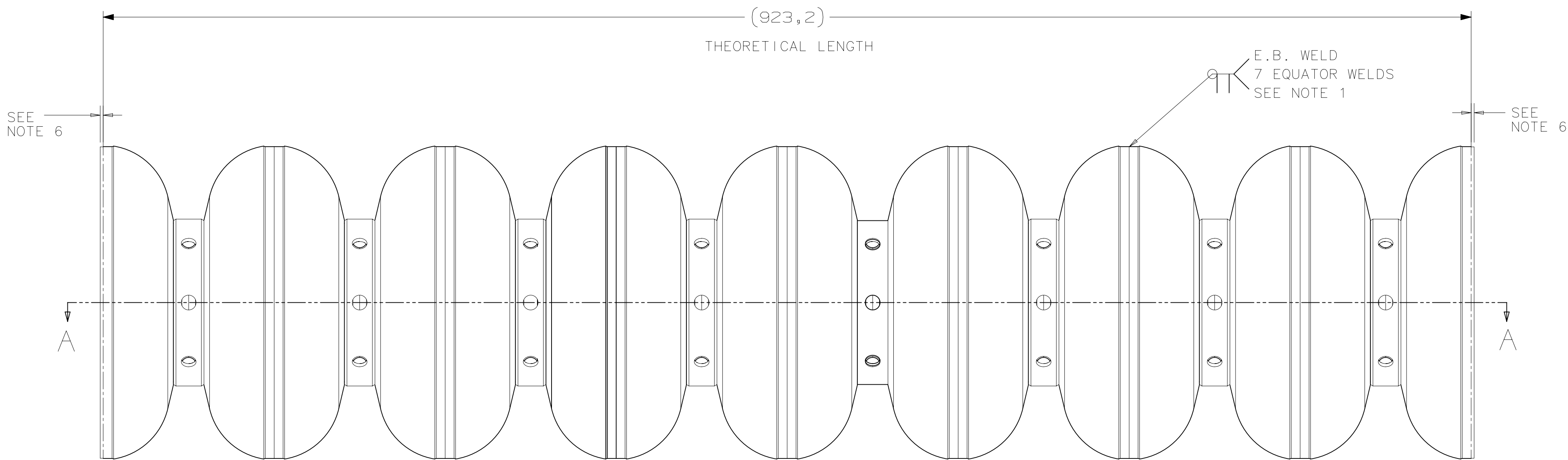
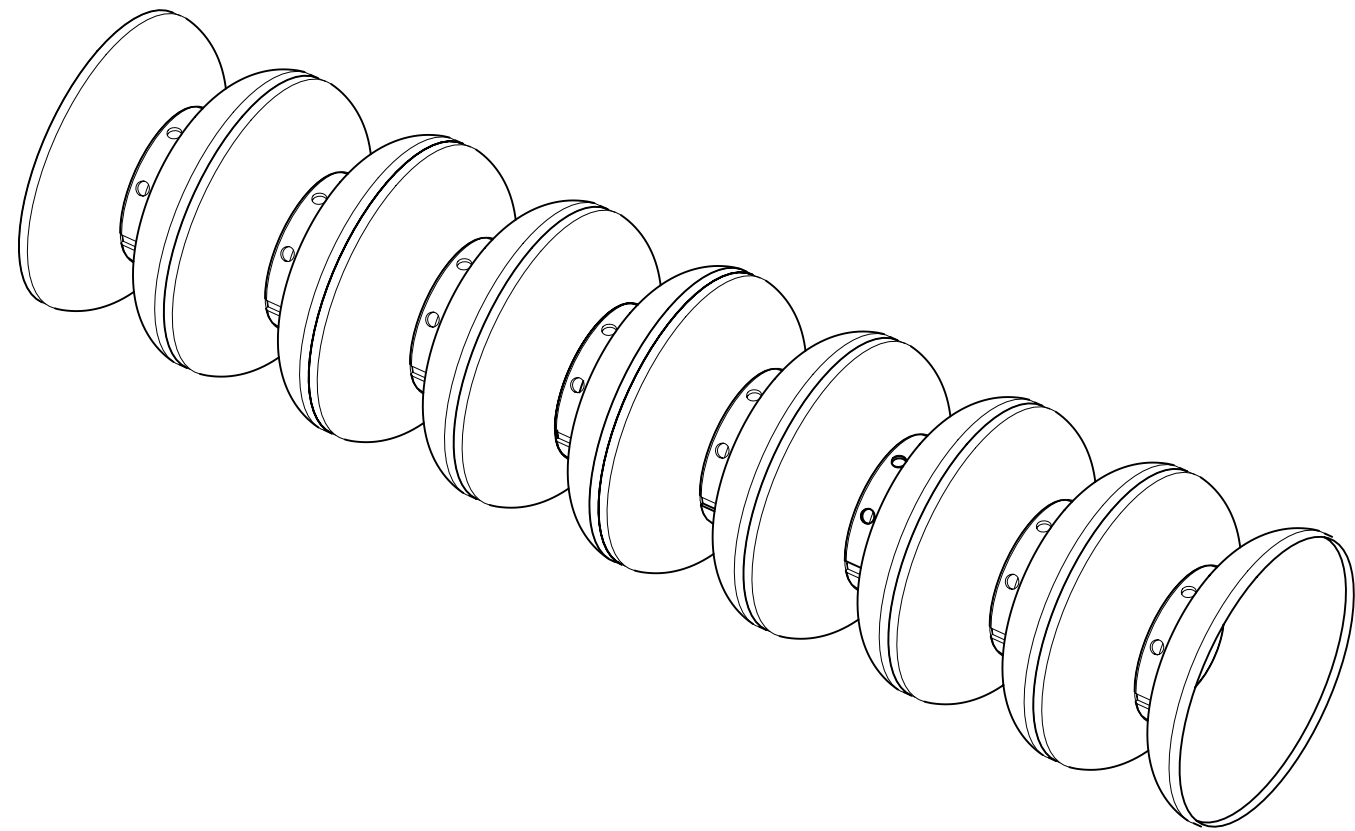
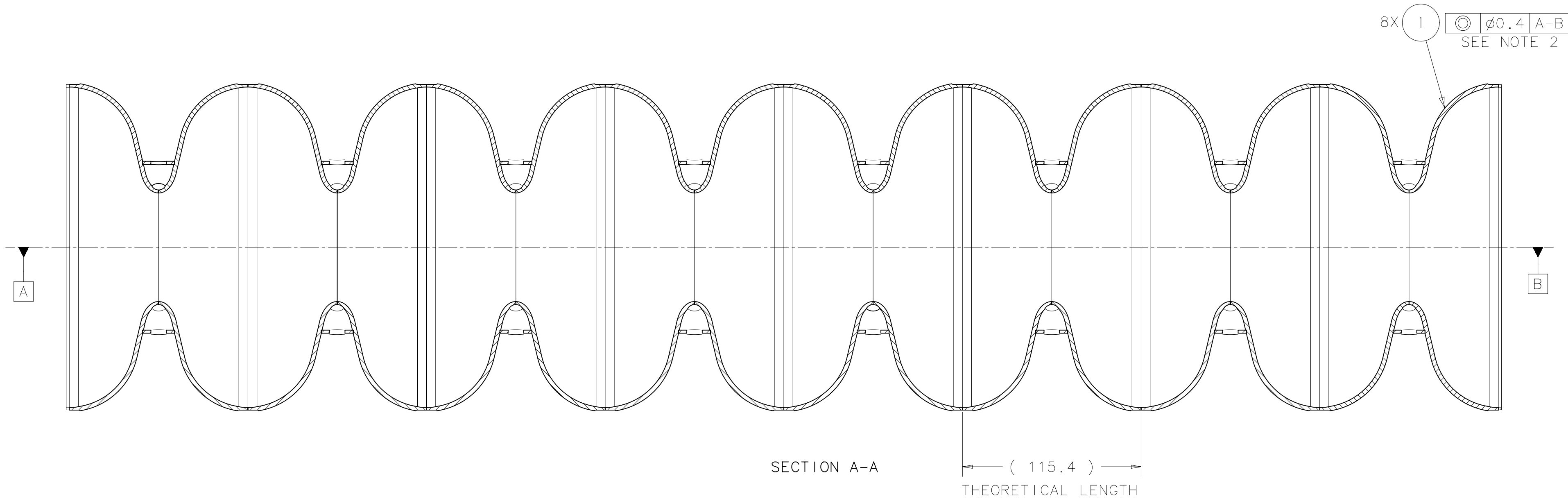
NOTES:

- 1) RF SURFACES IS TO BE FREE OF DAMAGE
- 2) ADDITIONAL MATERIAL NEEDED FOR CELL TUNING PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE. FINAL SURFACE TO BE MACHINED UNTIL TUNED.
- 3) ALL PARTS ARE TO BE CONCENTRIC WITHIN 0.08mm ALONG DATUM A AND B
- 4) DO NOT BREAK EDGES ON END CELL
- 5) DUAL PASS WELD -- WELD BOTH SIDES TO ENSURE OVERLAP

2	F00439156	1.3GHZ RF CAVITY MID HALF CELL	2
1	F00439151	1.3GHZ BARBELL SUPPORT RING	2
ITEM	PART #	DESCRIPTION	QTY.
PARTS LIST			

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE	DATE	18-Apr-2005	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	C.REID	DATE	16-Sep-2005		
2	0.3	0.12	N/A	1	APPROVED	C.REID	DATE	20-Sep-2005		
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-2009 MAX MACHINE ALL SURFACES: 3.2✓ DRAWING UNITS: MM					USED ON				NAME	
 THIRD ANGLE PROJECTION					F100439173				1.3GHZ RF CAVITY DUMBELL	
					MATERIAL				SCALE	SIZE
					SEE PARTS LIST				1:2	A2
					GROUP: Technical Division - Design and Drafting				DRAWING NUMBER	SHEET
					CAGE CODE: QUSR6				F00439172	1 of 1
									REV	C

REV	REVISION	CONTROL DOCUMENT	DATES	SIGNATURES
B	F00439173-B-RCD		03-Oct-2019 04-Oct-2019	DRAWN: M. KRAMP APPROVED: Y. ORLOV



NOTES:

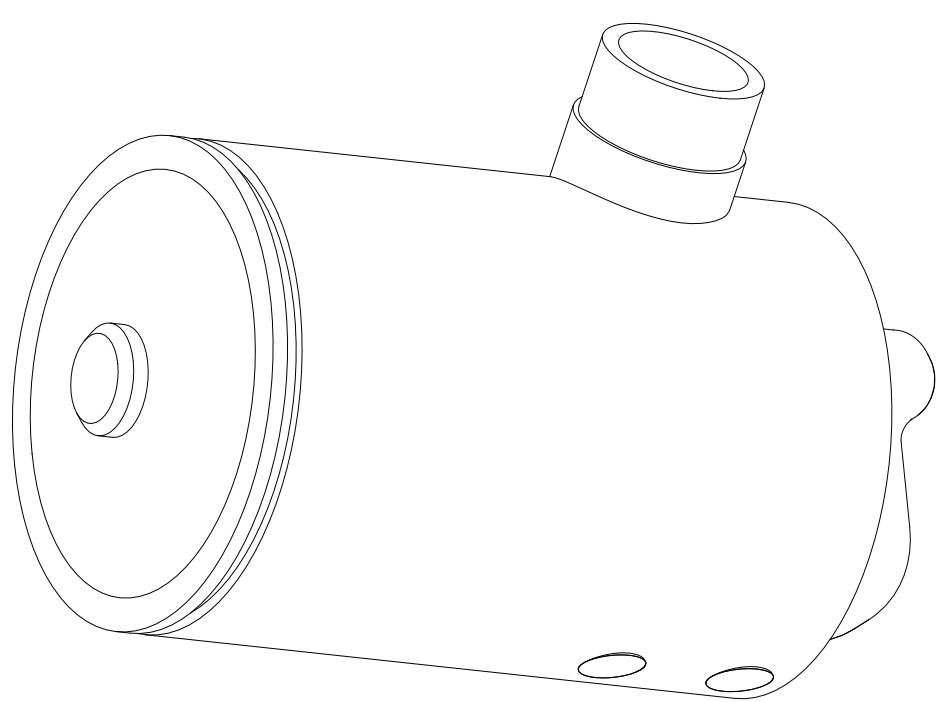
- 1) ENSURE THAT THE CLOCKING OF THE SUPPORT RINGS ON THE DUMBBELL WELDMENTS ARE HELD TO $\pm 0.56^\circ$
- 2) ALL PARTS ARE TO BE CONCENTRIC WITHIN $\pm 0.4\text{mm}$ ALONG DATUM A AND B
- 3) DEFINITION OF FORM AND TOLERANCES CONCERNING WELD JOINT PREPARATION AT THE IRIS AND THE EQUATOR TO BE COORDINATED BETWEEN MANUFACTURERS AND FNAL
- 4) INDIVIDUAL PART DIMENSIONS ARE FINAL LENGTH AFTER ACID ETCHING AND TUNING
- 5) THIS DEVICE IS EASILY DEFORMED. A FIXTURE IS REQUIRED FOR ALL HANDLING.
- 6) ADDITIONAL MATERIAL NEEDED FOR CELL TUNING PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE. FINAL SURFACE TO BE MACHINED UNTIL TUNED.
- 7) DO NOT BREAK SHARP EDGES ON ENDCELL

WELDING NOTES:

- 1) ASSEMBLY TO BE VACUUM TIGHT.
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM-CC/SEC FOR HELIUM.
- 2) ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FROM FOREIGN MATERIALS, METAL CHIPS OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
- 3) ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES
- 4) ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL 1-1999 AND MUST BE FOLLOWED.

UNLESS OTHERWISE SPECIFIED				DRAWN	E.PIRTLE	DATE	18-Apr-2005
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	D.RICHARDSON	DATE 16-May-2005
2	0.3	0.12	N/A	1	APPROVED	D.RICHARDSON	DATE 16-May-2005
BREAK ALL SHARP EDGES, MAX: 0.5				USED ON			
DO NOT SCALE DRAWING				F00439181			
DIMENSIONS BASED ON: ASME Y14.5M-2009							
MAX MACHINE ALL SURFACES: 3.2				MATERIAL			
DRAWING UNITS: MM				SEE PARTS LIST			
				GROUP: Technical Division - Design and Drafting/CAGE CODE: 05U96			
THIRD ANGLE PROJECTION							

1	F00439172	1.3GHZ RF CAVITY DUMBBELL	8
ITEM	PART#	DESCRIPTION	QTY
PARTS LIST			
NAME: FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
1.3GHZ BARBELL WELDMENT ASSY			
SCALE: 1:2	SIZE: A1	DRAWING NUMBER: F00439173	SHEET: 1 of 1
		REV: B	



The drawing shows a mechanical part with a complex internal structure. The cross-section A-A is a vertical section through the center, revealing a central shaft with a series of overlapping circular features. The top view B-B is a horizontal section at the top of the part, showing a rectangular shape with a central circular feature. The part is shown in a perspective view, with the cross-sections A-A and B-B indicated by dashed lines and arrows.



- 1) ASSEMBLY TO BE VACUUM TIGHT.
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM-CC/SEC FOR HELIUM.
- 2) ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FROM FOREIGN MATERIALS, METAL CHIPS OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
- 3) ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES
- 4) ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL 1-1999 AND MUST BE FOLLOWED.
- 5) WELD PREP TO MATCH WALL THICKNESS AT DISCRETION OF MANUFACTURER

1) FINAL LENGTH AFTER MACHINING OPERATION DETAILED
ON DRAWING NUMBER F00439179

2) ITEM #1 MUST BE CONCENTRIC TO ITEM #3 TO WITHIN 0.2

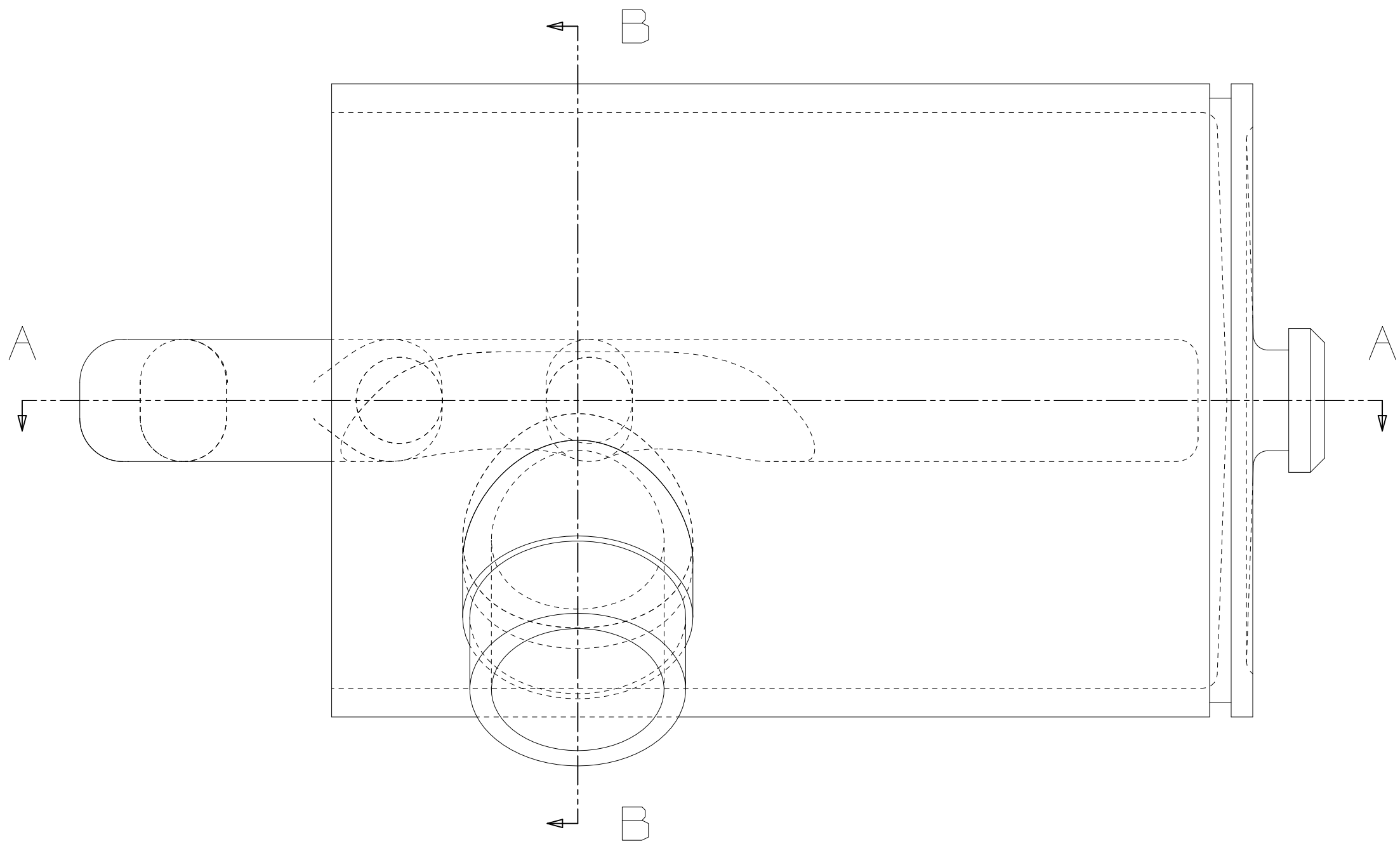
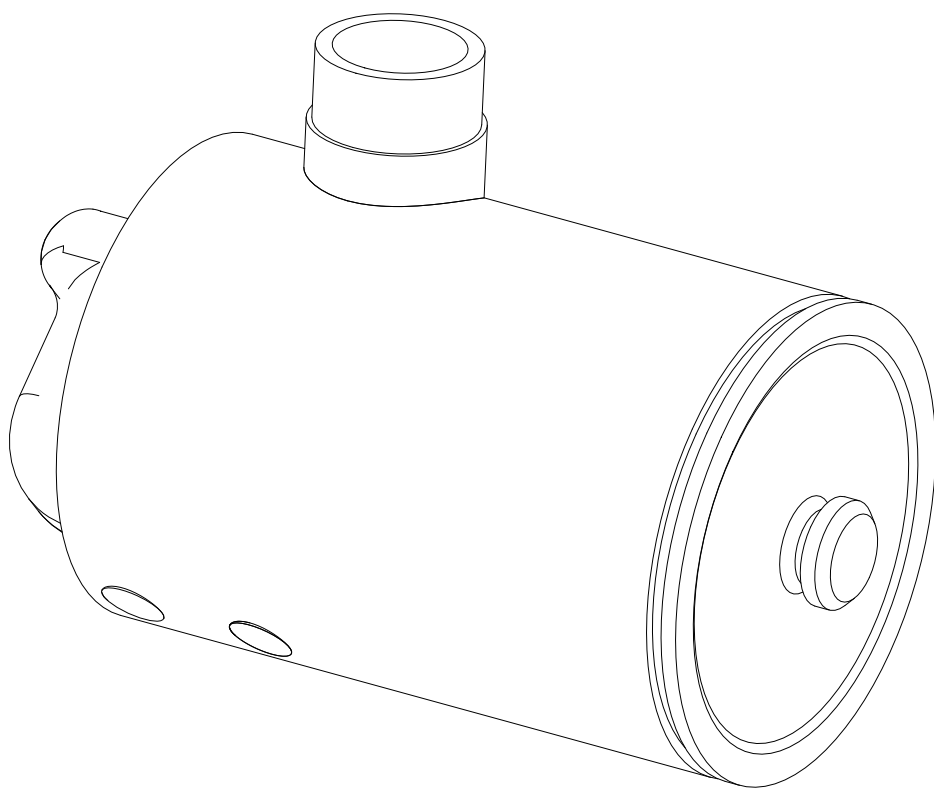
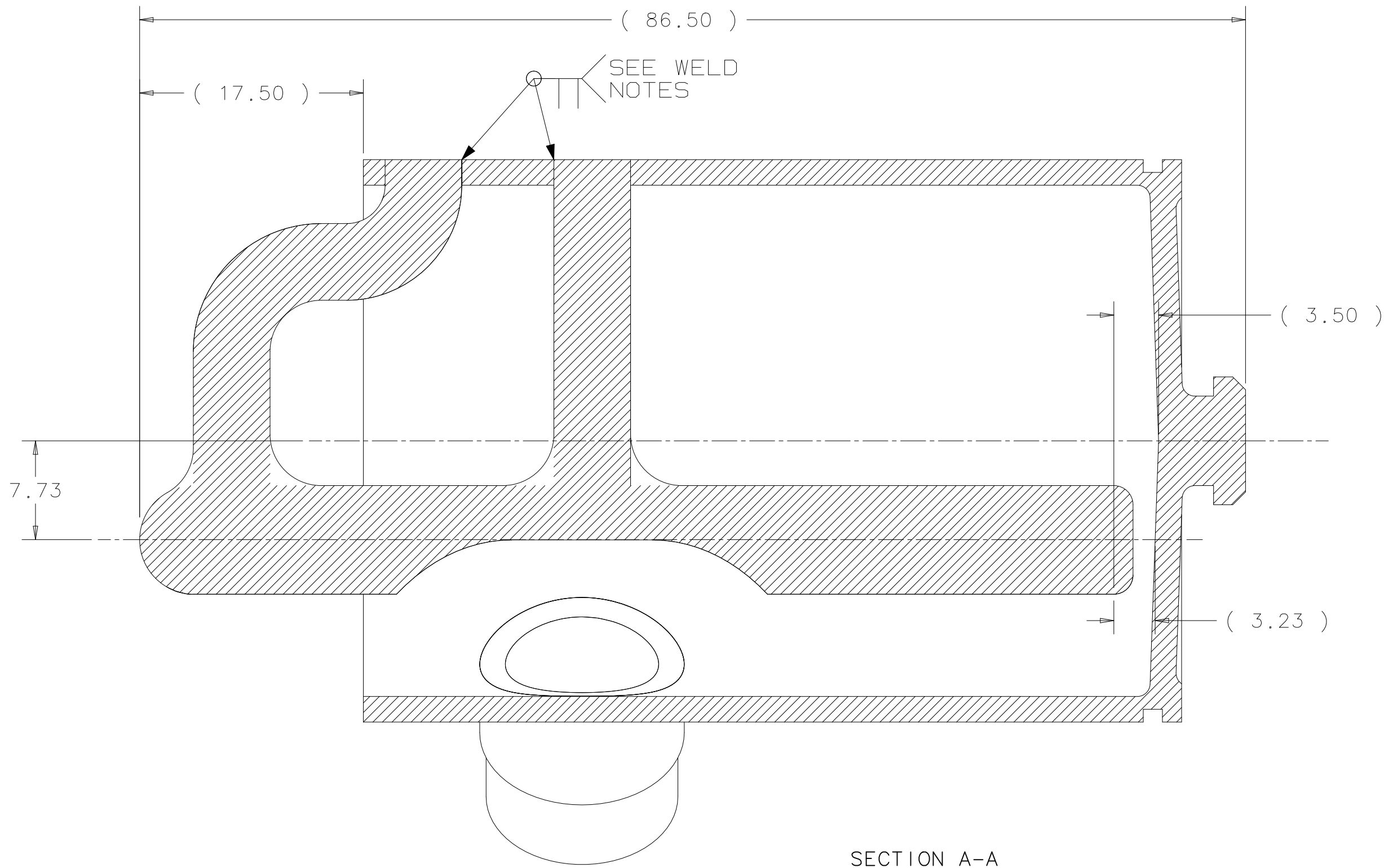
3) ITEM #2 MUST BE CONCENTRIC TO ITEM #3 TO WITHIN 0.2

3	F00439165	1.3GHZ RF CAVITY LONG END HOM FORMTEIL HOUSING	1
2	F00439154	1.3GHZ RF CAVITY LONG END HOM FORMTEIL	1
1	F00439150	1.3GHZ RF CAVITY HOM SPOOL PIECE	1
ITEM	PART#	DESCRIPTION	QTY

PARTS LIST

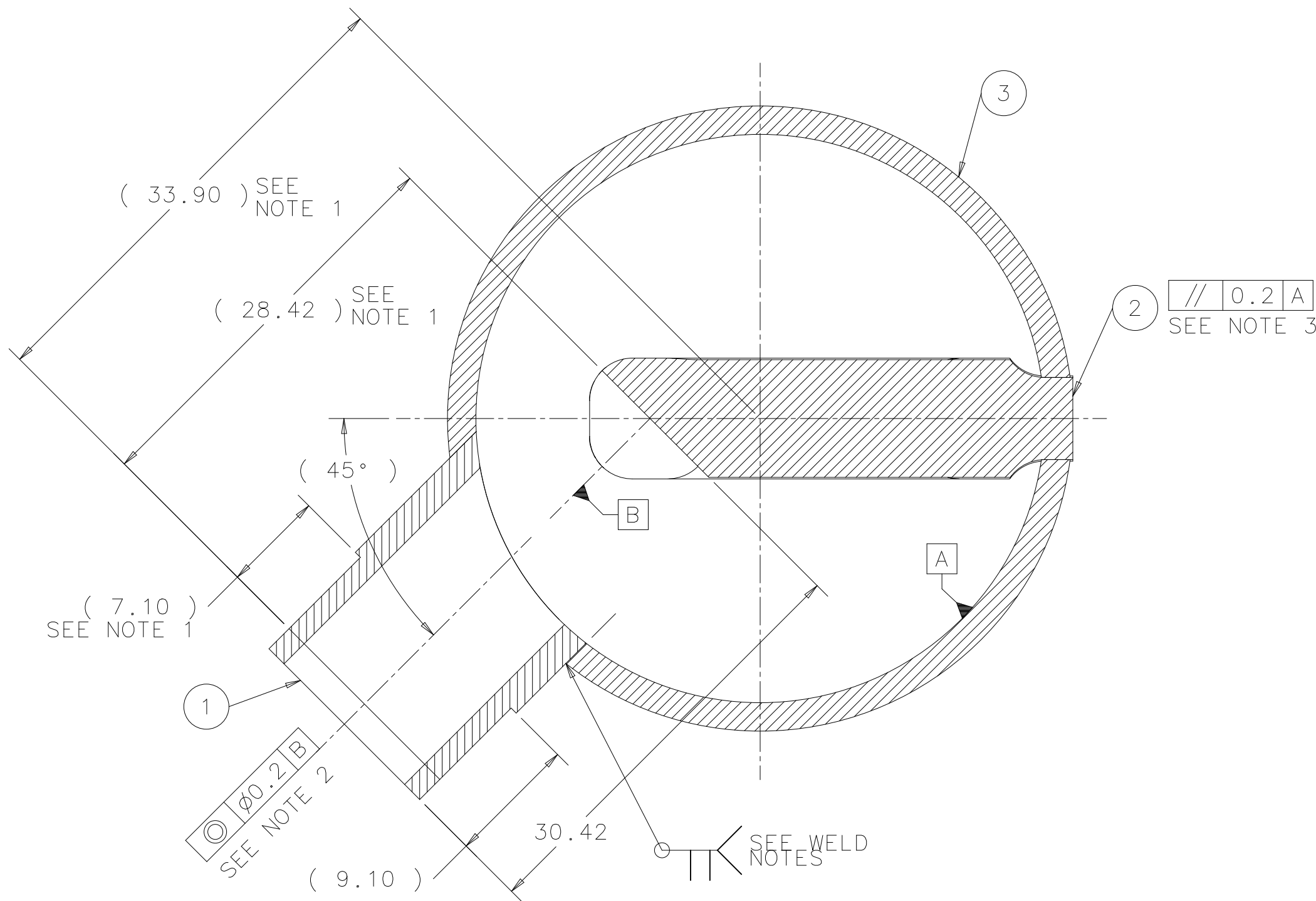
UNLESS OTHERWISE SPECIFIED						DRAWN		E.PIRTLE		DATE		18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY													
±X		±X.X		±X.XX		±X/X		±X"		CHECKED		D.RICHARDSON								DATE		18-Sep-2005					
Z		0.3		0.12		N/A		1"		APPROVED		D.RICHARDSON								DATE		18-Sep-2005					
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX SURF MACH SURFACES 3/2 DRAWING UNITS: MM						USED ON F10026400						NAME ASSEMBLY - 1.3GHZ RF CAVITY LONG END HOM															
						MATERIAL SEE PARTS LIST						SCALE 3:1						SIZE A1		DRAWING NUMBER F00439174				SHEET 1 OF 1		REV A	
GROUP: Technical Division - Design and Drafting						CAGE CODE# 0U5R6																					

REV		REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
A	F00439175-A-RCD		04-Aug-2015		DRAWN	G. LANGLOIS
					APPROVED	C. GRIMM



- WELDING NOTES:
- 1) ASSEMBLY TO BE VACUUM TIGHT. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM-CC/SEC FOR HELIUM.
 - 2) ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FROM FOREIGN MATERIALS, METAL CHIPS OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - 3) ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES.
 - 4) ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL 1-1999 AND MUST BE FOLLOWED.
 - 5) WELD PREP TO MATCH WALL THICKNESS AT DISCRETION OF MANUFACTURER

- NOTES:
- 1) FINAL LENGTH AFTER MACHINING OPERATION DETAILED ON DRAWING NUMBER F00439180
 - 2) ITEM #1 MUST BE CONCENTRIC TO ITEM #3 TO WITHIN 0.2
 - 3) ITEM #2 MUST BE CONCENTRIC TO ITEM #3 TO WITHIN 0.2
 - 4) TRAILING ZEROS DENOTE TOLERANCE.



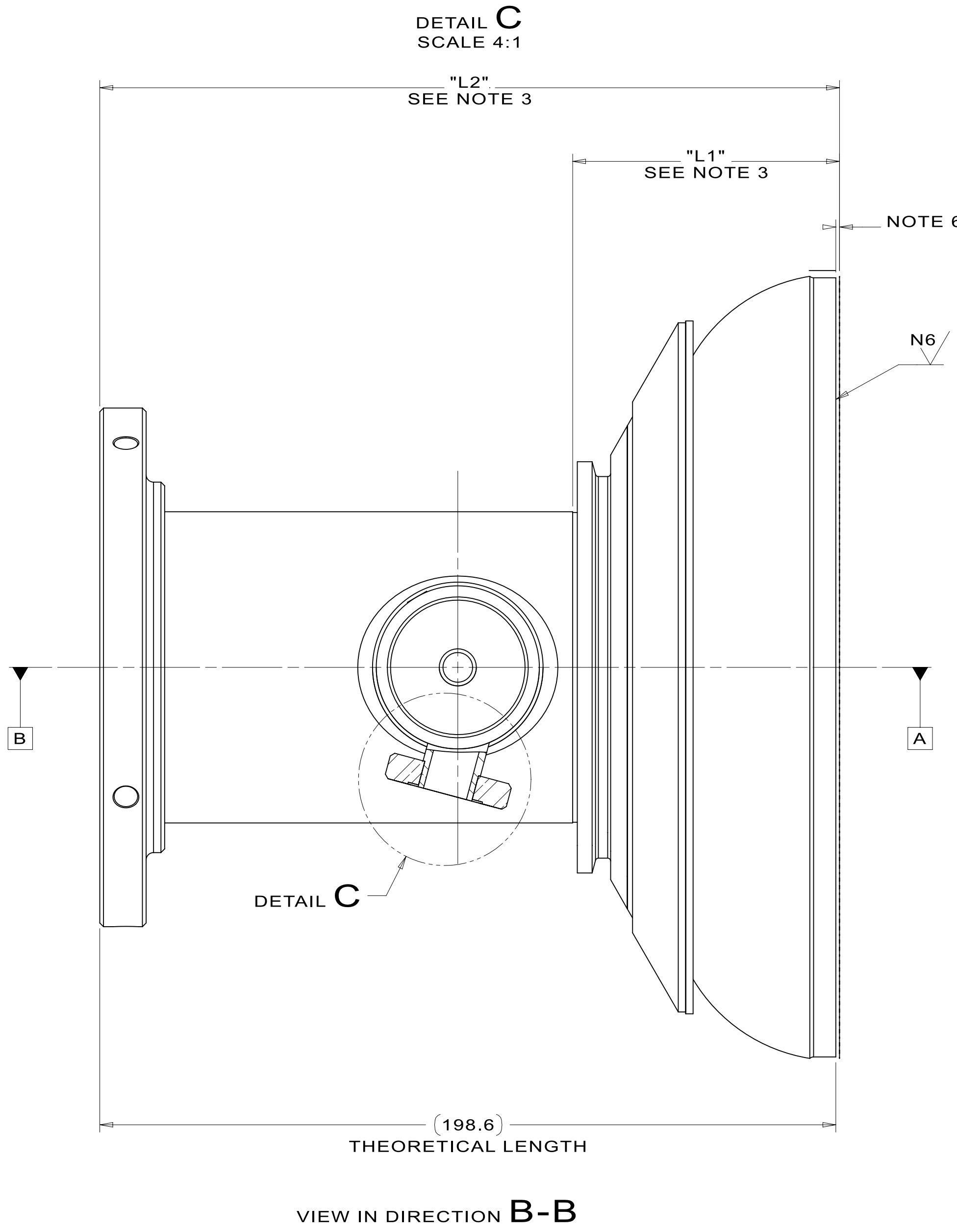
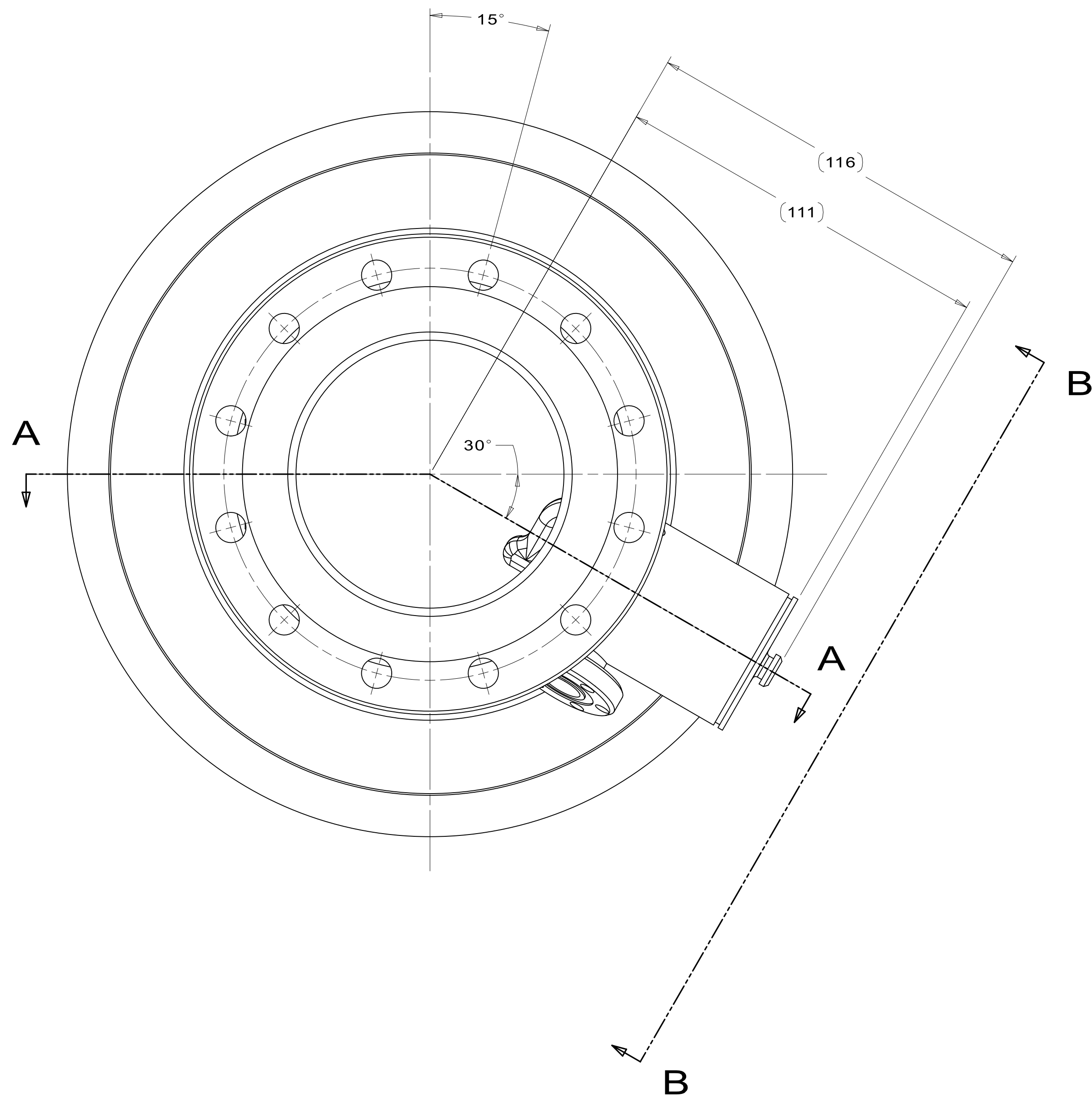
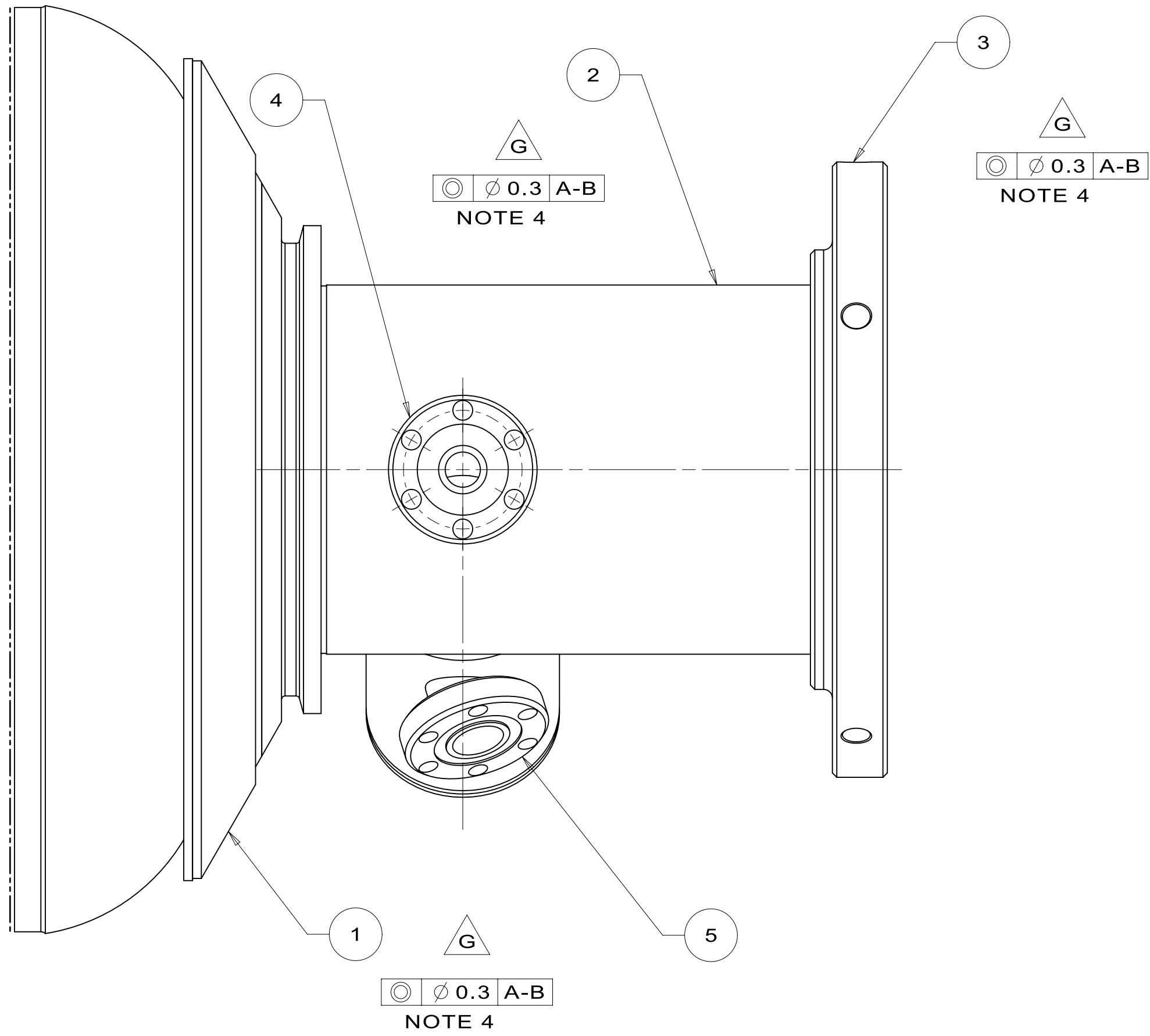
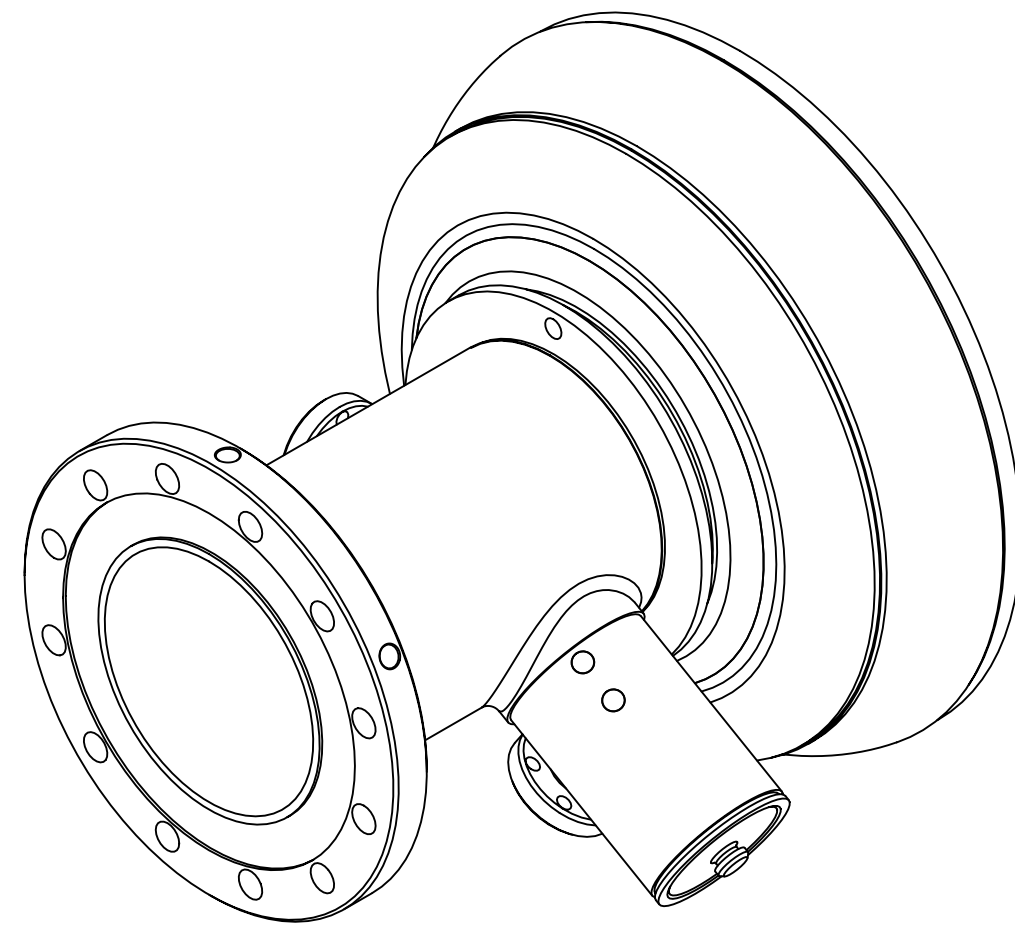
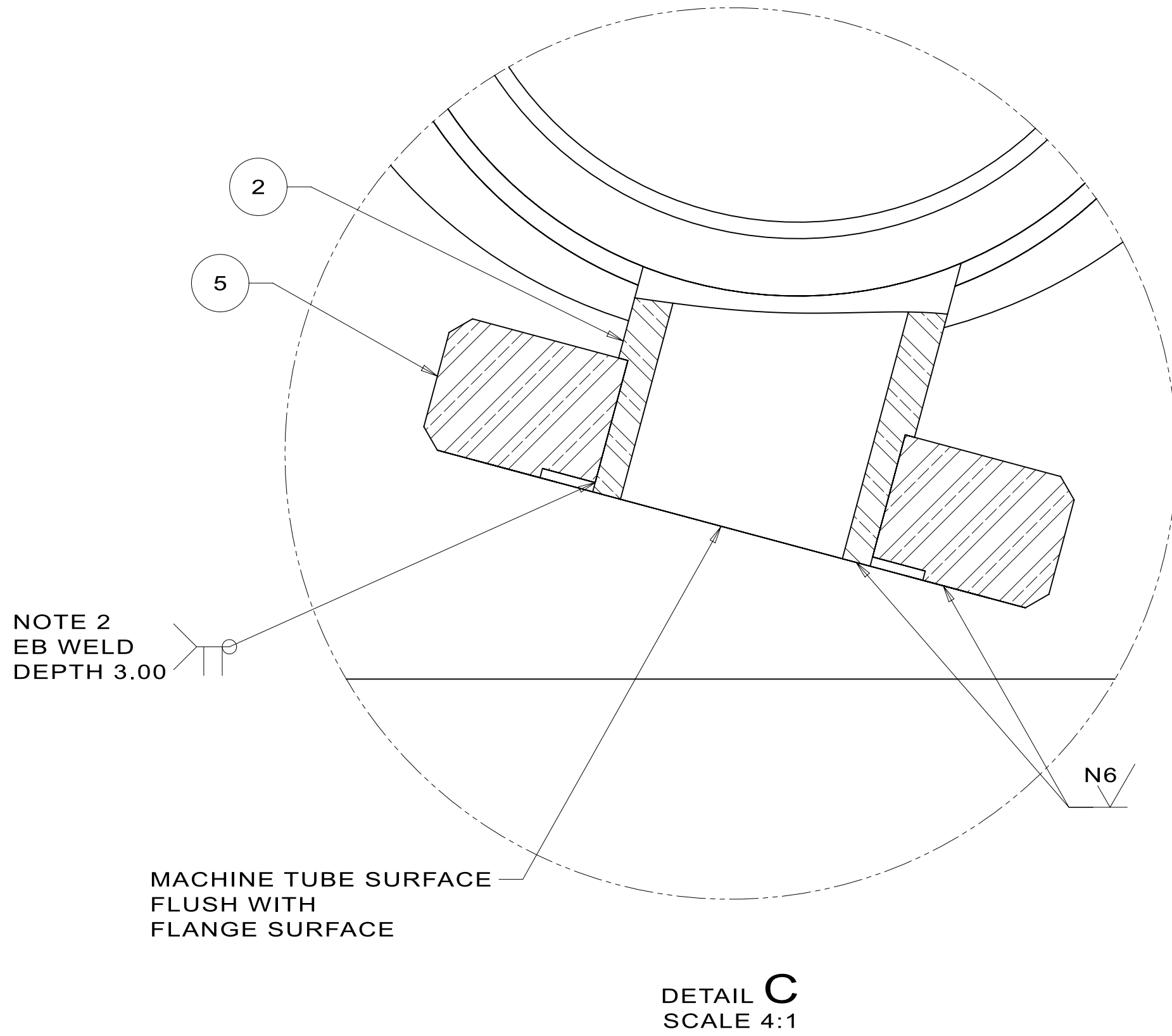
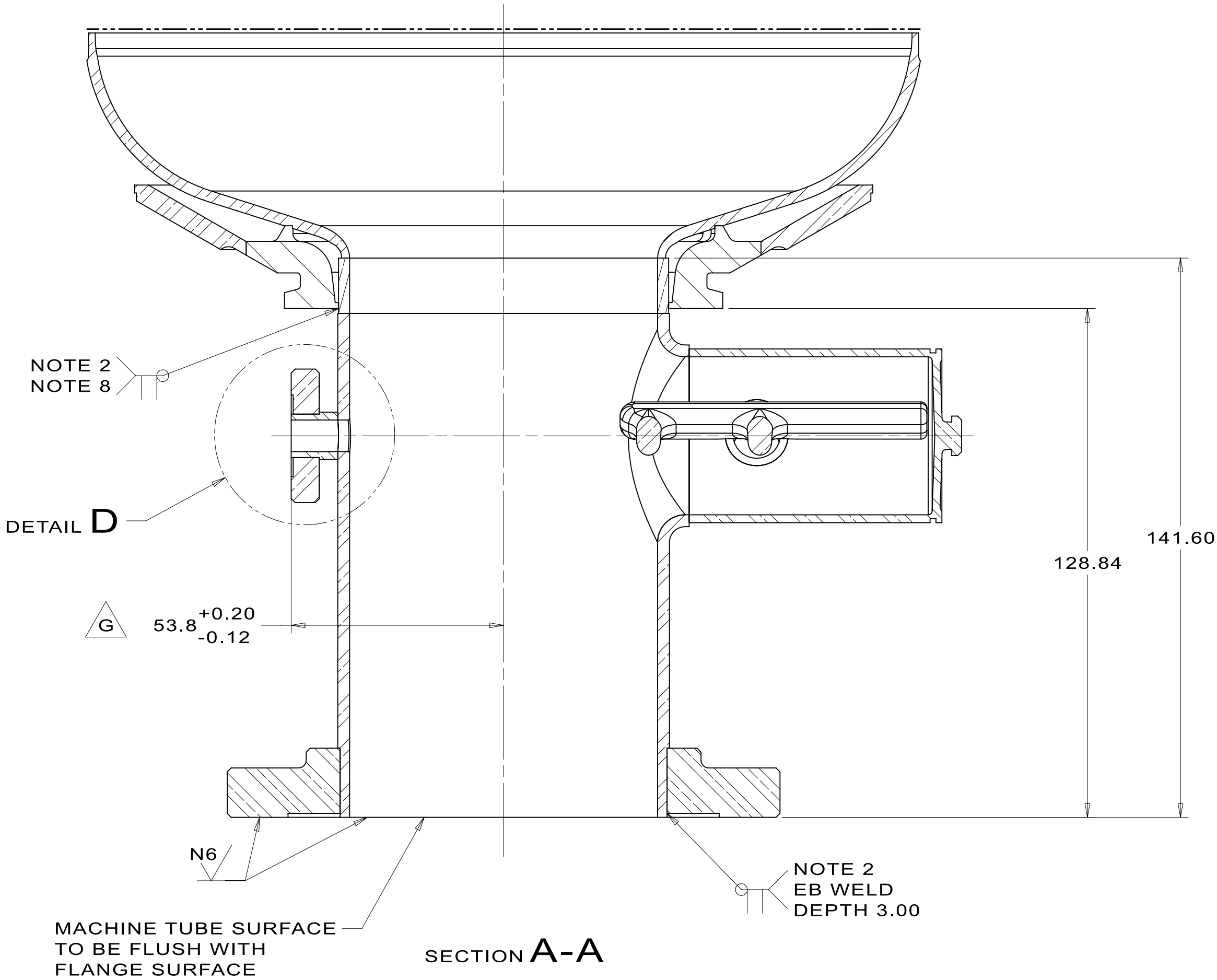
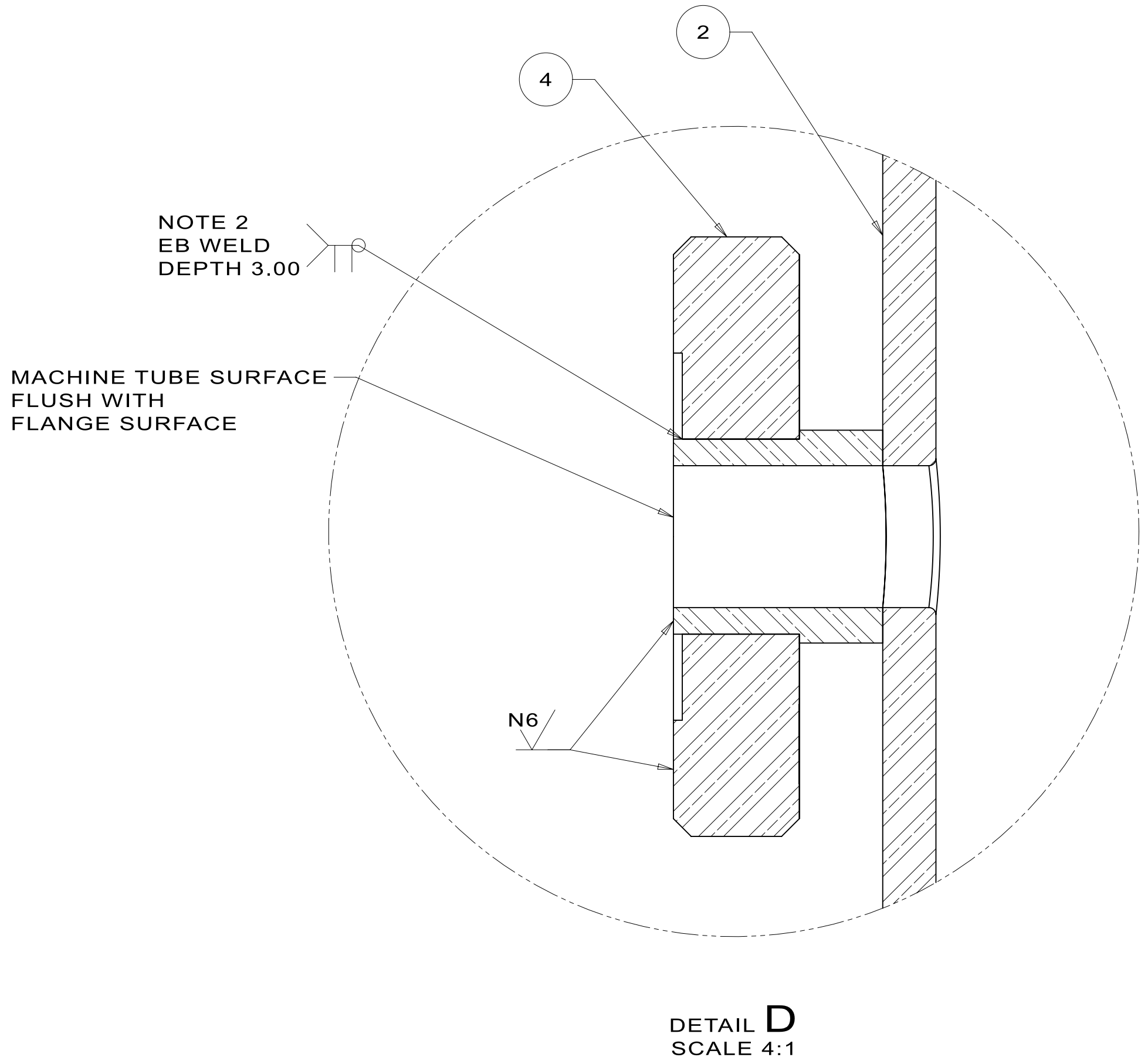
SECTION B-B

3	F00439166	1.3GHZ FORMTEIL HOUSING SHORT	1
2	F00439162	1.3GHZ RF CAVITY SHORT END HOM FORMTEIL	1
1	F00439150	1.3GHZ RF CAVITY HOM SPOOL PIECE	1
ITEM	PART#	DESCRIPTION	QTY.

PARTS LIST

UNLESS OTHERWISE SPECIFIED					DRAWN	E. PIRTLE		DATE	18-Apr-2005		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY						
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D. MITCHELL		DATE	16-Sep-2005								
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY		DATE	20-Sep-2005		NAME						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM 					USED ON F00439180, F10026402		1.3GHZ RF CAVITY SHORT END HOM ASSEMBLY				SCALE		SIZE	DRAWING NUMBER	SHEET	REV	
											3:1		A1	F00439175		1 OF 1	A
					MATERIAL												
					SEE PARTS LIST												
					GROUP: Technical Division - Design and Drafting				CAGE CODE: QUSR6								

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
3:1	A1	F00439175	1 OF 1	A



NOTES: (UNLESS OTHERWISE SPECIFIED)

- WELDMENT TO BE FREE OF DUST, GREASE, OIL, CHIPS, AND BURRS.
- WELDING NOTES:
 - ASSEMBLY TO BE VACUUM TIGHT. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
 - ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS, OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES.
 - ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL-1-1999 AND MUST BE FOLLOWED.
- DIMENSIONS "L1" AND "L2" ARE DEPENDENT ON A FREQUENCY MEASUREMENT. HALF CELL EQUATOR IS TO BE FINISHED TO FERMILAB SPECIFICATIONS RELATED TO SAID MEASUREMENT ALLOWING ADDITIONAL MATERIAL FOR WELD SHRINKAGE "S".
- ITEMS 1, 2, AND 3 ARE TO BE CONCENTRIC WITHIN $\varnothing 0.3$ mm ALONG DATUMS A AND B.
- SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING. SURFACE MUST BE FREE OF DAMAGES.
- ADDITIONAL MATERIAL NEEDED FOR CELL TUNING PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE. FINAL SURFACE TO BE MACHINED UNTIL TUNED.
- DO NOT BREAK EDGES ON END CELL.
- DUAL PASS WELD -- ENSURE OVERLAP.
- ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

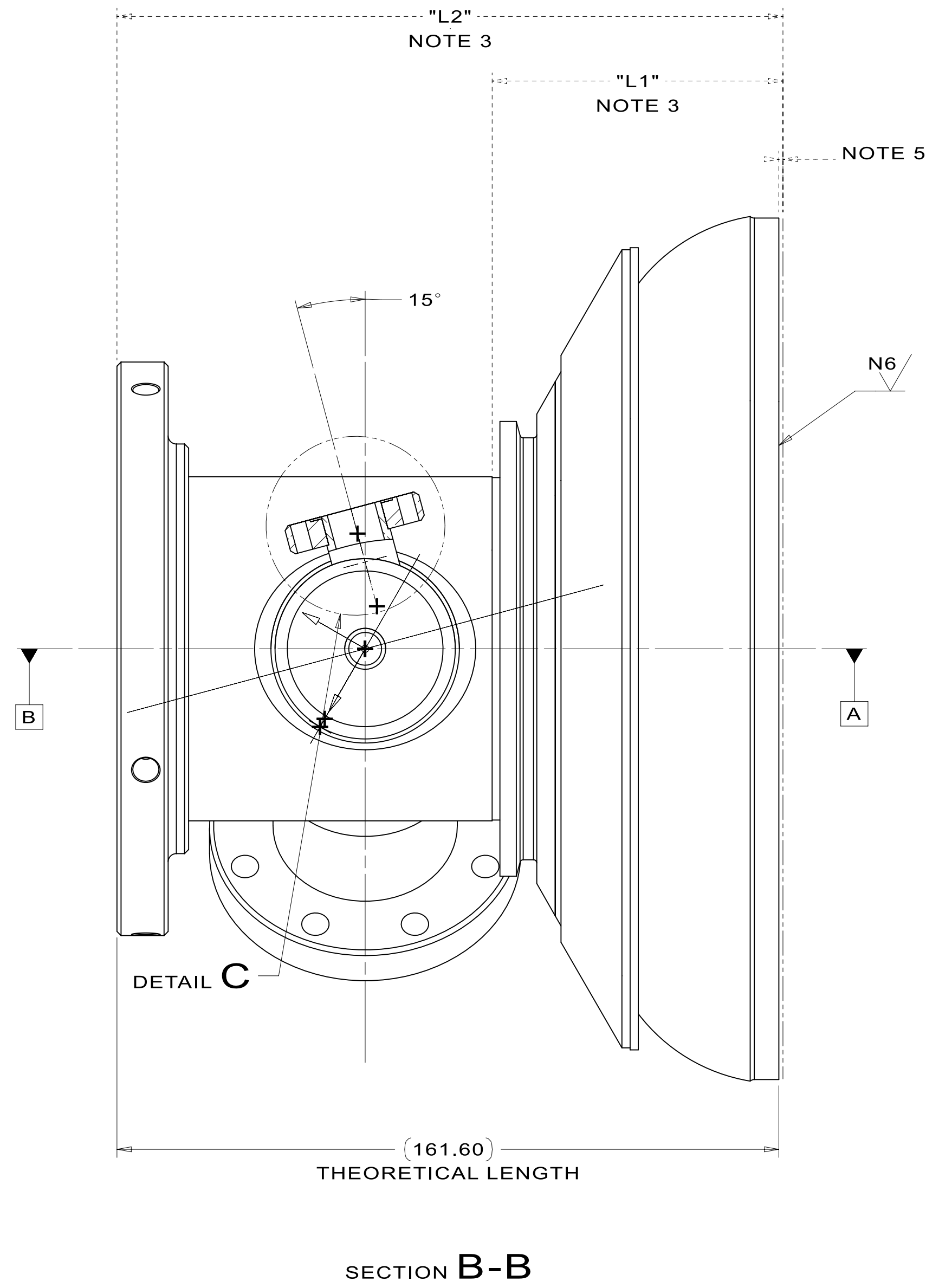
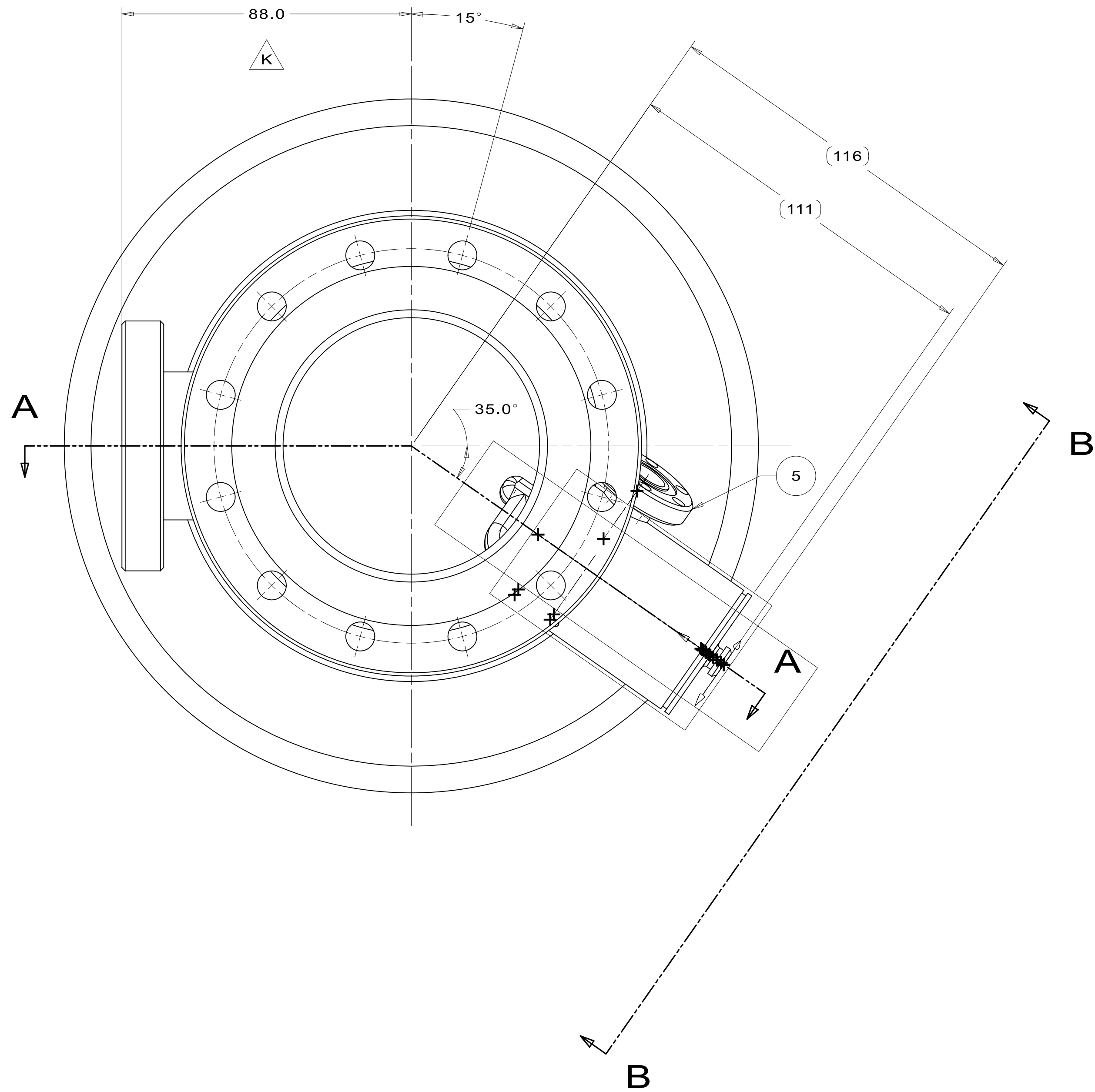
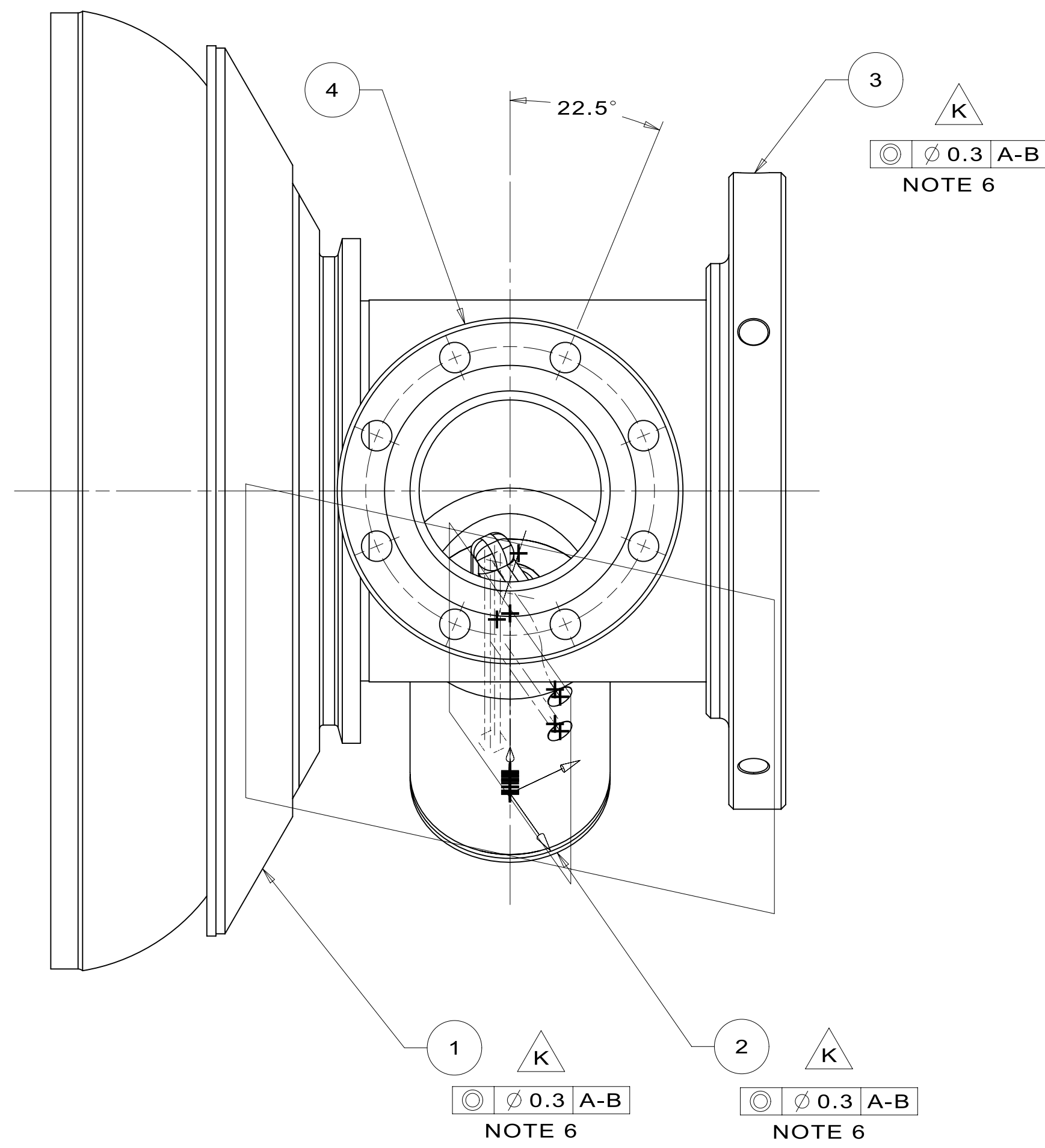
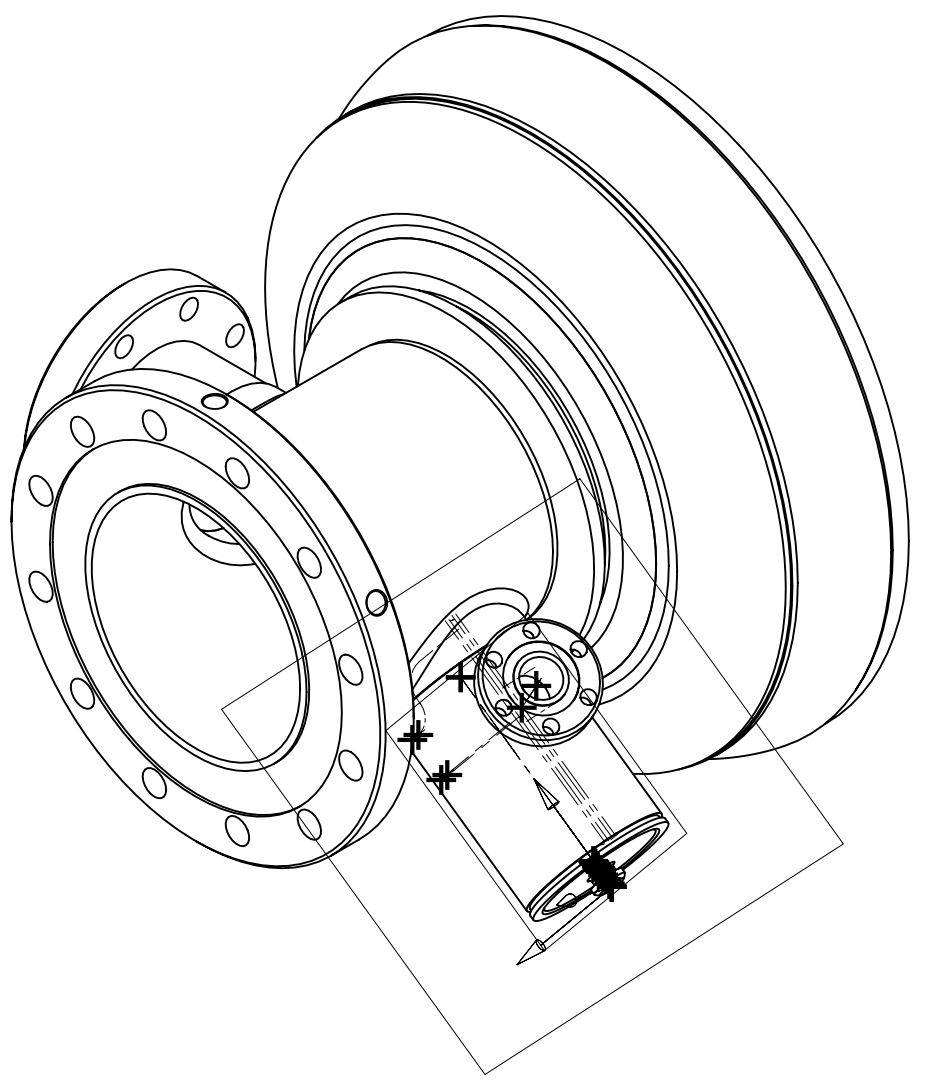
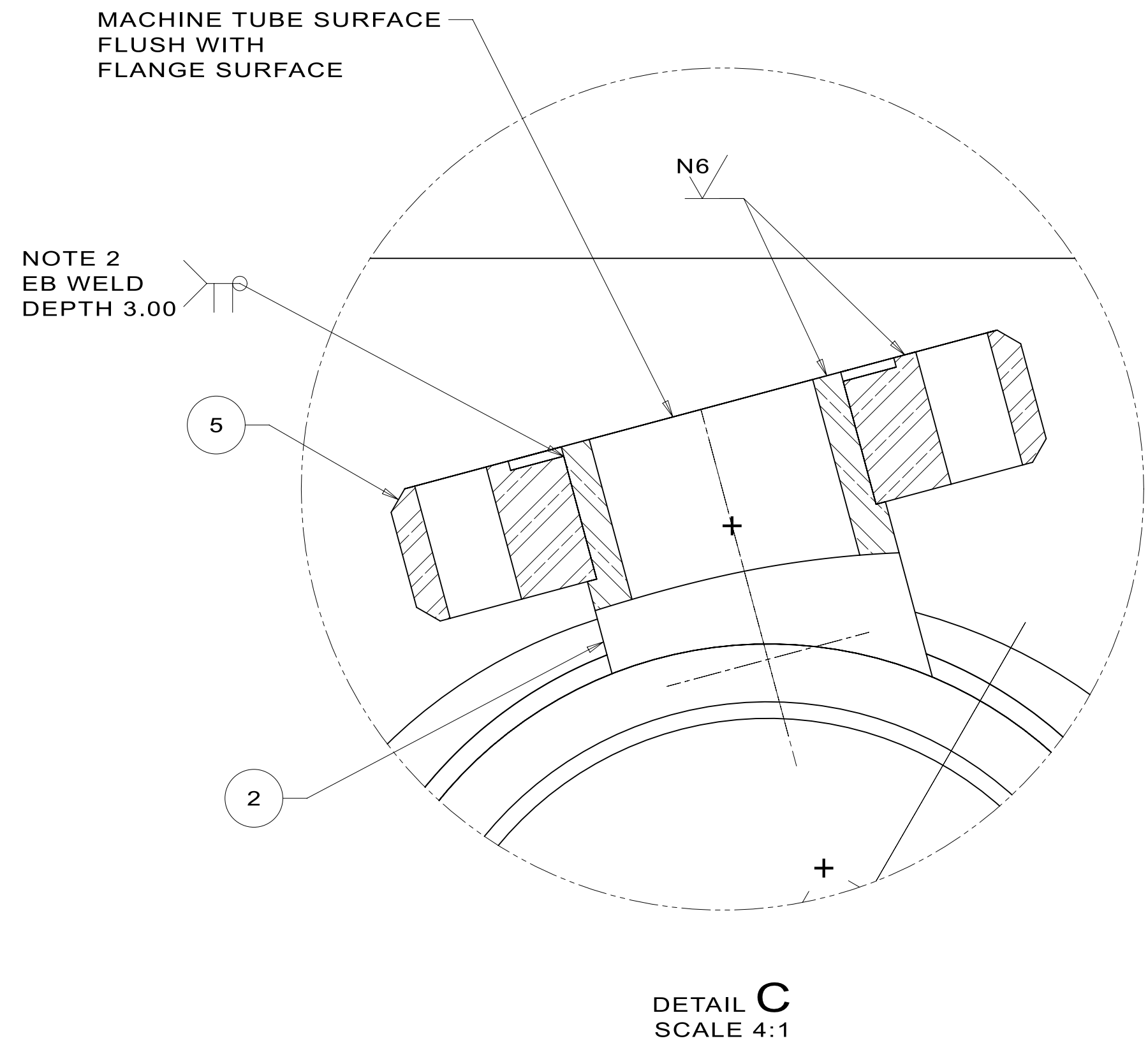
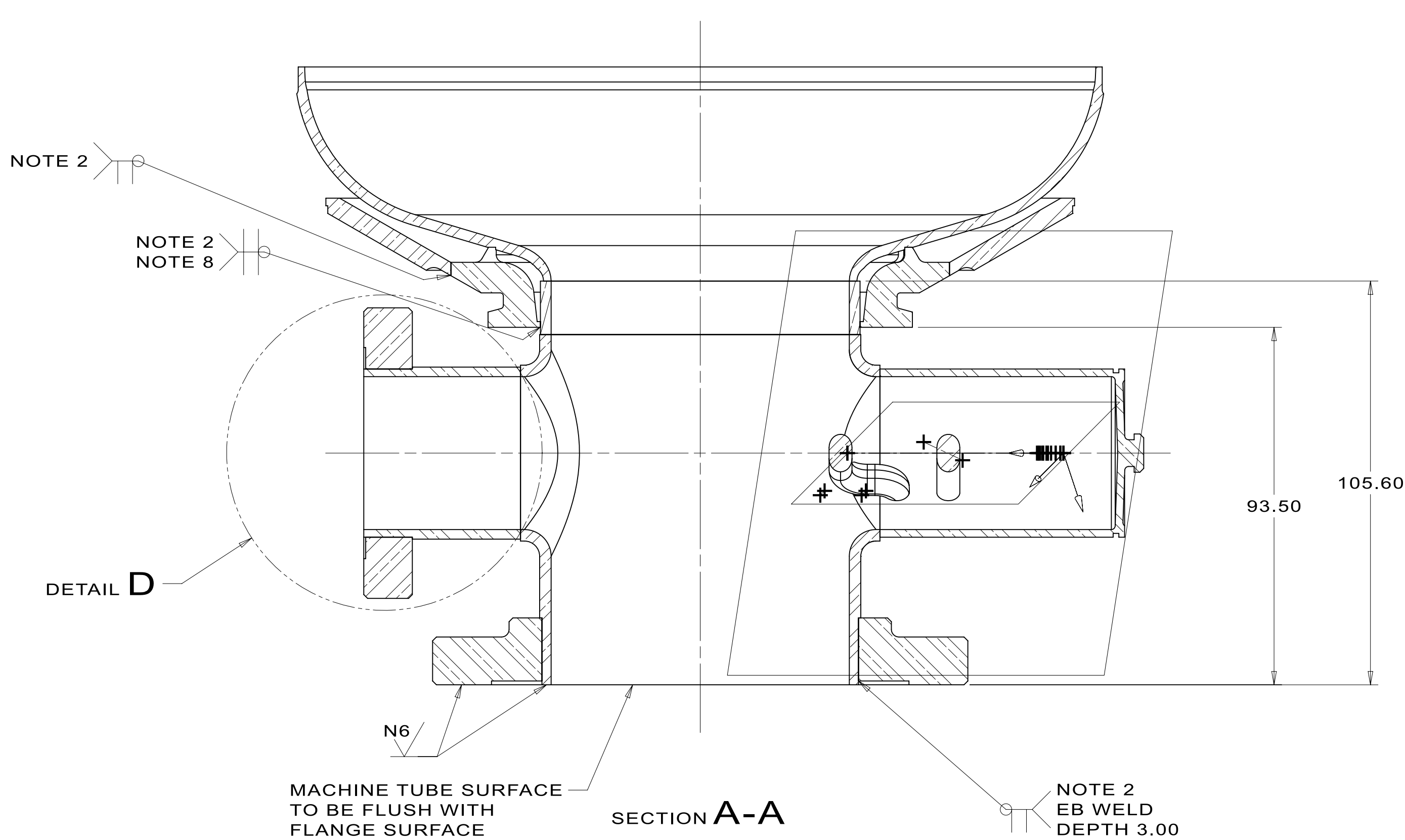
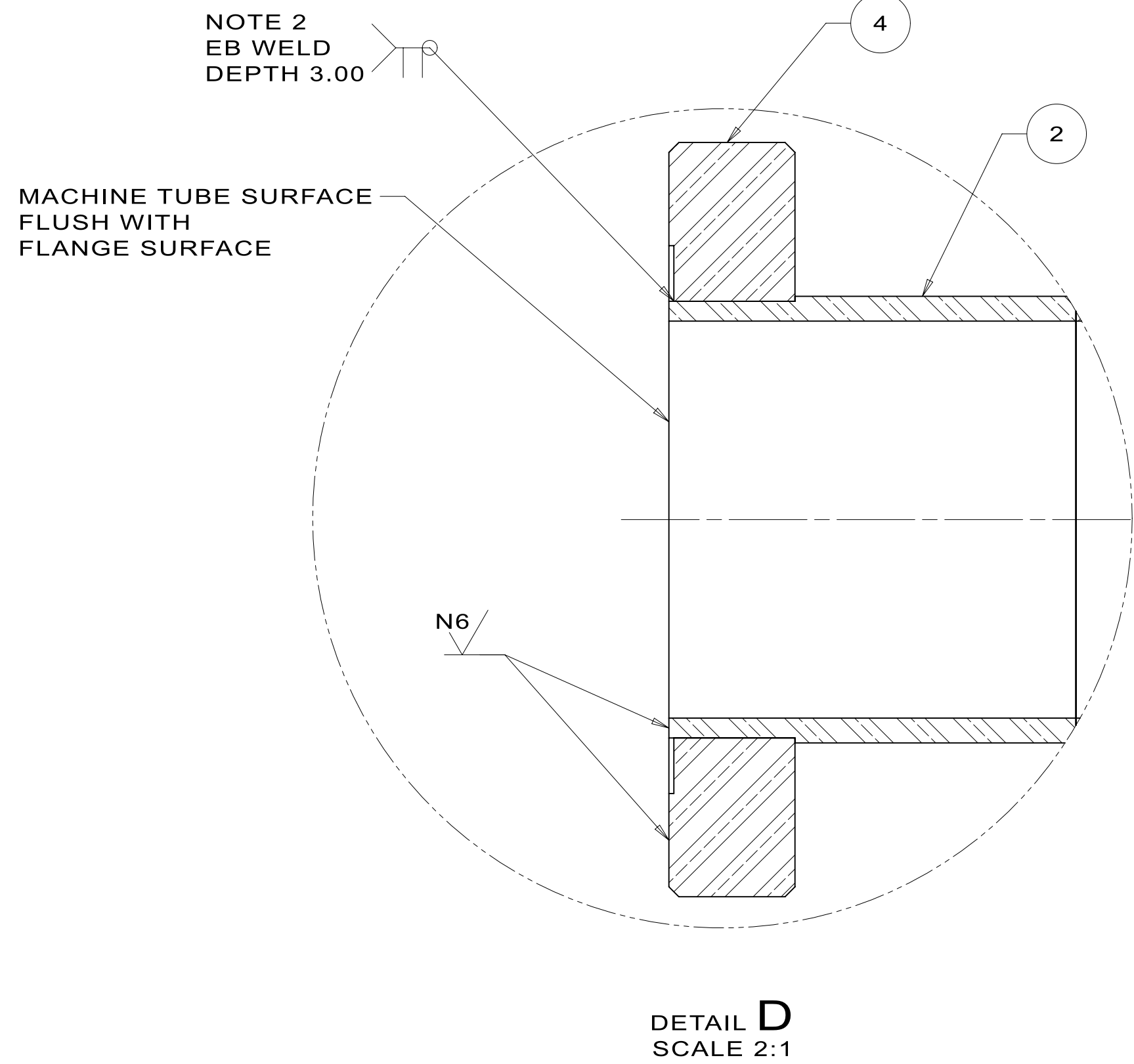
5	F00439157	1.3GHZ RF CAVITY NW 12 FLANGE	1
4	F00439160	1.3GHZ RF CAVITY NW 8 FLANGE	1
3	F10026185	FLANGE, BEAM - NW78	1
2	F10026400	WELDMENT, LONG ENG TUBE - 1.3 GHZ RF CAVITY	1
1	F10026401	WELDMENT, LONG END DISK - 1.3 GHZ RF CAVITY	1
ITEM	PART#	DESCRIPTION	QTY.

UNLESS OTHERWISE SPECIFIED				PARTS LIST			
1X	2X	3X	4X	5X	CHECKED	E. PIRTE	DATE
2	0.3	0.12	N/A	1	APPROVED	D. MITCHELL	DATE
BREAK ALL SHARP EDGES TO R0.5				DATE			
DO NOT SCALE DRAWING				DATE			
DIMENSIONS BASED ON ASME Y14.5M-1994				DATE			
MAX MACHINER ALL SURFACES: Ra: 3.2				DATE			
DRAWING LIMIT: 100				DATE			
THERO-ANGLE PROJECTION				DATE			
MATERIAL				DATE			
SEE PARTS LIST				DATE			
GROUP: Technical Design - Design and Drafting				DATE			
CASE CODE: 0088				DATE			

FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

1.3 GHZ RF CAVITY LONG END HALF CELL ASSEMBLY

SCALE: 1:1 & AS SHOWN
SIZE: A0
DRAWING NUMBER: F00439179
SHEET: 1 of 1
REV: G



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. WELDMENT TO BE FREE OF DUST , GREASE, OIL, CHIPS, AND BURRS.

2. WELDING NOTES:

- A. ASSEMBLY TO BE VACUUM TIGHT:
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE
OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A
MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
- B. ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE
NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS,
OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED
BY FERMILAB.
- C. ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO
STANDARD ULTRA HIGH VACUUM PRACTICES.
- D. ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND
HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION
MHF-SL-1-1999 AND MUST BE FOLLOWED.

3. DIMENSIONS "L1" AND "L2" ARE DEPENDENT ON A FREQUENCY MEASUREMENT.
HALF CELL EQUATOR IS TO BE FINISHED TO FERMILAB SPECIFICATIONS
RELATED TO SAID MEASUREMENT ALLOWING ADDITIONAL MATERIAL FOR
WELD SHRINKAGE "S".

4. SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.
SURFACE MUST BE FREE OF DAMAGES.

5. ADDITIONAL MATERIAL NEEDED FOR CELL TUNING PLUS ALLOWANCE FOR
E-BEAM WELD SHRINKAGE. FINAL SURFACE TO BE MACHINED UNTIL TUNED.

6. ITEMS 1, 2, AND 3 ARE TO BE CONCENTRIC WITHIN $\varnothing 0.3\text{mm}$ ALONG
DATUM A-B.

7. DO NOT BREAK EDGES ON END CELL.

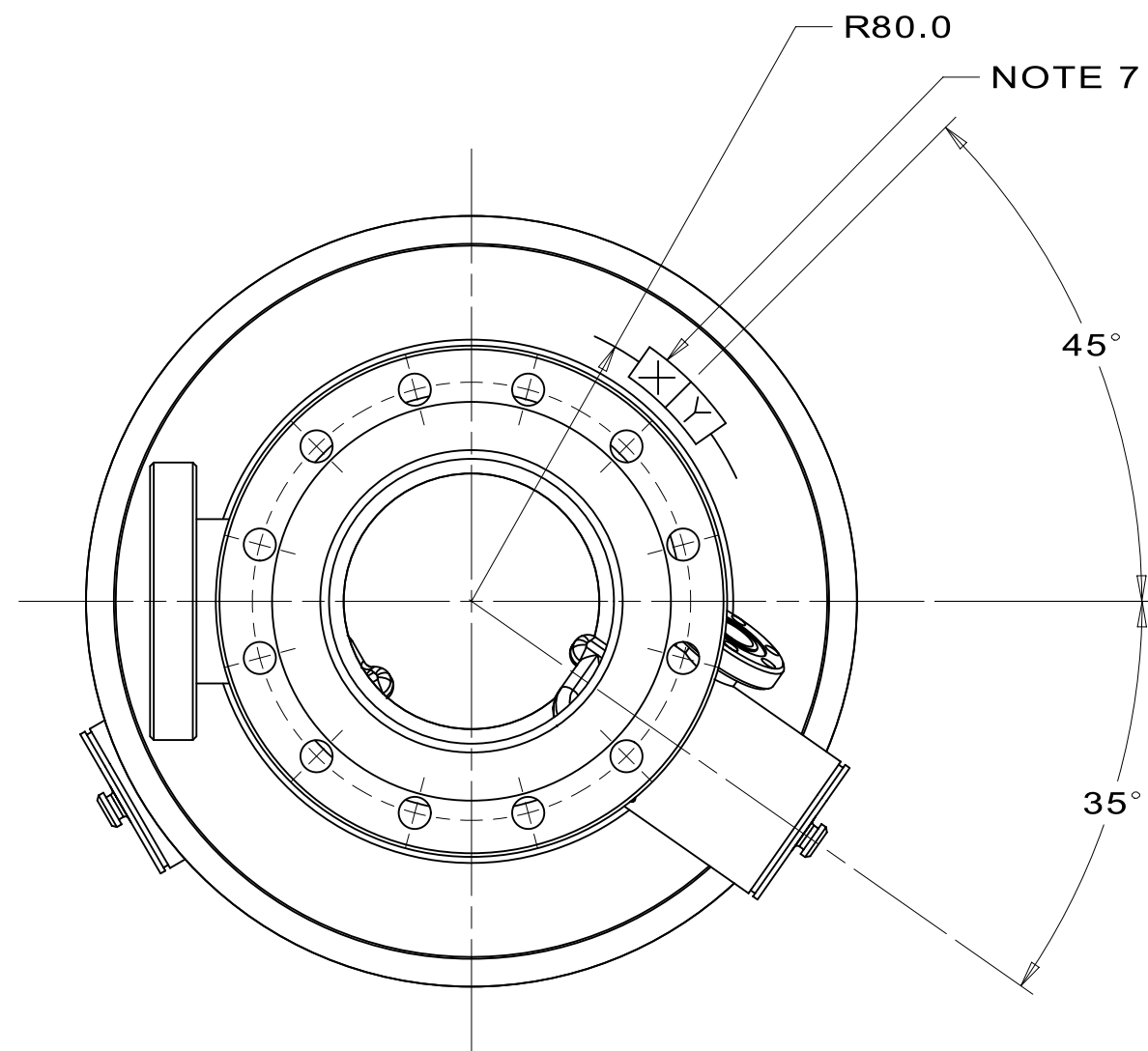
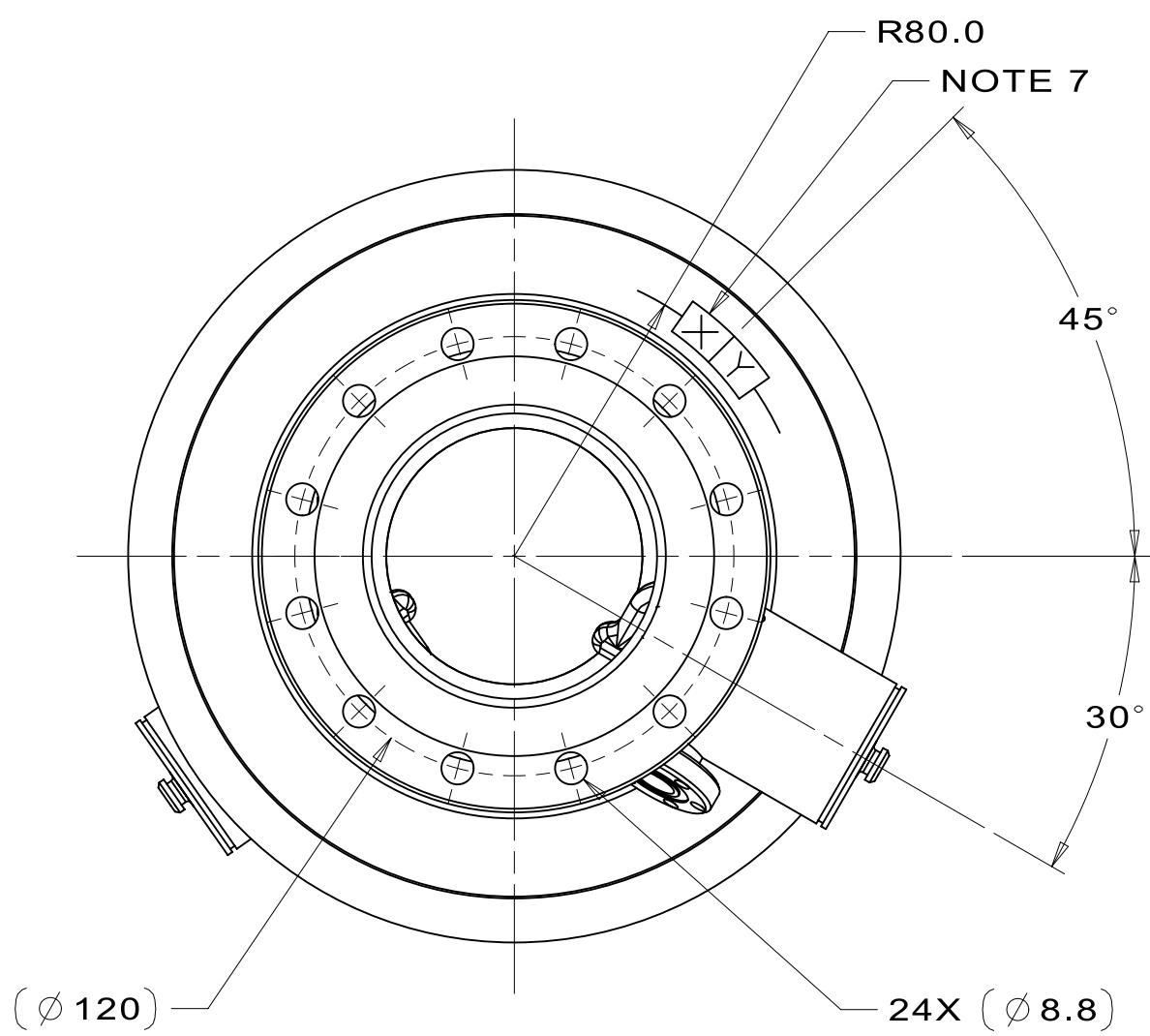
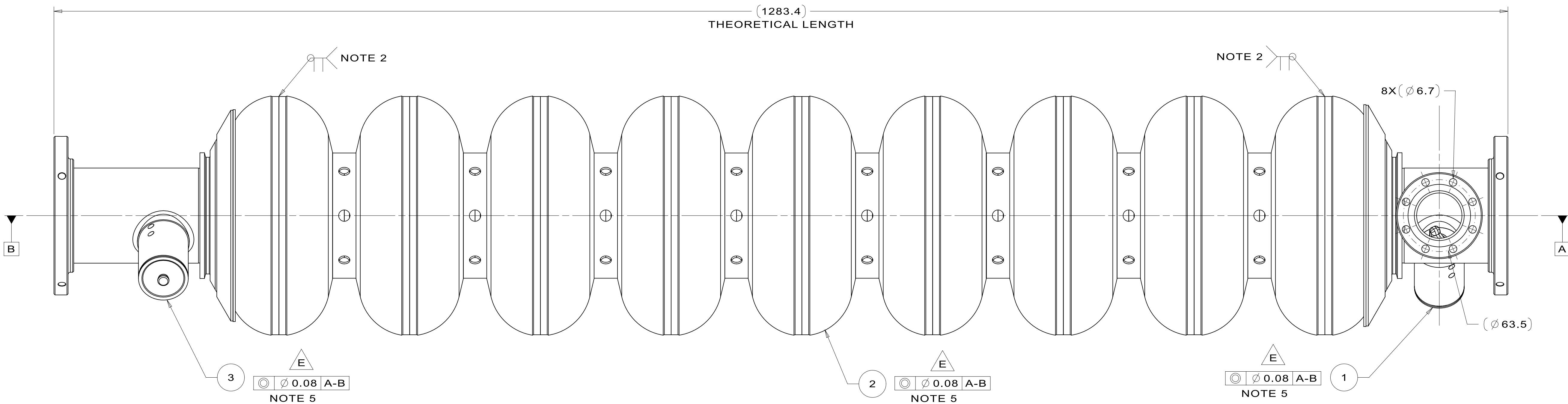
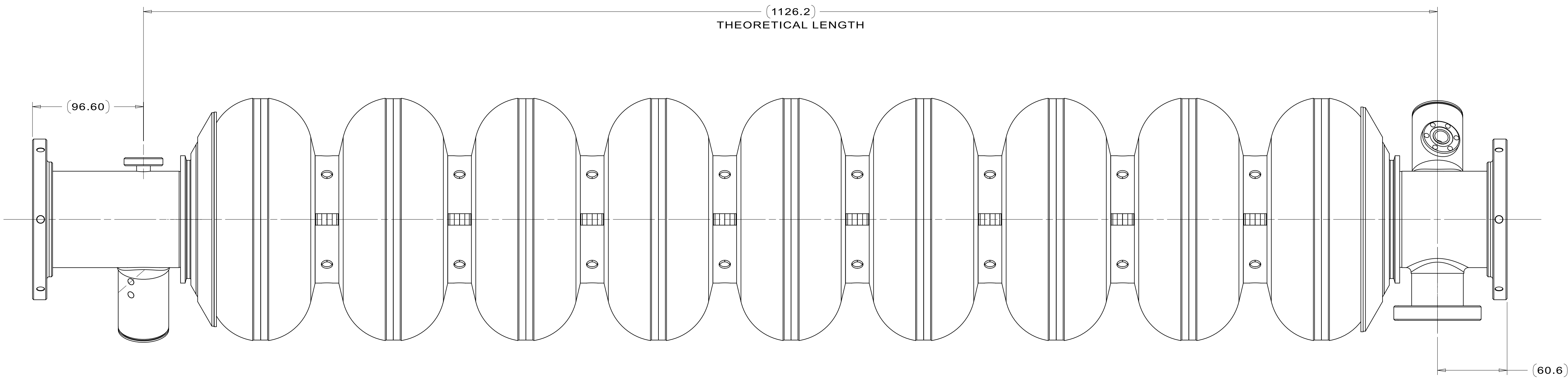
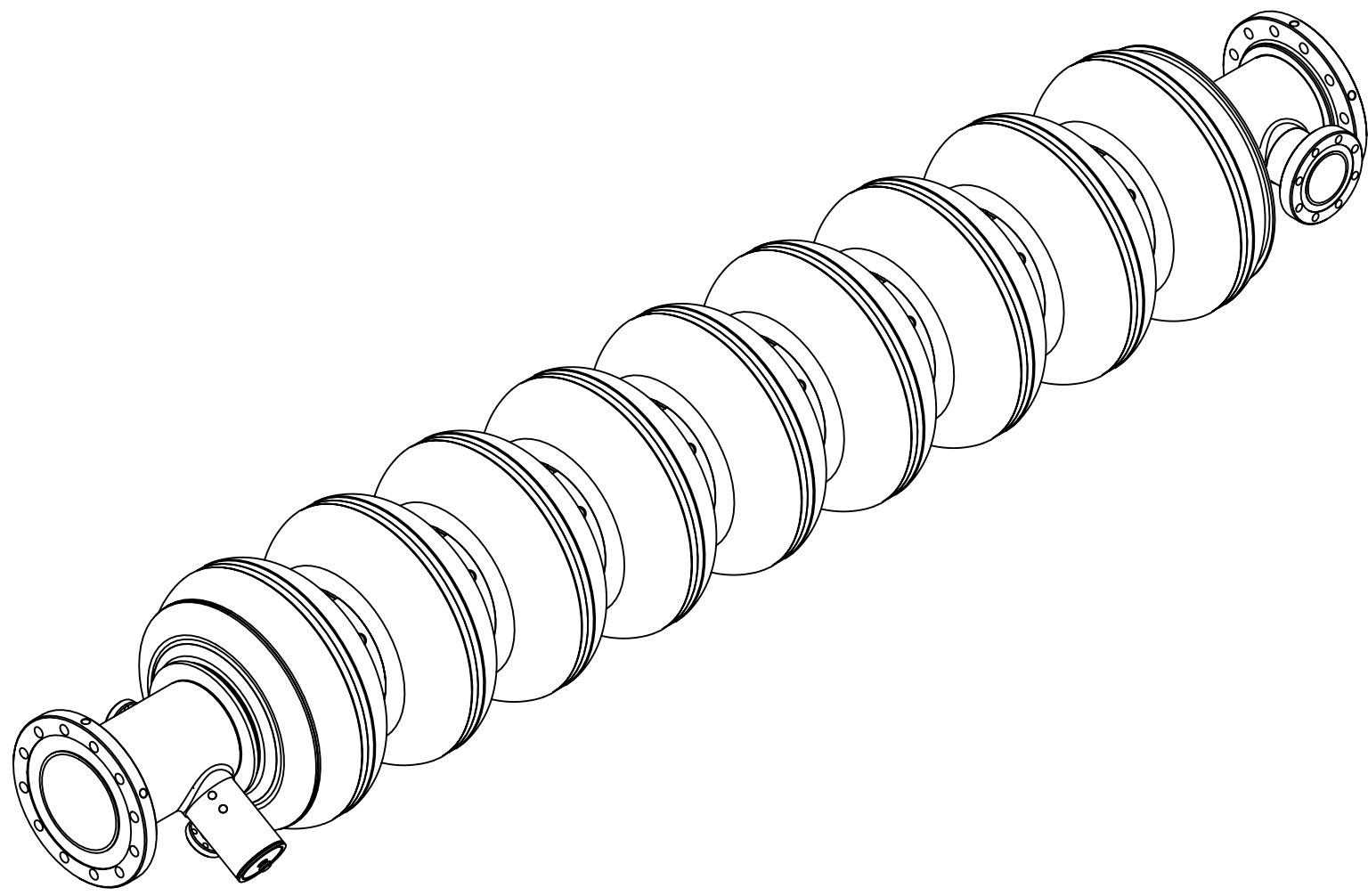
8. ELECTRON-BEAM WELD FROM BOTH SIDES TO ENSURE FULL PENETRATION AND
OVERLAP FROM FULL JOINT CONSUMPTION.

9. ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

5	F00439157	1.3GHZ RF CAVITY NW 12 FLANGE	1
4	F00439158	1.3GHZ RF CAVITY NW 40 FLANGE	1
3	F10026185	FLANGE, BEAM - NW78	1
2	F10026402	WELDMENT, SHORT ENG TUBE - 1.3 GHZ RF CAVITY	1
1	F10026403	WELDMENT, SHORT END DISK - 1.3 GHZ RF CAVITY	1
ITEM	PART NUMBER	DESCRIPTION	QTY.

UNLESS OTHERWISE SPECIFIED				DRAWN				DATE				FERMILAB			
1X	2X	3X	4X	5X	6X	7X	8X	9X	10X	11X	12X	13X	14X	15X	16X
2	0.3	0.12	N/A	0.5											
DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX UNFINISHED SURFACES: Ra: 3.2 DRAWING LIMIT: 100															
THERMAL ANGLE PROJECTION				GROUP: Technical Design - Design and Drafting				CASE CODE: 0000				SCALE: 1:1 & AS SHOWN			
MATERIAL: SEE PARTS LIST				F00439181				1.3GHZ SHORT HALF CELL ASSY				DRAWING NUMBER: F00439180			
SHEET: 1 OF 1				REV: K				DATE: 18-Apr-2005				DATE: 16-Sep-2005			

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
E	F00439181-E-RCD	22-Dec-2021 07-Feb-2022	DRAWN B.TREVINO APPROVED B.HARTSELL



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. WELDMENT TO BE FREE OF DUST , GREASE, OIL, CHIPS, AND BURRS.
2. WELDING NOTES:

- A. ASSEMBLY TO BE VACUUM TIGHT:
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE
OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A
MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
B. ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE
NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS,
OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED
BY FERMILAB.
C. ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO
STANDARD ULTRA HIGH VACUUM PRACTICES.
D. ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND
HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION
MHF-SL-1-1999 AND MUST BE FOLLOWED.

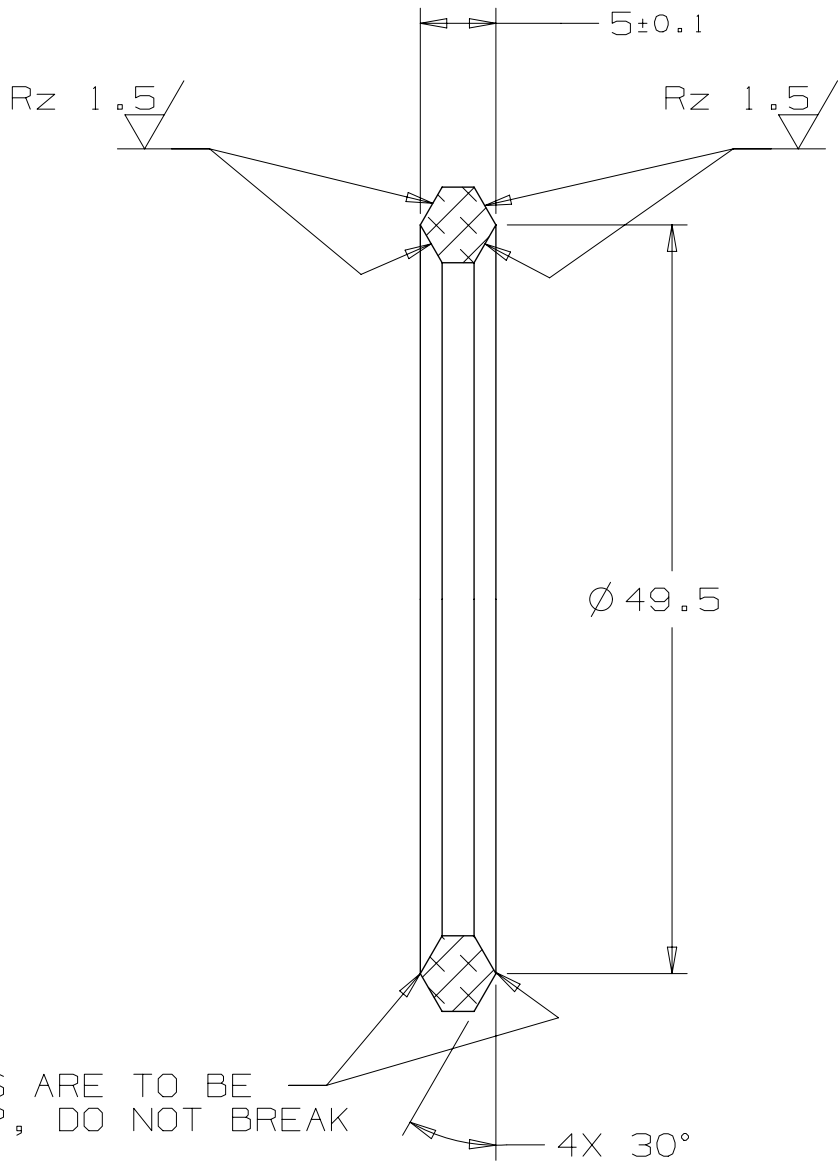
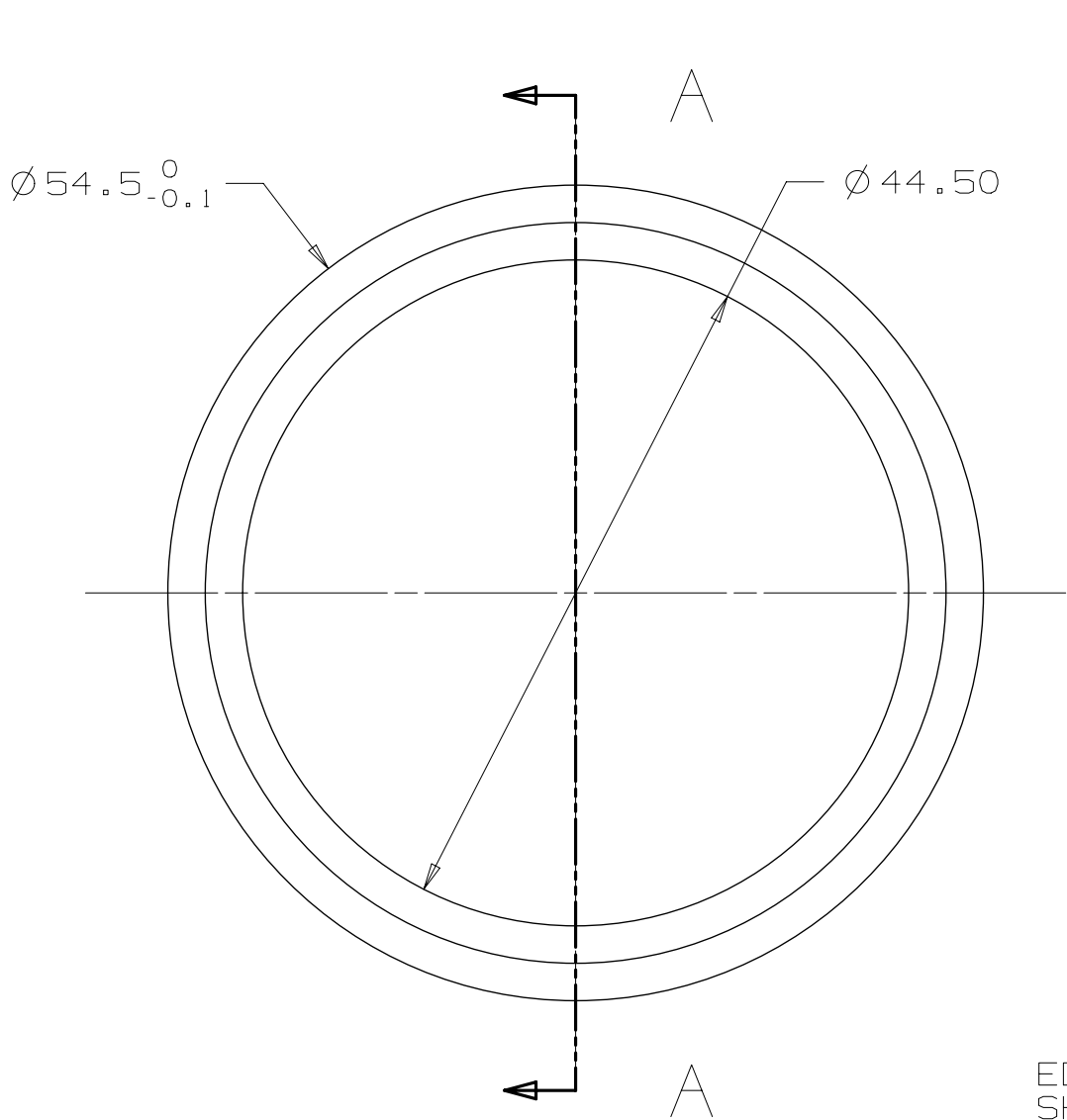
3. THIS DEVICE IS EASILY DEFORMED. A FIXTURE IS REQUIRED
FOR ALL HANDLING.
4. ENSURE THAT THE CLOCKING OF THE SUB-ASSEMBLIES ARE HELD
TO $\pm 0.5^\circ$.
5. ITEMS 1, 2, AND 3 ARE TO BE CONCENTRIC WITHIN $\varnothing 0.4\text{mm}$ ALONG
DATUM A-B.
6. DEFINITION OF FORM AND TOLERANCES CONCERNING WELD JOINT
PREPARATION AT THE IRIS AND THE EQUATOR TO BE COORDINATED
BETWEEN MANUFACTURERS AND FERMILAB.
7. PUNCH 4mm HIGH, 0.2mm DEEP LETTERS X-FIRM CODE,
Y-MANUFACTURING NUMBER.
8. ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

3	F00439179	1.3 GHZ RF CAVITY LONG END HALF CELL ASSEMBLY	1
2	F00439173	1.3GHZ BARBELL WELDMENT ASSY	1
1	F00439180	1-3GHZ SHORT HALF CELL ASSY	1
ITEM	PART#	DESCRIPTION	QTY.

UNLESS OTHERWISE SPECIFIED				DRAWN		DATE		E PARTLE		DATE		F10023864		1.3GHZ LCLS-II RF CAVITY ASSEMBLY		F00439181		1 of 1		E	
1X	2X	3X	4X	5X	6X	7X	8X	9X	10X	11X	12X	13X	14X	15X	16X	17X	18X	19X	20X	21X	22X
2	0.3	0.12	N/A	0.5																	
BREAK ALL SHARP CORNERS, UNLESS OTHERWISE SPECIFIED										DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX UNFINISHED SURFACES: Ra 3.2 DRAWING DATE: 16-Sep-2005										SCALE 1:2	
THERO-ANGLE PROJECTION										MATERIAL SEE PARTS LIST GROUP: Technical Division - Design and Drafting CASE CODE: 0088										SIZE A0	
										FIRM NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY										1	

DESCRIPTION: SCRF SEAL FOR NW40 FLANGE
CATEGORY: SEAL PROJECT: LCLSII/Cryogenics

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
G	F00439231-G-RCD	23-Mar-2018	DRAWN	M.KRAMP
		17-Apr-2018	APPROVED	Y.ORLOV

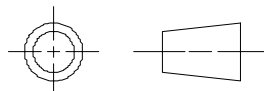


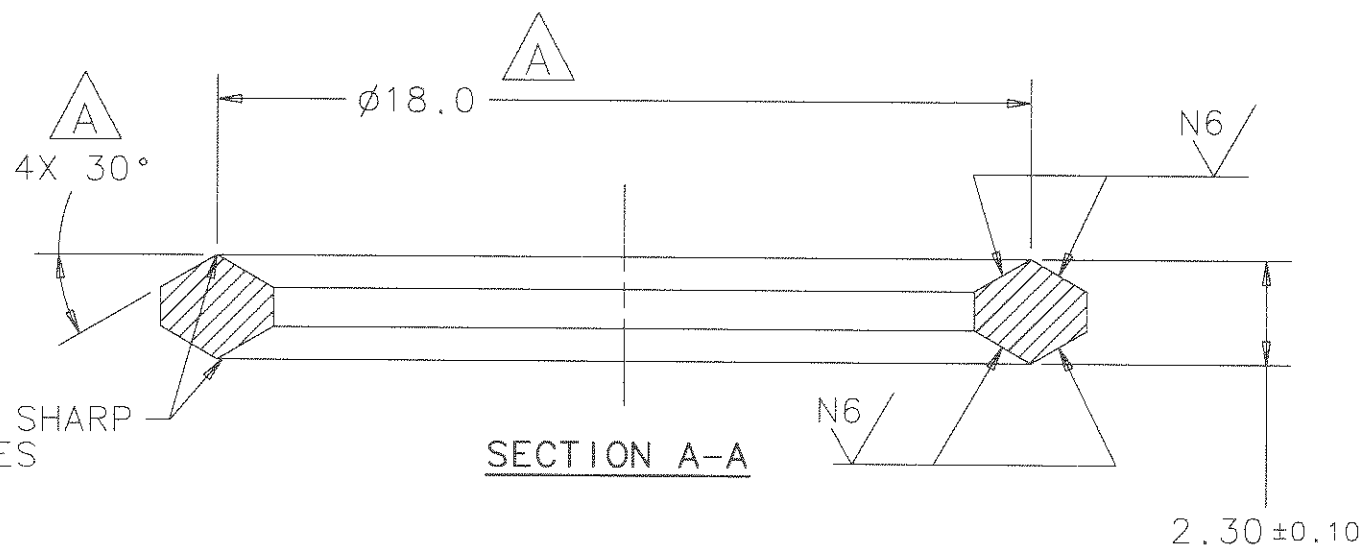
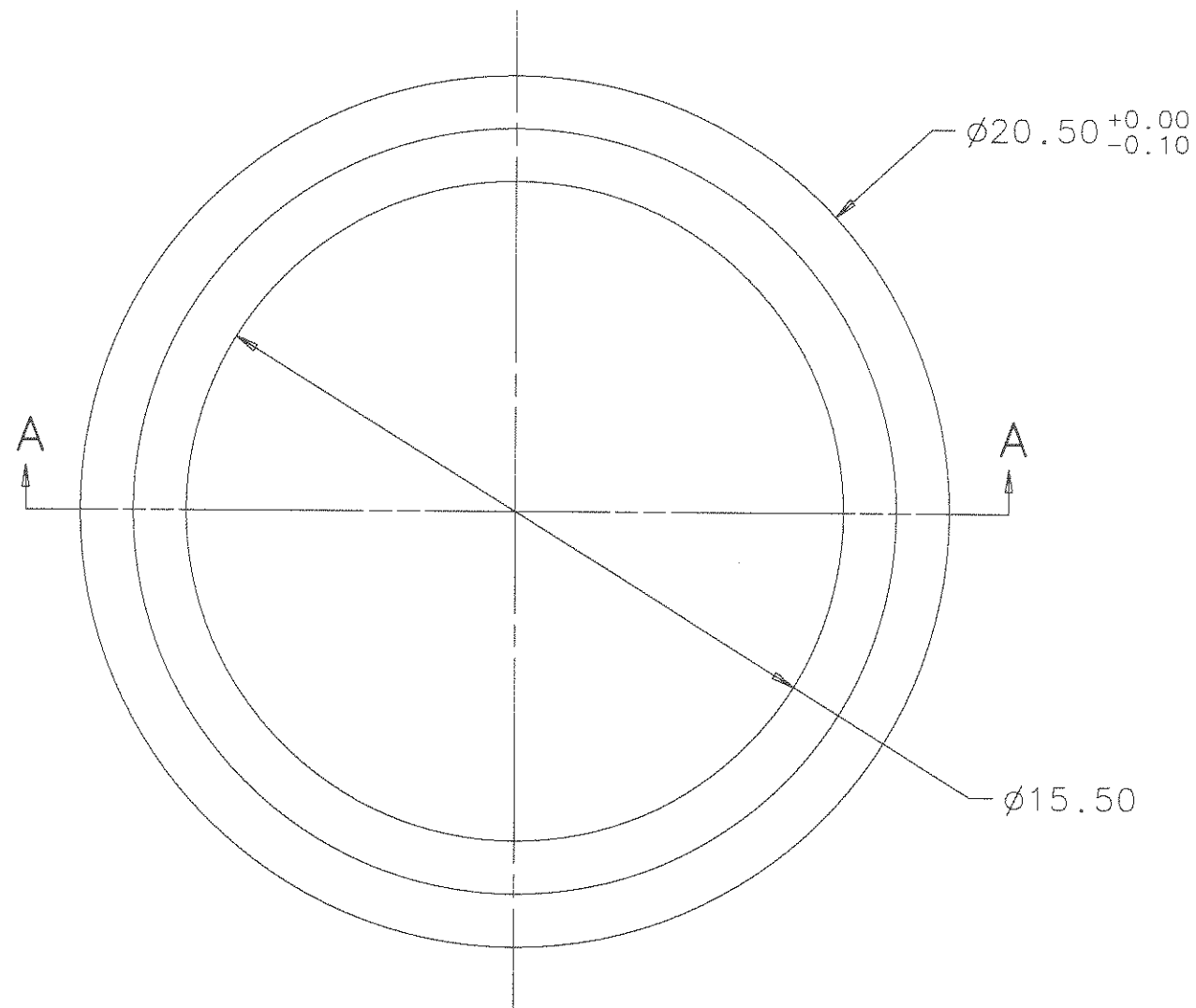
SECTION A-A

NOTES:

- PART IS TO BE CLEANED AND DEGREASED.
- MATERIAL: EN AW-6060 T66 (AlMgSi0.5 F22, 3.3206.71) MIN. HB60 - MAX. HB75, HBW2.5/62.5 PER ASTM E10.

THIS DESIGN IS THE INTELLECTUAL PROPERTY OF DESY ACCORDING TO DIN 34 / ISO 16016. THIS DRAWING HAS BEEN REDRAWN WITH DESY'S PERMISSION FOR FABRICATION PURPOSES WITHIN THE USA AND IS TO BE USED EXCLUSIVELY WITHIN FERMILAB. USAGE OUTSIDE OF FERMILAB MUST BE APPROVED BY DESY.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE	DATE	28-Apr-2005	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	D.MITCHELL	DATE	25-May-2005				
2	0.3	0.12	N/A	1°	APPROVED	T.ARKAN	DATE	25-May-2005	NAME			
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON			SCRF SEAL FOR NW40 FLANGE				
					F10008819, F10041054							
					MATERIAL SEE NOTE #2					SCALE AS SHOWN A3		
GROUP: Accelerator Mechanical Support CAGE CODE: 0U5R6												



THIS DESIGN IS THE INTELLECTUAL PROPERTY OF DESY
 ACCORDING TO DIN 34 / ISO 16016. THIS DRAWING HAS
 BEEN REDRAWN WITH DESY'S PERMISSION FOR FABRICATION
 PURPOSES WITHIN THE USA AND IS TO BE USED
 EXCLUSIVELY WITHIN FERMILAB. USAGE OUTSIDE OF
 FERMILAB MUST BE APPROVED BY DESY.

REV	DESCRIPTION	DRAWN	DATE
		APPROVED	DATE
	ER# 8021		
A	ECO# 8280; $\phi 18.0$ WAS $\phi 18.00$, ADDED NOTE 2, 4X 30° WAS 30° TYP, UPDATED TOLERANCE BLOCK, 0.13 WAS .012, MATERIAL WAS ALMGSI 0.5 F22.	D. ARNOLD	10-FEB-2006
		D. OLIS	13-FEB-2006
B	ECO#10013, DELETED NOTE 2 MATL WAS 5052 AL PLT	V. MARTINEZ	31-MAR-2011
		T. Arkan	3/31/2011

NOTES:

1.) PART IS TO BE CLEANED AND DEGREASED.

UNLESS OTHERWISE SPECIFIED			ORIGINATOR	DESY	
0.X	0.XX	ANGLES	DRAWN	E.PIRTLE	28-APR-2005
± 0.3	± 0.13	$\pm 1^\circ$	CHECKED	D.MITCHELL	25-MAY-2005
1. BREAK ALL SHARP EDGES 0.40 MAX. 2. DO NOT SCALE DRAWING. 3. DIMENSIONS BASED UPON ASME Y14.5M-1994 4. MAX. ALL MACH. SURFACES N7 5. DRAWING UNITS: U.S. INCH			APPROVED	T.ARKAN	25-MAY-2005
			USED ON		
			MATERIAL	AlMgSi 0.5 F22	
 FERMILAB FERMION EXPERIMENTAL RESEARCH NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY					
DESY 1.3GHZ TESLA CAVITY DRESSED SEAL FOR NW8 FLANGE					
SCALE	DRAWING NUMBER			SHEET	REV
6:1	4904.010-MB-439233			1 OF 1	B
CREATED WITH : Ideas12NXSeries			GROUP: TD/DDCIS-DESIGN-COMPUTING		



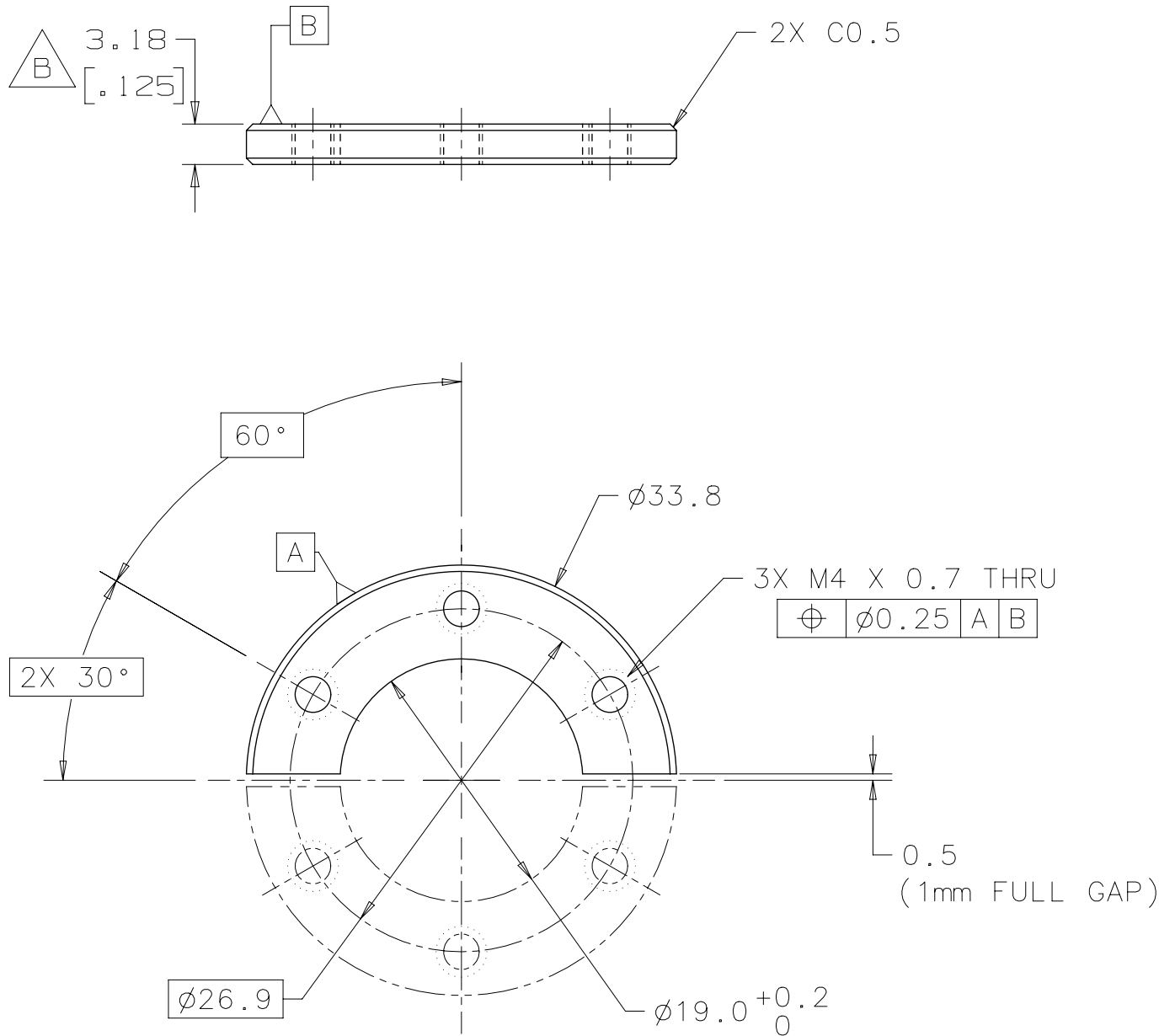
1. PART TO BE FREE OF DIRT, GREASE, OIL, AND CHIPS.
2. VENDOR MUST SUPPLY MATERIAL CERTIFICATION.
3. TRAILING ZEROS DENOTE TOLERANCE.

THIS DESIGN IS THE INTELLECTUAL PROPERTY OF DESY
ACCORDING TO DIN 34/ISO 16016. THIS DRAWING HAS
BEEN REDRAWN WITH DESY'S PERMISSION FOR FABRICATION
PURPOSES WITHIN THE USA AND IS TO BE USED BY TTC
MEMBERS EXCLUSIVELY. USAGE OUTSIDE OF THE TTC MUST
BE APPROVED BY DESY.

UNLESS OTHERWISE SPECIFIED					DRAWN	W.SHARP		DATE	13-Jul-2007		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY						
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	C.GRIMM		DATE	31-Jul-2007								
2	0.3	0.12	N/A	1*	APPROVED	D.MITCHELL		DATE	31-Jul-2007								
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM 					USED ON		F10023864										
					MATERIAL												
					GROUP: Particle Physics Mechanical Support					CAGE CODE: 0U5R6		NAME		FLANGE BLANK OFF CAVITY END			
										SCALE 1:1 AS SHOWN		SIZE A2		DRAWING NUMBER F00457202		SHEET 1 OF 1	

DESCRIPTION: NUT BACKING PLATE
PROJECT: FNALCommonParts
CATEGORY: NUT

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00459093-B-RCD	17-Mar-2021	DRAWN	M.KRAMP
		22-Mar-2021	APPROVED	JF.HELSPER



UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-2009 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM				
THIRD ANGLE PROJECTION				

DRAWN	D.MITCHELL	DATE	08-Sep-2008
CHECKED	C.GRIMM	DATE	12-Sep-2008
APPROVED	T.ARKAN	DATE	12-Sep-2008
USED ON			
MATERIAL	SILICON BRONZE B, UNS C65100		
GROUP:	Technical Division - Design and Drafting		
CAGE CODE:	OU5R6		



FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

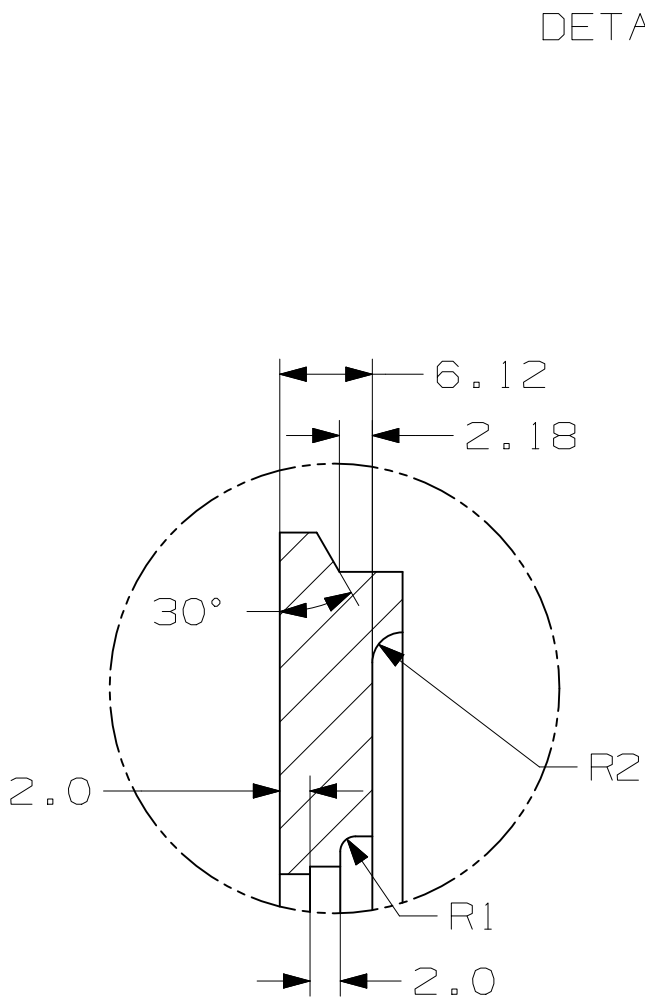
NUT BACKING PLATE

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
2:1	A3	F00459093	1 of 1	B

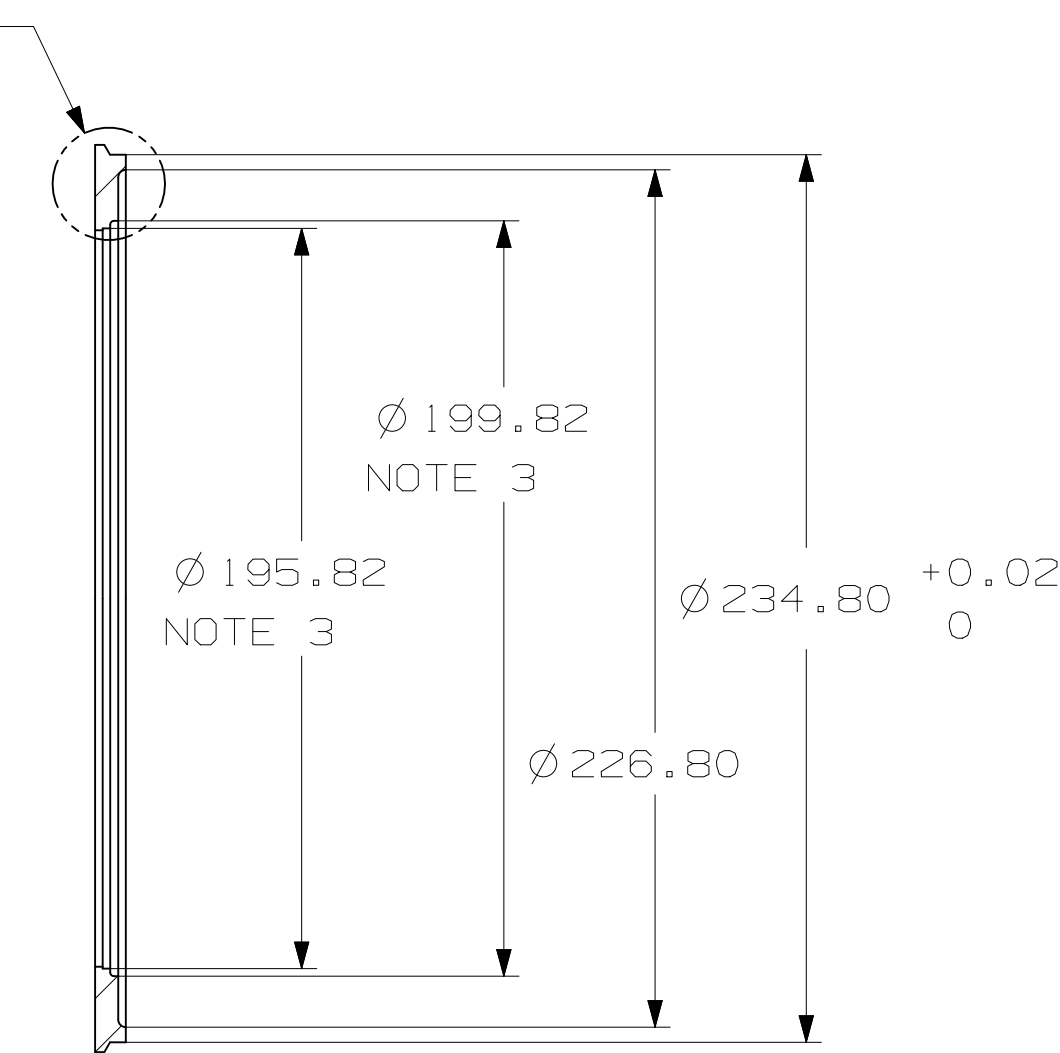
NOTES:
1) TO BE USED IN CONJUNCTION
WITH 1.33" MINI CF FLANGE

DESCRIPTION: FNAL CAVITY TRANS RING MC END
CATEGORY: RING PROJECT: ILCCryoModules

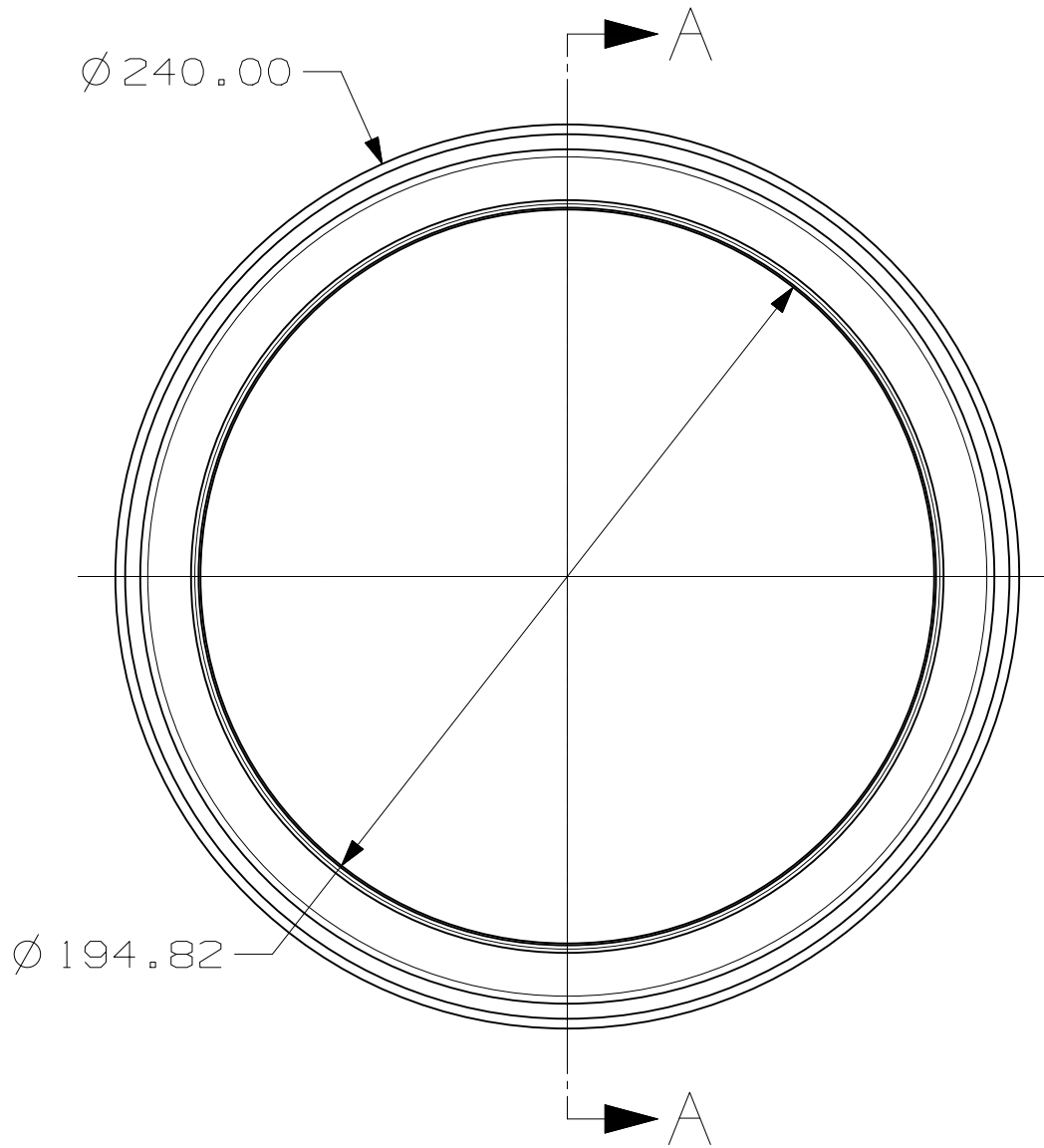
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00459457-B-RCD	11-Aug-2015	DRAWN	G. LANGLOIS
			APPROVED	C. GRIMM



DETAIL B
SCALE 2:1

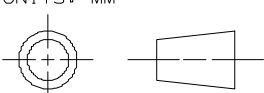


SECTION A-A



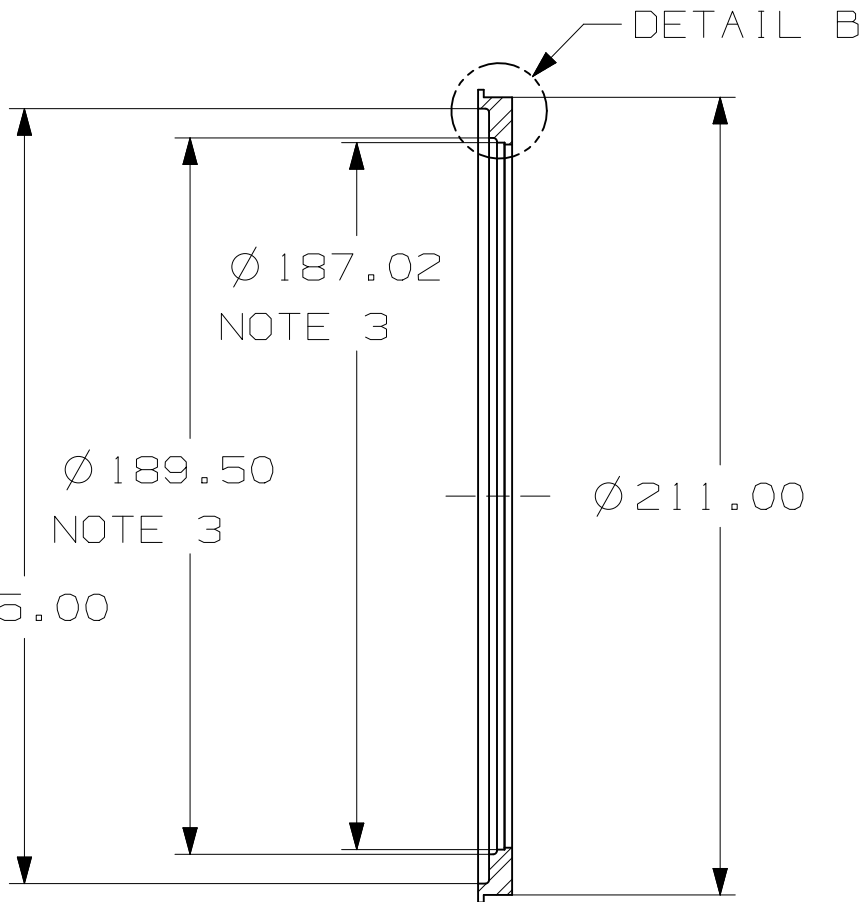
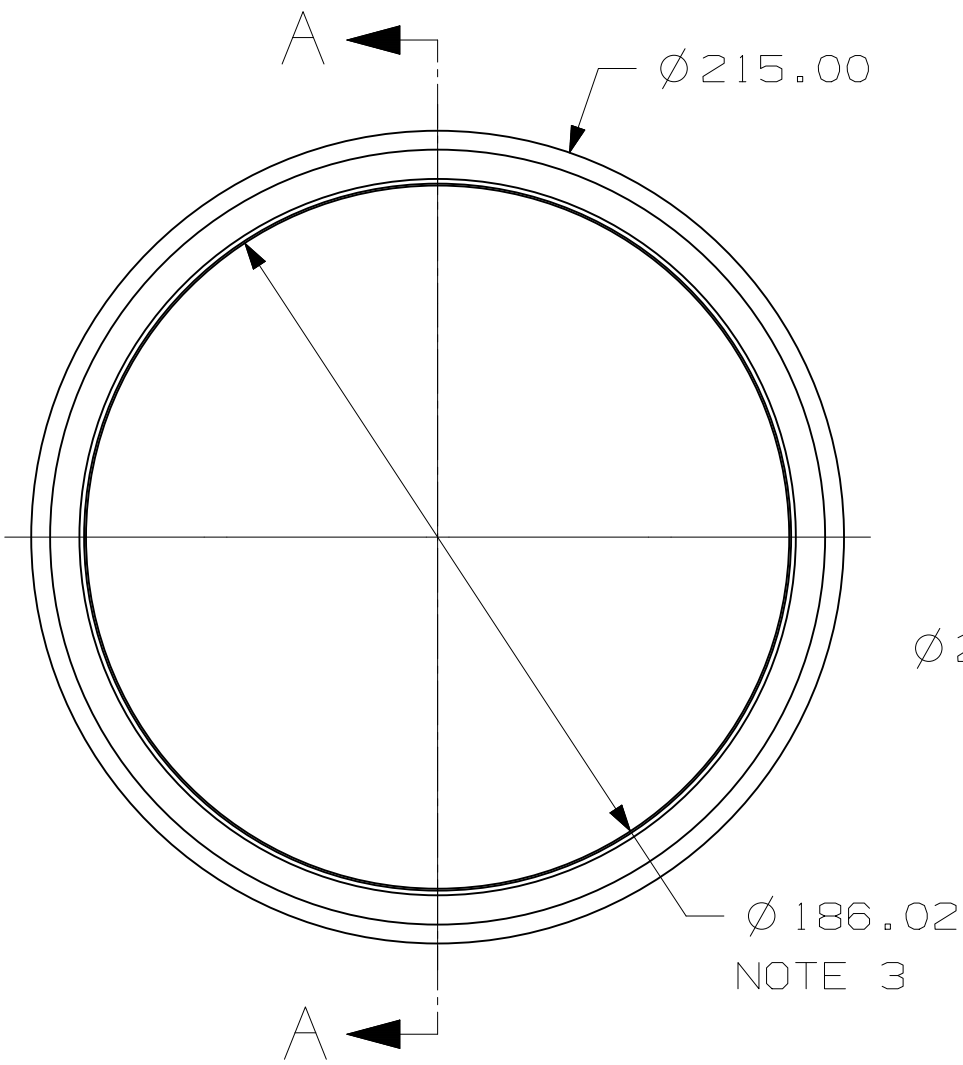
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- MACHINE ID TO MATCH OD OF F00439168 END CAP DISK
- TRAILING ZEROS DENOTE TOLERANCE.

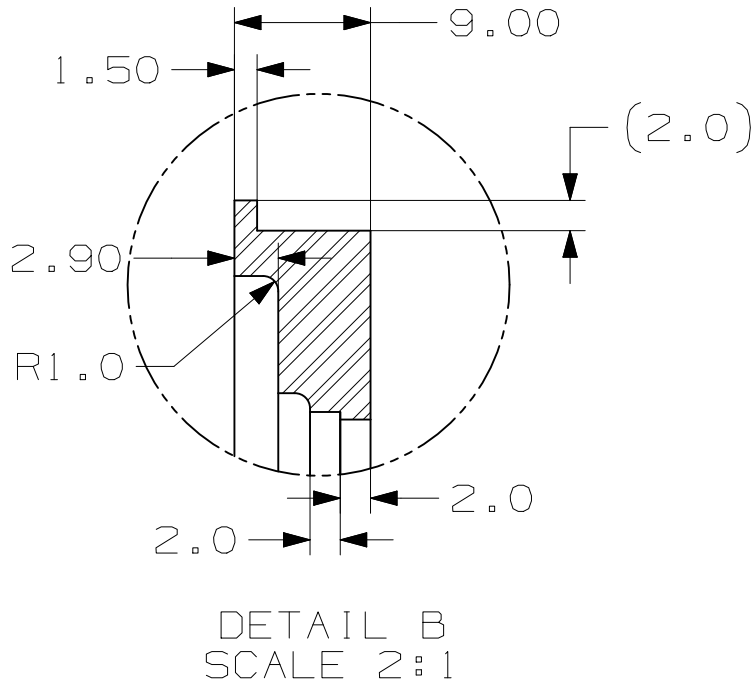
UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE	DATE	19-Dec-2008	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY									
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.FOLEY	DATE	06-Jan-2009										
2	0.3	0.12	N/A	1°	APPROVED	M.FOLEY	DATE	06-Jan-2009										
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON				NAME FNAL CAVITY TRANS RING MC END									
					F10027807													
										MATERIAL				TITANIUM GRADE 2				
										GROUP: Accelerator Mechanical Support				CAGE CODE: 0U5R6				SCALE AS SHOWN 1:2

DESCRIPTION: FNL CAVITY TRANS RING PROBE END
CATEGORY: PROBE PROJECT: ILCCryoModules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F00459459-B-RCD	11-Aug-2015	DRAWN	G. LANGLOIS
		18-Aug-2015	APPROVED	C.GRIMM

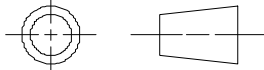


SECTION A-A



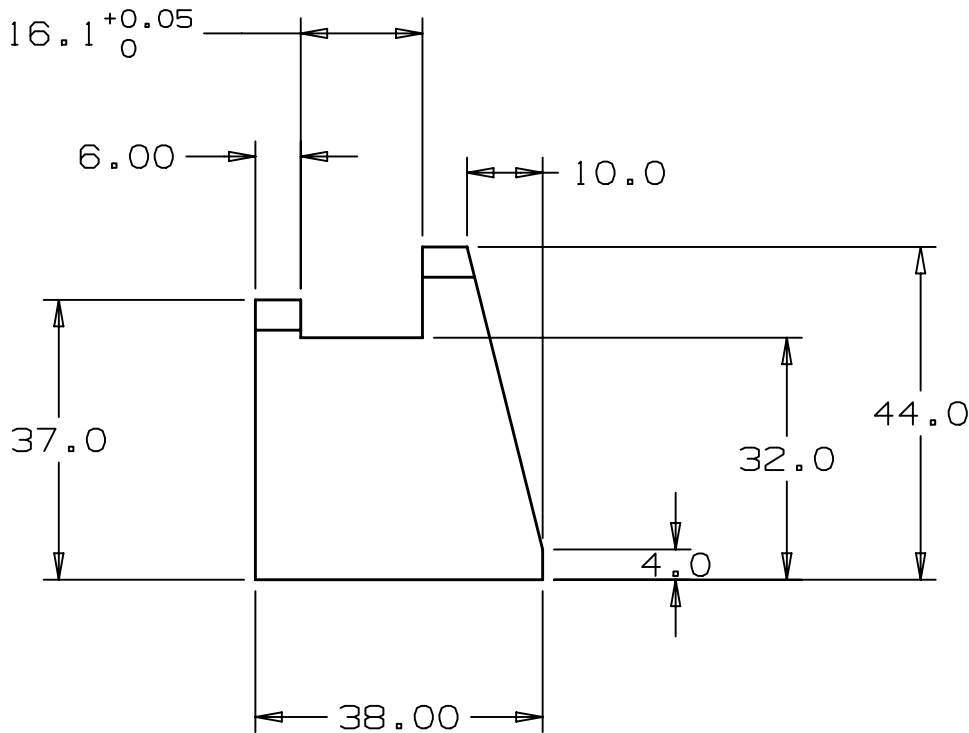
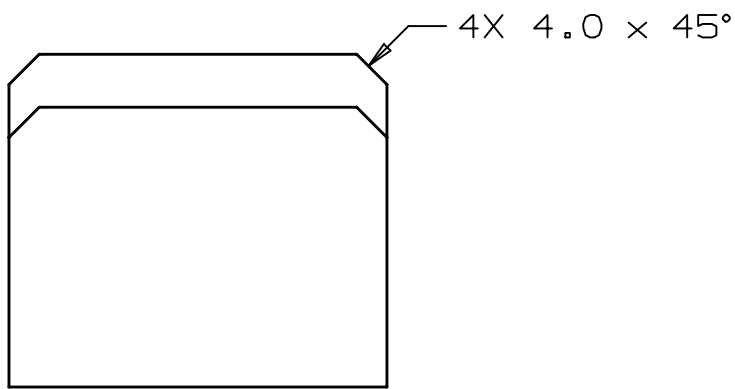
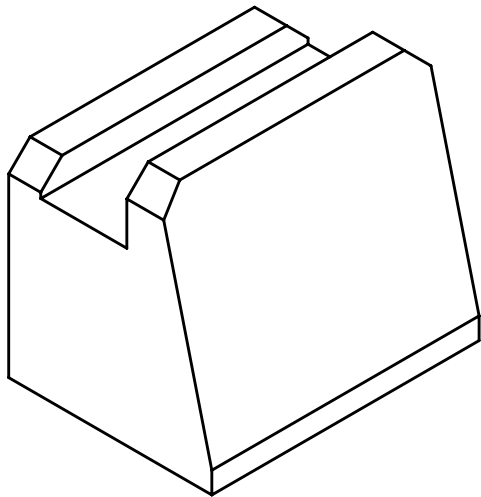
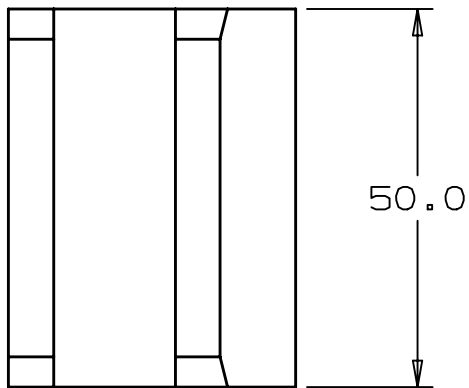
NOTES (UNLESS OTHERWISE SPECIFIED):

- 1. PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- 2. PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- 3. MACHINE ID TO MATCH OD OF F00439167 END CAP DISK
- 4. TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	E.PIRTLE		DATE	19-Dec-2008		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY								
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.FOLEY		DATE	06-Jan-2009										
2	0.3	0.12	N/A	1°	APPROVED	M.FOLEY		DATE	06-Jan-2009		NAME								
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON						F00440003								
					MATERIAL														
					GROUP: Technical Division - Design and Drafting						CAGE CODE: 0U5R6		SCALE AS SHOWN 1 : 2		SIZE A3	DRAWING NUMBER F00459459		SHEET 1 OF 1	REV B

DESCRIPTION: PLATE, CAVITY SAFETY STOP
CATEGORY: PLATE PROJECT: LCLSII Cryomodule

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
D	F10006861-D-RCD	10-Feb-2016	DRAWN	B.DAMPHOUSSE
		20-Apr-2016	APPROVED	C.GRIMM



NOTES (UNLESS OTHERWISE SPECIFIED):

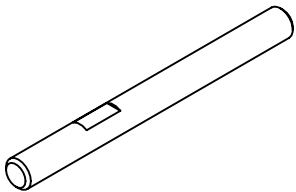
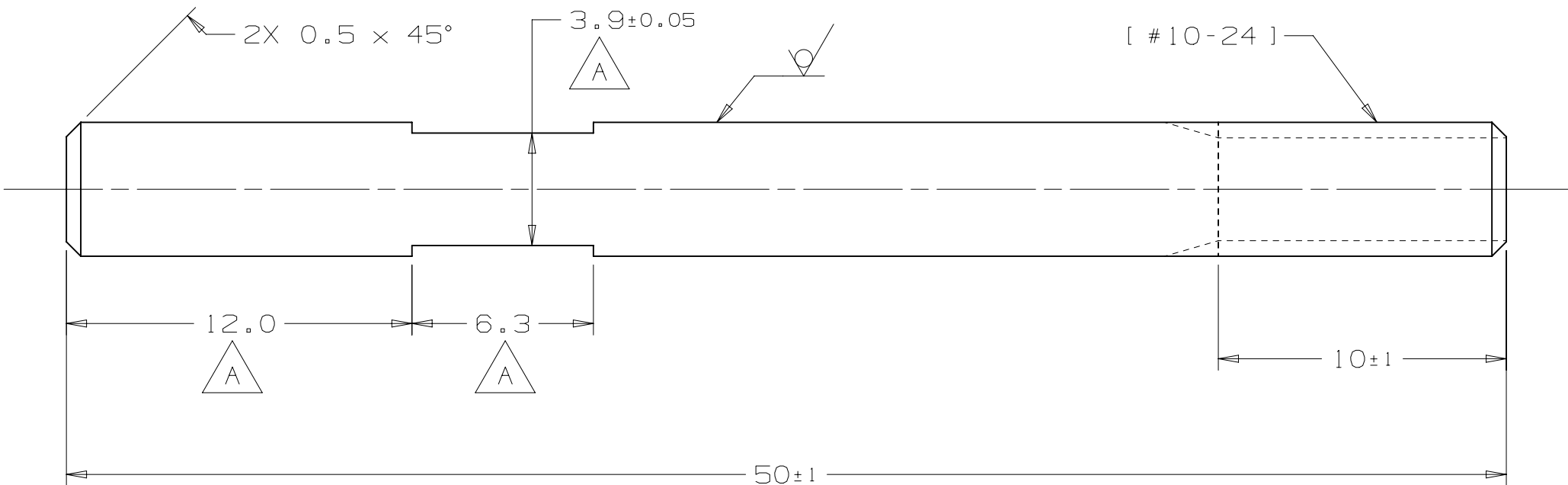
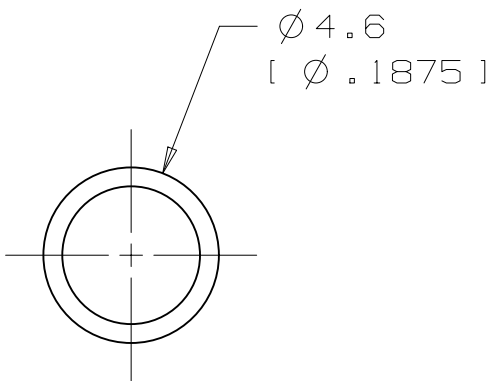
- PART MUST BE FREE FROM DUST, GREASE, OIL, CHIPS, AND BURRS.
- ALL DIMENSIONS IN BRACKETS [X.XX] IN INCHES.
- DIMENSIONS WITH TRAILING ZEROES DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	09-May-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	18-Jun-2014
2	0.3	0.12	N/A	1°	APPROVED	E.BORISSOV	DATE	19-Jun-2014
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON			
					F10030937, F10030938			
					MATERIAL	316LN STAINLESS STEEL		
GROUP: Technical Division - Design and Drafting					CAGE CODE: 0U5R6			

					FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
NAME					PLATE, CAVITY SAFETY STOP			
SCALE	SIZE	DRAWING NUMBER			SHEET	REV		
1:1	A3	F10006861			1 OF 1	D		

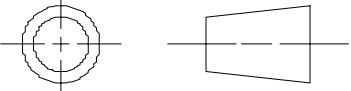
DESCRIPTION: ROD, PA SUPPORT
PROJECT: PIP-11_650Mhz
CATEGORY: ROD

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10006874-A-RCD	11-Nov-2020	DRAWN	M.KRAMP
		11-Nov-2020	APPROVED	B.HARTSELL



NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- ALL DIMENSIONS IN BRACKETS [X.XX] ARE IN INCHES.

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM				
				
THIRD ANGLE PROJECTION				

DRAWN	M.SAWTELL	DATE	08-May-2014
CHECKED	M.KRAMP	DATE	29-May-2014
APPROVED	E.BORISSOV	DATE	30-May-2014
USED ON	F10017508		
MATERIAL	BRASS, FREE CUTTING, UNS C36000		
GROUP:	Technical Division - Design and Drafting		
CAGE CODE:	OU5R6		



FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

NAME ROD, PA SUPPORT				
SCALE 5:1	SIZE A3	DRAWING NUMBER F10006874	SHEET 1 of 1	REV A

DESCRIPTION: PLATE, LCLS-II PP BELLOWS BRACE ARM 1
PROJECT: PIP-II_650MHz
CATEGORY: PLATE

REV	REVISION CONTROL DOCUMENT	DATE	DRAWN	SIGNATURES
F	F10008697-F-RCD	15-Aug-2019	M.KRAMP	
		27-Aug-2019	APPROVED	C.GRIMM

D

D

C

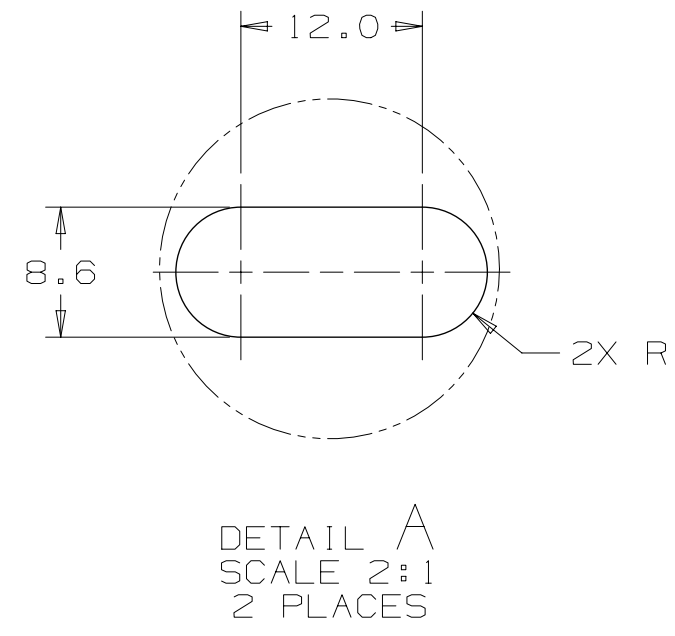
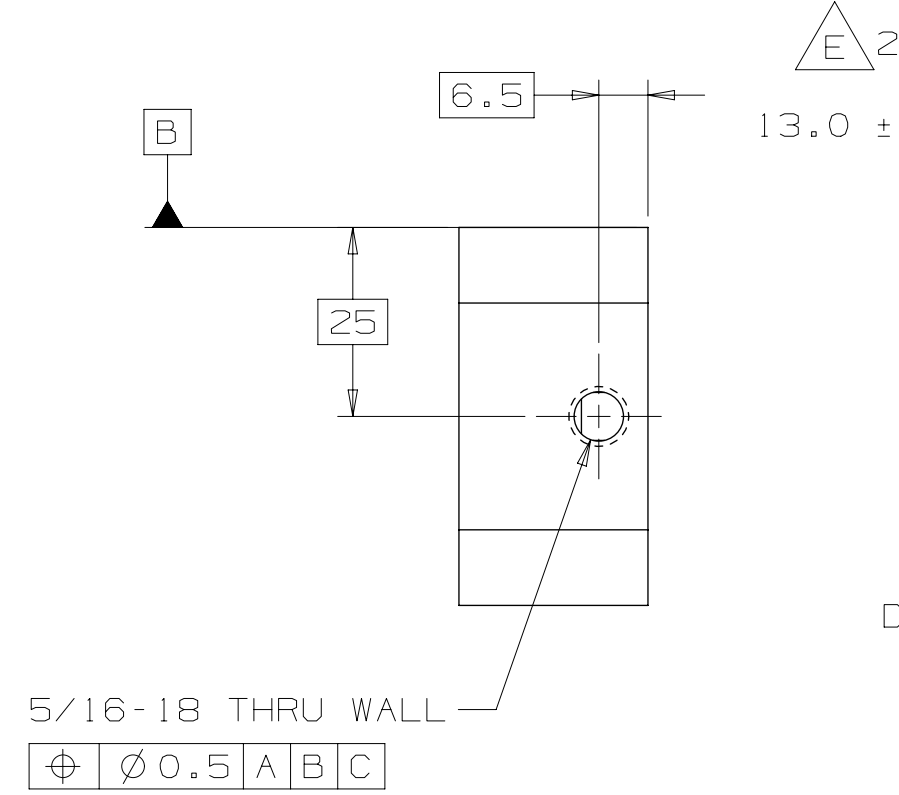
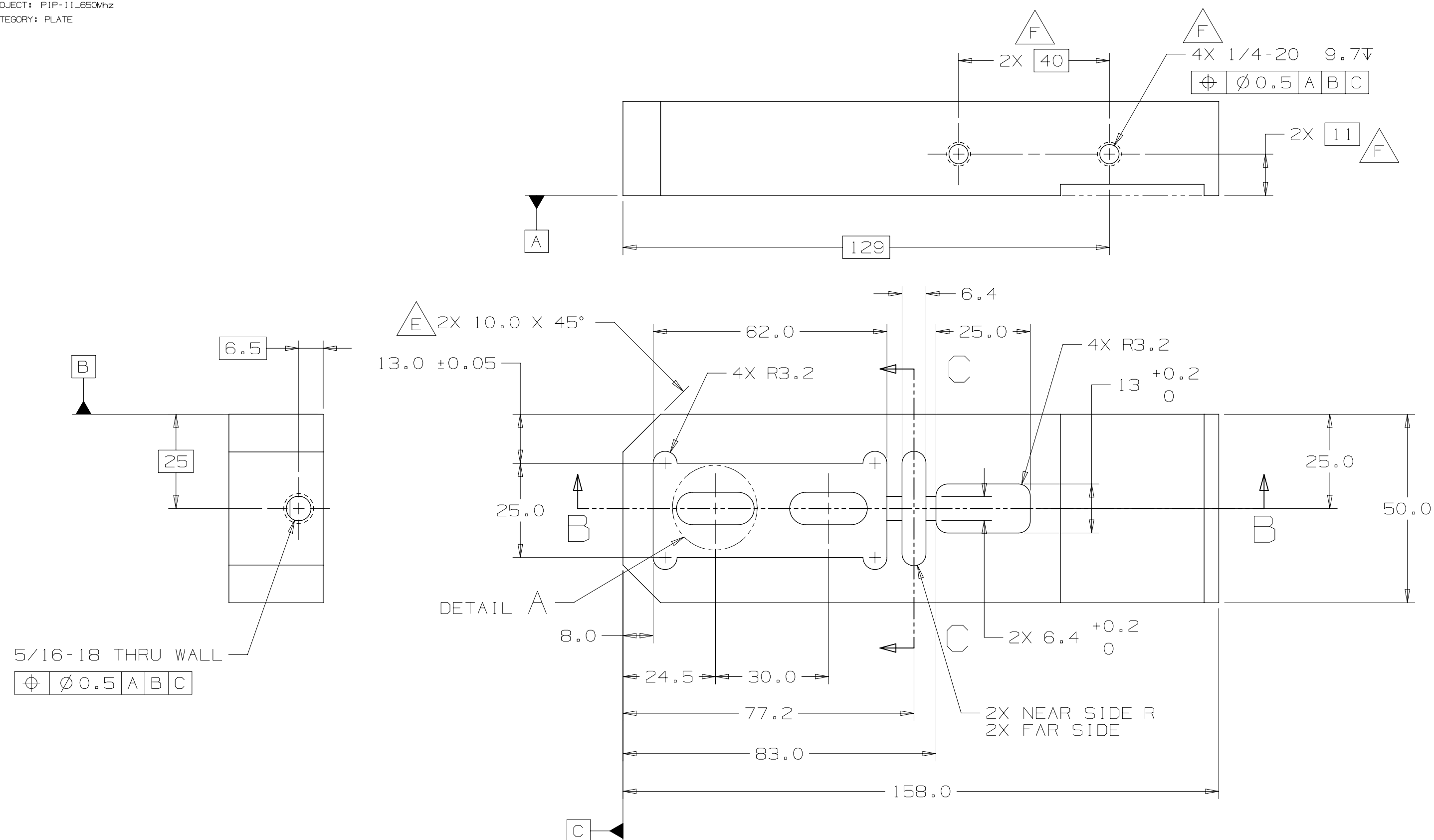
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B

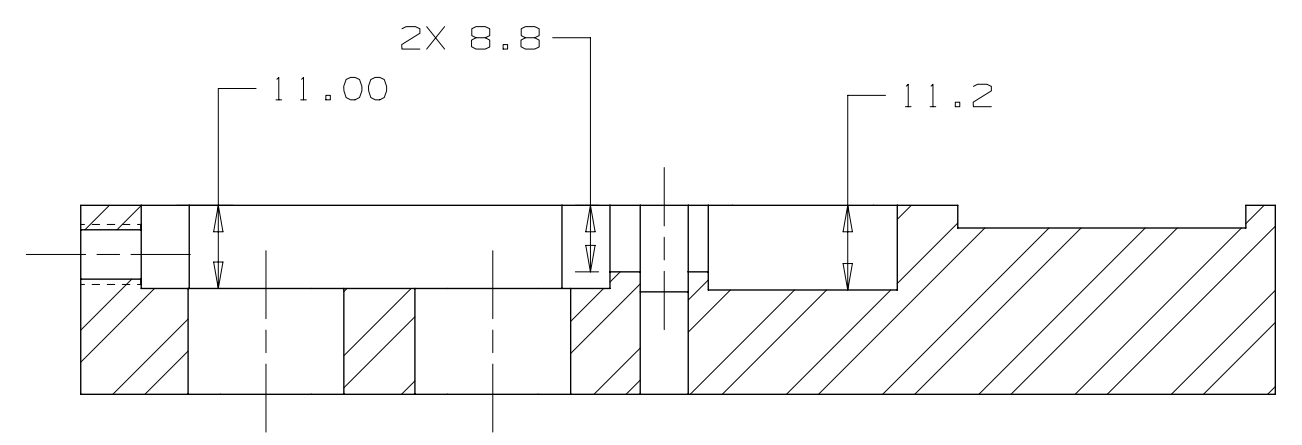
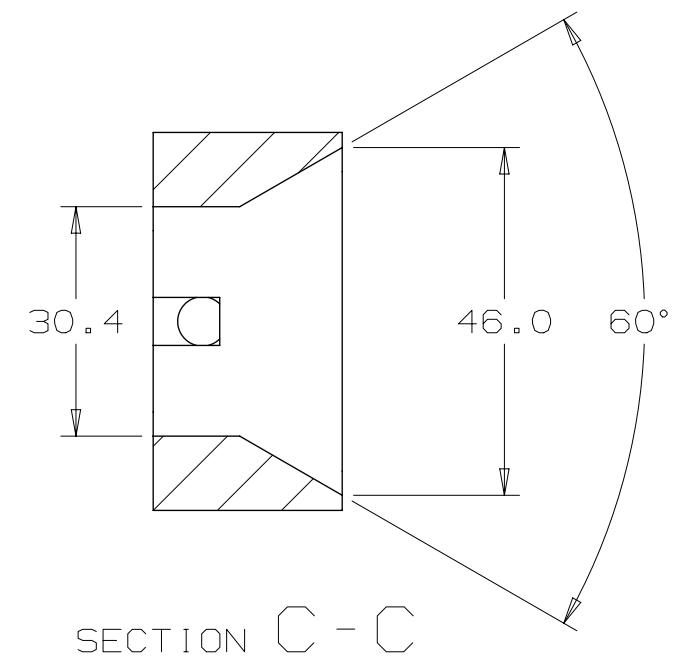
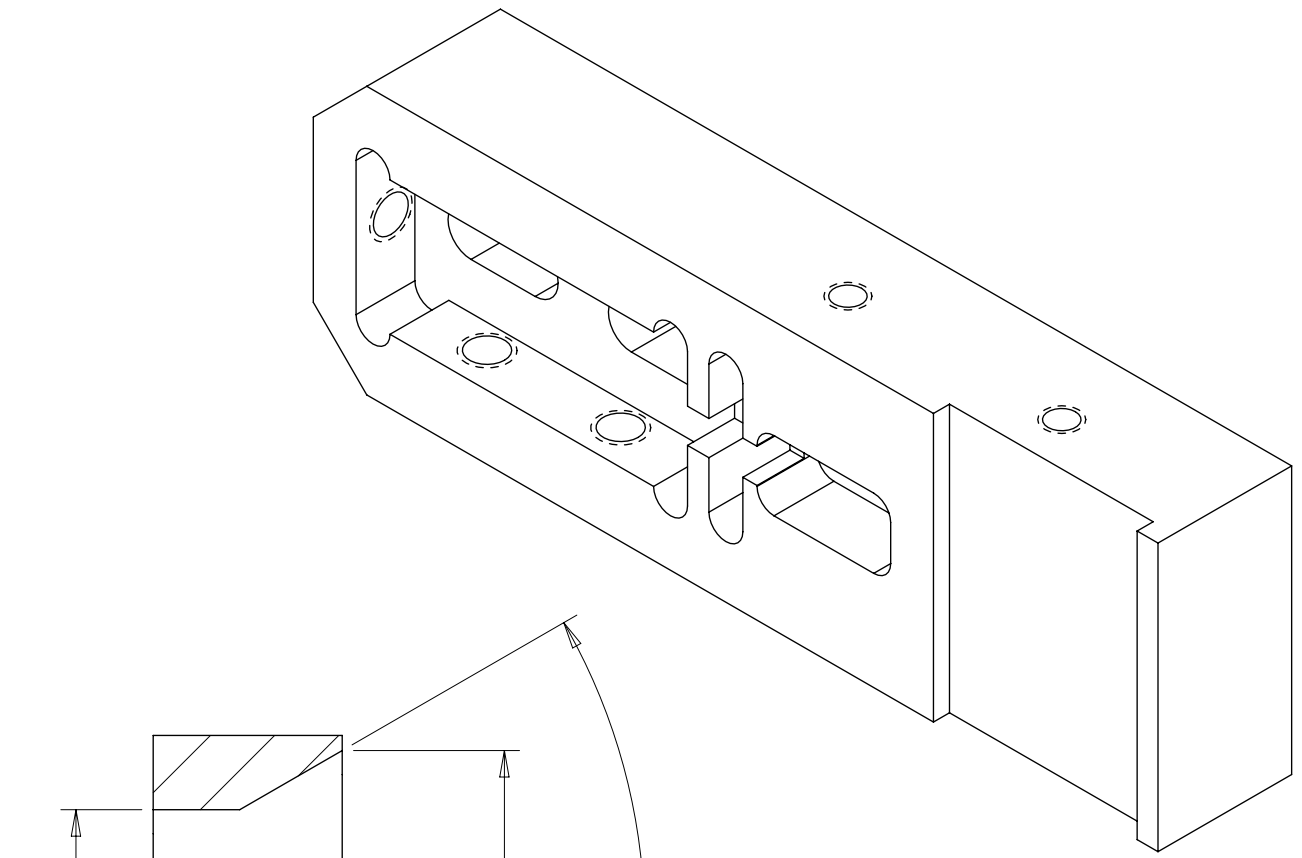
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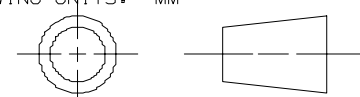
A

A



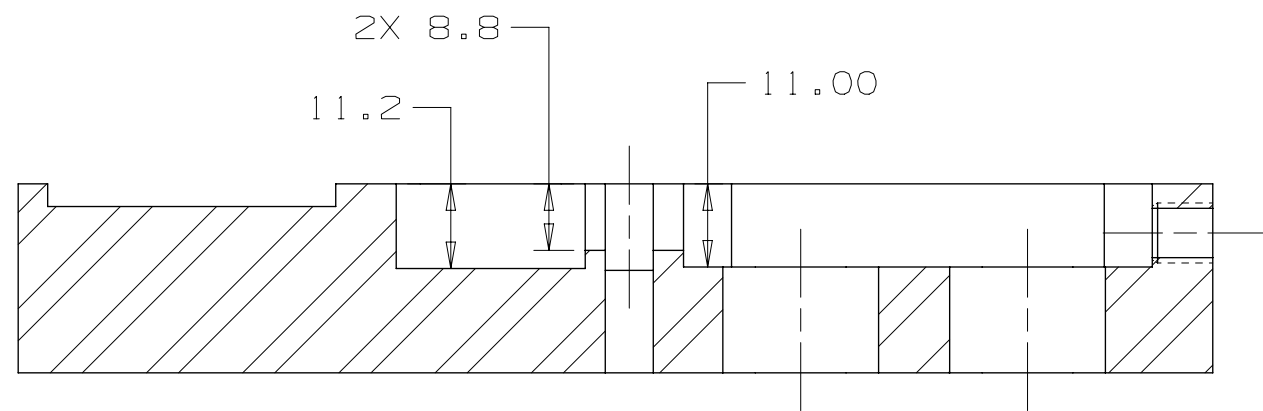
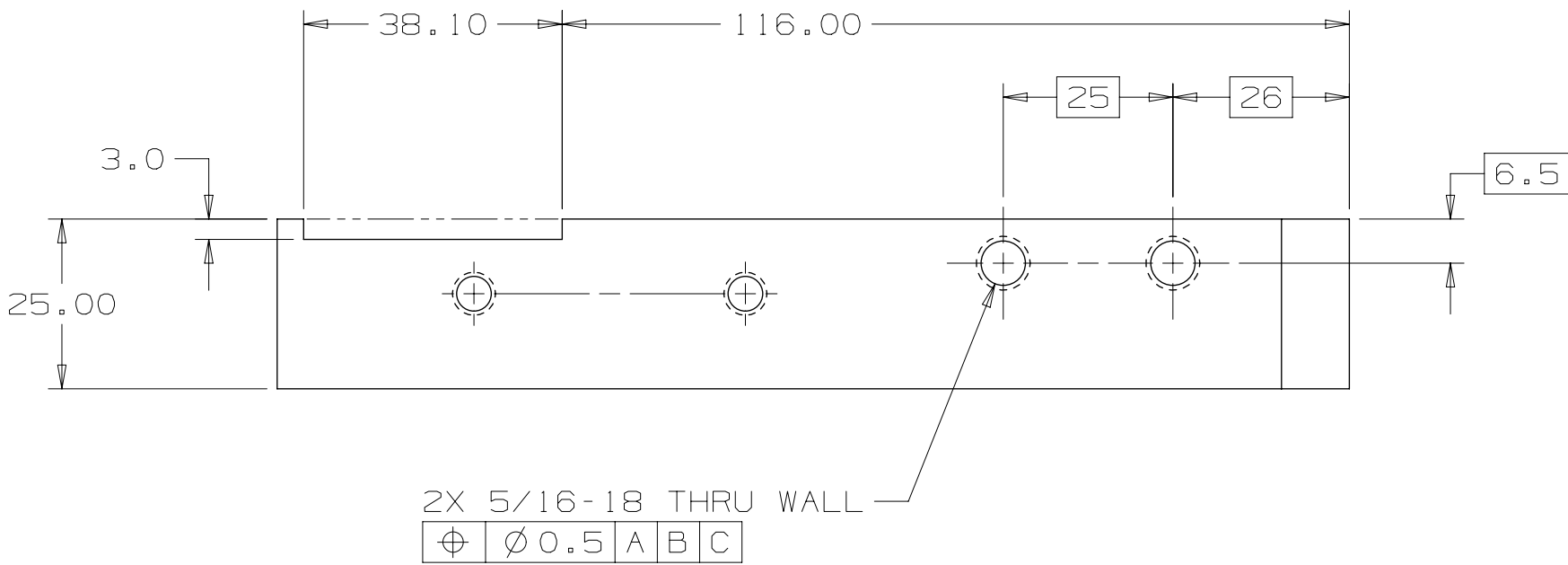
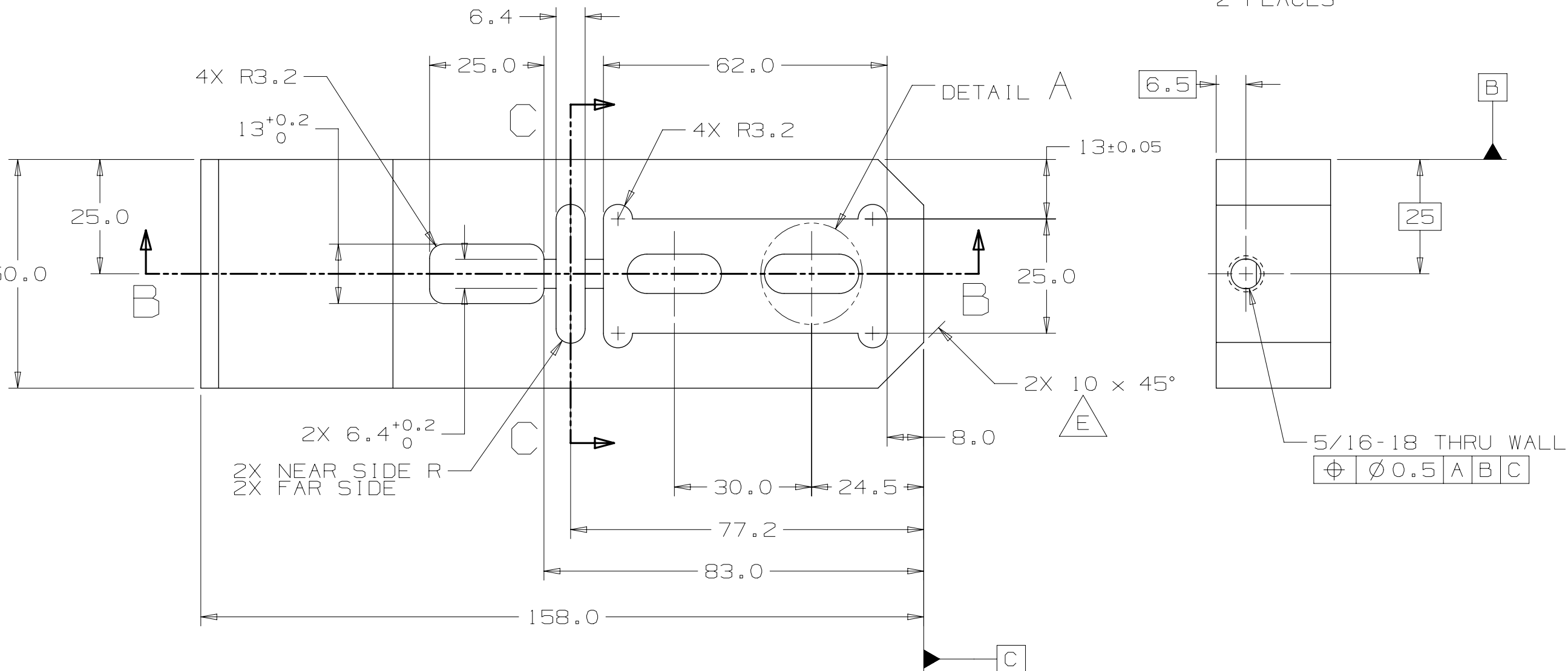
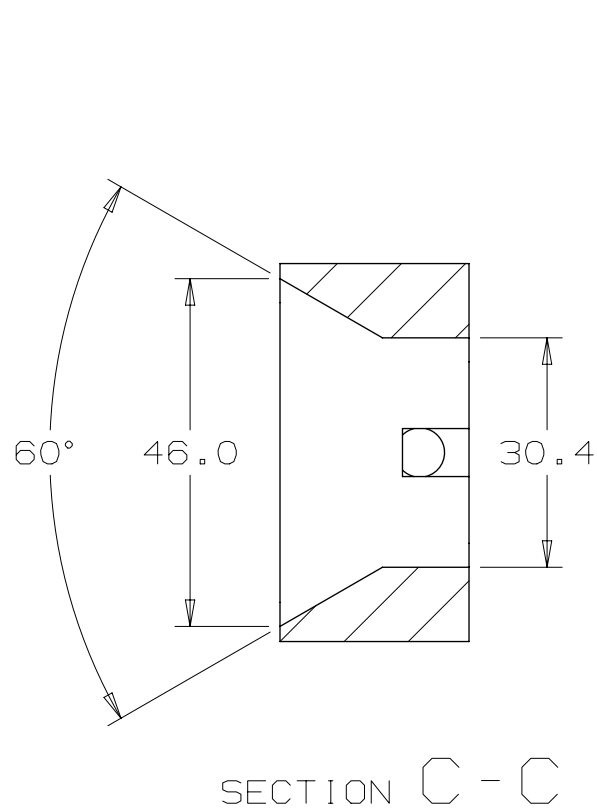
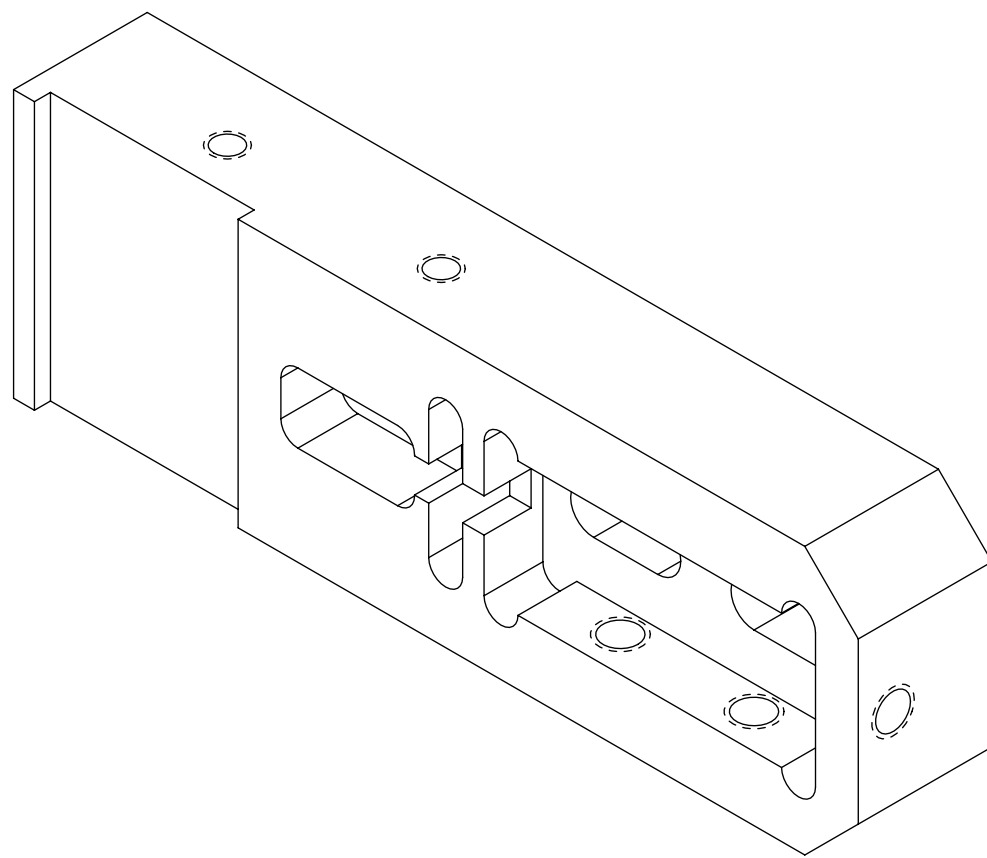
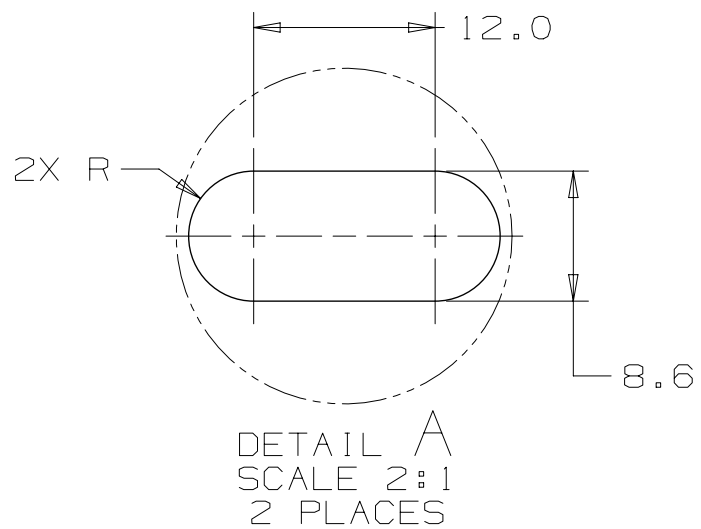
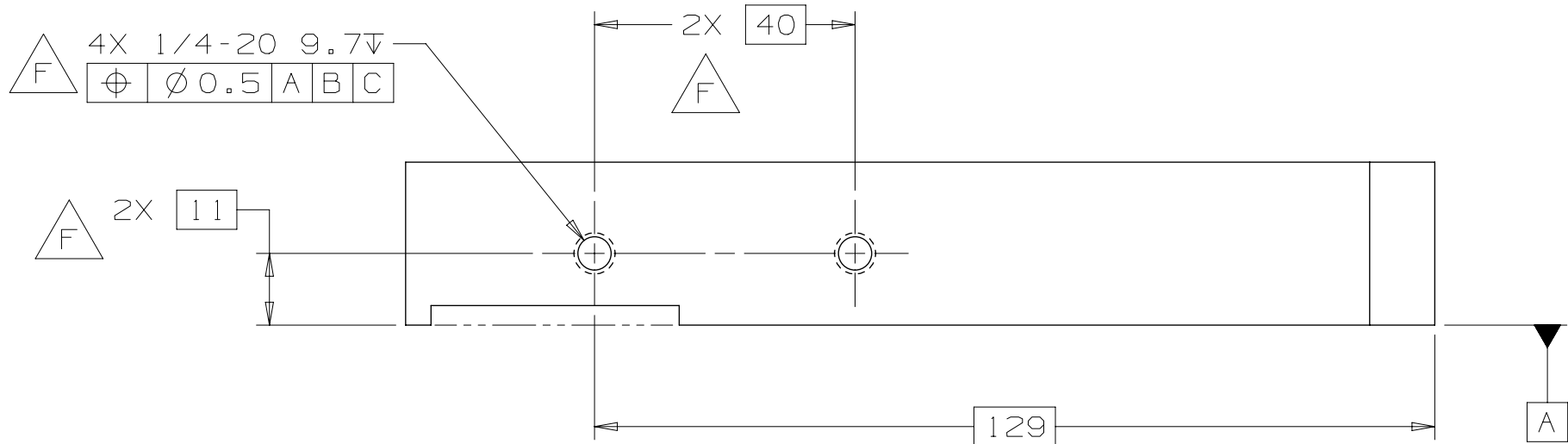
- NOTES: (UNLESS OTHERWISE SPECIFIED)
- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
 - DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.



UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL		DATE	08-May-2014		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M.KRAMP		DATE	29-May-2014						
2	0.3	0.12	N/A	1	APPROVED	E.BORISSOV		DATE	30-May-2014						
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5-2009 MAX MACHINE ALL SURFACES: 3.2✓ DRAWING UNITS: MM					USED ON					NAME					
 THIRD ANGLE PROJECTION					F10030937					PLATE, LCLS-II PP BELLOWS BRACE ARM 1					
					MATERIAL					316LN STAINLESS STEEL					
GROUP: Technical Division - Design and Drafting					CAGE CODE: QUSR6					SCALE	SIZE	DRAWING NUMBER		SHEET	REV
										1:1	A2	F10008697		1 of 1	F

DESCRIPTION: PLATE, LCLS-II PP BELLOWS BRACE ARM 2
PROJECT: PIP-II_650MHz
CATEGORY: PLATE

REV	REVISION CONTROL DOCUMENT	DATE	DRAWN	SIGNATURES
F	F10008698-F-RCD	15-Aug-2019	M.KRAMP	
		27-Aug-2019	APPROVED	C.GRIMM



- NOTES: (UNLESS OTHERWISE SPECIFIED)
- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
 - DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	08-May-2014
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M.KRAMP	DATE	29-May-2014
2	0.3	0.12	N/A	1	APPROVED	E.BORISSOV	DATE	30-May-2014
BREAK ALL SHARP EDGES, MAX: 0.5					USED ON			
DO NOT SCALE DRAWING					F10030938			
DIMENSIONS BASED ON: ASME Y14.5M-1994					MATERIAL			
MAX MACHINE ALL SURFACES: 3.2					316LN STAINLESS STEEL			
DRAWING UNITS: MM					GROUP: Technical Division - Design and Drafting			
THIRD ANGLE PROJECTION					CAGE CODE: QUSR6			



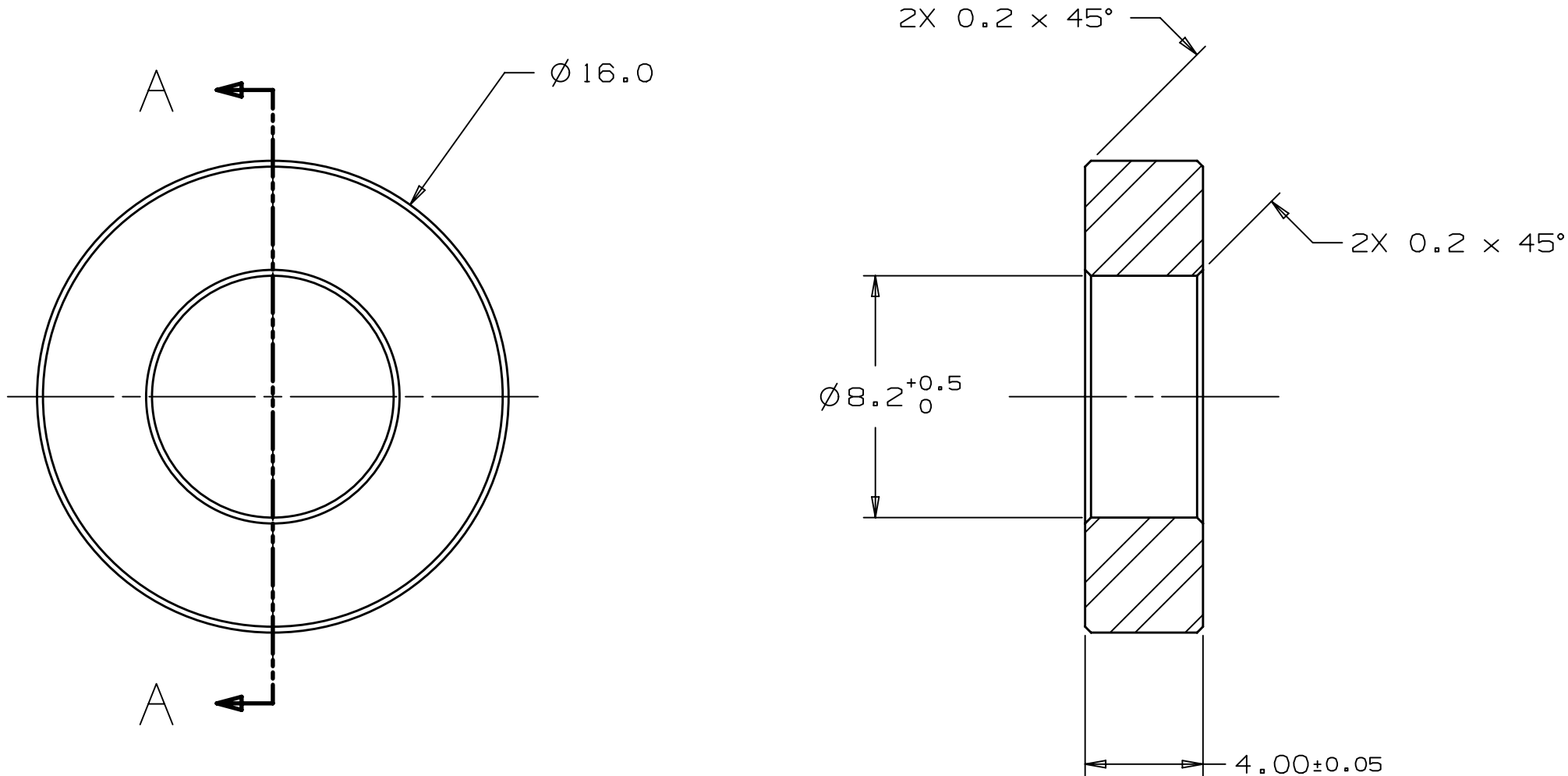
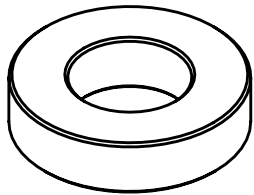
FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

NAME
PLATE, LCLS-II PP BELLOWS BRACE
ARM 2

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
A2		F10008698	1 of 1	F

DESCRIPTION: SPACER, CLAMP RING
CATEGORY: SPACER PROJECT: LCLSII Cryomodule

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
C	F10008700-C-RCD	10-Feb-2016	DRAWN	B.DAMPHOUSSE
		20-Apr-2016	APPROVED	C.GRIMM



NOTES (UNLESS OTHERWISE SPECIFIED):

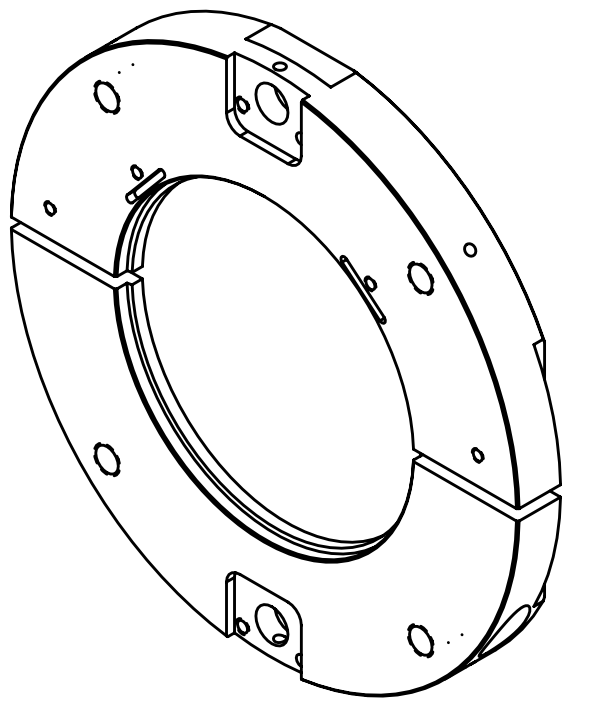
- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1°

BREAK ALL SHARP EDGES 0.5 MAX.
DO NOT SCALE DRAWING
DIMENSIONS BASED ON ASME Y14.5M-1994
MAX. ALL MACH SURFACES 3.2
DRAWING UNITS: MM

DRAWN	M.SAWTELL	DATE	08-May-2014
CHECKED	M.KRAMP	DATE	29-May-2014
APPROVED	E.BORISSOV	DATE	30-May-2014
USED ON			
F10017508			
MATERIAL		316LN STAINLESS STEEL	
			
GROUP: Technical Division - Design and Drafting		CAGE CODE: 0U5R6	

		FERMI NATIONAL ACCELERATOR LABORATORY			
		UNITED STATES DEPARTMENT OF ENERGY			
NAME					
SPACER, CLAMP RING					
SCALE	SIZE	DRAWING NUMBER	SHEET		
5:1	A3	F10008700	1 OF 1		
			REV		
			C		



1. PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
2. PART CAN BE MADE FROM A SINGLE PIECE OF RAW STOCK, THEN SPLIT INTO TWO PIECES WHERE INDICATED.
4. DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

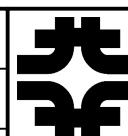
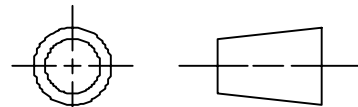
UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	06-May-2014		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY									
+X 2					+X.X 0.3	+X.XX 0.12	+X/X N/A	+X" 1*							CHECKED	M.KRAMP	DATE	29-May-2014	
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					APPROVED	E.BORISSOV	DATE	30-May-2014							NAME	RING, SPLIT, CAVITY 1.3 GHZ			
					USED ON					F10031029									
					MATERIAL					316LN STAINLESS STEEL									
					GROUP: Technical Division - Design and Drafting					CAGE CODE: QUSR6					SCALE	SIZE	DRAWING NUMBER	SHEET	REV
															A1	F10008763	1 OF 2	M	

3		2		1	
REV	REVISION	CONTROL	DOCUMENT	DATES	SIGNATURES
M	F10008763-M-RCD			03-Oct-2018	DRAWN M. KRAMP
				11-Oct-2018	APPROVED J. YUN



1. PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
2. PART CAN BE MADE FROM A SINGLE PIECE OF RAW STOCK, THEN SPLIT INTO TWO PIECES WHERE INDICATED.
3. CERTAIN FEATURES CANNOT BE MACHINED UNTIL PART IS CUT INTO TWO PIECES.
5. DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

GROUP: Technical Division - Design and Drafting	CAGE CODE: OU5R6
---	------------------



FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

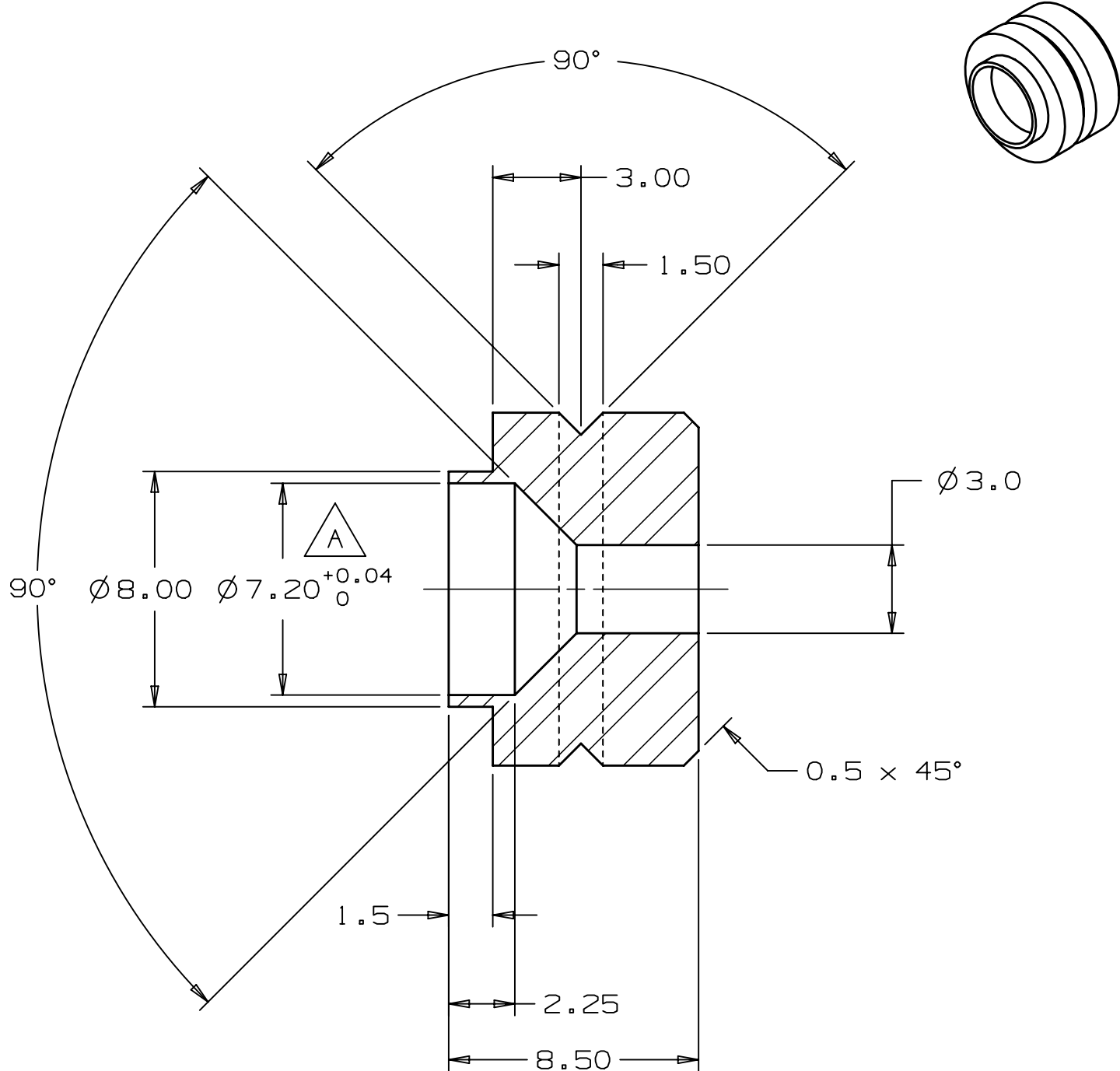
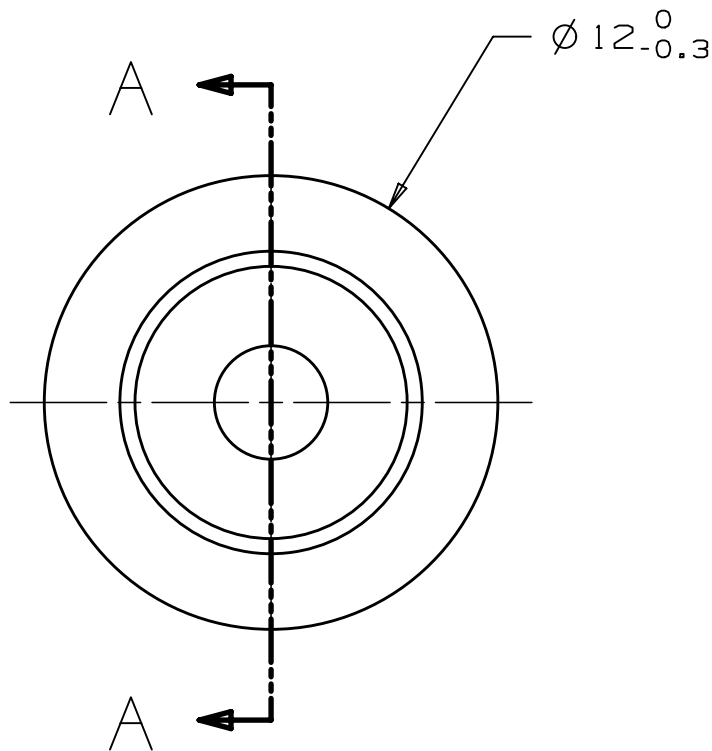
NAME _____

RING, SPLIT, CAVITY 1.3 GHZ

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
	A1	F10008763	2 OF 2	M

DESCRIPTION: HOLDER, BALL
CATEGORY: HOLDER PROJECT: LCLSII Cryogenic System

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
E	F10008764-E-RCD	12-May-2016	DRAWN	B.DAMPHOUSSE
		20-May-2016	APPROVED	E.BORISSOV



SECTION A - A

NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- TRAILING ZEROS DENOTE TOLERANCE.

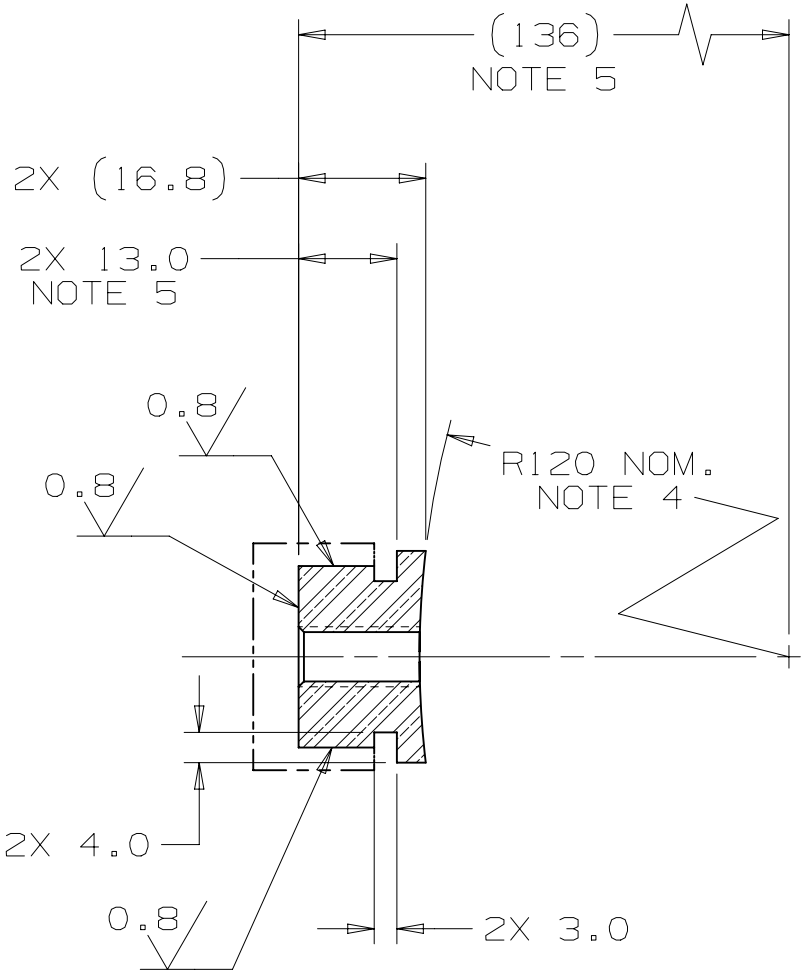
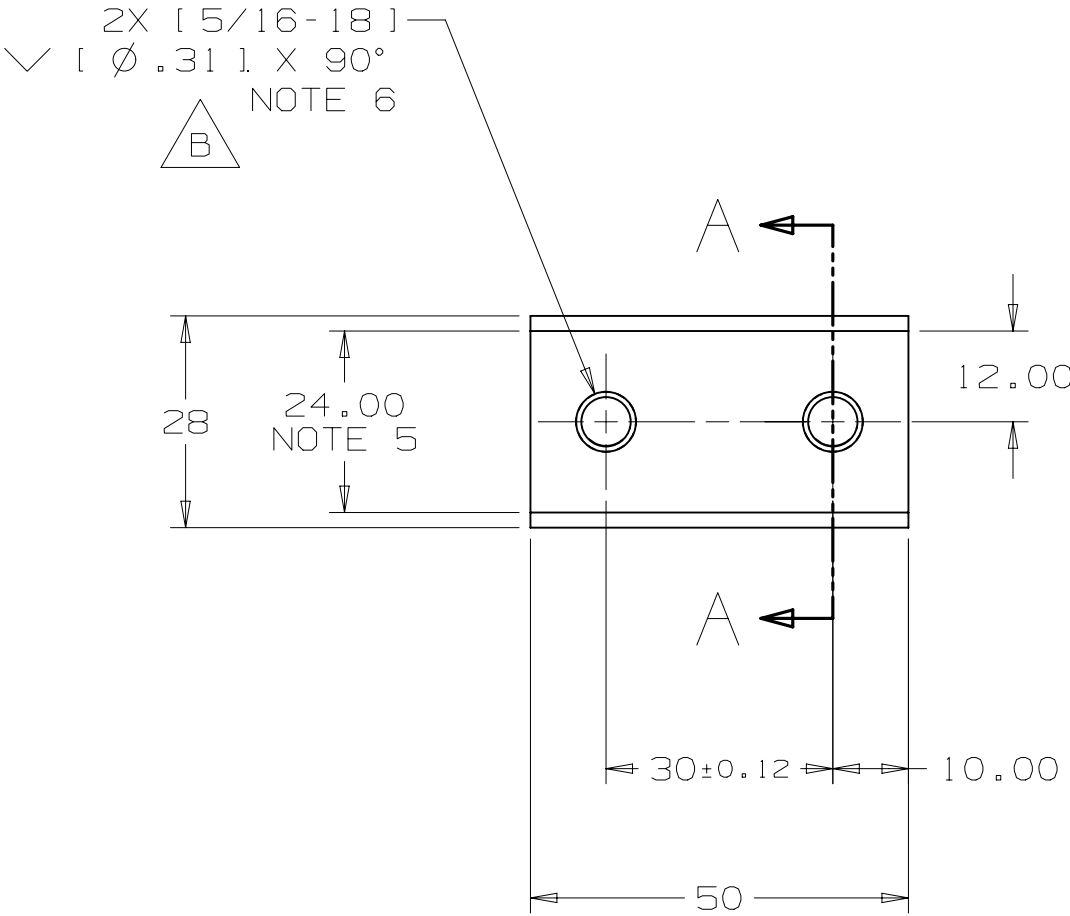
UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1°
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM				

DRAWN	M.SAWTELL	DATE	08-May-2014
CHECKED	M.KRAMP	DATE	29-May-2014
APPROVED	E.BORISSOV	DATE	30-May-2014
USED ON	F10017493, F10017508, F10008759		
MATERIAL	316LN STAINLESS STEEL		
GROUP: Technical Division - Design and Drafting		CAGE CODE: 0U5R6	

FERMIONATIONALACCELERATORLABORATORY UNITED STATES DEPARTMENT OF ENERGY				
NAME HOLDER, BALL				
SCALE 5:1	SIZE A3	DRAWING NUMBER F10008764	SHEET 1 OF 1	REV E

DESCRIPTION: PLATE, LEVER TUNER ADAPTER
PROJECT: PIP-11_650Mhz
CATEGORY: PLATE

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F10008807-B-RCD	14-Aug-2019	DRAWN	M.KRAMP
		27-Aug-2019	APPROVED	C.GRIMM



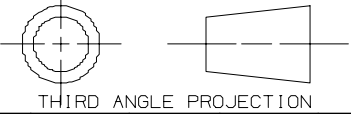
SECTION A - A

NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- TRAILING ZEROS DENOTE TOLERANCE.
- DIMENSIONS IN [.XX] ARE IN INCHES.
- DIMENSION TO MATCH FINAL TUBE OUTSIDE DIAMETER ON DRAWING F10008818.
- ALL DIMENSIONS REPRESENT FINAL MACHINE SIZES, EXTRA MATERIAL STOCK WILL BE REQUIRED, SEE DRAWING F10015802 FOR FINAL MACHINED SPECIFICATION FOR THIS PART.
- DRILL AND TAP HOLES THROUGH BEFORE WELDING IN VESSEL (F10015802).

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
1	0.3	0.12	N/A	1

BREAK ALL SHARP EDGES, MAX: 0.5
DO NOT SCALE DRAWING
DIMENSIONS BASED ON: ASME Y14.5M-1994
MAX MACHINE ALL SURFACES: 3.2
DRAWING UNITS: MM



THIRD ANGLE PROJECTION

DRAWN	M.SAWTELL	DATE	26-Feb-2014
CHECKED	M.KRAMP	DATE	30-May-2014
APPROVED	C.GRIMM	DATE	30-May-2014
USED ON	F10015802		
MATERIAL	TITANIUM GRADE 2		
GROUP:	Technical Division - Design and Drafting		
CAGE CODE:	OU5R6		

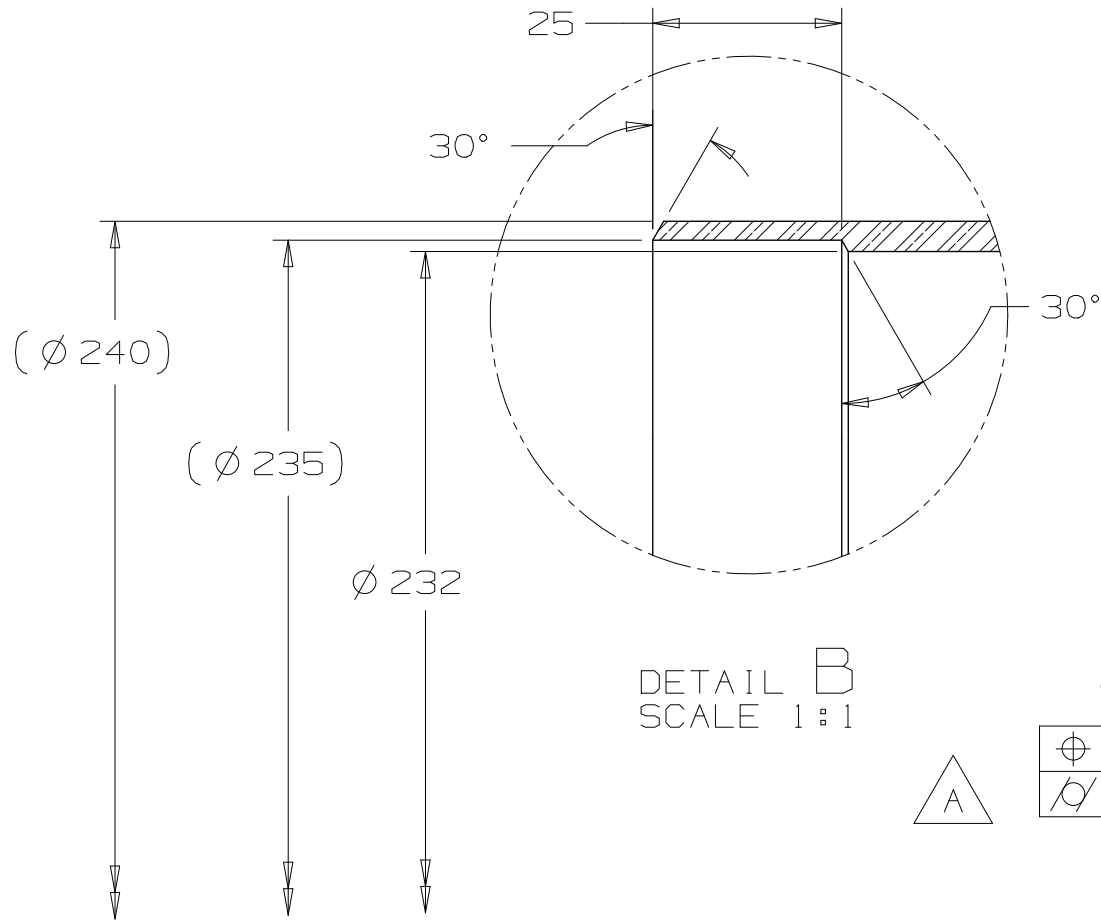


FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

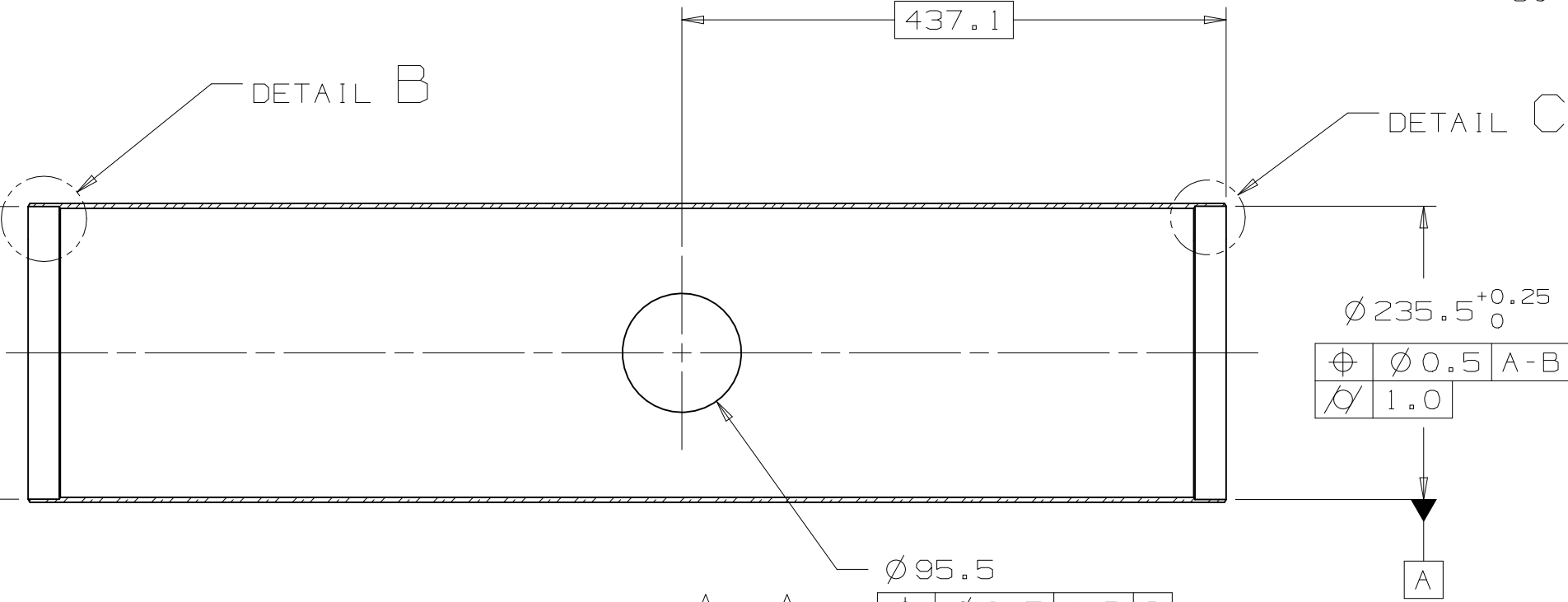
NAME PLATE, LEVER TUNER ADAPTER				
SCALE 1:1	SIZE A3	DRAWING NUMBER F10008807	SHEET 1 of 1	REV B

DESCRIPTION: TUBE, HELIUM VESSEL
CATEGORY: TUBE PROJECT: LCLSII Cryomodule

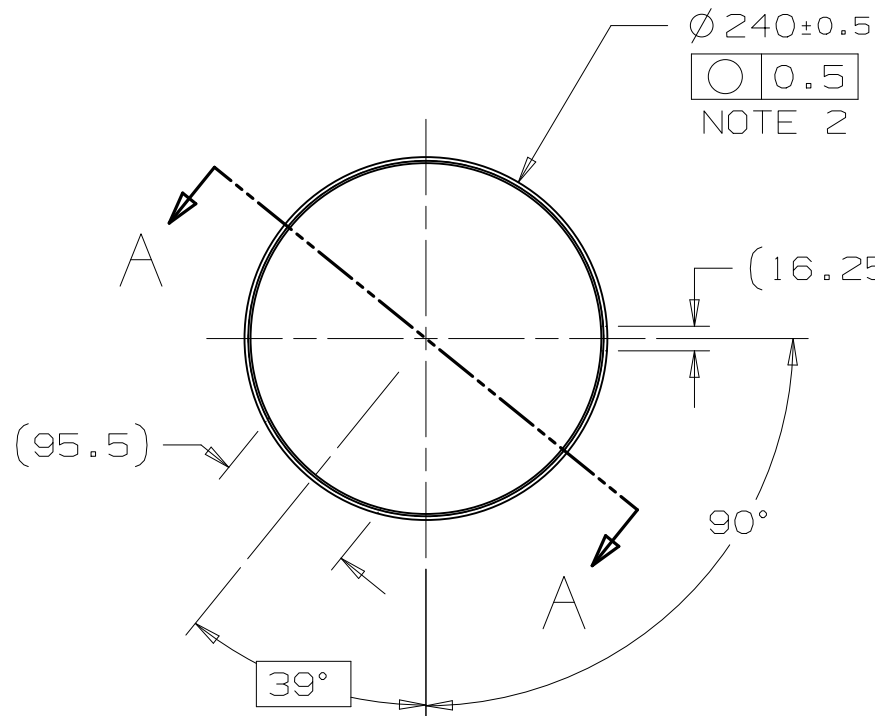
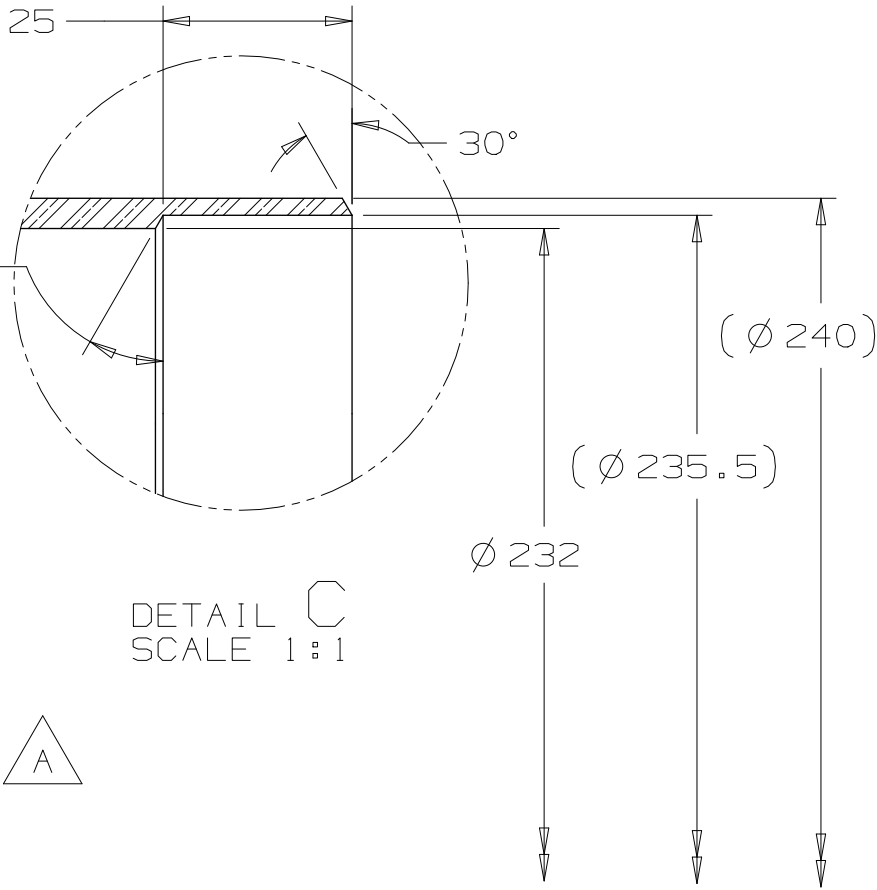
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10008818-A-RCD	03-Nov-2014 05-Nov-2014	DRAWN APPROVED	B.DAMPHOUSSE C.GRIMM



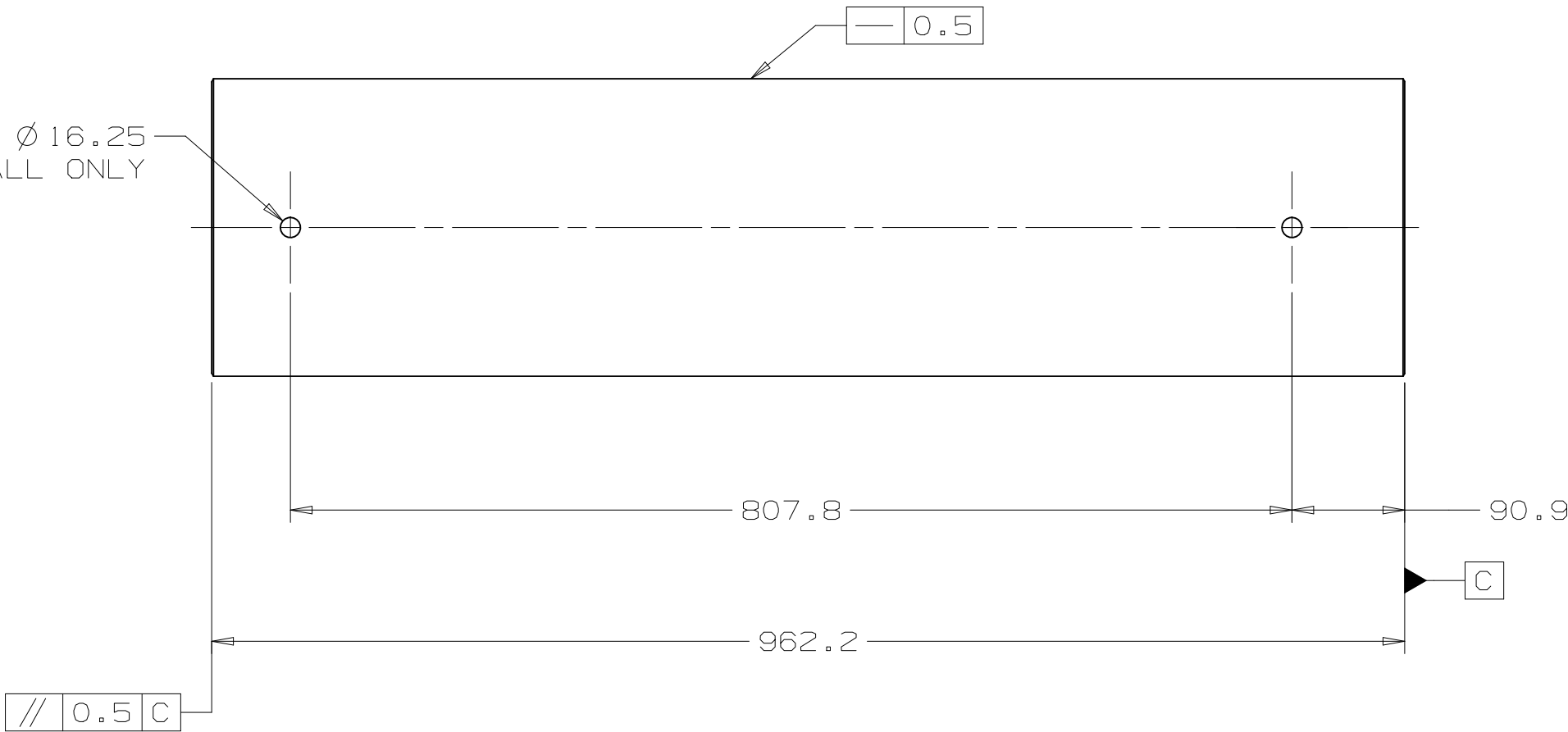
$\varnothing 235.0_{-0.25}^0$
$\varnothing 0.5$ A-B
1.0



$\varnothing 235.5^{+0.25}_0$
$\varnothing 0.5$ A-B
1.0



2X $\varnothing 16.25$
THRU ONE WALL ONLY



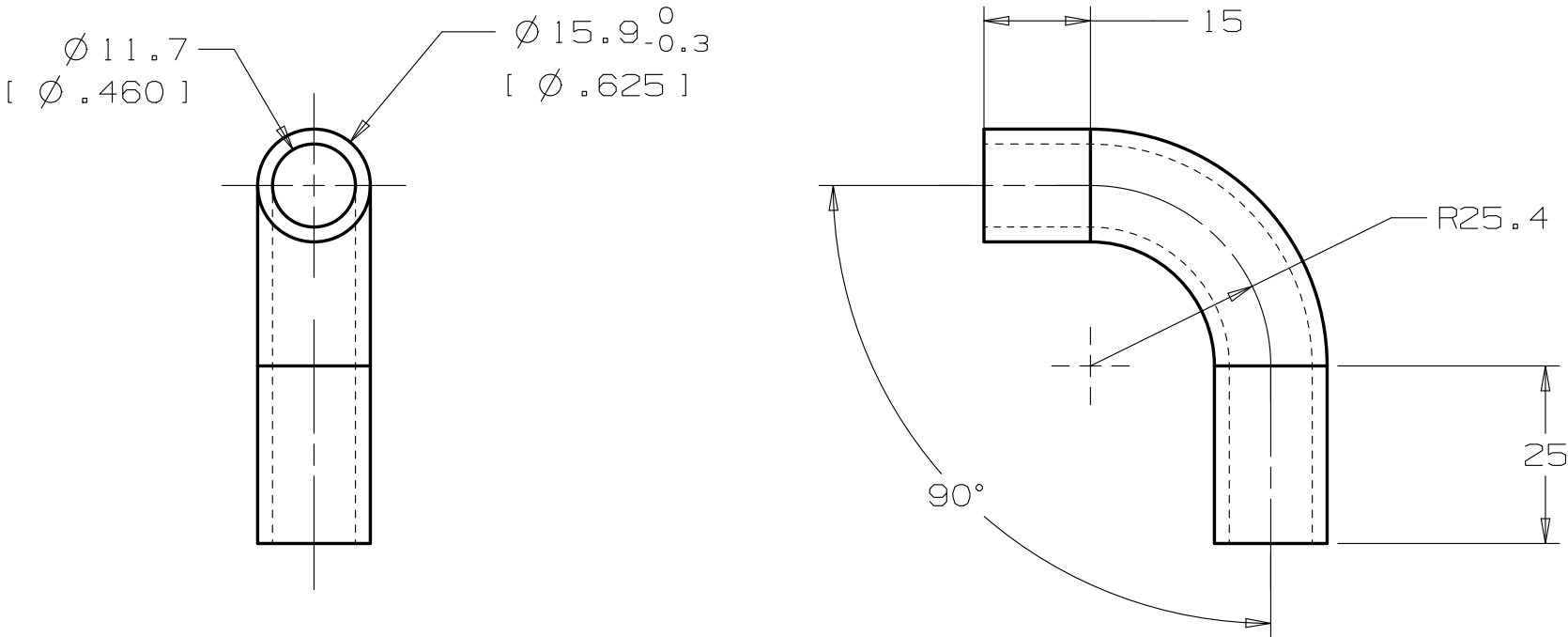
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- TO ACHIEVE DESIRED O.D. TOLERANCE AND CIRCULARITY, O.D. MAY BE SLIGHTLY INCREASED TO ALLOW FOR EXTRA MATERIAL FOR MACHINING OF THE TUBE.
- TUBE FABRICATION PREFERRED METHOD IS SPIN FORMING AND CIRCUMFERENTIAL TIG WELDING FULL PENETRATION SECTIONS. THE 3 HOLE PENETRATIONS SHOULD NOT GO THROUGH ANY CIRCUMFERENCE WELDS.
3A. ALTERNATIVE METHOD IS ROLLING AND FULL PENETRATION SEAM WELDING.
- ALL TITANIUM WELDS SHOULD GUIDELINES SPECIFIED IN NOTES ON F10015802.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	26-Feb-2014	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
$\pm X$	$\pm X.X$	$\pm X.XX$	$\pm X/X$	$\pm X^\circ$	CHECKED	M.KRAMP	DATE	30-May-2014	NAME			
1	0.3	0.12	N/A	1°	APPROVED	C.GRIMM	DATE	30-May-2014	TUBE, HELIUM VESSEL			
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2/ DRAWING UNITS: MM					USED ON F10015802				SCALE 1:5 AS SHOWN			
					MATERIAL TITANIUM GRADE 2				SIZE A2			
GROUP: Technical Division - Design and Drafting					CAGE CODE: QUES6				DRAWING NUMBER F10008818			
									SHEET 1 OF 1			
									REV A			

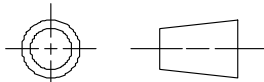
DESCRIPTION: ELBOW, HELIUM FILL LINE, 1.5"-OD, .083" -WALL
CATEGORY: ELBOW PROJECT: ProjectX650MHzCryomodules

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10008988---RCD		DRAWN	
			APPROVED	



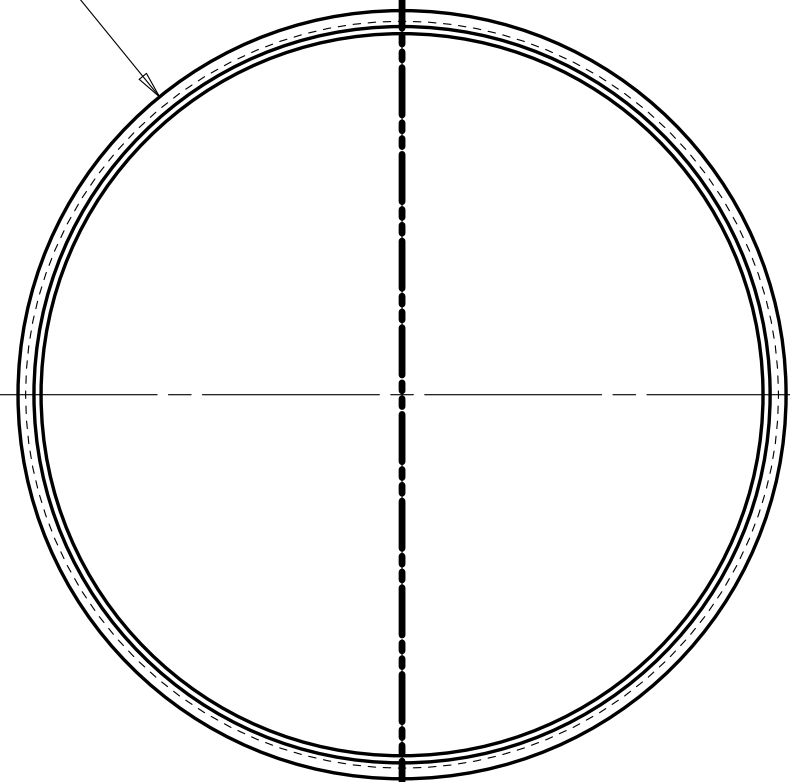
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- DIMENSIONS IN [.XX] ARE IN INCHES.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL		DATE	26-Feb-2014		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP		DATE	30-May-2014					
2	0.3	0.12	N/A	1°	APPROVED	C.GRIMM		DATE	30-May-2014		NAME			
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM 					USED ON						ELBOW, HELIUM FILL LINE			
					F10015802									
					MATERIAL						TITANIUM GRADE 2			
GROUP: Technical Division - Design and Drafting					CAGE CODE: 0U5R6					SCALE 1:1	SIZE A3	DRAWING NUMBER F10008988	SHEET 1 OF 1	REV -

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10009174---RCD		DRAWN	
			APPROVED	

Ø101.6
[4.00]



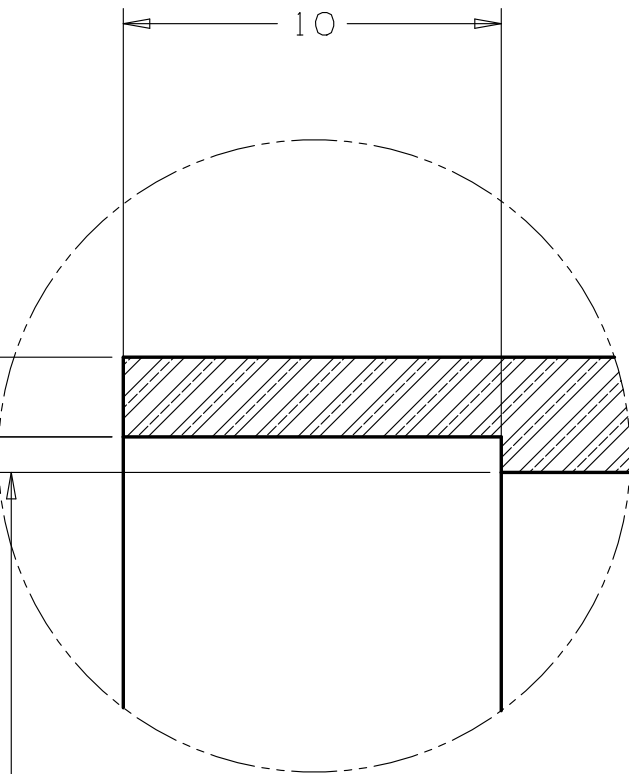
2.1
[.083]

Ø97.4
[3.834]
NOTE 3

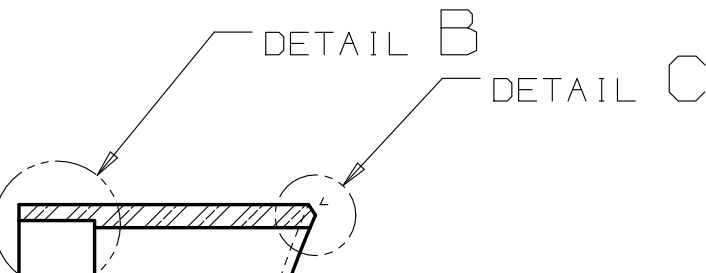
Ø95.5

DETAIL B
SCALE 5:1

10



NOTE 5



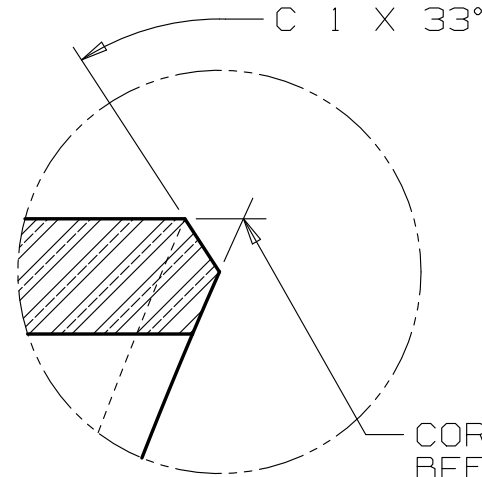
(R122)
NOTE 4

38.3

(39.9)

150.8

SECTION A - A



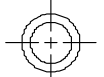
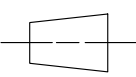
DETAIL C
SCALE 5:1

CORNER
BEFORE APPLYING
CHAMFER

C 1 X 33°

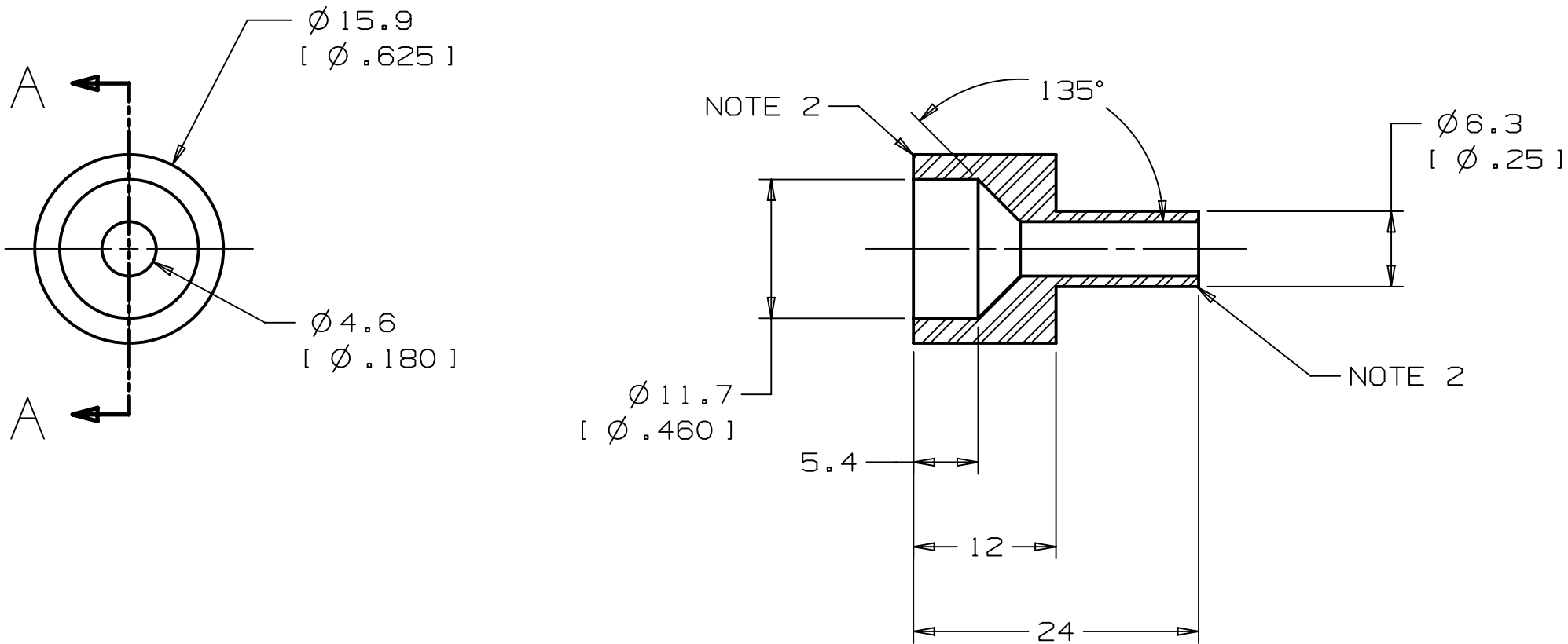
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- ALL DIMENSIONS IN BRACKETS, [X.XX], ARE IN INCHES.
- DIMENSION TO MATCH FINAL TUBE INNER DIAMETER ON DRAWING F10017486.
- DIMENSION TO MATCH FINAL TUBE OUTSIDE DIAMETER, PLUS AN ADDITIONAL 2mm, ON DRAWING F10008818.
- DO NOT BREAK SHARP EDGES, REQUIRED FOR ORBITAL WELDING.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	27-Feb-2014	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	30-May-2014		
1	0.3	0.12	N/A	1°	APPROVED	C.GRIMM	DATE	30-May-2014	NAME	
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2/ DRAWING UNITS: MM					USED ON F10015802				PIPE, Ti CHIMNEY ADAPTER	
					MATERIAL TITANIUM GRADE 2				SCALE 1:1 AS SHOWN	SIZE A2
 					GROUP: Technical Division - Design and Drafting				DRAWING NUMBER F10009174	SHEET 1 OF 1
					CAGE CODE: QUES6				REV -	

DESCRIPTION: ADAPTER, HELIUM FILL LINE, 5/8" TUBE - 1/4" TUBE
CATEGORY: ADAPTER PROJECT: PIP-11_650Mhz

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10010159---RCD		DRAWN	
			APPROVED	



SECTION A - A

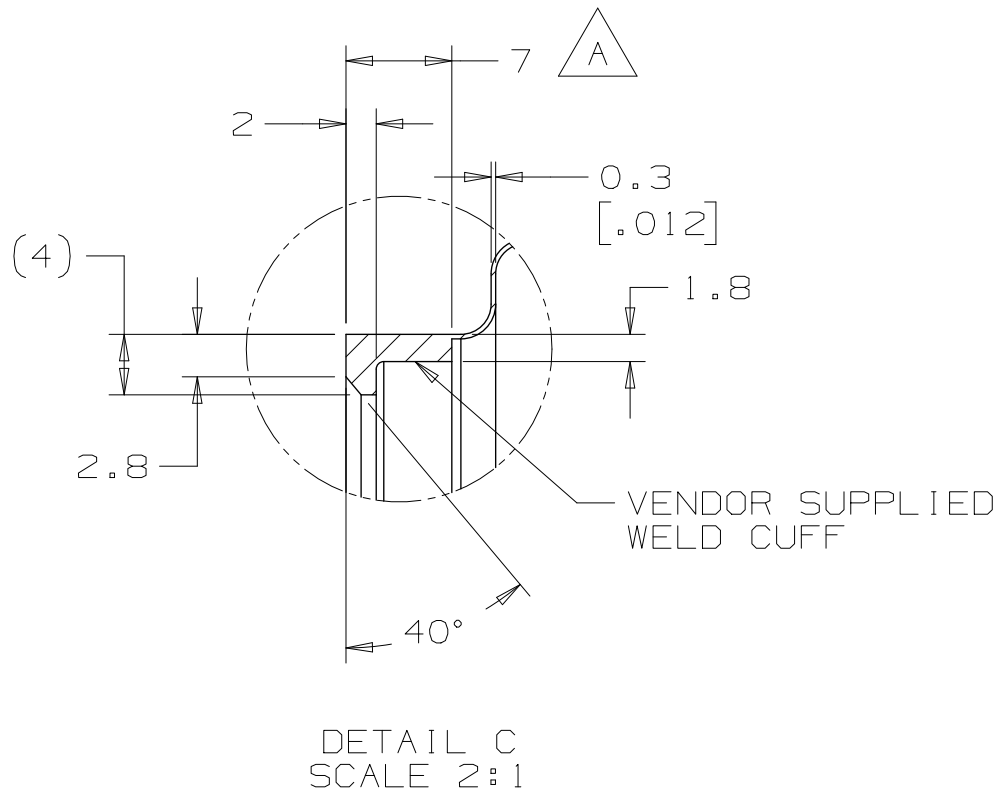
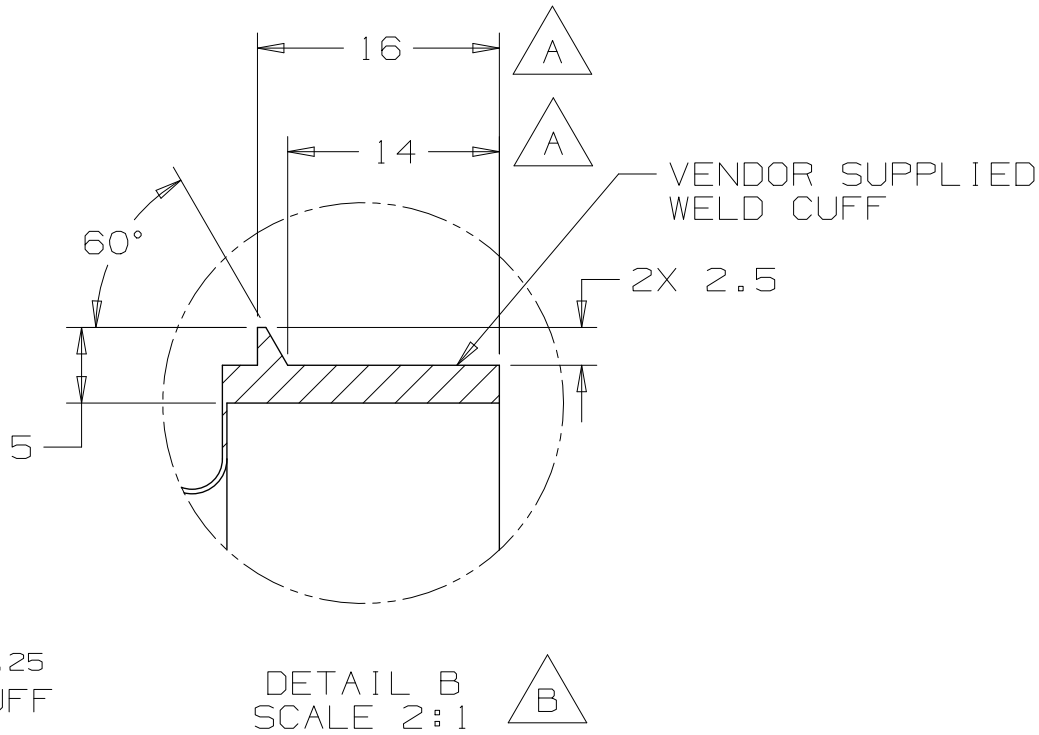
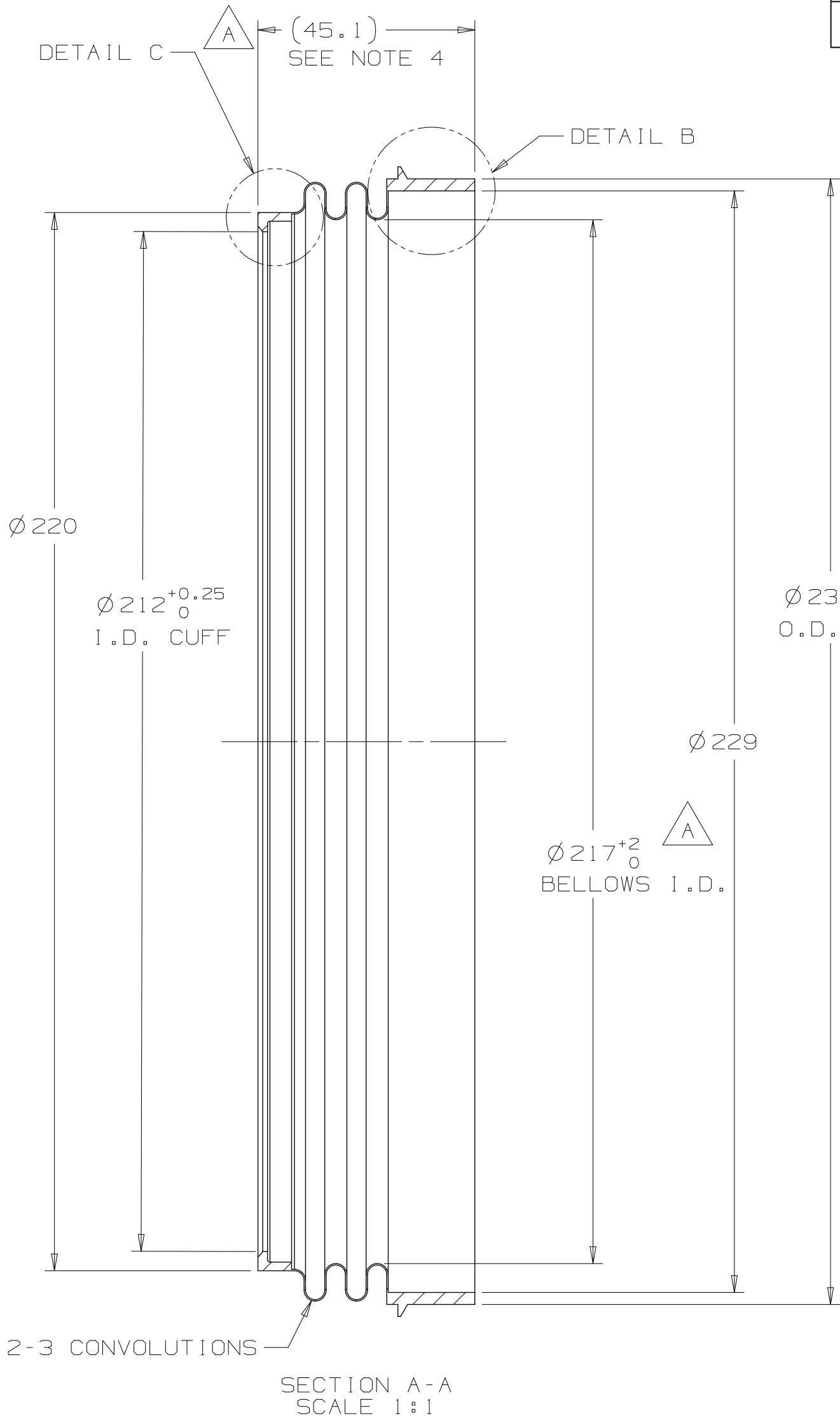
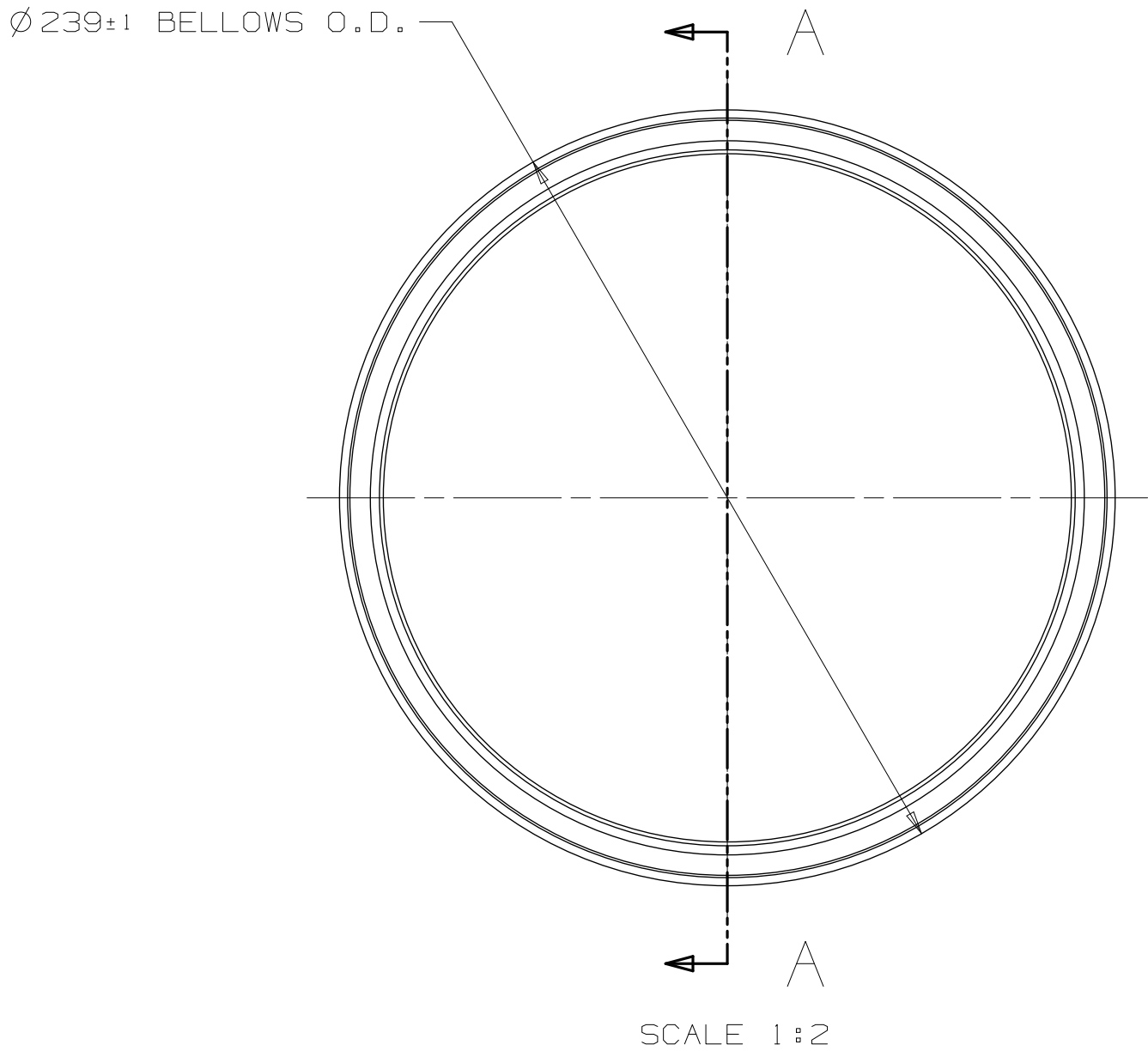
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- DO NOT BREAK SHARP EDGES, REQUIRED FOR BUTT WELDING.
- ALL DIMENSIONS IN [] ARE INCHES.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	26-Feb-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	30-May-2014
2	0.3	0.12	N/A	1°	APPROVED	C.GRIMM	DATE	30-May-2014
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON			
					F10015802			
					MATERIAL			
					316L STAINLESS STEEL, ANNEALED, UNS S31603			
					GROUP: Technical Division - Design and Drafting CAGE CODE: 0U5R6			

 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
NAME				
ADAPTER, HELIUM FILL LINE				
SCALE 2:1	SIZE A3	DRAWING NUMBER F10010159	SHEET 1 OF 1	REV -

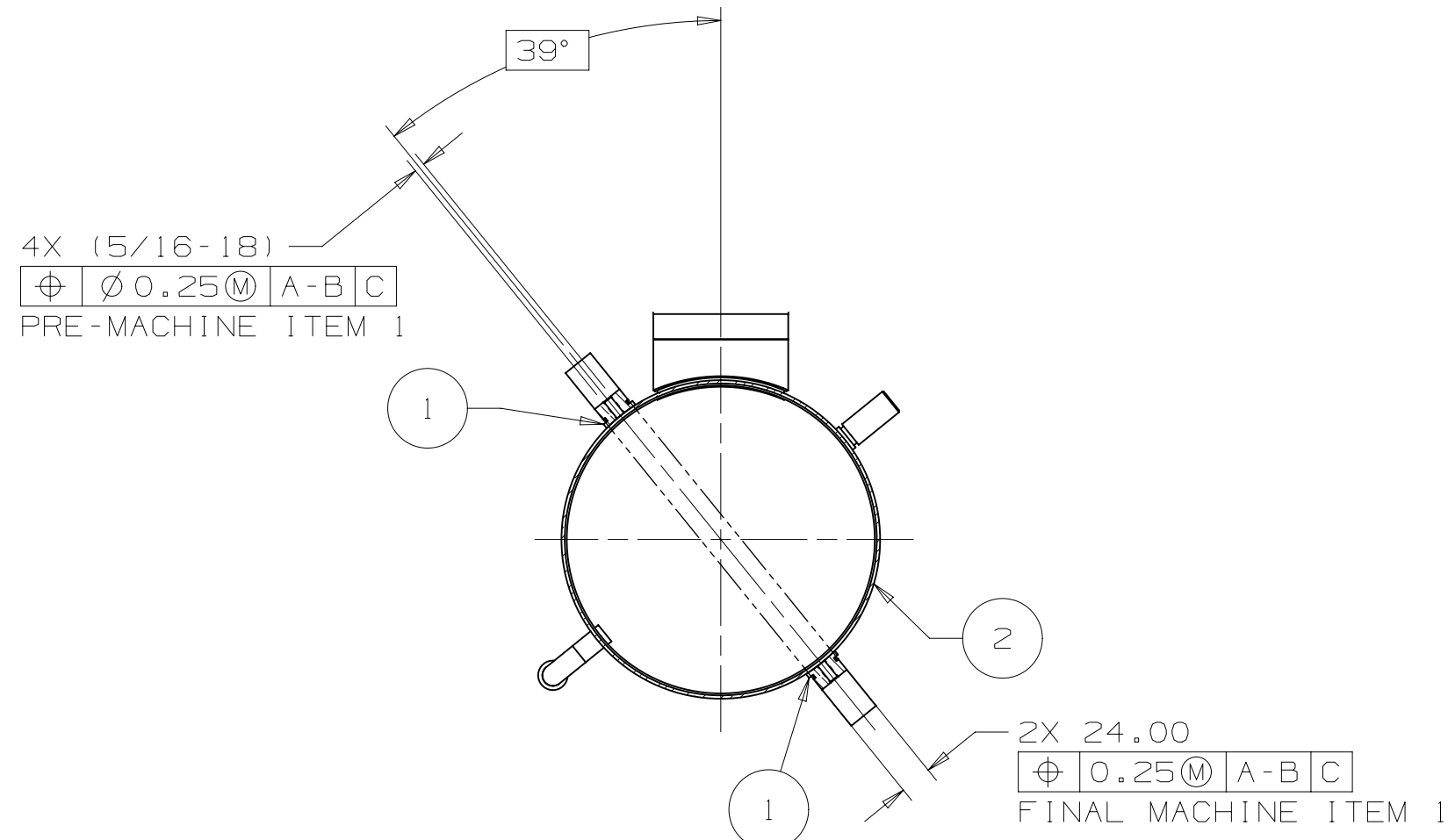
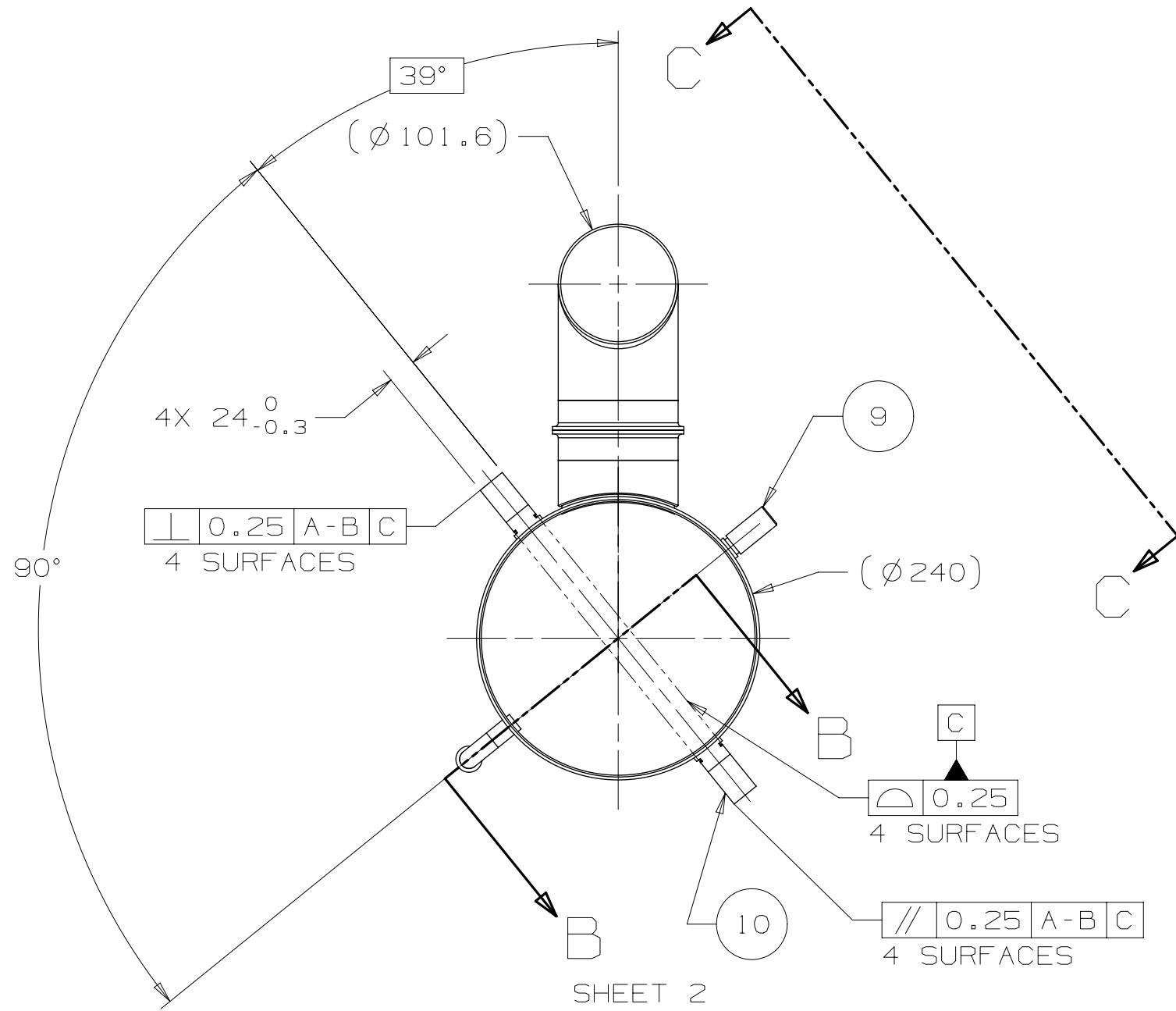
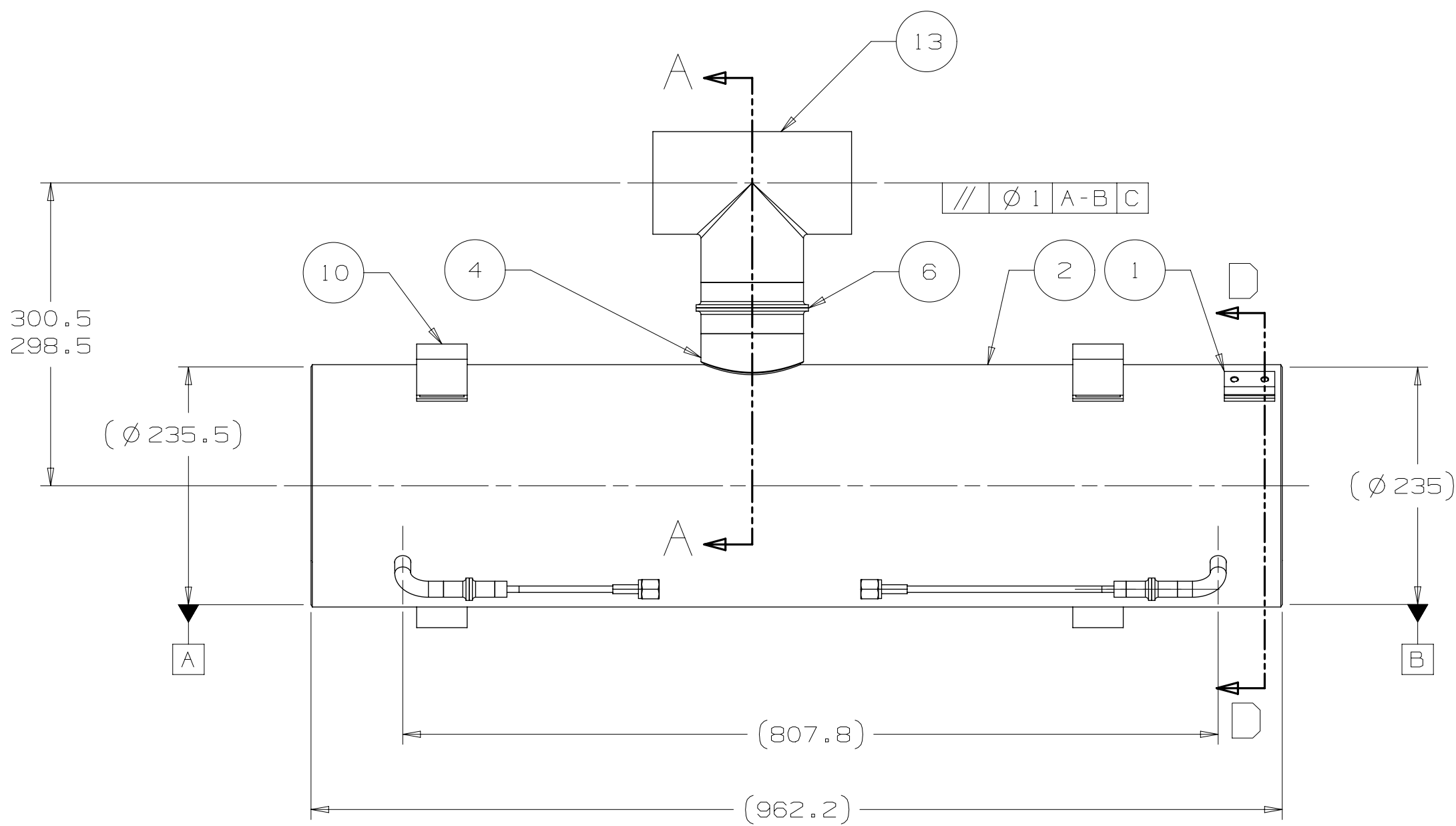
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F10010529-B-RCD	28-Aug-2015	DRAWN	G. LANGLOIS
		31-Aug-2015	APPROVED	C.GRIMM



NOTES (UNLESS OTHERWISE SPECIFIED):

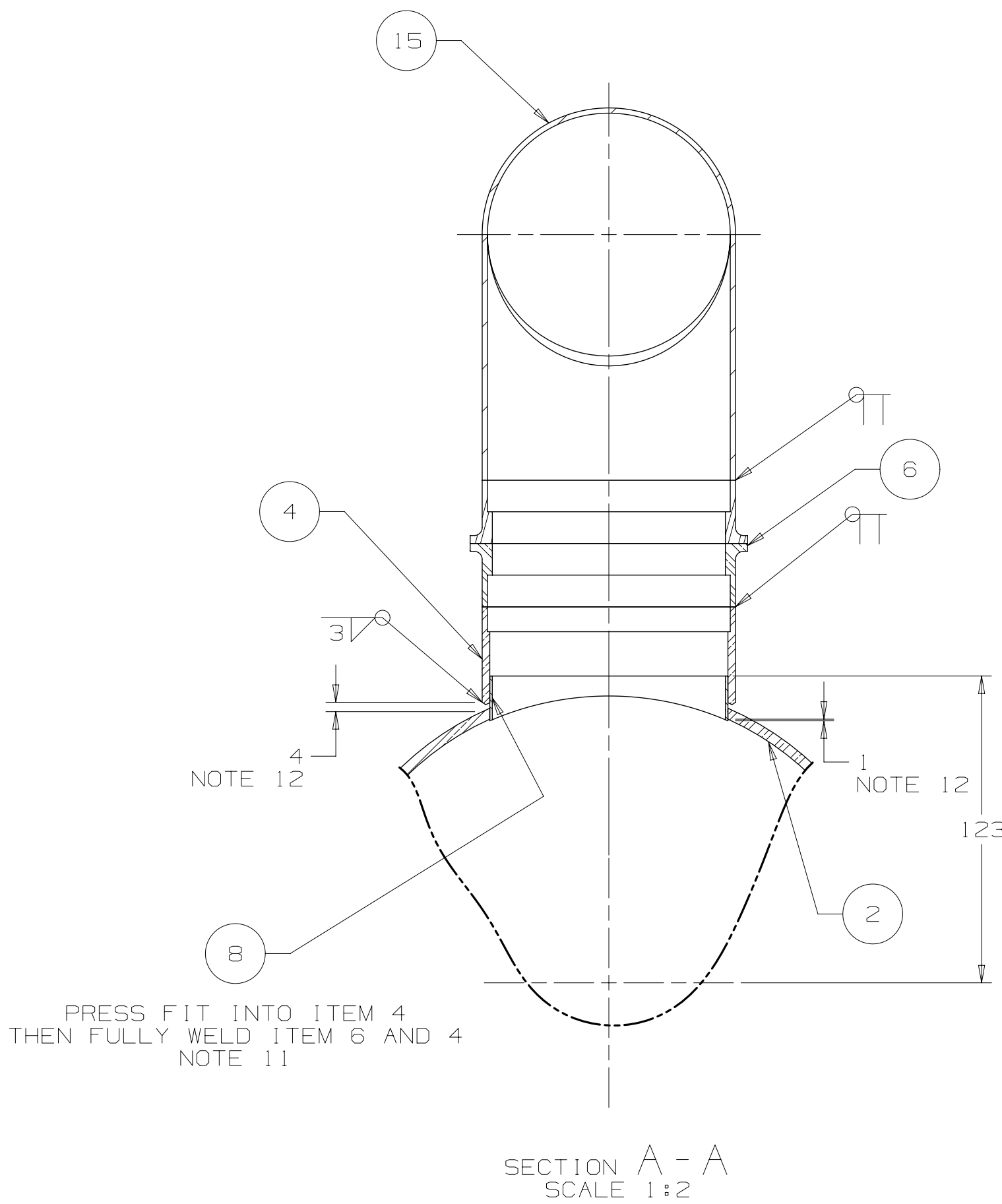
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- 2-3 CONVOLUTIONS ARE REQUIRED. DETAILS ARE TO BE SET BY THE SUPPLIER IN ACCORDANCE WITH ASME OR EMJA STANDARDS. INNER AND OUTER DIAMETERS ARE TO BE CONTROLLED WITH THE DIMENSIONS SHOWN
- BELLOWS SHALL BE HYDROFORMED WITH NO CRACKS, HOLES, PITS, DENTS, OR OTHER VISIBLE FLAWS THAT WOULD RENDER THE BELLOWS USELESS FOR CRYOGENIC VACUUM USE.
- WELD CUFFS SHALL BE DESIGNED BY THE SUPPLIER. THE FINAL LENGTH OF THE BELLOWS SHALL BE 45.1 mm AT A MINIMUM. THE FINAL BELLOWS DESIGN SHALL BE DETAILED IN A DRAWING AND PROVIDED TO FERMILAB FOR APPROVAL PRIOR TO PRODUCTION FABRICATION. THE FINAL DESIGN "FREE LENGTH" MUST BE HELD TO +/-0.5mm. DESIGN MOVEMENT RANGE: ±2mm.
- ALL CLEANING AND WELDING PROCEDURES WILL CONFORM TO THE AMERICAN WELDING SOCIETY SPECIFICATION: AWS G2.4/G2.4M: 2007, "GUIDE FOR THE FUSION ELDTING OF TITANIUM AND TITANIUM ALLOYS."
- THE VENDOR'S WRITTEN PROCEDURE DESCRIBING THE CLEANING AND WELDING PROCEDURES MUST BE SUPPLIED TO FERMILAB FOR WRITTEN APPROVAL BEFORE ANY PRODUCT WELDING.
- INSPECTION OF FINAL PRODUCT WILL BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO FINAL ACCEPTANCE. WELDS SHOWING AND OXIDATION LEVEL HIGHER THAN AN "AMBER" DISCOLORATION WILL BE GROUNDS FOR NON-ACCEPTANCE.
- ALL WELDS TO BE VACUUM TIGHT. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2 X 10⁻¹⁰ ATM. CC/SEC. STABILIZE BELLOWS PRIOR TO VACUUM LEAK TESTING TO AVOID DAMAGE.
- MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.
- WORKING PRESSURE:
2 BAR WARM (300K)
4 BAR COLD (12K)
- MAX. LIFE CYCLES: LESS THAN 100,000

UNLESS OTHERWISE SPECIFIED					DRAWN	S.HART		DATE	24-Feb-2014		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	N.TANOVIC		DATE	05-Mar-2014						
0.5	0.3	0.10	N/A	--°	APPROVED	C.GRIMM		DATE	05-Mar-2014		NAME				
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2/ DRAWING UNITS: MM					USED ON		F10023864				BELLOWS, LCLS-II HELIUM VESSEL				
					MATERIAL										
					TITANIUM GRADE 2										
GROUP: Technical Division - Design and Drafting					CAGE CODE: QUES6					SCALE 1:2 AS SHOWN	SIZE A2	DRAWING NUMBER F10010529		SHEET 1 OF 1	REV B



NOTES: (UNLESS OTHERWISE SPECIFIED)

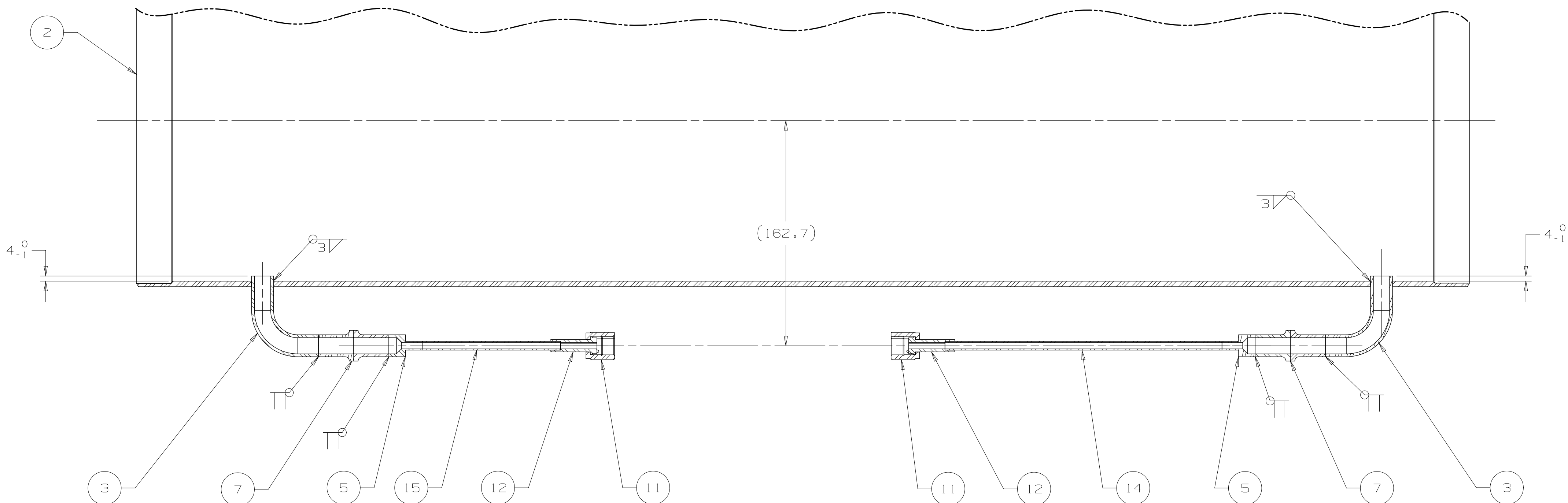
- PLEASE SEE TECHNICAL SPECIFICATION "LCLS-11-HE-1.2-TS-0085-R0" FOR ADDITIONAL MANUFACTURING INFORMATION.
- ASSEMBLY MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS. MUST BE PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
- ALL WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
- ALL WELDS MUST BE CONTAMINANT FREE, WELD JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE, OIL, MOISTURE AND OXIDATION.
- ALL CLEANING AND WELDING PROCEDURES WILL CONFORM TO THE AMERICAN WELDING SOCIETY SPECIFICATION: AWS G2.4M: 2007, "GUIDE FOR FUSION WELDING OF TITANIUM AND TITANIUM ALLOYS."
- WELD MUST BE PERFORMED WITH AN ARGON PURGED SYSTEM, A CONTINUOUS ARGON FLOW IS REQUIRED INSIDE THE TUBE TO GET THE OXYGEN COUNT OF 20 PPM OR LESS, WELD MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION. EXCEPTIONS CAN BE MADE BUT MUST BE DETAILED PER NOTE 7.
- WRITTEN PROCEDURE DESCRIBING THE CLEANING & WELDING PROCEDURE MUST BE SUPPLIED TO FERMILAB FOR APPROVAL PRIOR TO ANY PRODUCT WELDING.
- WELDER MUST BE QUALIFIED IN TITANIUM WELDING, VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
- LEAK CHECK. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY (MDL) OF 2×10^{-9} MBAR X LITER / SEC. THE VACUUM LEVEL DURING THE LEAK CHECK SHALL BE LESS THAN 1×10^{-6} TORR.
- ALL WELD PROCEDURES MUST FOLLOW GUIDELINES LISTED IN THE LATEST EDITION OF THE ASME BPVC SECTION 8, DIVISION 1.
- ALL TITANIUM WELDS MUST BE RADIOGRAPHED ACCORDING TO THE GUIDELINES IN THE LATEST EDITION OF THE ASME BPVC SECTION 8, DIVISION 1, PARAGRAPH UW-51.
- A "PULL-OUT" AND BUTT WELD OF THIS JOINT IS ACCEPTABLE, BUT MUST HAVE PRIOR APPROVAL FROM FERMILAB, TEST SAMPLES MUST BE MADE AND EVALUATED BY FERMILAB AS PART OF THE ACCEPTABLE CRITERIA.
- MATERIAL MAY BE REMOVED FROM ITEMS 1 AND 10 TO MATCH DIMENSION.
- ITEMS 6 AND 7 REQUIRE COLD SHOCK W/L_{h2} AND He LEAK TEST PER NOTE 9 PRIOR TO WELDING TO TANK.



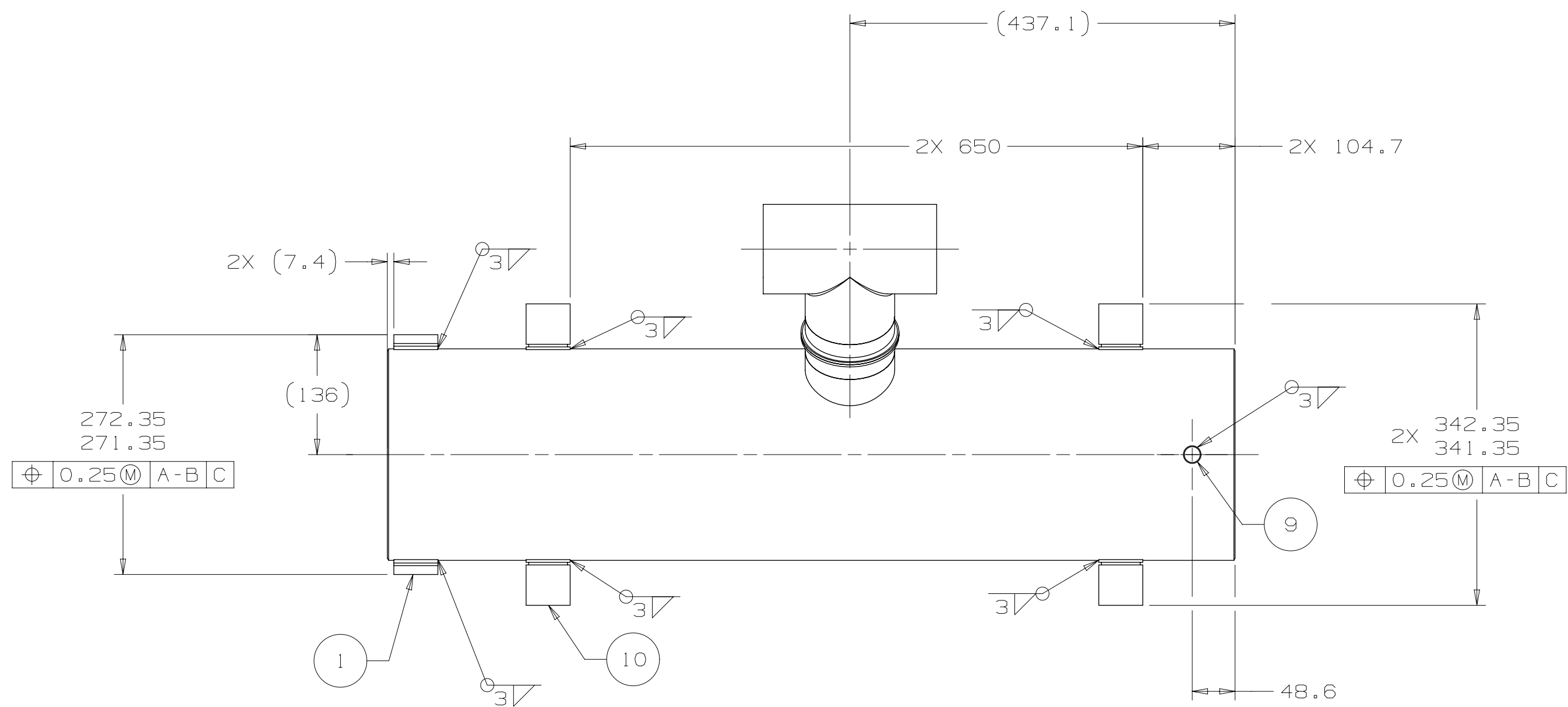
15	FC0045835	1/4" O.D. X .035 WALL THICKNESS X 100MM LONG 316L SS SEAMLESS TUBE	1
14	FC0045834	1/4" O.D. X .035 WALL THICKNESS X 200MM LONG 316L SS SEAMLESS TUBE	1
13	FC0045719	TEE, TUBE - 4.0" OD .083" WALL THICKNESS 316L WCB FLOW PRODUCTS B7W-1 4.0"	1
12	FC0021975	SOCKET WELD GLAND 1/4 INCH SWAGelok SS-4-VCR-3, NO EQUIV.	2
11	FC0021926	FEMALE NUT 1/4 INCH SWAGelok SS-4-VCR-1, NO EQUIV.	2
10	F10018181	PAD, ROLLING	4
9	F10018180	PIN, CLAMPING	1
8	F10017519	RING, WELD BACKING	1
7	F10017488	RING, TI-SS TRANSITION - FILL LINE	2
6	F10017486	RING, TI-SS TRANSITION 2-PHASE	1
5	F10010159	ADAPTER, HELIUM FILL LINE	2
4	F10009174	PIPE, TI CHIMNEY ADAPTER	1
3	F10008988	ELBOW, HELIUM FILL LINE	2
2	F10008818	TUBE, HELIUM VESSEL	1
1	F10008807	PLATE, LEVER TUNER ADAPTER	2
ITEM	PART NUMBER	DESCRIPTION	QTY.

UNLESS OTHERWISE SPECIFIED					DRAWN		DATE		F	
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M. KRAMP	DATE	30-May-2014		
1	0.3	0.12	N/A	1	APPROVED	C. GRIMM	DATE	30-May-2014		
BREAK ALL SHARP EDGES, MAX: 0.5					USED ON		F10023864		F	
DO NOT SCALE DRAWING					MATERIAL		316L STAINLESS STEEL, ANNEALED, UNS S31603		SCALE	
DIMENSIONS BASED ON: ASME Y14.5M-1994					SEE PARTS LIST - ALL GRADE 2 TITANIUM UNLESS NOTED		GROUP: Technical Division - Design and Drafting		CAGE CODE: 00586	
DRAWING UNITS: MM					THIRD ANGLE PROJECTION		DRAWING NUMBER		F10015802	
					SHEET		1 of 3		REV	
					F					

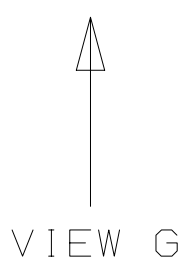
REV	REVISION	CONTROL DOCUMENT	DATES	SIGNATURES
F	F10015802-F-RCD		26-Dec-2019 10-Jan-2020	DRAWN: M.KRAMP APPROVED: C.GRIMM



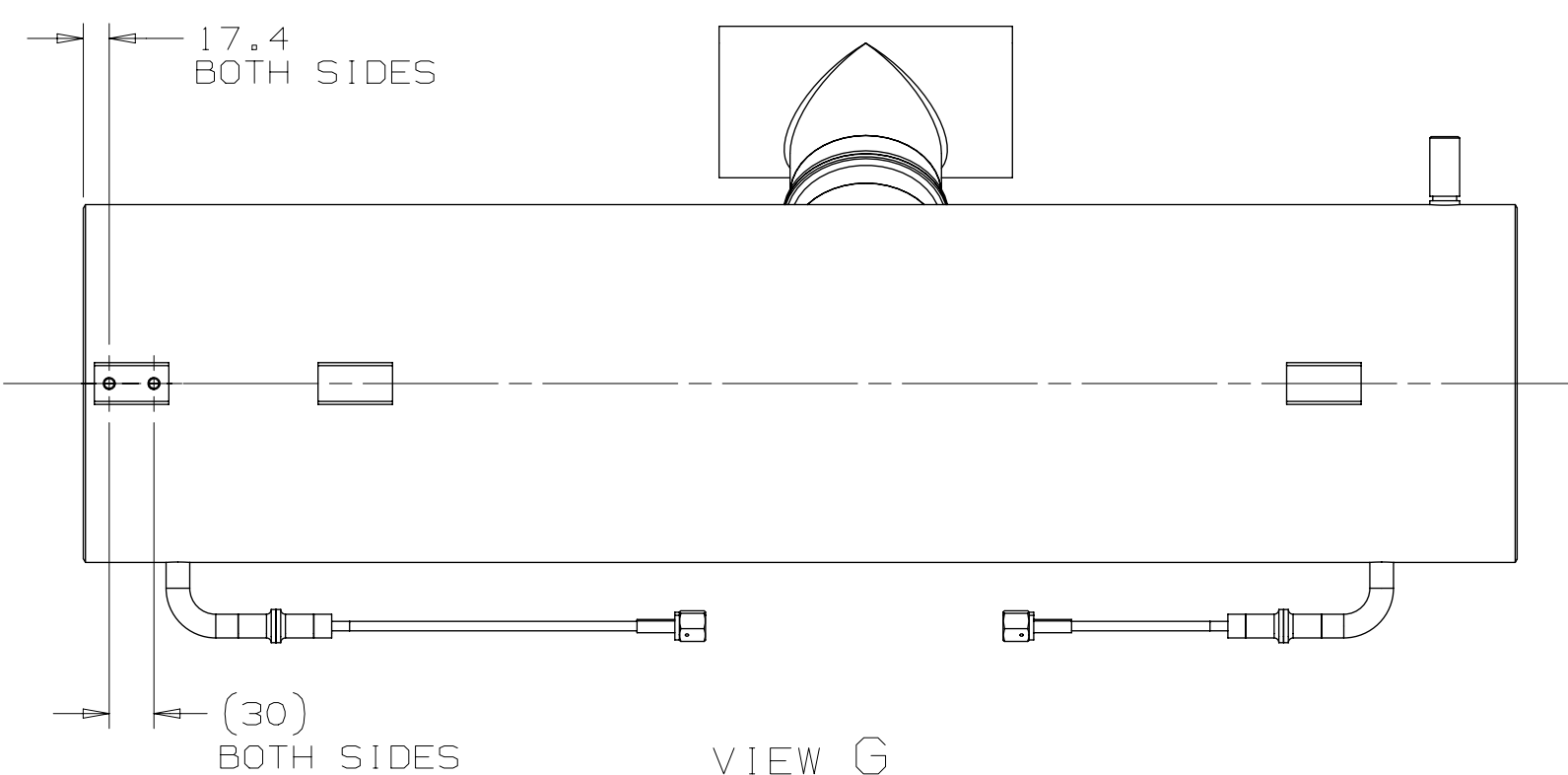
SECTION B-B
SCALE 1:2



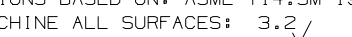
VIEW IN DIRECTION C-C

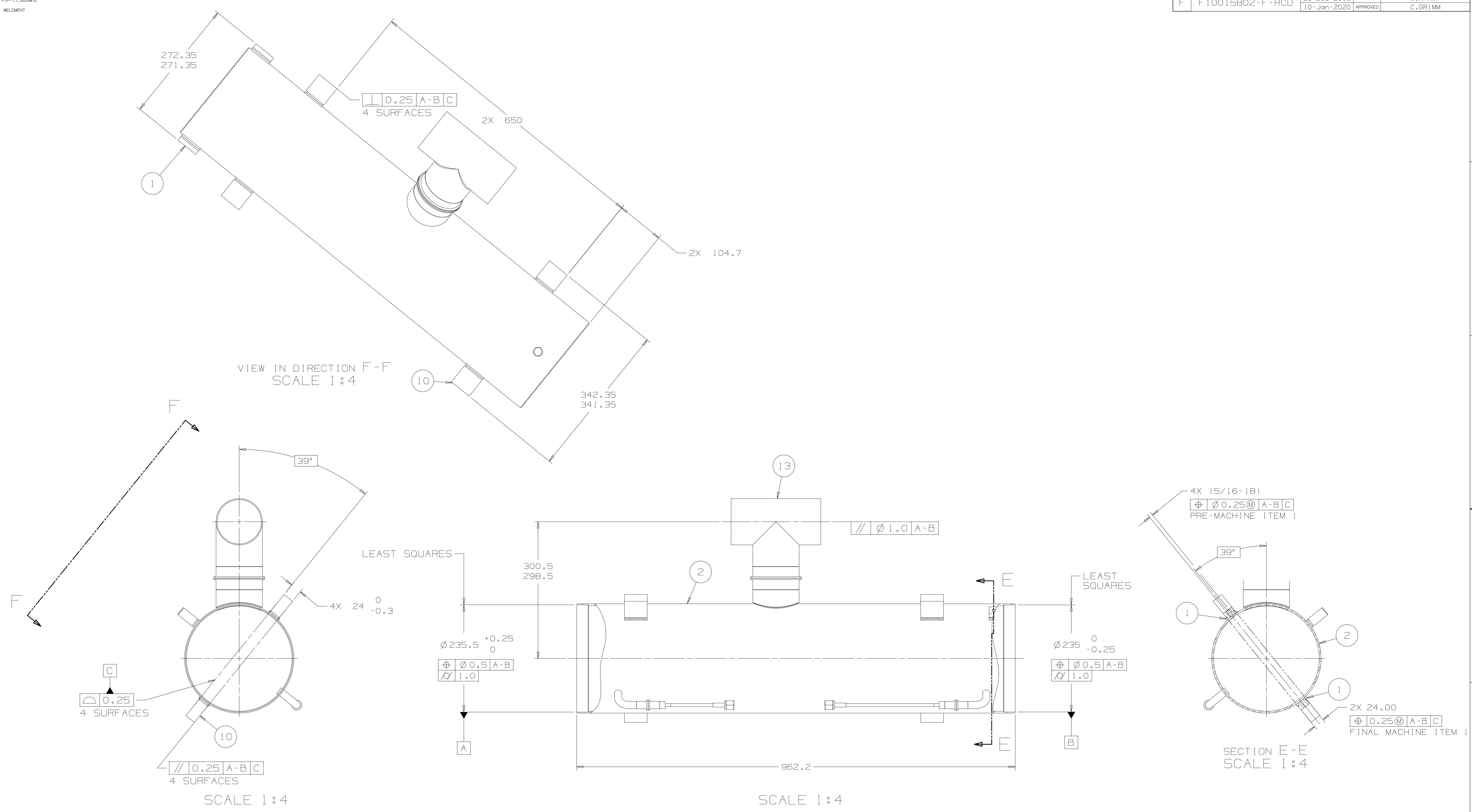


VIEW G



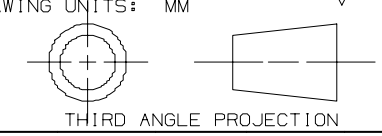
VIEW G
SCALE 1:5

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL		DATE	25-Feb-2014			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY						
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M.KRAMP		DATE	30-May-2014									
1	0.3	0.12	N/A	1	APPROVED	C.GRIMM		DATE	30-May-2014									
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES: 3.2√ DRAWING UNITS: MM					USED ON					F10023864					NAME	WELDMENT, HELIUM VESSEL		
 THIRD ANGLE PROJECTION					MATERIAL: 316L STAINLESS STEEL, ANNEALED, UNS S31603 SEE PARTS LIST - ALL GRADE 2 TITANIUM UNLESS NOTED GROUP: Technical Division - Design and Drafting CAGE CODE: 00586					SCALE					SIZE			DRAWING NUMBER
										1:5 & AS SHOWN	A1	F10015802	2 of 3	F				

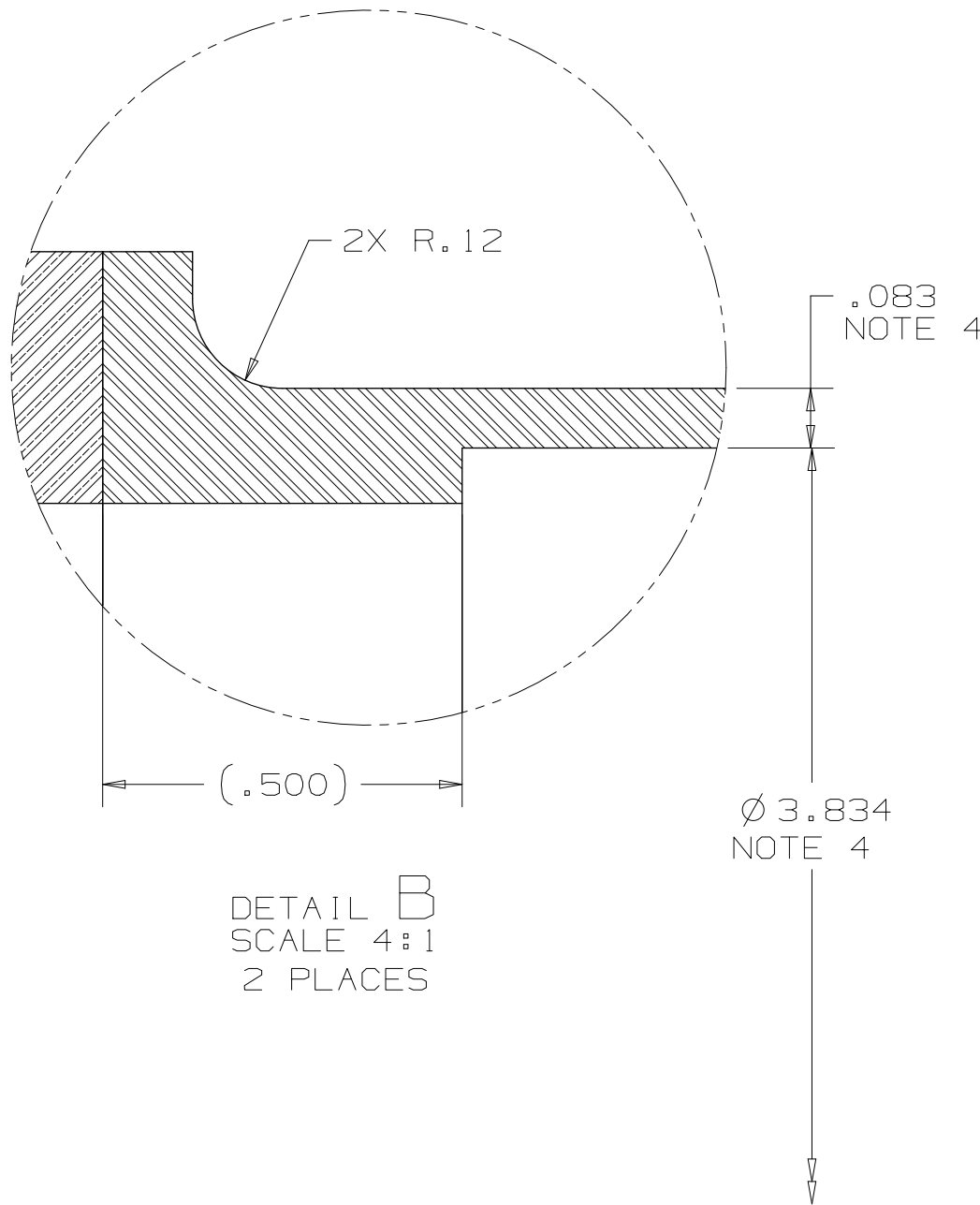
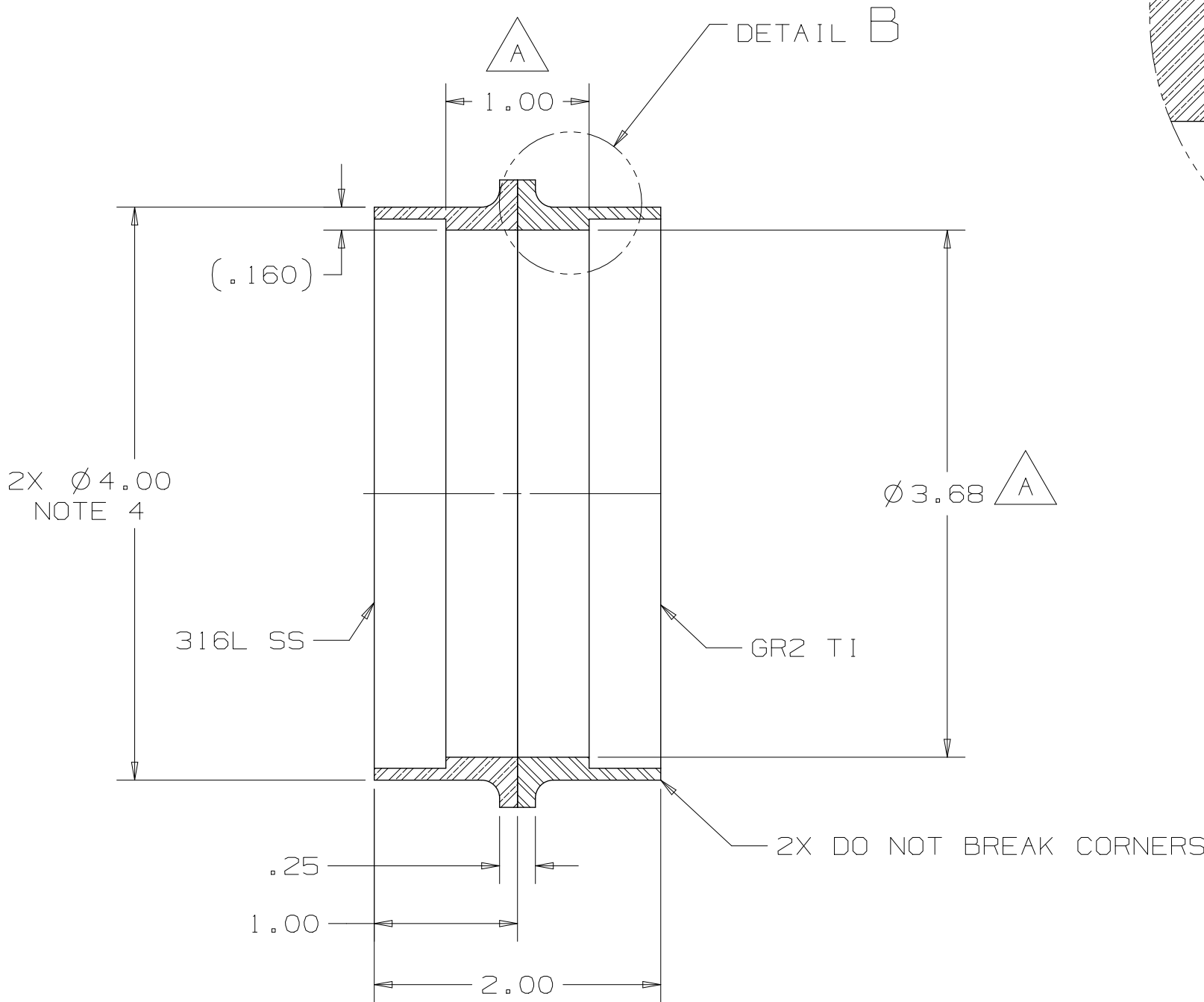
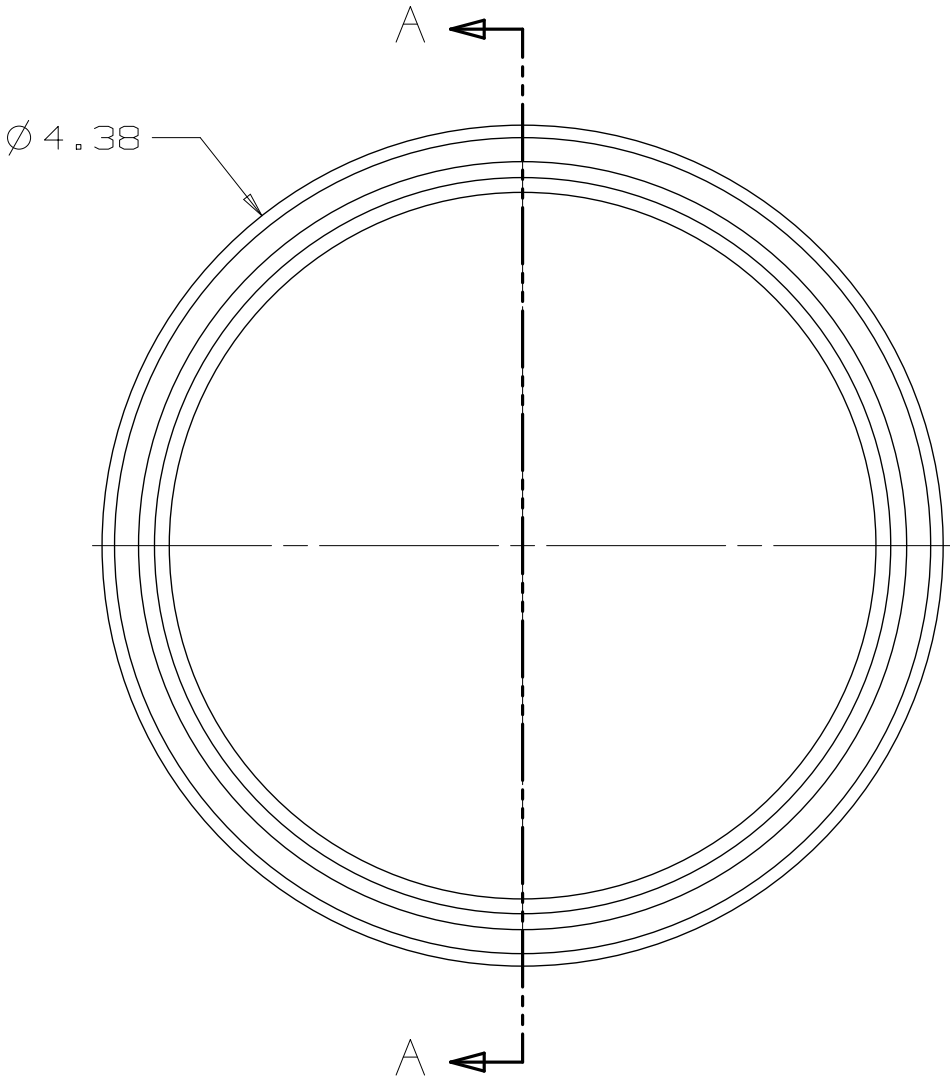


INSPECTION SHEET

TEMPLATE VERSION: 2018.12.03

UNLESS OTHERWISE SPECIFIED				DRAWN	M. SAWTELL	DATE	25-Feb-2014		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M. KRAMP	DATE					30-May-2014
1	0.3	0.12	N/A	1	APPROVED	C. GRIMM	DATE					30-May-2014
BREAK ALL SHARP EDGES, MAX: 0.5				USED ON		F10023864			NAME			
DO NOT SCALE DRAWING												
DIMENSIONS BASED ON: ASME Y14.5M-1994												
MAX MACHINE ALL SURFACES: 3.2/												
DRAWING UNITS: MM												
				THIRD ANGLE PROJECTION								
MATERIAL: 316L STAINLESS STEEL, ANNEALED, UNS S31603												
SEE PARTS LIST - ALL GRADE 2 TITANIUM UNLESS NOTED												
GROUP: Technical Division - Design and Drafting				CAGE CODE: 00586								
SCALE: 1:5 & AS SHOWN		SIZE: A1	DRAWING NUMBER: F10015802		SHEET: 3 of 3		REV: F					

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10017486-A-RCD	06-Aug-2015 07-Aug-2015	DRAWN APPROVED	G. LANGLOIS C. GRIMM



NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL, CHIPS, AND BURRS.
- DO NOT BREAK SHARP EDGES, REQUIRED FOR ORBITAL WELDING.
- DESIGN SPECIFICATION:

DESIGN PRESSURE: 2 BAR - WARM
4 BAR - COLD

OPERATION TEMPERATURE: 300 K - WARM
2 K - COLED

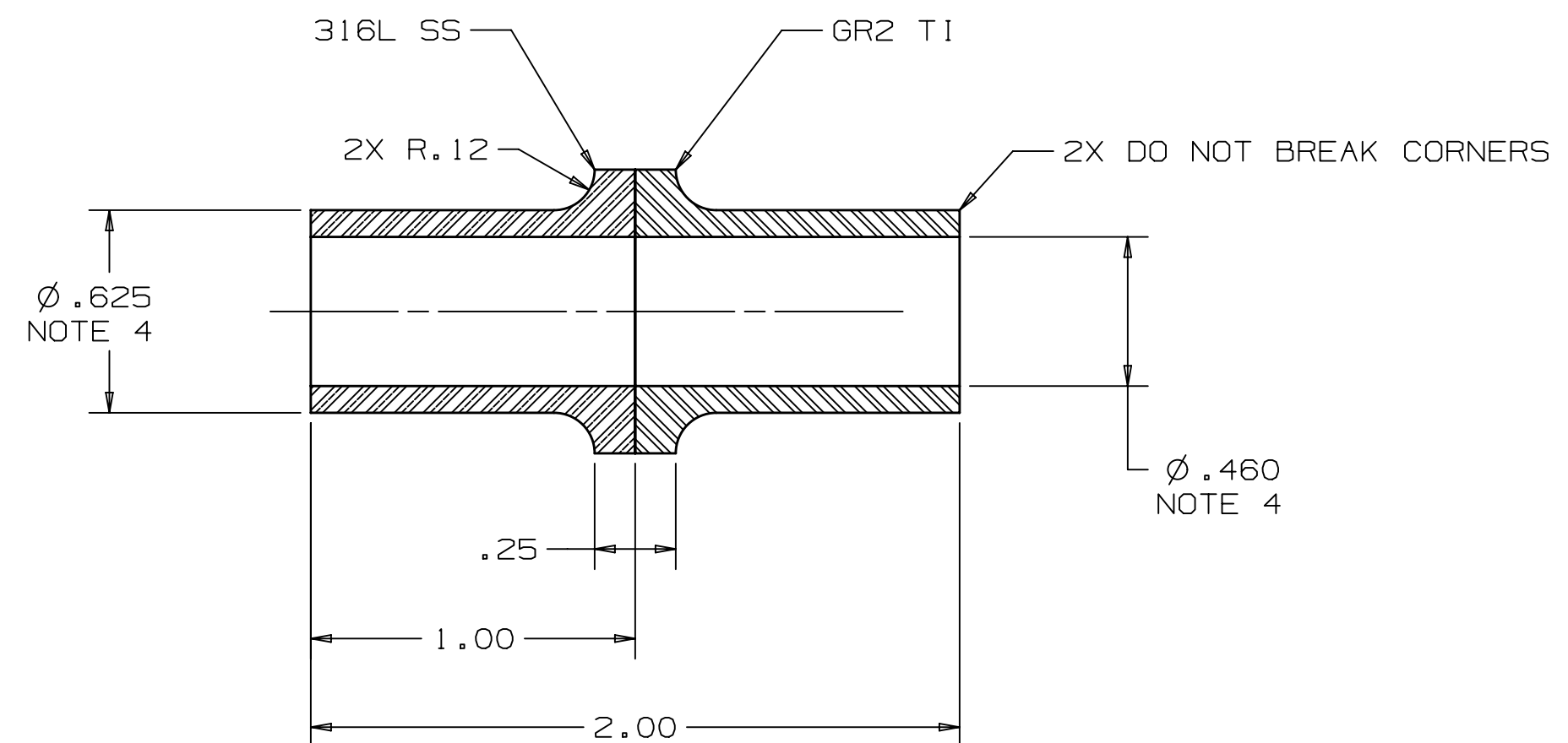
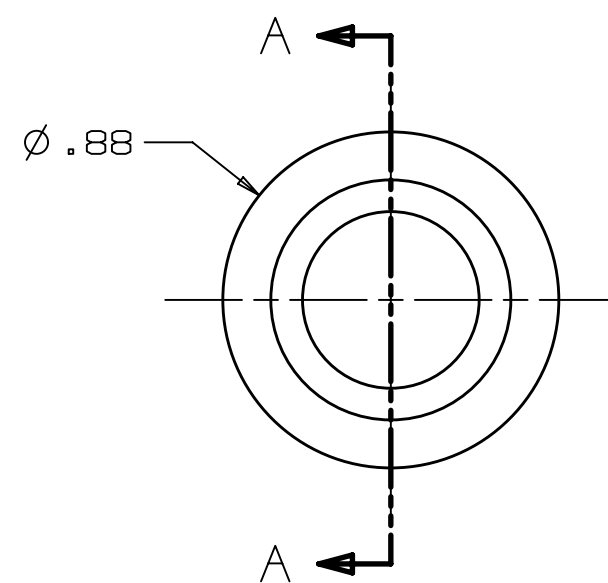
- ALL COMPONENTS MATED TO THIS PART FOR ORBITAL WELDING MUST EXACTLY MATCH DIMENSIONS SHOWN.

- SUGGESTED VENDOR:
HIGH ENEGRY METALS, INC.,
293 BUSINESS PARK LOOP, SEQUIM WA 98382



UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL		DATE	27-Feb-2014		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±.X	±.XX	±.XXX	±X/X	±X*	CHECKED	M.KRAMP		DATE	30-May-2014					
.1	.02	.005	1/16	1*	APPROVED	C.GRIMM		DATE	30-May-2014		NAME			
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 125 DRAWING UNITS: INCHES ✓					USED ON		F10015802		RING, TI-SS TRANSITION - 2-PHASE					
					MATERIAL									
					316L STAINLESS STEEL, ANNEALED, UNS S31600 / GRADE 2 TITANIUM									
					GROUP: Technical Division - Design and Drafting		CAGE CODE: QUSR6		SCALE 1:1		SIZE C	DRAWING NUMBER F10017486		SHEET 1 OF 1

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10017488-A-RCD	27-Mar-2019	DRAWN	G. LANGLAIS
		29-Mar-2019	APPROVED	C. GRIMM



SECTION A - A

NOTES (UNLESS OTHERWISE SPECIFIED):

1. PART MUST BE FREE OF DIRT, GREASE, OIL, CHIPS, AND BURRS.
2. DO NOT BREAK SHARP EDGES, REQUIRED FOR ORBITAL WELDING.
3. DESIGN SPECIFICATION:

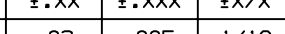
DESIGN PRESSURE: 2 BAR - WARM
 4 BAR - COLD

```
OPERATION TEMPERATURE: 300 K - WARM
                        2 K - COLED
```

4. ALL COMPONENTS MATED TO THIS PART FOR ORBITAL WELDING
MUST EXACTLY MATCH DIMENSIONS SHOWN.

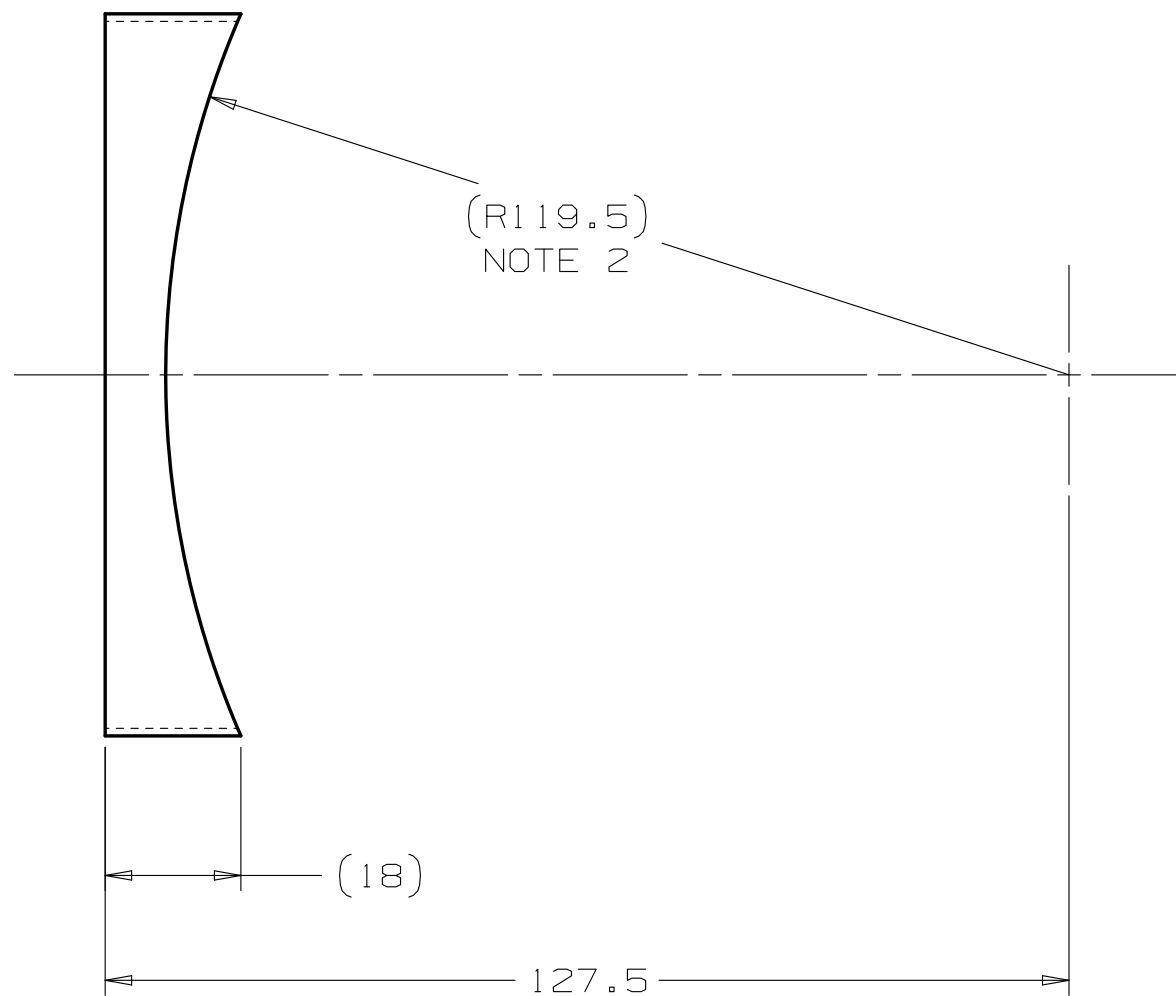
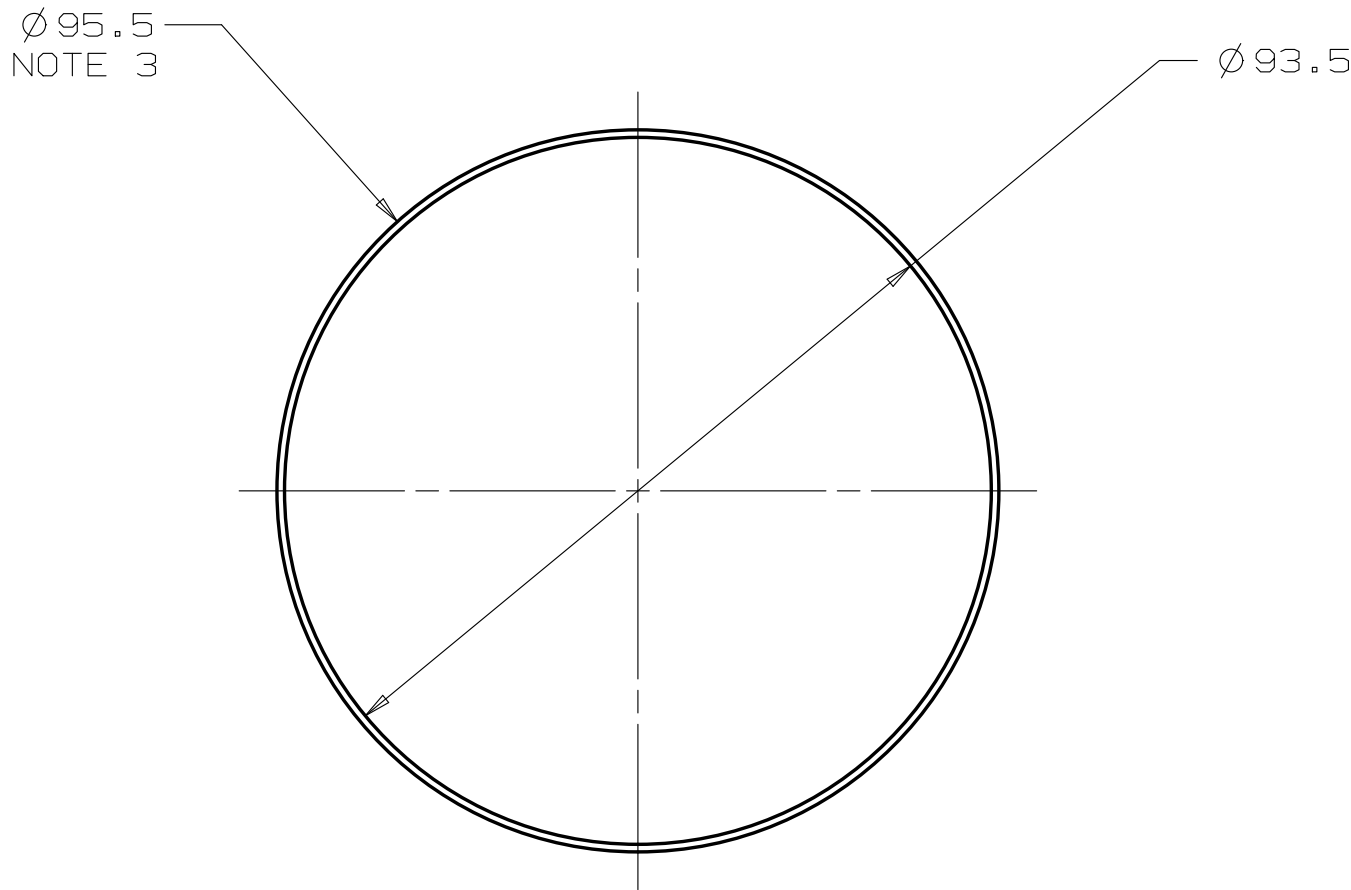
5. SUGGESTED VENDOR:
HIGH ENRGY METALS, INC.,
293 BUSINESS PARK LOOP, SEQUIM WA 98382



UNLESS OTHERWISE SPECIFIED					DRAWN		M.SAWTELL		DATE		27-Feb-2014		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY							
±.X ±.XX ±.XXX ±X/X ±*					CHECKED		M.KRAMP		DATE		30-May-2014				NAME					
.1 .02 .005 1/16 1"					APPROVED		C.GRIMM		DATE		30-May-2014									
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 125✓ DRAWING UNITS: INCHES					USED ON		F10015802		 RING, TI-SS TRANSITION - FILL LINE		SCALE 2:1		SIZE C		DRAWING NUMBER F10017488		SHEET 1 OF 1		REV A	
		MATERIAL		316L STAINLESS STEEL, ANNEALED, UNS S31600 / GRADE 2 TITANIUM																
GROUP: Technical Division - Design and Drafting					CAGE CODE: OQRS															

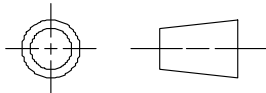
DESCRIPTION: WELD BACKING RING FOR CHIMNEY AND VESSEL TUBE
CATEGORY: RING PROJECT: LCLSII Cryomodule

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10017519---RCD		DRAWN	
			APPROVED	



- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
 - DIMENSION TO MATCH FINAL TUBE OUTSIDE DIAMETER, MINUS 0.5mm, ON DRAWING F10008818.
 - REVIEW SPECIFICATION FOR THIS DIMENSION BASED ON DRAWING F10009174.

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1°
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2/ DRAWING UNITS: MM				



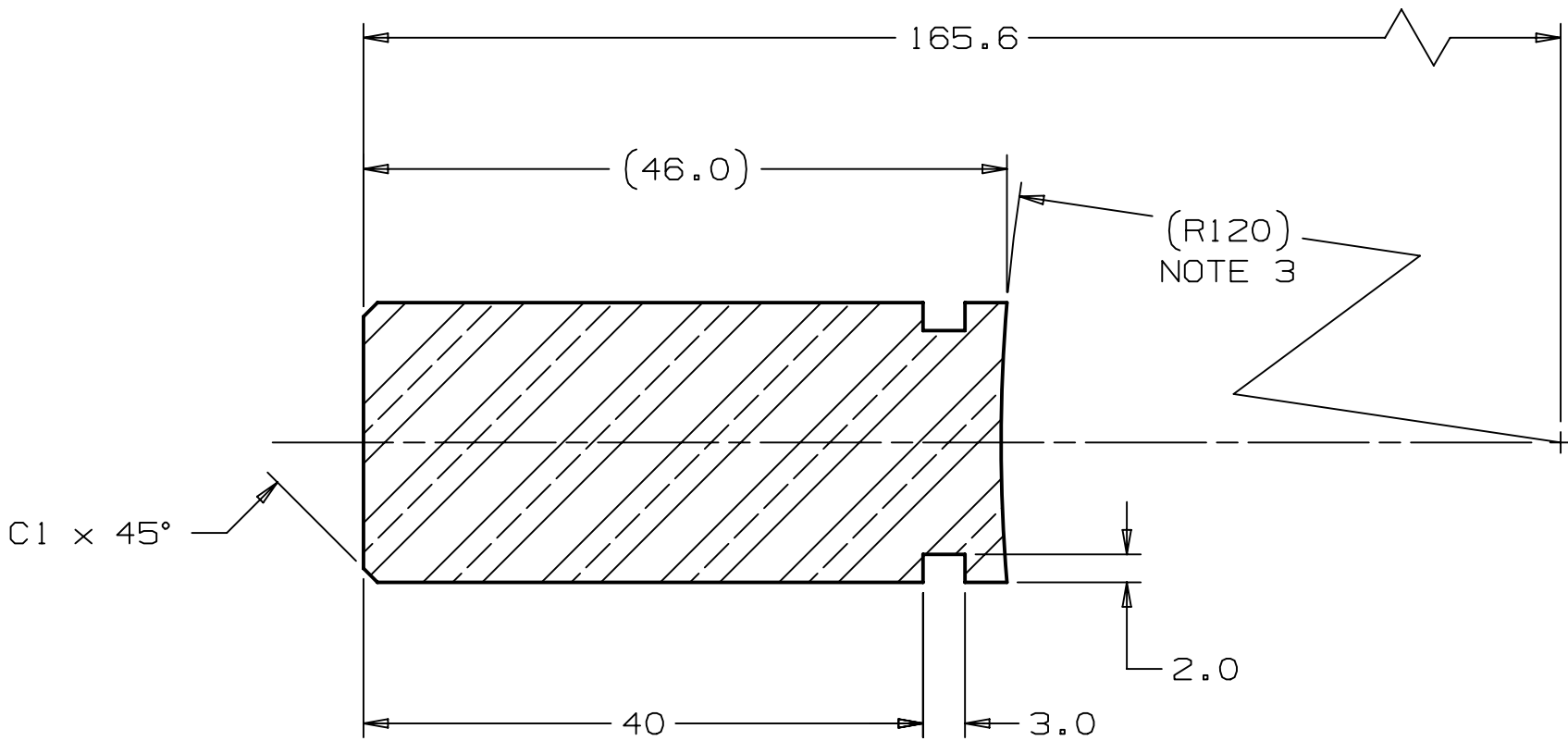
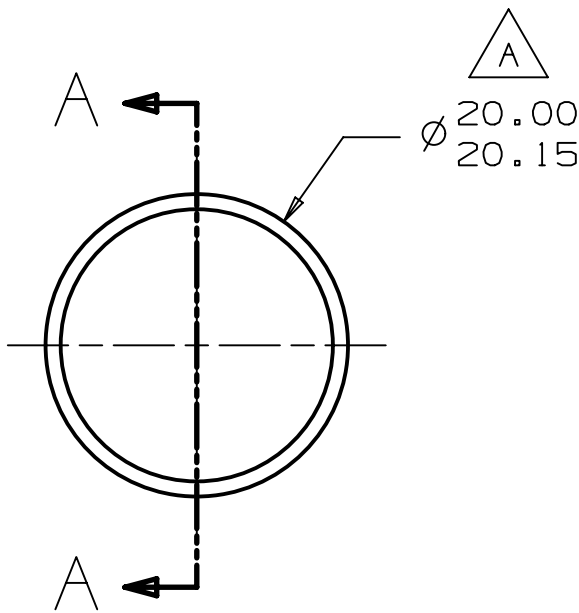
DRAWN	M.SAWTELL	DATE	28-Feb-2014
CHECKED	M.KRAMP	DATE	30-May-2014
APPROVED	C.GRIMM	DATE	30-May-2014
USED ON F10015802			
MATERIAL TITANIUM GRADE 2			
GROUP: Technical Division - Design and Drafting CAGE CODE: QUES6			



FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

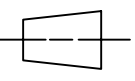
NAME RING, WELD BACKING				
SCALE 1:1	SIZE A2	DRAWING NUMBER F10017519	SHEET 1 OF 1	REV -

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10018180-A-RCD	12-Apr-2016	DRAWN	B.DAMPHOUSSE
		03-May-2016	APPROVED	C.GRIMM



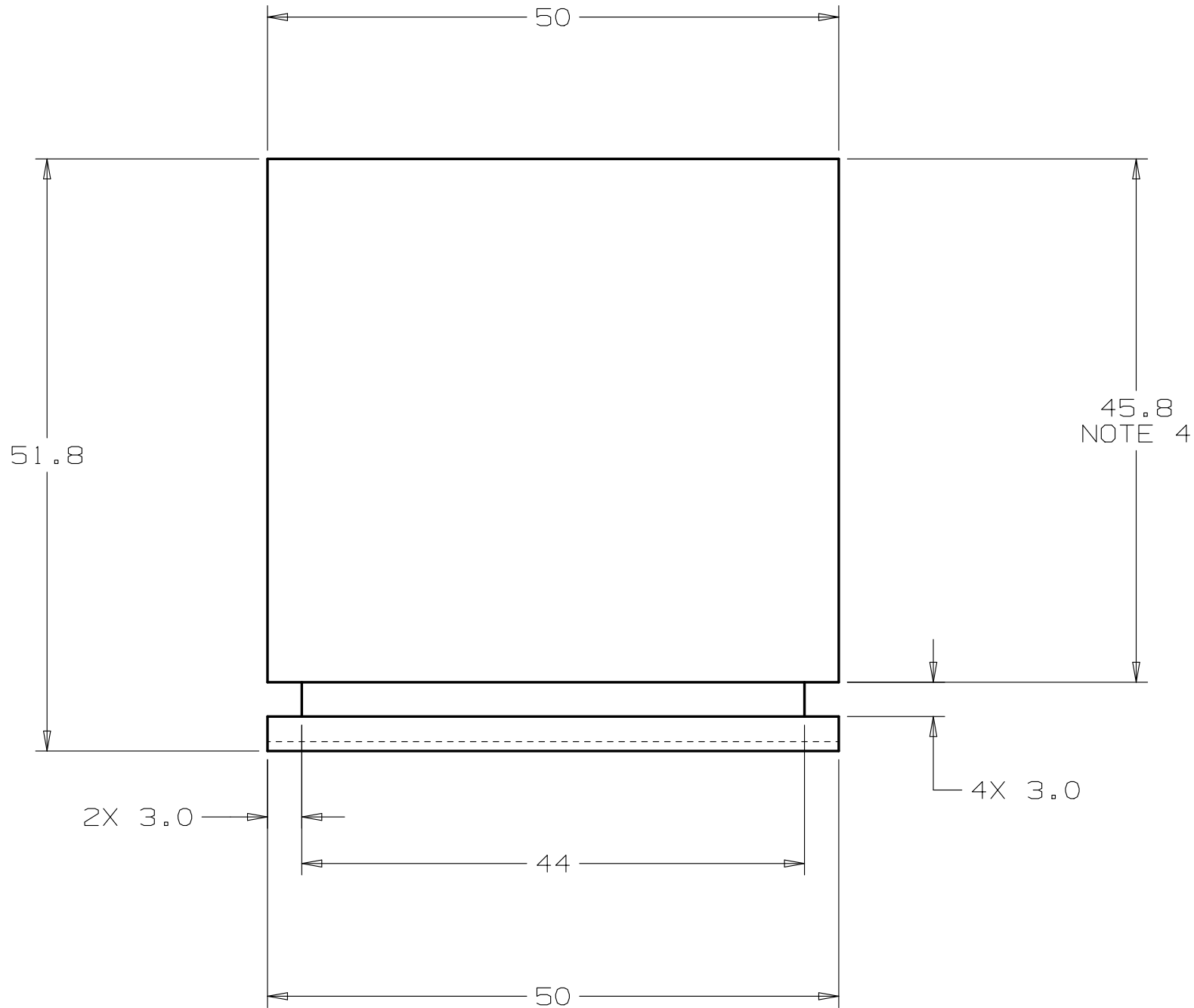
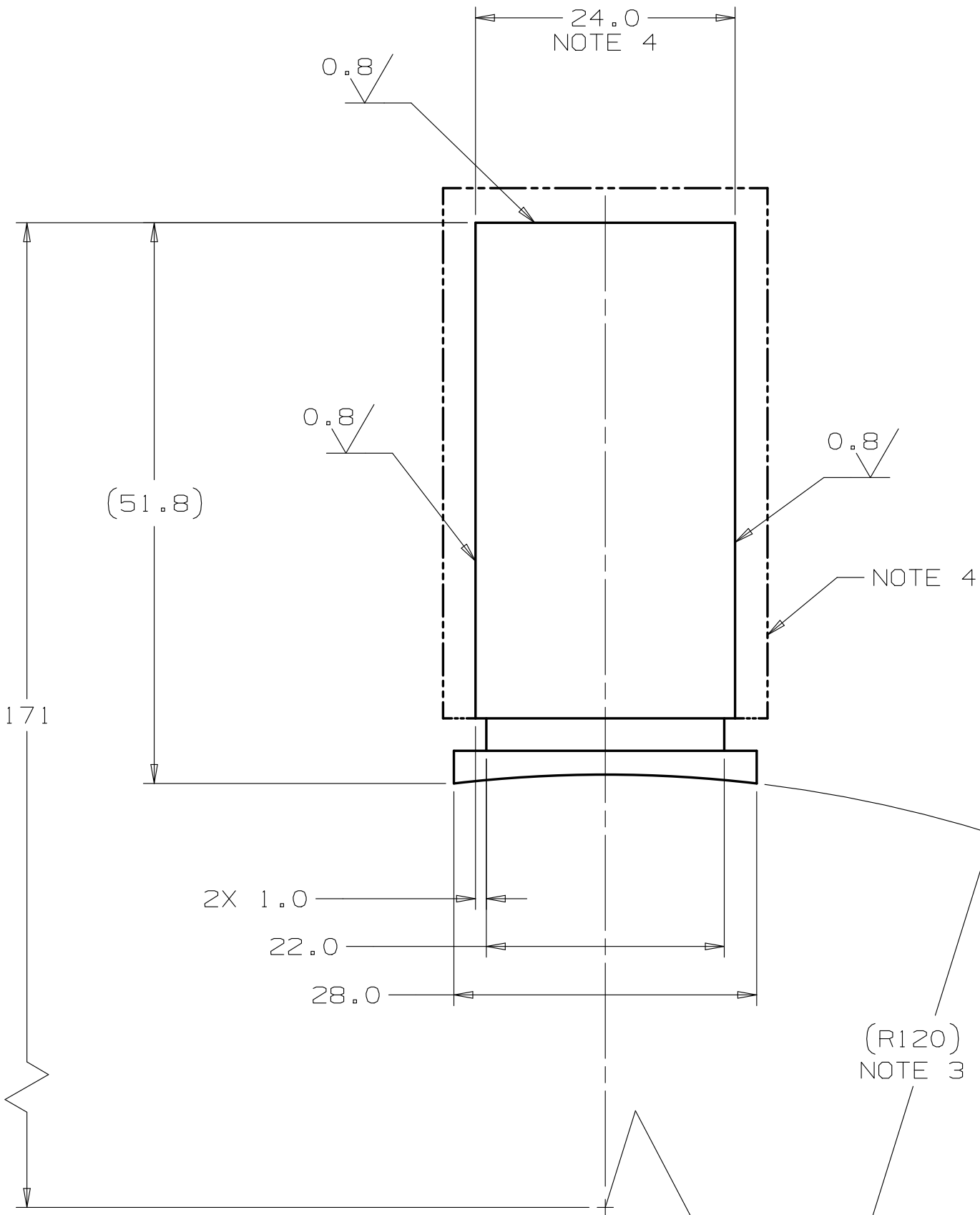
SECTION A - A

- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
 - TRAILING ZEROS DENOTE TOLERANCE.
 - DIMENSION TO MATCH FINAL TUBE OUTER DIAMETER ON DRAWING F10008818.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	13-Mar-2014	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	30-May-2014		
1	0.3	0.12	N/A	1°	APPROVED	C.GRIMM	DATE	30-May-2014	NAME	
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2/ DRAWING UNITS: MM  					USED ON F10015802				PIN, CLAMPING	
					MATERIAL TITANIUM GRADE 2				SCALE 2:1	SIZE A2
					GROUP: Technical Division - Design and Drafting CAGE CODE: 0U5R6				DRAWING NUMBER F10018180	SHEET 1 of 1
									REV A	

DESCRIPTION: ROLLING PAD FOR LCLS-II PP HELIUM VESSEL
CATEGORY: PAD PROJECT: LCLSII Cryomodule

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10018181---RCD		DRAWN	
			APPROVED	

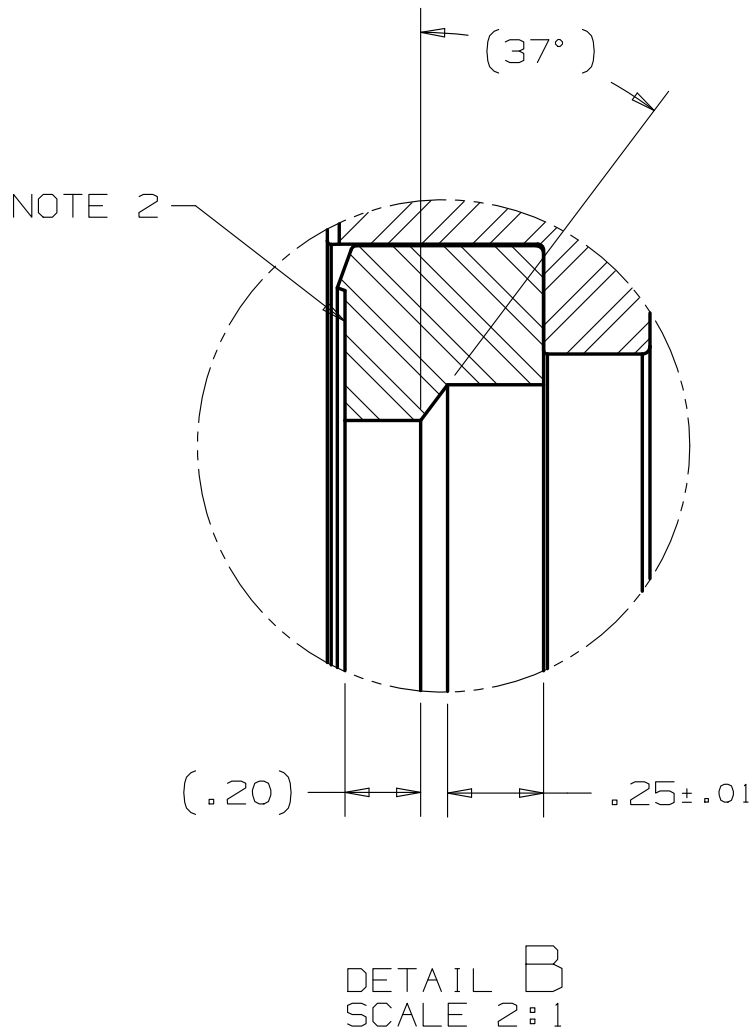
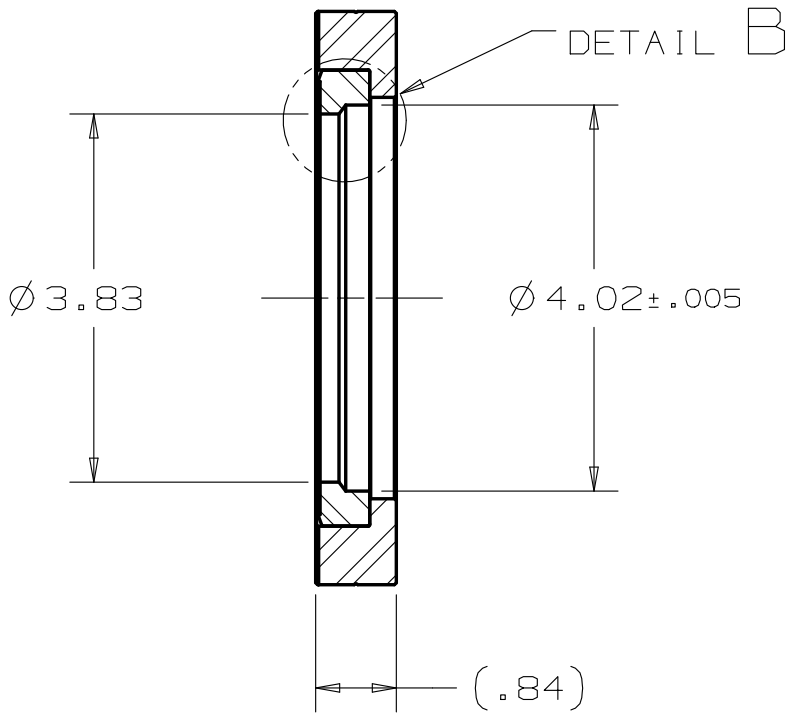
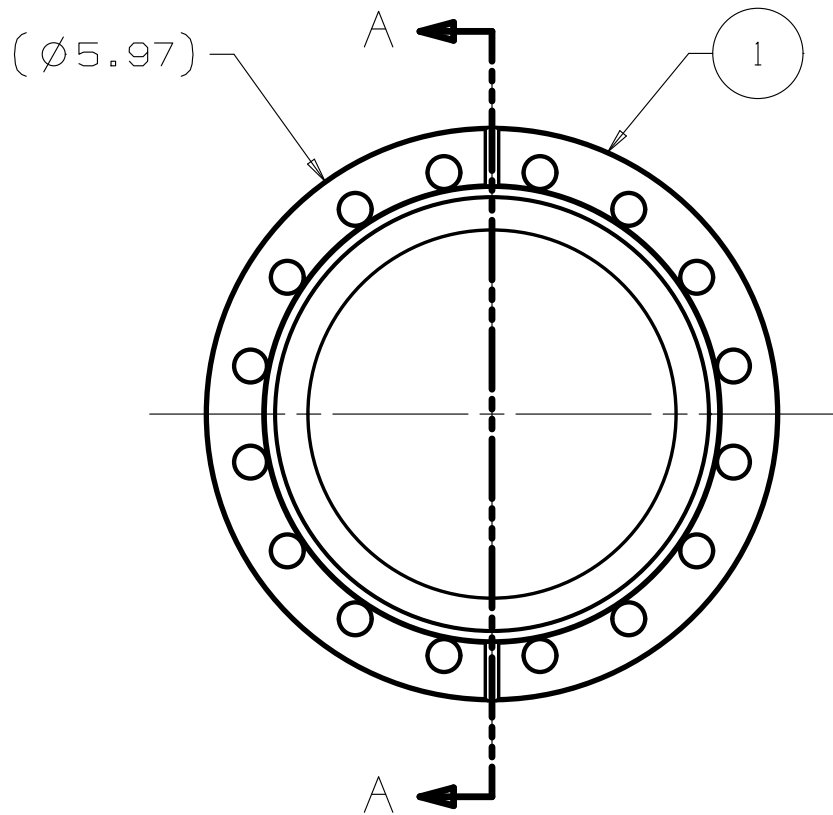


NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
- TRAILING ZEROS DENOTE TOLERANCE.
- DIMENSION TO MATCH FINAL TUBE OUTSIDE DIAMETER ON DRAWING F10008818.
- ALL DIMENSIONS REPRESENT FINAL MACHINE SIZES, EXTRA MATERIAL STOCK WILL BE REQUIRED, SEE DRAWING F10015802 FOR FINAL MACHINED SPECIFICATION FOR THIS PART.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL	DATE	13-Mar-2014	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	30-May-2014		
1	0.3	0.12	N/A	1°	APPROVED	C.GRIMM	DATE	30-May-2014	NAME	
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON F10015802				PAD, ROLLING	
 					MATERIAL TITANIUM GRADE 2				SCALE 2:1	SIZE A2
GROUP: Technical Division - Design and Drafting					CAGE CODE: QUES6				DRAWING NUMBER F10018181	SHEET 1 OF 1
									REV -	

REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
-	F10020437---RCD		DRAWN		
			APPROVED		



SECTION A - A

1	FC0045623	FLANGE, FC - 6" OD BLANK ROTATABLE - SS316 KURT J. LESKER F0600N000RLN, OR EQUIV.	1
ITEM	PART NUMBER	DESCRIPTION	QTY.
PARTS LIST			

NOTES (UNLESS OTHERWISE SPECIFIED):

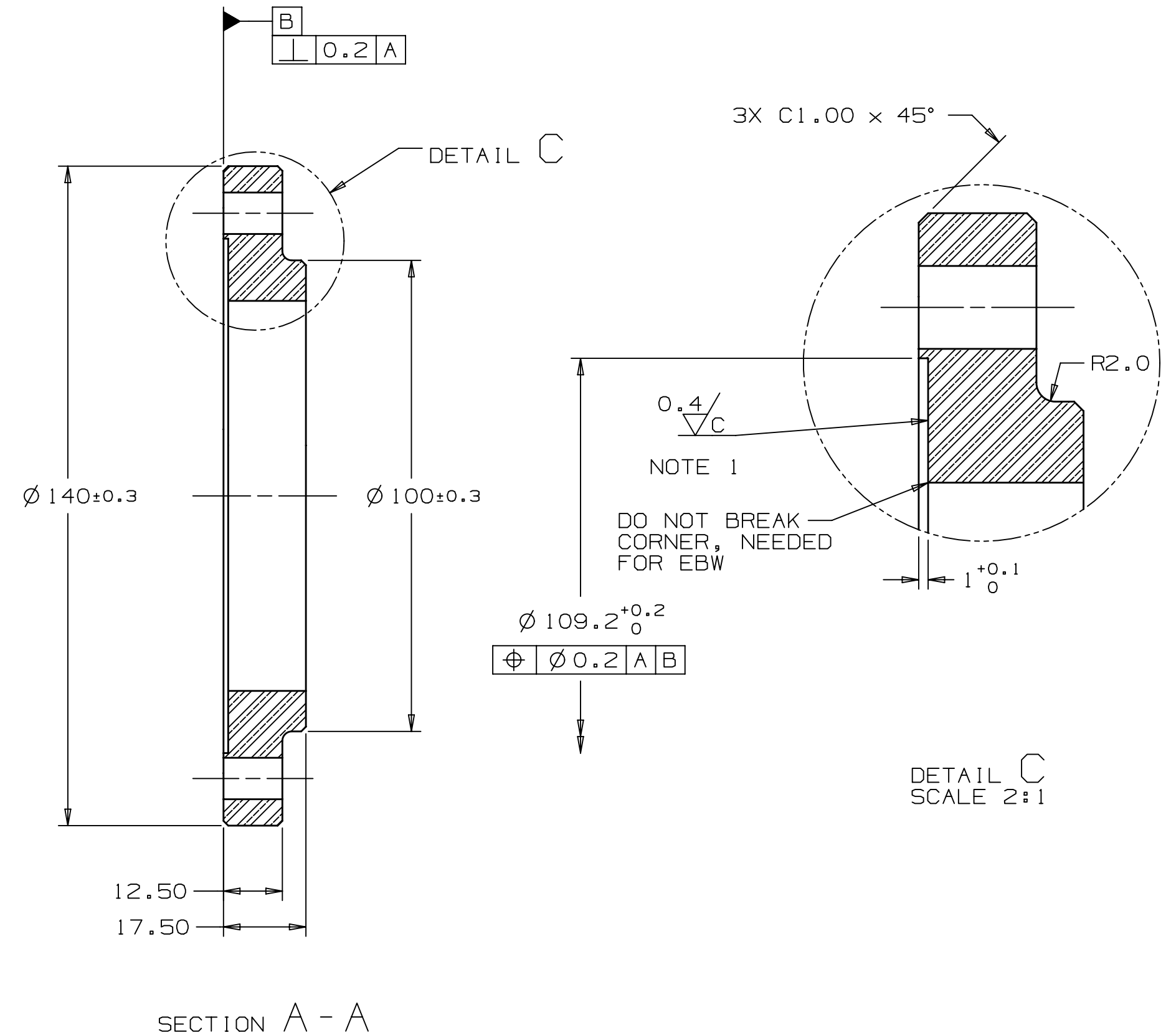
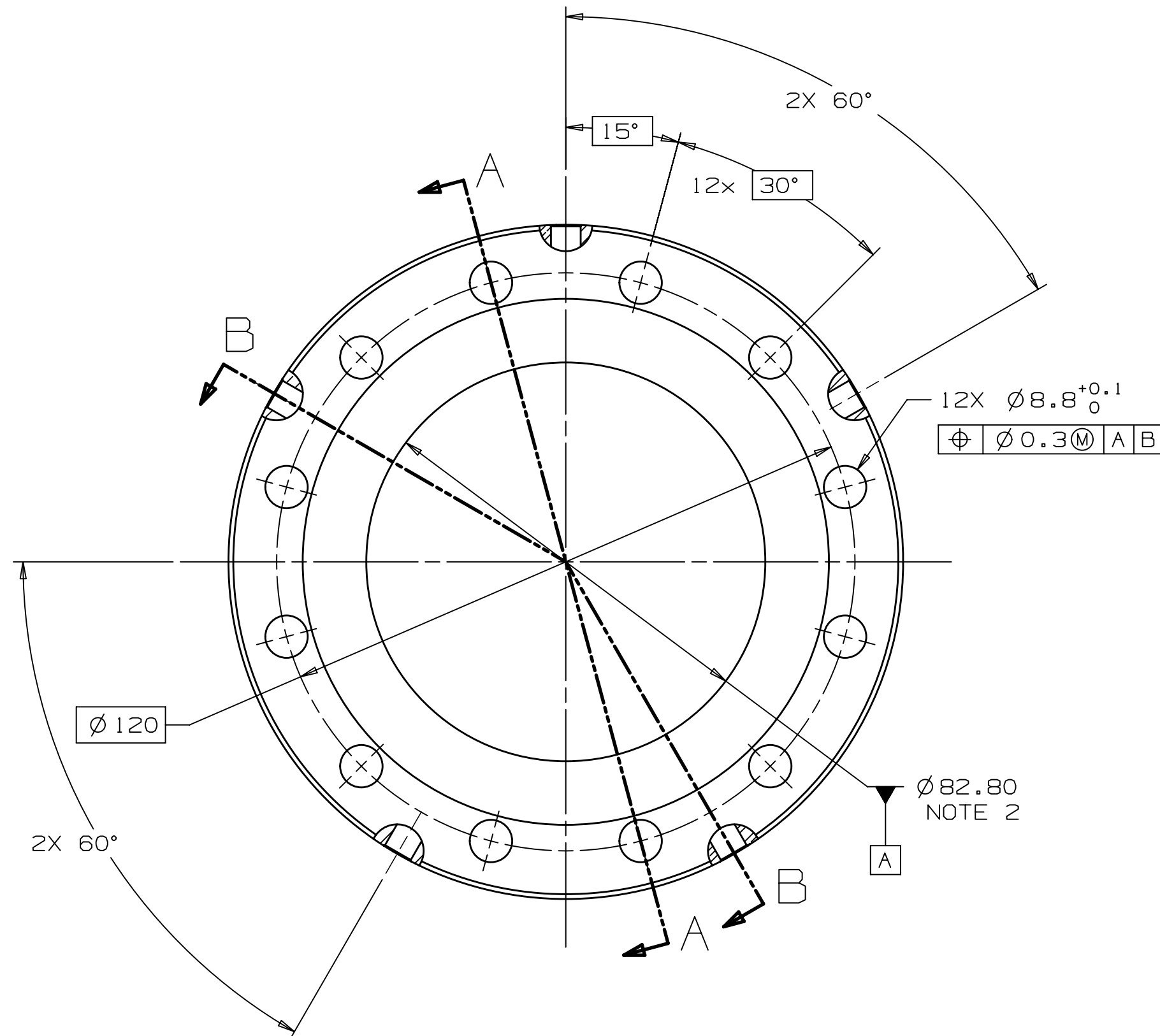
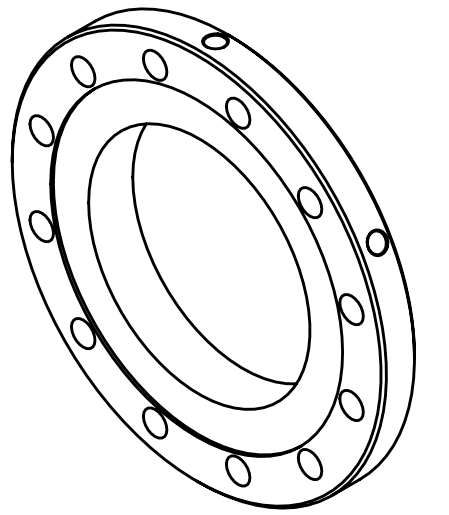
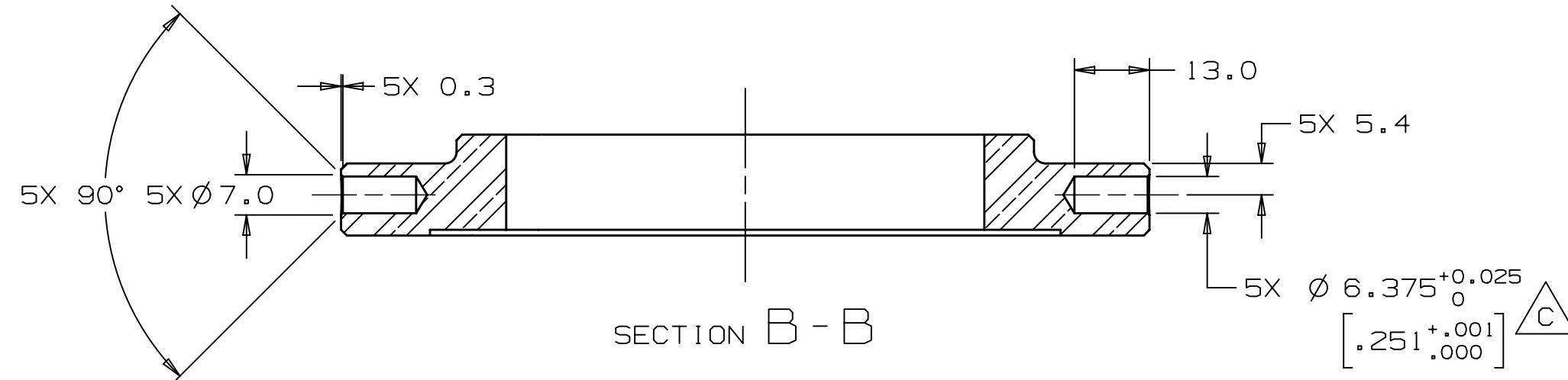
- ASSEMBLY MUST BE FREE FROM DUST, GREASE, OIL, BURRS, AND CHIPS.
- PROTECT SEALING SURFACE FROM NICKS AND SCRATCHES.

UNLESS OTHERWISE SPECIFIED				
±.X	±.XX	±.XXX	±X/X	±X°
.1	.02	.005	1/16	1°
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 125/ DRAWING UNITS: INCHES				
 				

DRAWN	M.SAWTELL	DATE	10-Apr-2014
CHECKED	M.KRAMP	DATE	28-May-2014
APPROVED	C.GRIMM	DATE	28-May-2014
USED ON			
F10015804			
MATERIAL			
SEE PARTS LIST			
GROUP: Technical Division - Design and Drafting			CAGE CODE: 0U5R6

 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
NAME FLANGE, LCLS-II HTS TESTING CONNECTOR				
SCALE 1:2 AS SHOWN	SIZE B	DRAWING NUMBER F10020437	SHEET 1 OF 1	REV -

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
C	F10026185-C-RCD	23-May-2016	DRAWN	M.KRAMP
		23-May-2016	APPROVED	C.GRIMM



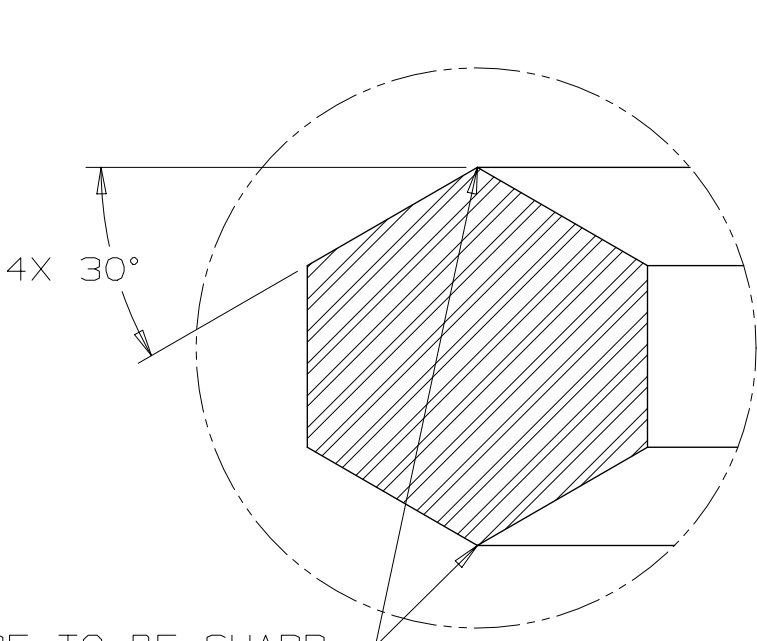
- NOTES (UNLESS OTHERWISE SPECIFIED):

1. SEALING SURFACE MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.
2. DIMENSION COORESPONDS WITH PART NUMBER MD-439153 AND MD-439161.
TOLERANCE IS TO COORDINATED BETWEEN MANUFACTURERS AND EB-WELDERS.
3. THIS DRAWING REPLACES MD-439159.
4. DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.
5. DIMENSION IN [X.X] IS IN INCHES.

UNLESS OTHERWISE SPECIFIED					DRAWN		M.SAWTELL		DATE		22-Jul-2014		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M.KRAMP		DATE	07-Aug-2014		NAME			
Z	0.3	0.12	N/A	1*	APPROVED	C.GRIMM		DATE	08-Aug-2014		FLANGE, BEAM - NW78			
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM					USED ON F00439179, F00439180									
MATERIAL					Nb55Ti									
GROUP: Technical Division - Design and Drafting					CAGE CODE: QUSR6									
					SCALE		SIZE		DRAWING NUMBER		SHEET		REV	
					1:1 AS SHOWN		A2		F10026185		1 OF 1		C	

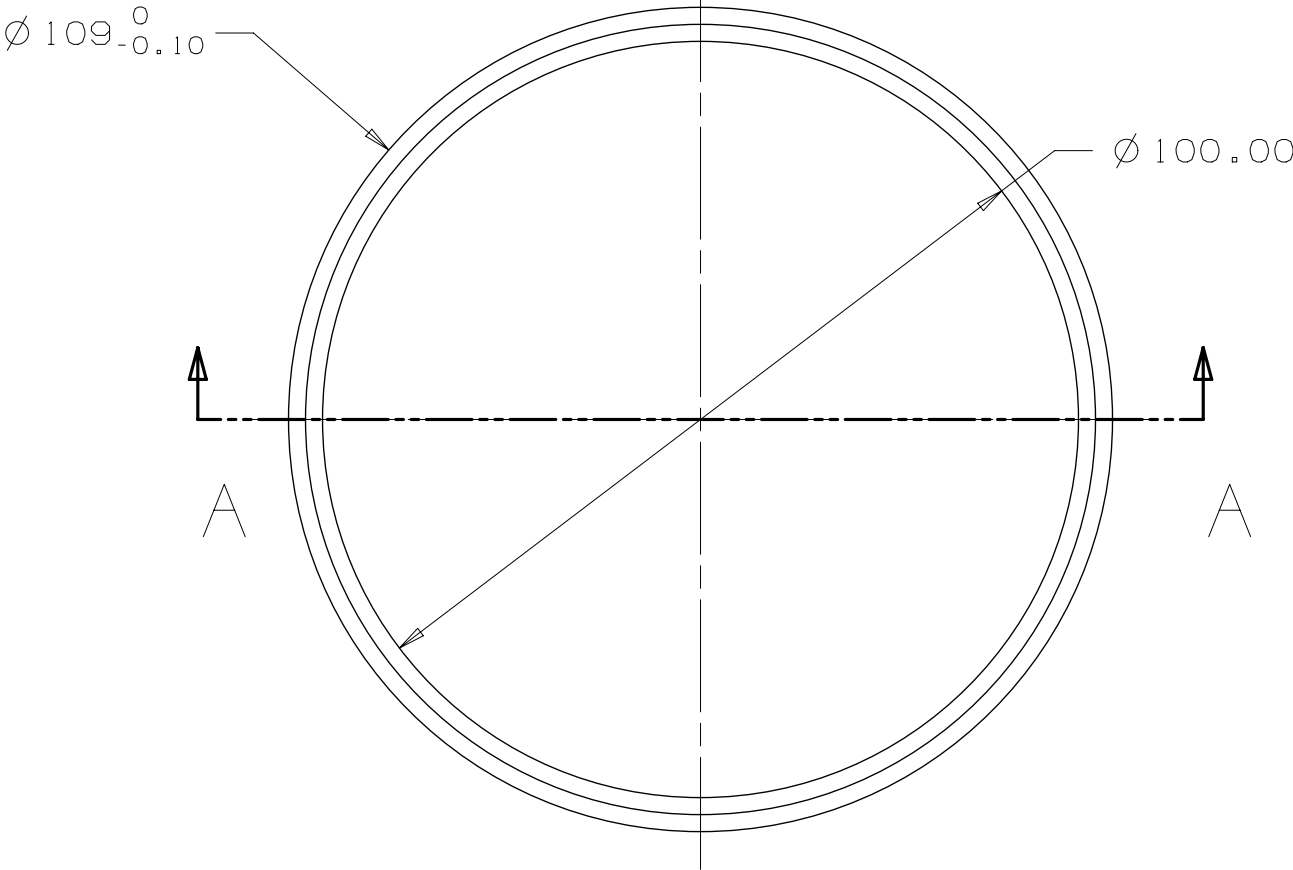
DESCRIPTION: SEAL END FLANGE 1.3
CATEGORY: SEAL PROJECT: PIP-11_FrontEndSSR1

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
E	F10026202-E-RCD	23-Mar-2018	DRAWN	M. KRAMP
		17-Apr-2018	APPROVED	Y. ORLOV



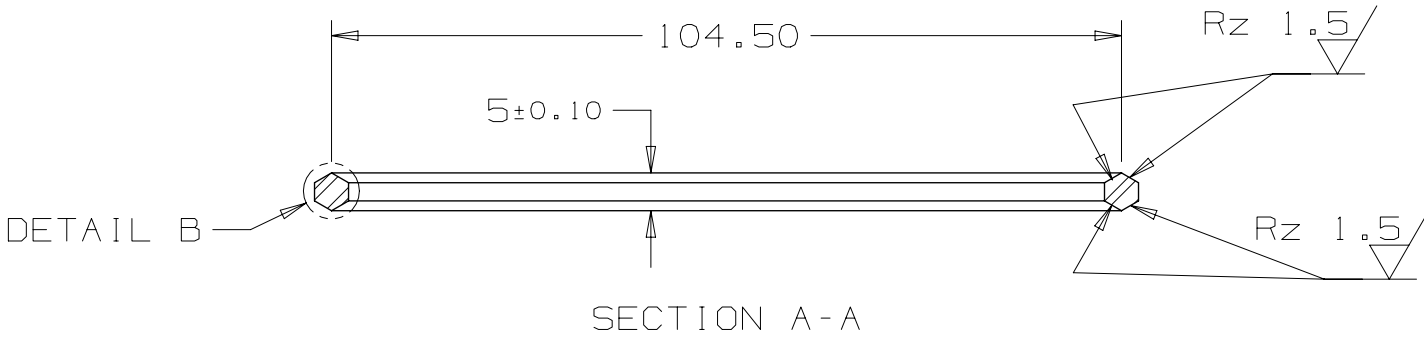
EDGES ARE TO BE SHARP
DON'T BREAK EDGES

DETAIL B
SCALE 10:1



NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CONRERS, AND BURRS. EXCEPT AS SHOWN.
- MATERIAL: EN AW-6060 T66 (AlMgSi0.5 F22, 3.3206.71), MIN. HB60 - MAX. HB75, HBW2.5/62.5 PER ASTM E10.
- TRAILING ZEROS ON DIMESIONS INDICATES TOLERANCE.

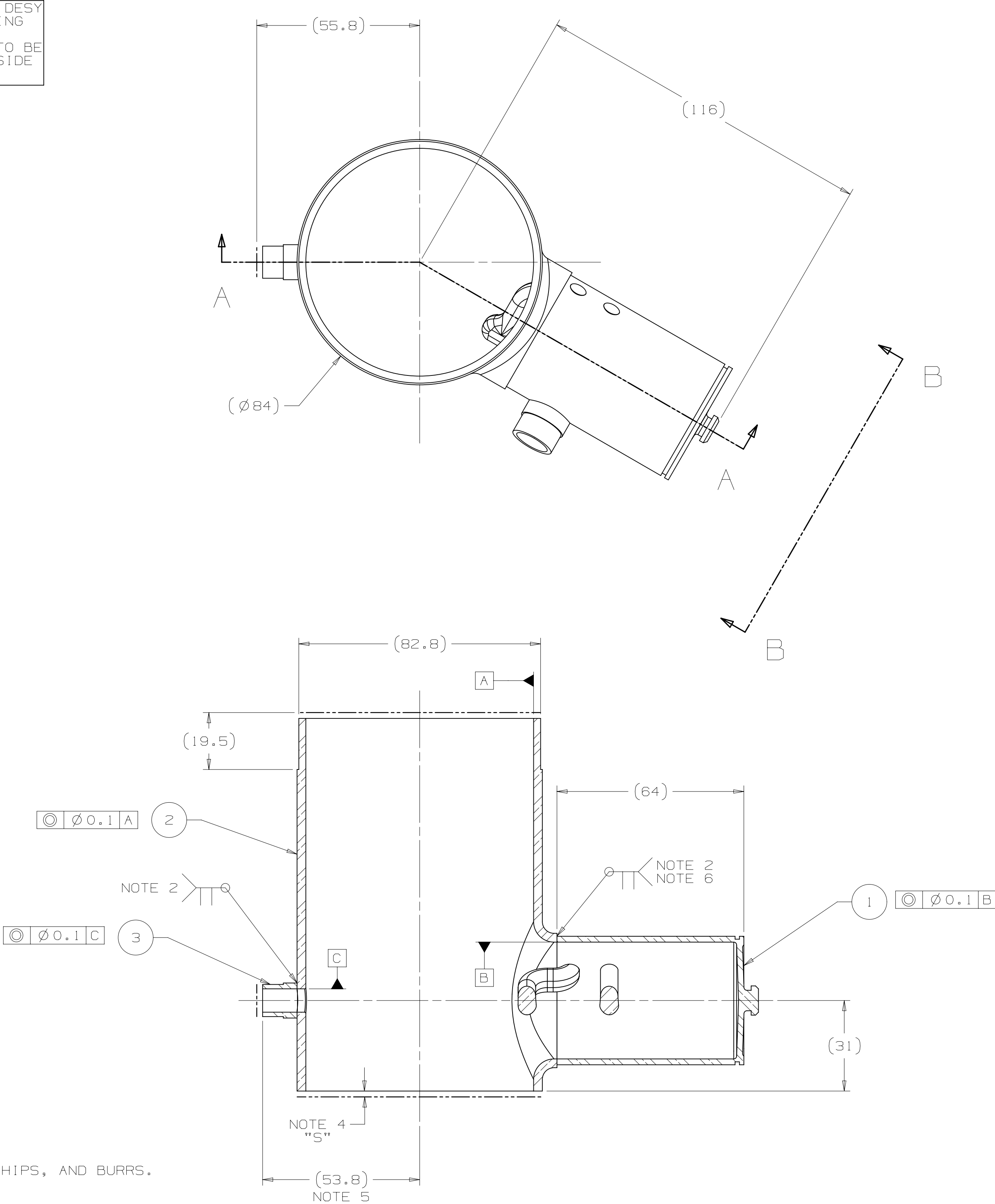


UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1°
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM				

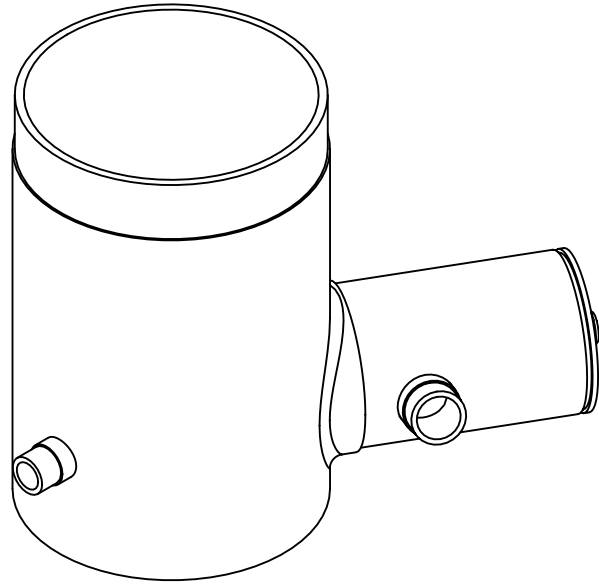
DRAWN	G. LANGLOIS	DATE	22-Jul-2014
CHECKED	M. KRAMP	DATE	06-Aug-2014
APPROVED	Y. ORLOV	DATE	06-Aug-2014
USED ON			
F10009887, F10041166			
MATERIAL			
SEE NOTE 3			
GROUP: Technical Division - Design and Drafting		CAGE CODE: 0U5R6	

FERMIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
NAME				
SEAL END FLANGE 1.3				
SCALE AS SHOWN	SIZE A3	DRAWING NUMBER F10026202	SHEET 1 OF 1	REV E

THIS DESIGN IS THE INTELLECTUAL PROPERTY OF DESY. ACCORDING TO DIN 34 / ISO 16016, THIS DRAWING HAS BEEN REDRAWN WITH DESY'S PERMISSION FOR FABRICATION PURPOSES WITHIN THE USA AND IS TO BE USED EXCLUSIVELY WITHIN FERMILAB. USAGE OUTSIDE OF FERMILAB MUST BE APPROVED BY DESY.



VIEW IN DIRECTION B - B



NOTES: (UNLESS OTHERWISE SPECIFIED)

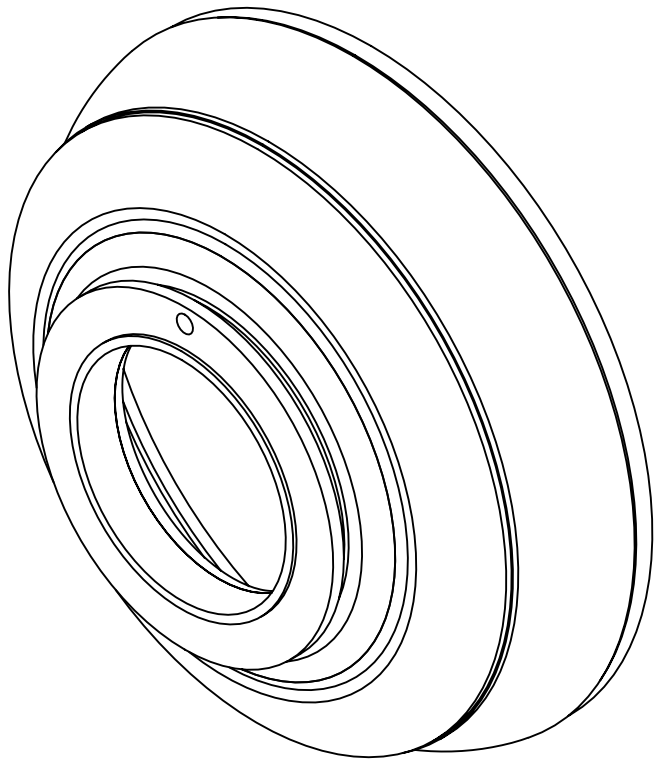
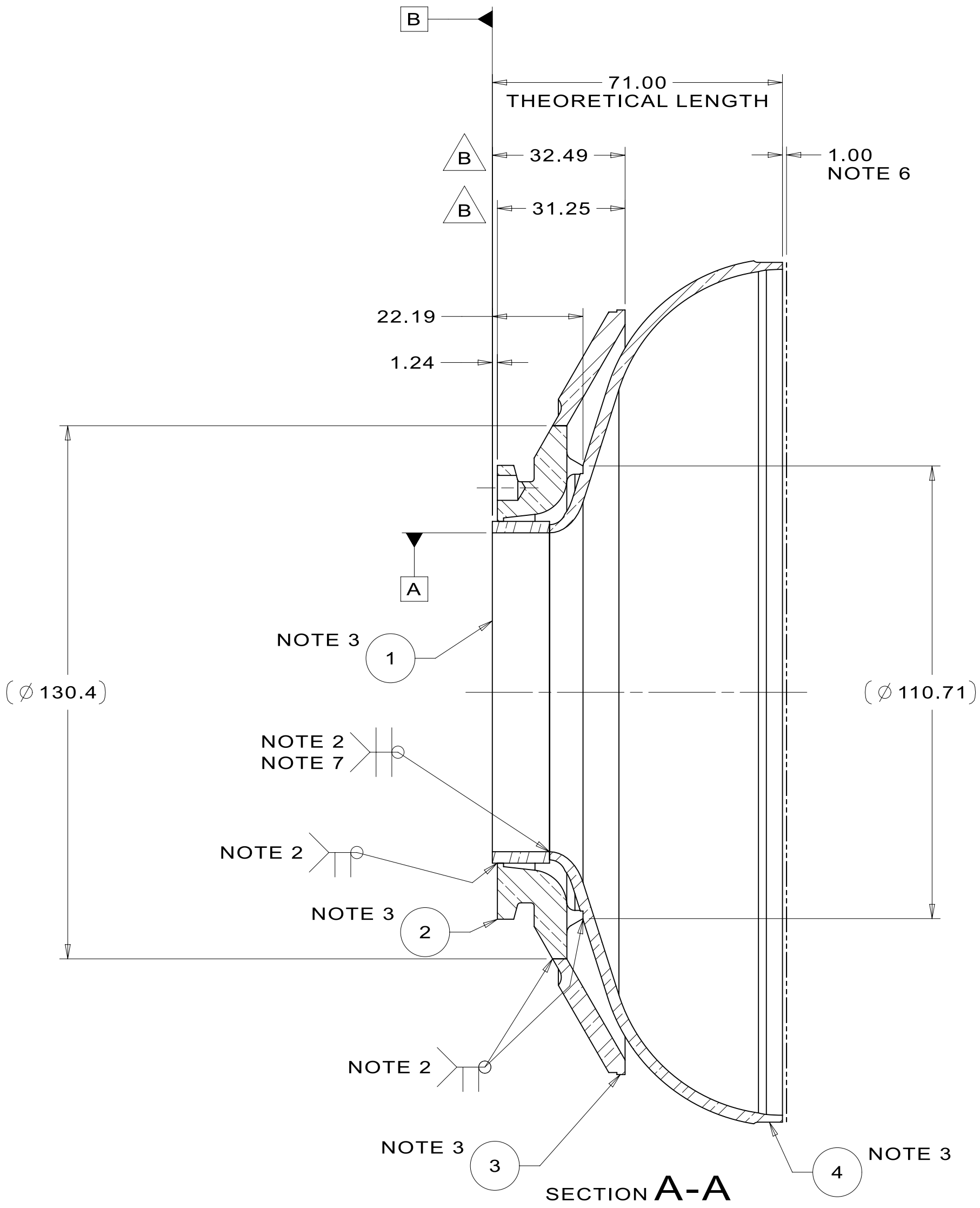
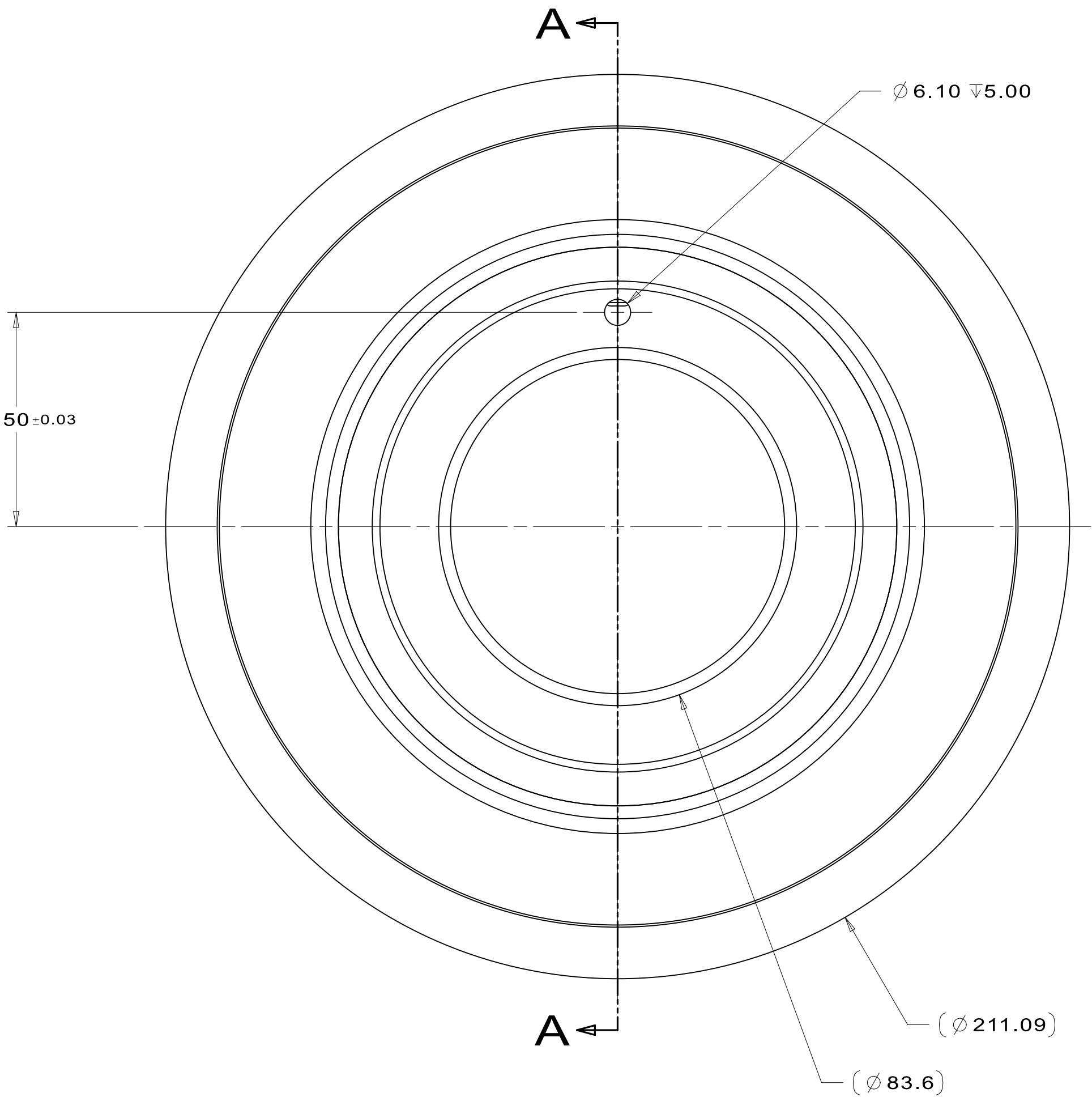
- WELDMENT TO BE FREE OF DUST , GREASE, OIL, CHIPS, AND BURRS.
- WELDING NOTES:
 - ASSEMBLY TO BE VACUUM TIGHT:
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
 - ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS, OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES.
 - ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL-1-1999 AND MUST BE FOLLOWED.
- DEFINITION OF FORM AND TOLERANCES CONCERNING WELD JOINT PREPARATION AT THE IRIS AND THE EQUATOR TO BE COORDINATED BETWEEN MANUFACTURERS AND FERMILAB.
- SUPPLEMENT FOR WELD SHRINKAGE REFERRED TO IN PIECE PART DRAWINGS.
- FINAL LENGTH AFTER MACHINING OPERATION DETAILED ON DRAWING F00439179.
- WELD PREP JOINTS TO MATCH WALL THICKNESS AT DISCRETION OF MANUFACTURER.
- ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.
- THIS DRAWING REPLACES MD-439176.

3	F00439170	1.3GHZ DESY ANTENNA SPOOL PIECE	1
2	F00439153	1.3GHZ DESY LONG END TUBE	1
1	F00439174	1.3GHZ DESY LONG OHM ASSY	1
ITEM	PART NUMBER	DESCRIPTION	QTY.

PARTS LIST			
NAME			
FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
WELDMENT, LONG END TUBE - 1.3 GHZ RF CAVITY			
SCALE 1:1	SIZE A1	DRAWING NUMBER F10026400	SHEET 1 of 1

UNLESS OTHERWISE SPECIFIED			
±X	±X.X	±X.XX	±X/X
2	0.3	0.12	N/A
BREAK ALL SHARP EDGES, MAX: .015			
DO NOT SCALE DRAWING			
DIMENSIONS BASED ON: ASME Y14.5M-1994			
MAX MACHINE ALL SURFACES: 3.2/			
DRAWING UNITS: MM			
THIRD ANGLE PROJECTION			
DRAWN: M.SAWTELL CHECKED: M.KRAMP APPROVED: C.GRIMM USED ON: F00439179 MATERIAL: SEE PARTS LIST GROUP: Technical Division - Design and Drafting			
DATE: 28-Jul-2014 DATE: 07-Aug-2014 DATE: 08-Aug-2014 CAGE CODE: 045R6			

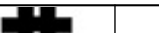
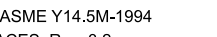
REV	REVISION CONTROL DOCUMENT	1		SIGNATURES	
		DATES		DRAWN	B.TREVINO
C	F10026401-C-RCD	21-Dec-2021		APPROVED	B.HARTSELL
		07-Feb-2022			

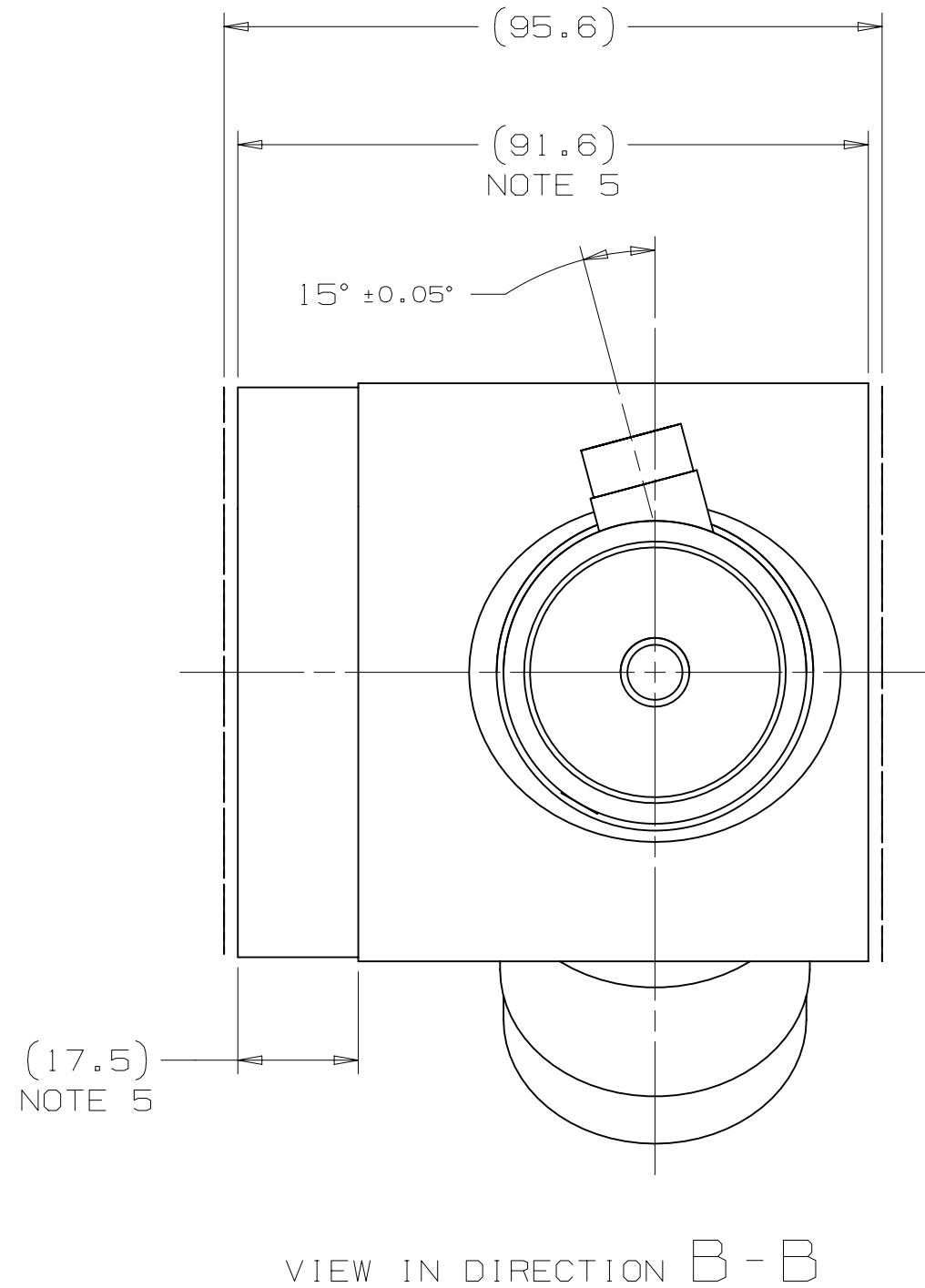
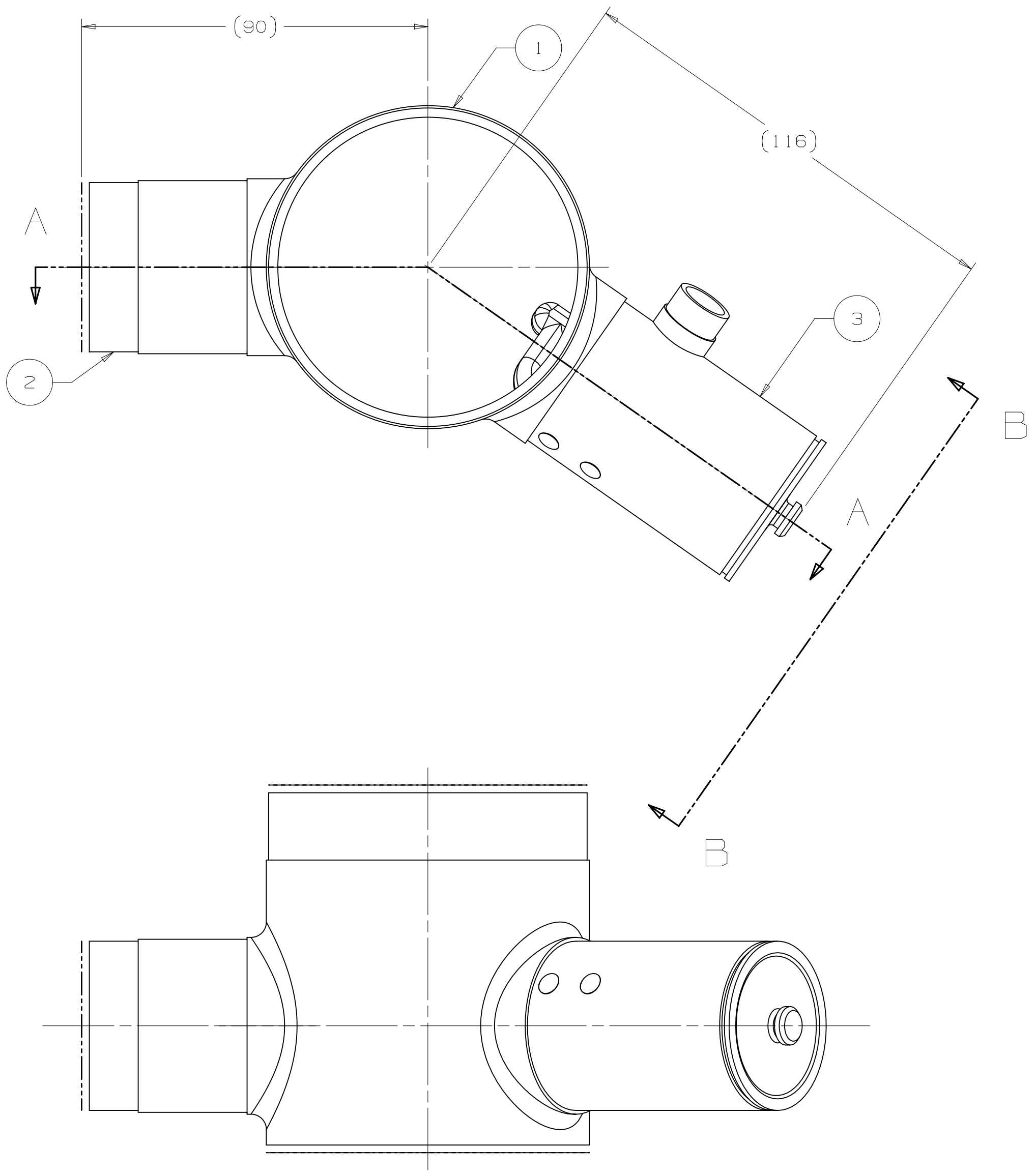
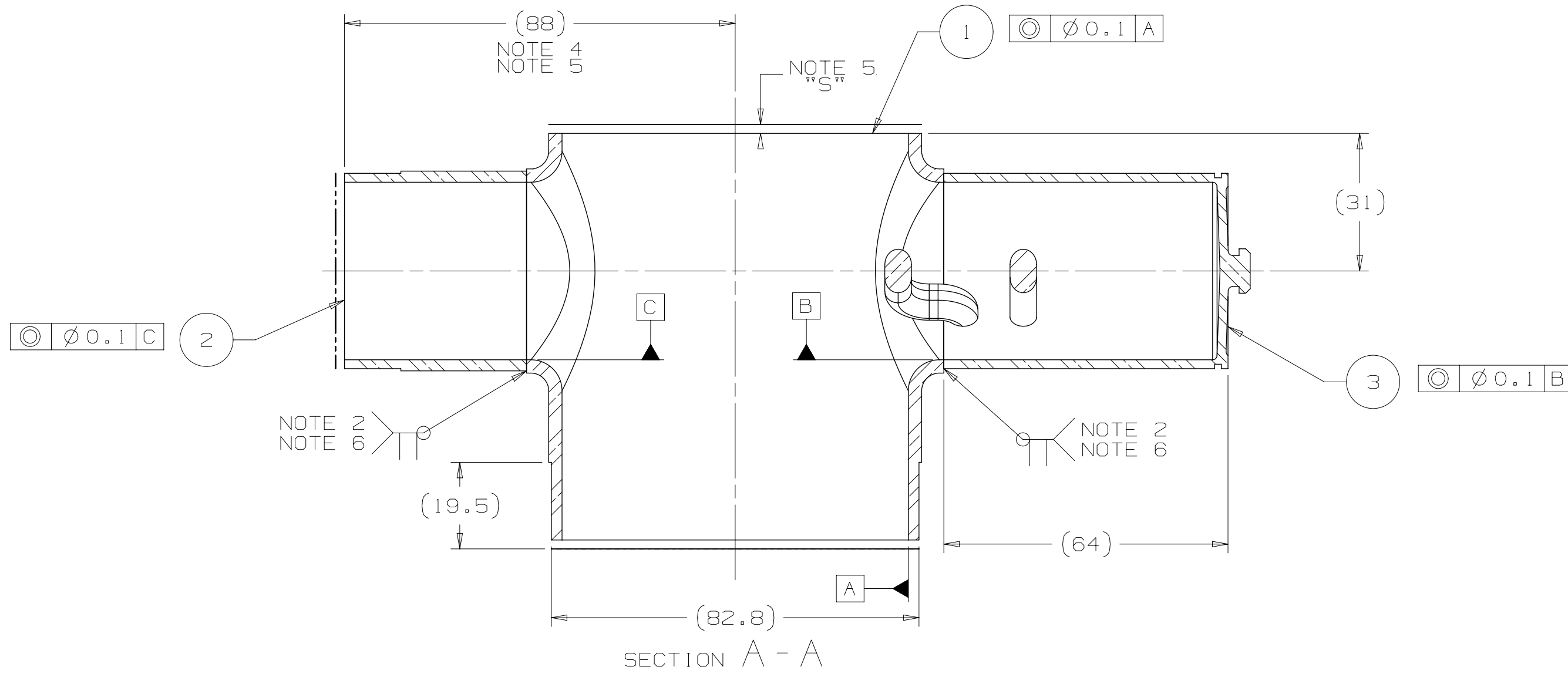


NOTES: (UNLESS OTHERWISE SPECIFIED)

- WELDMENT TO BE FREE OF DUST , GREASE, OIL, CHIPS, AND BURRS.
- WELDING NOTES:
 - ASSEMBLY TO BE VACUUM TIGHT:
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
 - ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS, OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES.
 - ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL-1-1999 AND MUST BE FOLLOWED.
- ALL PARTS TO BE CONCENTRIC WITHIN $\varnothing$ 0.3mm.
- AFTER EB-WELDING ALL SEAMS, MACHINE CONTOUR AS PER DRAWINGS MD-439167 AND MD-439152.
- DO NOT BREAK EDGES ON END CELL.
- ADDITIONAL MATERIAL NEEDED FOR CELL TUNING. PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE. FINAL SURFACE TO BE MACHINED UNTIL TUNED.
- WELD PREP JOINT TO MATCH WALL THICKNESS AT THE DISCRETION OF THE MANUFACTURER -- DUAL PASS WELD -- ENSURE OVERLAP.
- ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.
- THIS DRAWING REPLACES MD-439178.
- TRAILING ZEROS DENOTE TOLERANCE.

4	F00439155	1.3GHZ RF CAVITY LONG END HALF CELL	1
3	F00439167	1.3GHZ LONG END CAP DISK	1
2	F00439152	1.3GHZ RF CAVITY END DISK FLANGE	1
1	F00439164	1.3GHZ END TUBE SPOOL PIECE	1
ITEM	PART NUMBER	DESCRIPTION	QTY.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL		DATE	28-Jul-2014			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY		
±X	±X.X	±X.XX	±X.X	±X"	CHECKED	M.KRAMP		DATE	07-Aug-2014					
2	0.3	0.12	N/A	1	APPROVED	C.GRIMM		DATE	08-Aug-2014					
BREAK ALL SHARP EDGES, MAX: .015 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES, Ra: 3.2 DRAWING UNITS: MM					USED ON		NAME							
					F00439179		WELDMENT, LONG END DISK - 1.3 GHZ RF CAVITY							
MATERIAL					SEE PARTS LIST		SCALE 1:1		SIZE A1		DRAWING NUMBER F10026401			
GROUP: Technical Division - Design and Drafting					CAGE CODE: OUSR6									



- NOTES:(UNLESS OTHERWISE SPECIFIED)
- WELDMENT TO BE FREE OF DUST , GREASE, OIL, CHIPS, AND BURRS.
 - WELDING NOTES:
 - ASSEMBLY TO BE VACUUM TIGHT:
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
 - ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS, OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES.
 - ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL-1-1999 AND MUST BE FOLLOWED.
 - DEFINITION OF FORM AND TOLERANCES CONCERNING WELD JOINT PREPARATION AT THE IRIS AND THE EQUATOR TO BE COORDINATED BETWEEN MANUFACTURERS AND FERMILAB.
 - SUPPLEMENT FOR WELD SHRINKAGE REFERRED TO IN PIECE PART DRAWINGS.
 - FINAL LENGTH AFTER MACHINING OPERATION DETAILED ON DRAWING F00439180.
 - WELD PREP JOINTS TO MATCH WALL THICKNESS AT DISCRETION OF MANUFACTURER.
 - ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.
 - THIS DRAWING REPLACES MD-439177.

3	F00439175	1.3GHZ RF CAVITY SHORT END HOM ASSEMBLY	1
2	F00439171	1.3GHZ RF CAVITY COUPLER SPOOL PIECE	1
1	F00439161	1.3GHZ RF CAVITY SHORT END TUBE	1
ITEM	PART#	DESCRIPTION	QTY.
PARTS LIST			

UNLESS OTHERWISE SPECIFIED

2

±X

±X.X

±X.XX

±X/X

±X°

0.3

0.12

N/A

1

BREAK ALL SHARP EDGES, MAX: .015

DO NOT SCALE DRAWING

DIMENSIONS BASED ON: ASME Y14.5M-1994

MAX MACHINE ALL SURFACES: 3.2/

DRAWING UNITS: MM

THIRD ANGLE PROJECTION

DRAWN

M.SAWTELL

CHECKED

M.KRAMP

APPROVED

C.GRIMM

USED ON

F00439180

MATERIAL

SEE PARTS LIST

GROUP: Technical Division - Design and Drafting

CAGE CODE: 045R6

DATE

28-Jul-2014

DATE

07-Aug-2014

DATE

08-Aug-2014

NAME

F00439180

WELDMENT, SHORT END TUBE - 1.3 GHZ RF CAVITY

SCALE

1:1

SIZE

A1

DRAWING NUMBER

F10026402

SHEET

1 of 1

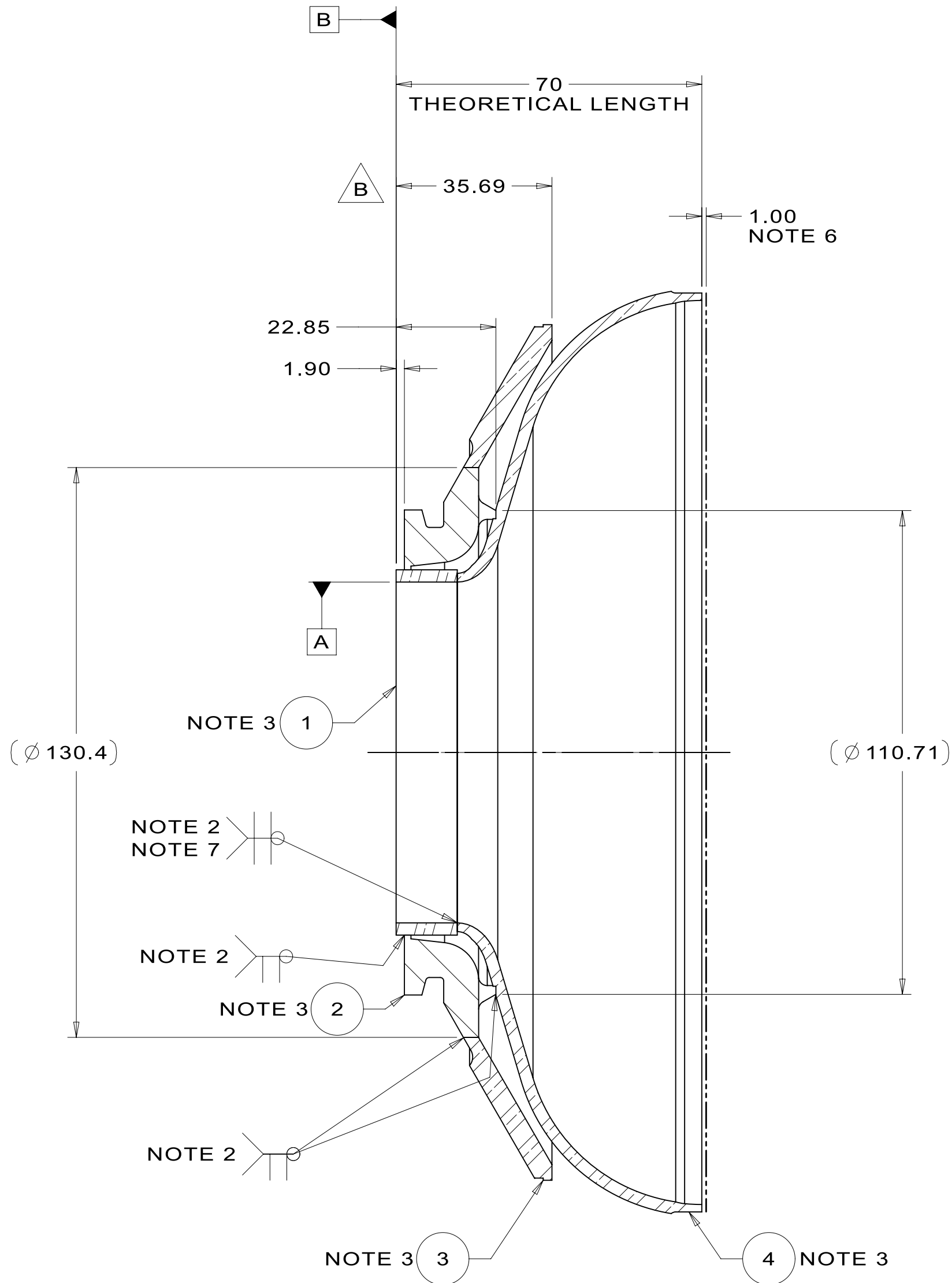
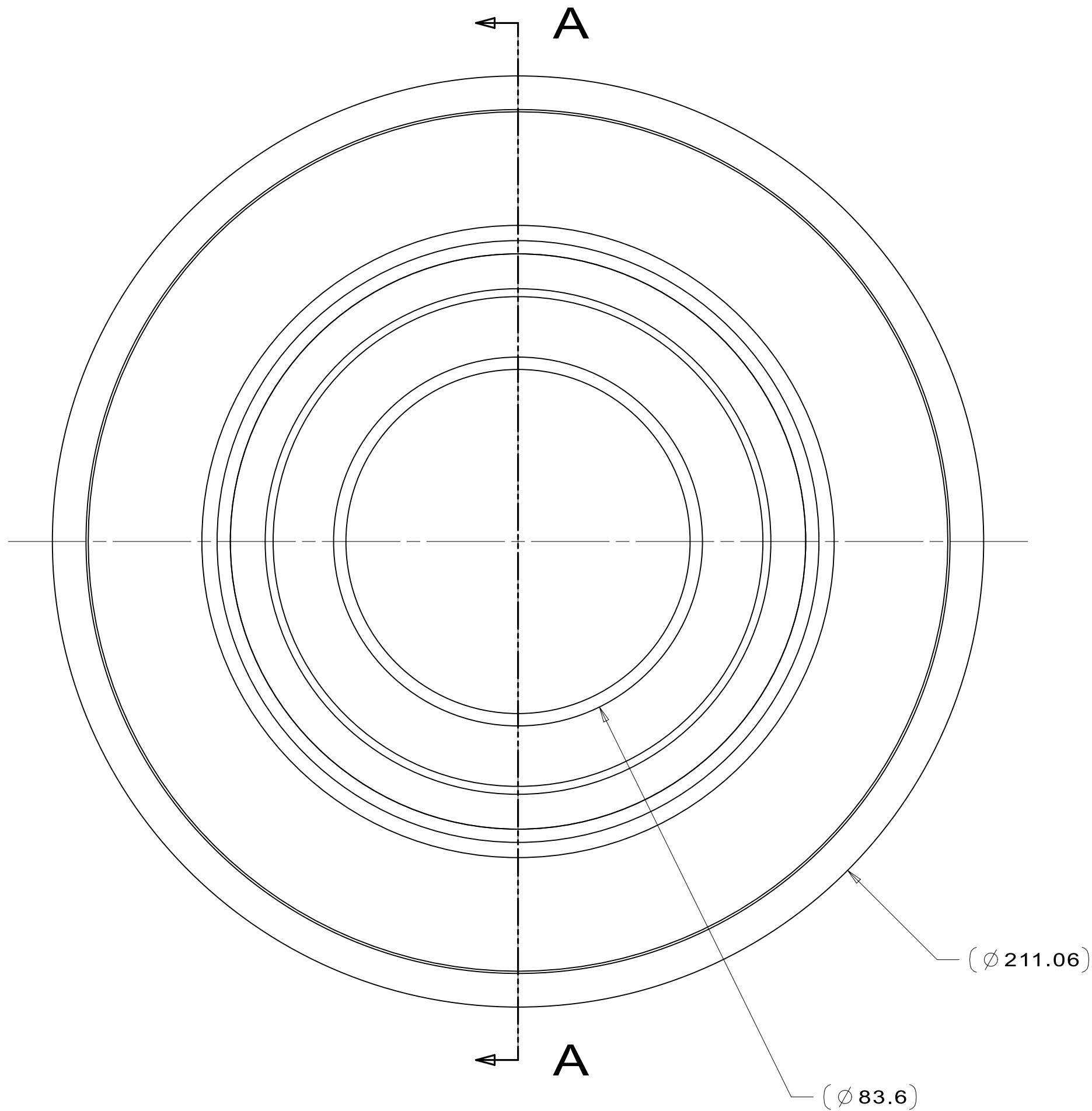
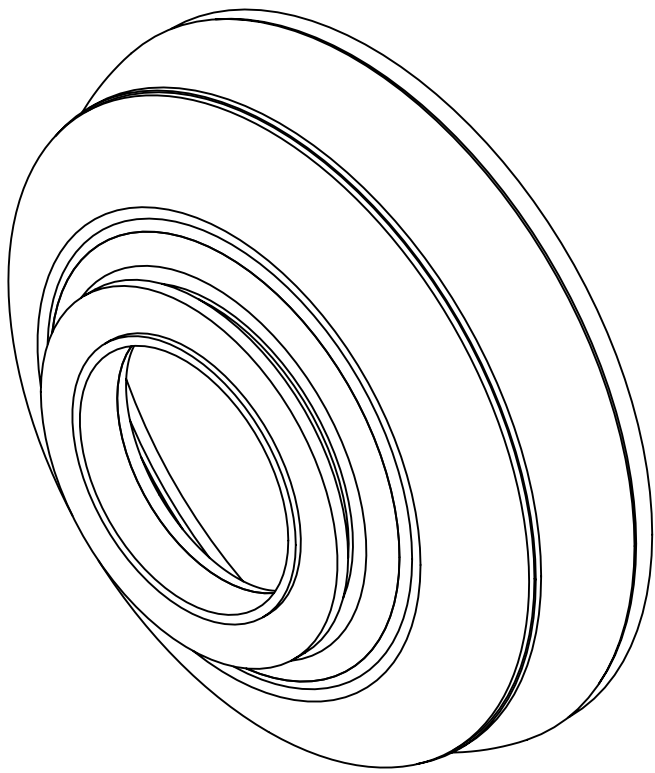
REV

B

FERMI NATIONAL ACCELERATOR LABORATORY

UNITED STATES DEPARTMENT OF ENERGY

REV	REVISION CONTROL DOCUMENT	1		SIGNATURES	
		DATES		DRAWN	B.TREVINO
C	F10026403-C-RCD	21-Dec-2021		APPROVED	B.HARTSELL
		07-Feb-2022			

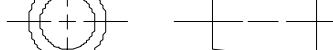


SECTION A-A

NOTES (UNLESS OTHERWISE SPECIFIED):

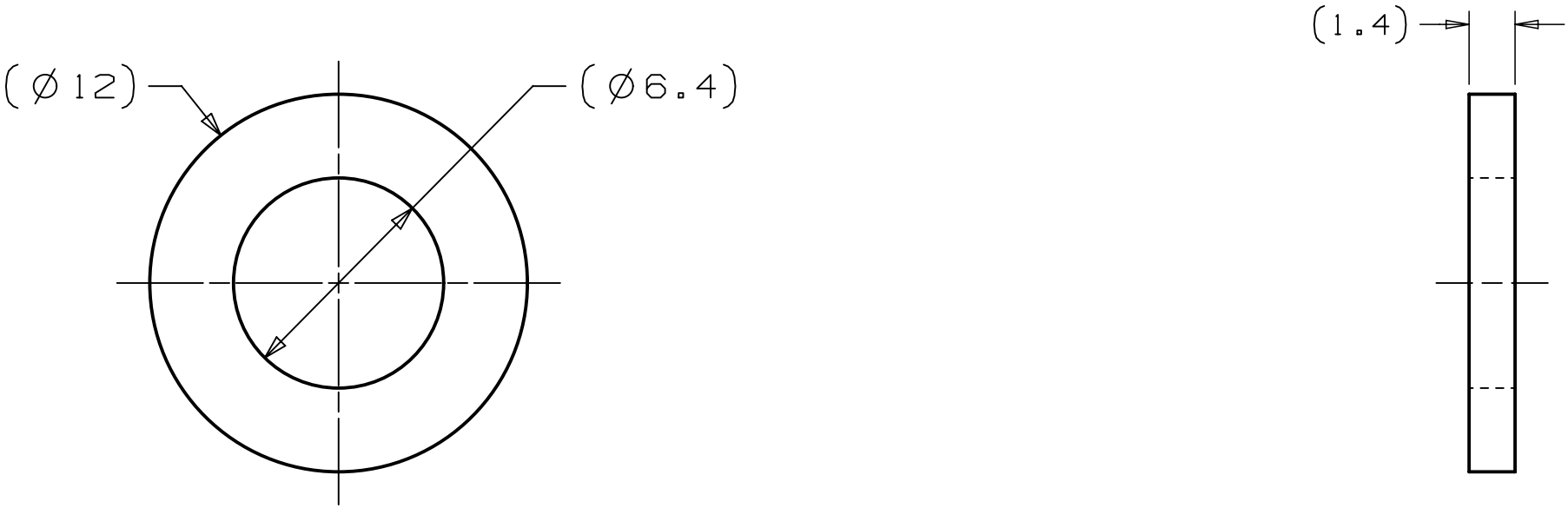
- WELDMENT TO BE FREE OF DUST , GREASE, OIL, CHIPS, AND BURRS.
- WELDING NOTES:
 - ASSEMBLY TO BE VACUUM TIGHT:
NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM MASS SPECTROMETER LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 2×10^{-10} ATM CC/SEC FOR HELIUM.
 - ASSEMBLY TO BE CLEANED, AND PACKAGED SO AS TO ASSURE NO CONTAMINATION FOR FOREIGN MATERIALS, METAL CHIPS, OR OTHER CONTAMINATES. CLEANING PROCEDURE TO BE APPROVED BY FERMILAB.
 - ALL DESIGN, ASSEMBLY, AND HANDLING IS TO CONFORM TO STANDARD ULTRA HIGH VACUUM PRACTICES.
 - ALL ELECTRON BEAM WELDING, ACID ETCHING, CLEANLINESS, AND HANDLING PROCEDURES ARE DETAILED IN DESY SPECIFICATION MHF-SL-1-1999 AND MUST BE FOLLOWED.
- ALL PARTS TO BE CONCENTRIC WITHIN $\varnothing$ 0.3mm.
- AFTER EB-WELDING ALL SEAMS, MACHINE CONTOUR AS PER DRAWINGS MD-439168 AND MD-439152.
- DO NOT BREAK EDGES ON END CELL.
- ADDITIONAL MATERIAL NEEDED FOR CELL TUNING. PLUS ALLOWANCE FOR E-BEAM WELD SHRINKAGE. FINAL SURFACE TO BE MACHINED UNTIL TUNED.
- WELD PREP JOINT TO MATCH WALL THICKNESS AT THE DISCRETION OF THE MANUFACTURER -- DUAL PASS WELD -- ENSURE OVERLAP.
- ALL DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.
- THIS DRAWING REPLACES MD-439178.

4	F00439163	1.3GHZ RF CAVITY SHORT END HALF CELL	1
3	F00439168	1.3GHZ SHORT END CAP DISK	1
2	F00439152	1.3GHZ RF CAVITY END DISK FLANGE	1
1	F00439164	1.3GHZ END TUBE SPOOL PIECE	1
ITEM	PART#	DESCRIPTION	QTY.
PARTS LIST			

UNLESS OTHERWISE SPECIFIED					DRAWN	M.SAWTELL		DATE	28-Jul-2014			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X.X	±X"	CHECKED	M.KRAMP		DATE	07-Aug-2014						
2	0.3	0.12	N/A	1	APPROVED	C.GRIMM		DATE	08-Aug-2014						
BREAK ALL SHARP EDGES, MAX: .015 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES, Ra: 3.2 DRAWING UNITS: MM					USED ON		F00439180		NAME		WELDMENT, SHORT END DISK - 1.3 GHZ RF CAVITY				
 THIRD ANGLE PROJECTION					MATERIAL		SEE PARTS LIST		SCALE		SIZE	DRAWING NUMBER		SHEET	REV
					GROUP: Technical Division - Design and Drafting CAGE CODE: OUSR6				A1		F10026403		1 of 1	C	

DESCRIPTION: WASHER, M6, 316L SS, ELECTRO-POLISHED
PROJECT: PIP-11_650MHz
CATEGORY: WASHER

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
A	F10028985-A-RCD	26-Dec-2019 10-Jan-2020	DRAWN APPROVED M.KRAMP C.GRIMM



NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- ELECTRO-POLISHED

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM				
 THIRD ANGLE PROJECTION				

DRAWN	G. LANGLOIS	DATE	29-Sep-2014
CHECKED	M. KRAMP	DATE	10-Sep-2015
APPROVED	C. GRIMM	DATE	10-Sep-2015
USED ON			
F10023864			
MATERIAL			
SEE PARTS LIST			
GROUP: Technical Division - Design and Drafting		CAGE CODE: QUSR6	

1	FC0016263	WASHER, M6-6.4x12x1.4, SS316L	1
ITEM	FERMI #	DESCRIPTION	QTY
PARTS LIST			

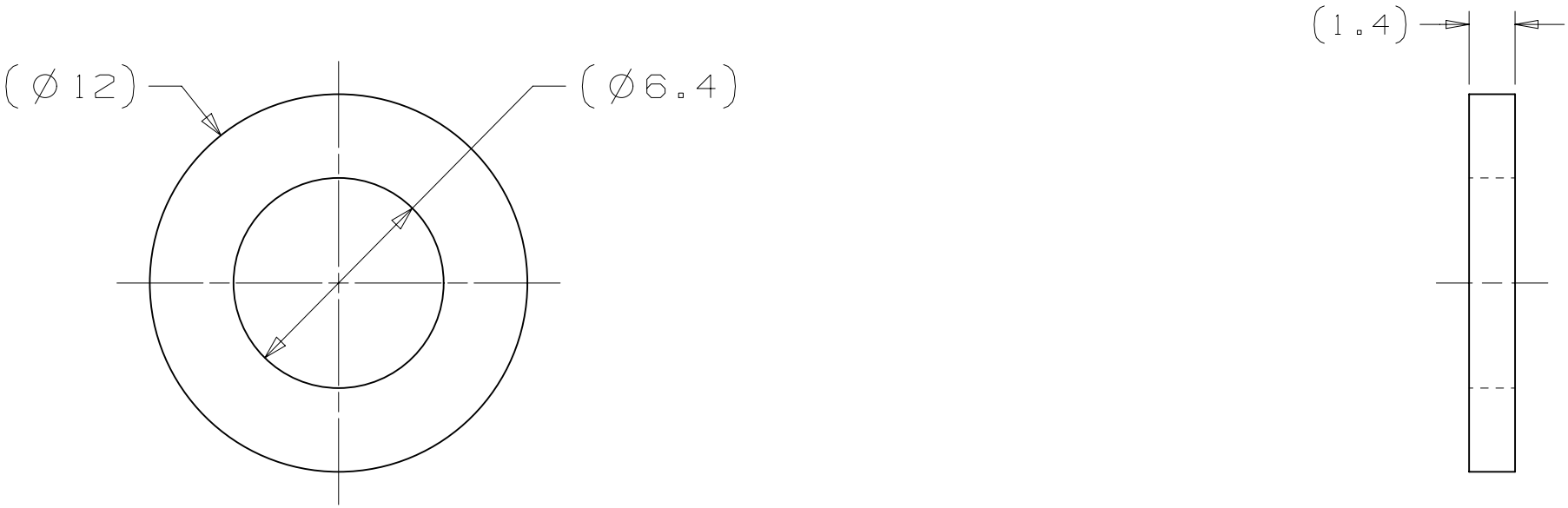


FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

NAME		WASHER, M6, 316L SS, ELECTRO-POLISHED		
SCALE	SIZE	DRAWING NUMBER	SHEET	REV
5:1	A3	F10028985	1 of 1	A

DESCRIPTION: WASHER, M6, 316L SS, ELECTRO-POLISHED
PROJECT: PIP-11_650Mhz
CATEGORY: WASHER

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
A	F10028985-A-RCD	26-Dec-2019	DRAWN M.KRAMP
		10-Jan-2020	APPROVED C.GRIMM



NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- ELECTRO-POLISHED

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM				
 THIRD ANGLE PROJECTION				

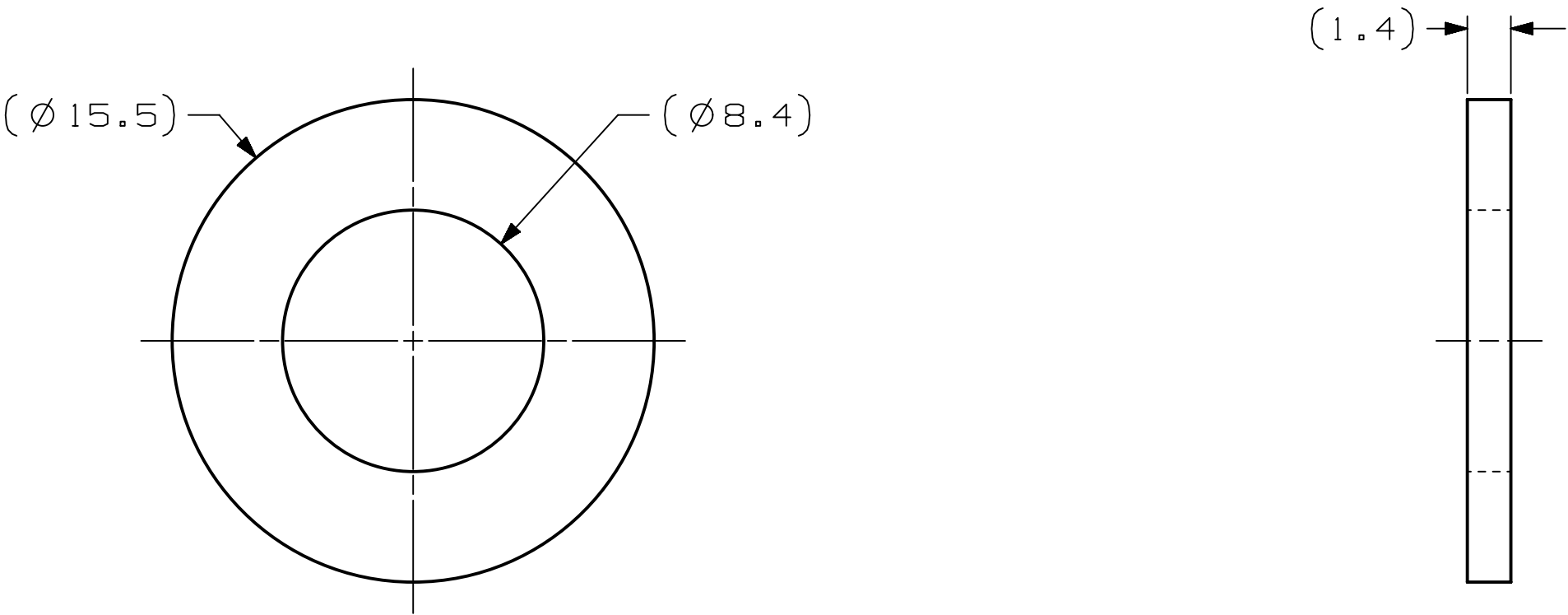
DRAWN	G. LANGLOIS	DATE	29-Sep-2014
CHECKED	M. KRAMP	DATE	10-Sep-2015
APPROVED	C. GRIMM	DATE	10-Sep-2015
USED ON			
F10023864			
MATERIAL			
SEE PARTS LIST			
GROUP: Technical Division - Design and Drafting		CAGE CODE: 0U5R6	

1	FC0016263	WASHER, M6-6.4x12x1.4, SS316L	1
ITEM	FERMI #	DESCRIPTION	QTY
PARTS LIST			

		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
NAME		WASHER, M6, 316L SS, ELECTRO-POLISHED	
SCALE	SIZE	DRAWING NUMBER	SHEET
5:1	A3	F10028985	1 of 1
		REV	A

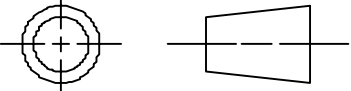
DESCRIPTION: WASHER, M8, 316L SS, ELECTRO-POLISHED
PROJECT: LCLSII Cryogenic System
CATEGORY: WASHER

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
B	F10028993-B-RCD	26-Dec-2019	DRAWN M.KRAMP
		10-Jan-2020	APPROVED C.GRIMM



NOTES: (UNLESS OTHERWISE SPECIFIED)

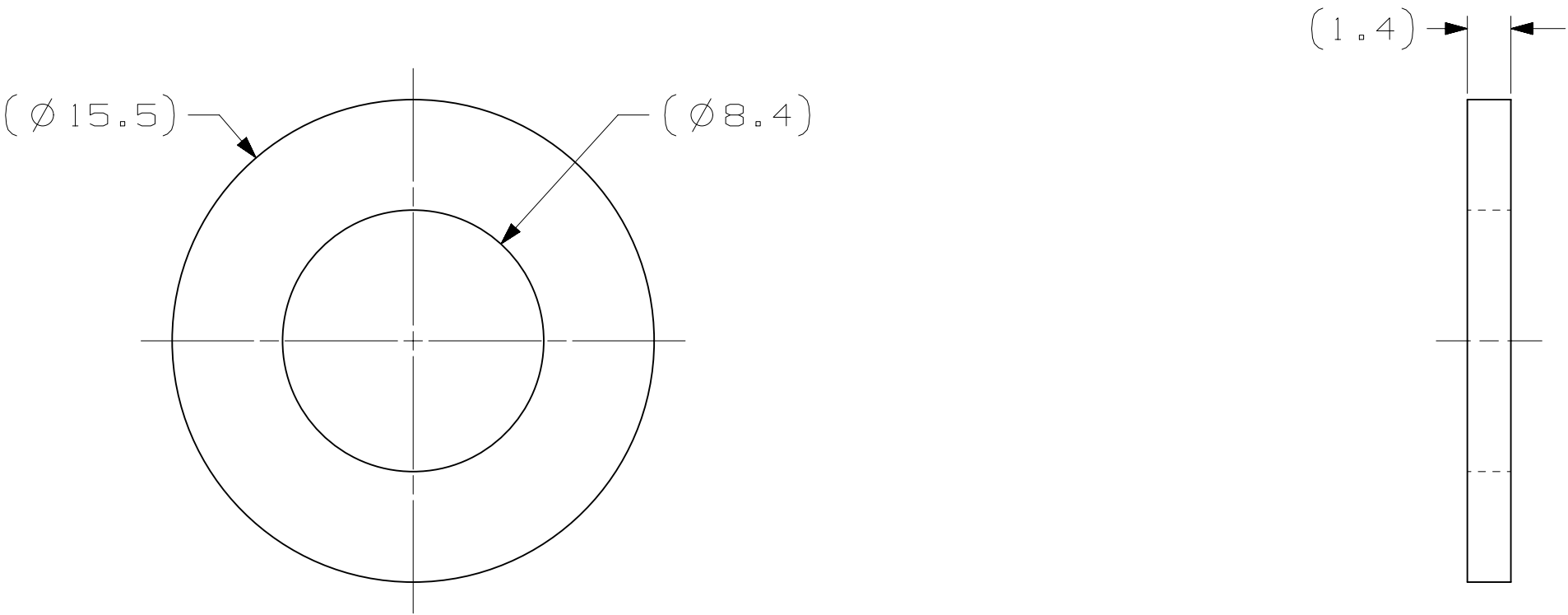
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- ELECTRO-POLISHED

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM				
				
THIRD ANGLE PROJECTION				

	1	FC0016265	WASHER, M8-8.4x16x1.4, SS316L				1	
	ITEM	PART NUMBER	DESCRIPTION				QTY	
	PARTS LIST							
DRAWN	G.NELSON	DATE	02-Mar-2015		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
CHECKED	J.COGHILL	DATE	12-Mar-2015					
APPROVED	O.PRONITCHEV	DATE	12-Mar-2015					
USED ON				NAME				
F10023864				WASHER, M8, 316L SS,  ELECTRO-POLISHED				
MATERIAL								
SEE PARTS LIST				SCALE	SIZE	DRAWING NUMBER	SHEET	REV
				5:1	A3	F10028993	1 of 1	B
GROUP: Technical Division - Design and Drafting				CAGE CODE: 0U5R6				

DESCRIPTION: WASHER, M8, 316L SS, ELECTRO-POLISHED
PROJECT: LCLSII Cryogenic System
CATEGORY: WASHER

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
B	F10028993-B-RCD	26-Dec-2019	DRAWN	M.KRAMP
		10-Jan-2020	APPROVED	C.GRIMM



NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- ELECTRO-POLISHED

UNLESS OTHERWISE SPECIFIED

±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1

BREAK ALL SHARP EDGES, MAX: 0.5
DO NOT SCALE DRAWING
DIMENSIONS BASED ON: ASME Y14.5M-1994
MAX MACHINE ALL SURFACES: 3.2√
DRAWING UNITS: MM

THIRD ANGLE PROJECTION

DRAWN	G.NELSON	DATE	02-Mar-2015
CHECKED	J.COGHILL	DATE	12-Mar-2015
APPROVED	O.PRONITCHEV	DATE	12-Mar-2015

USED ON
F10023864

MATERIAL
SEE PARTS LIST

GROUP: Technical Division - Design and Drafting

FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

NAME
WASHER, M8, 316L SS, ELECTRO-POLISHED

SCALE
5:1

SIZE
A3

DRAWING NUMBER
F10028993

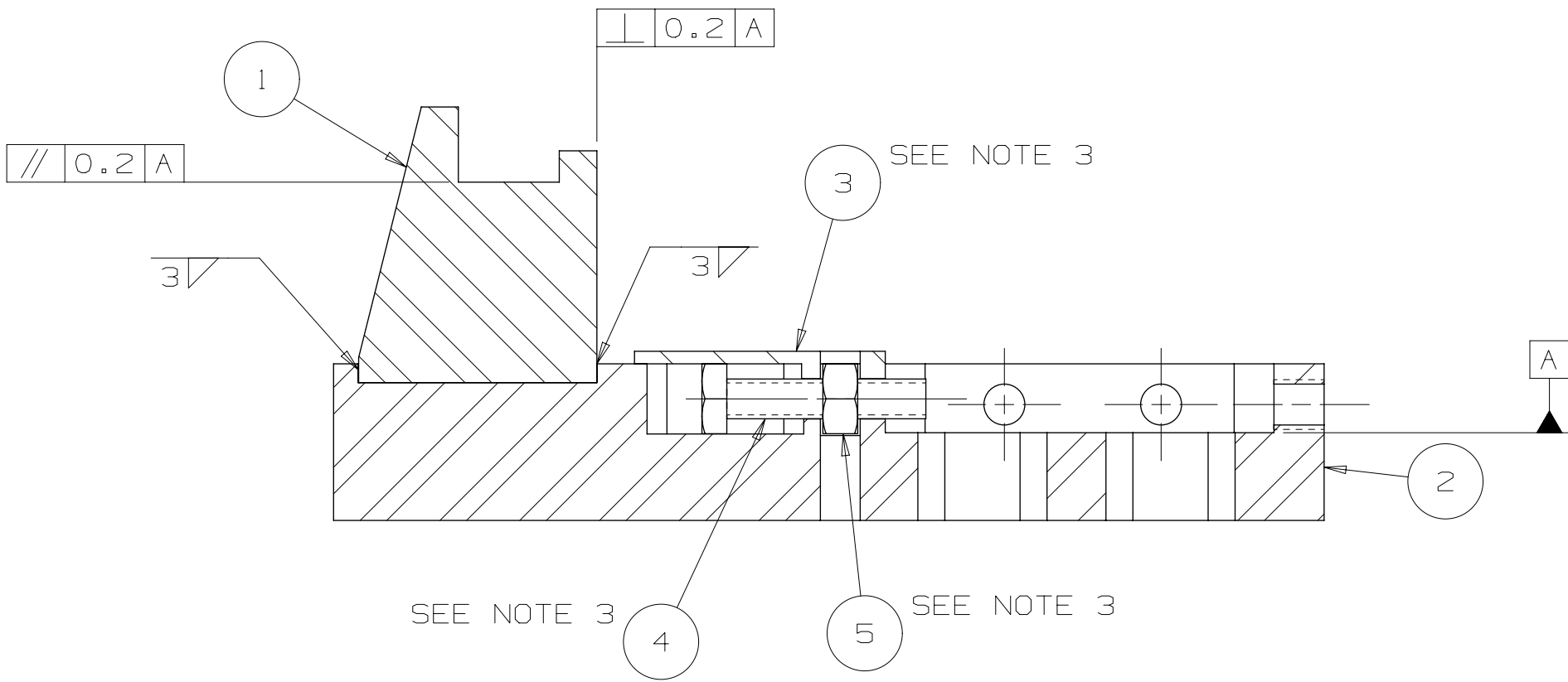
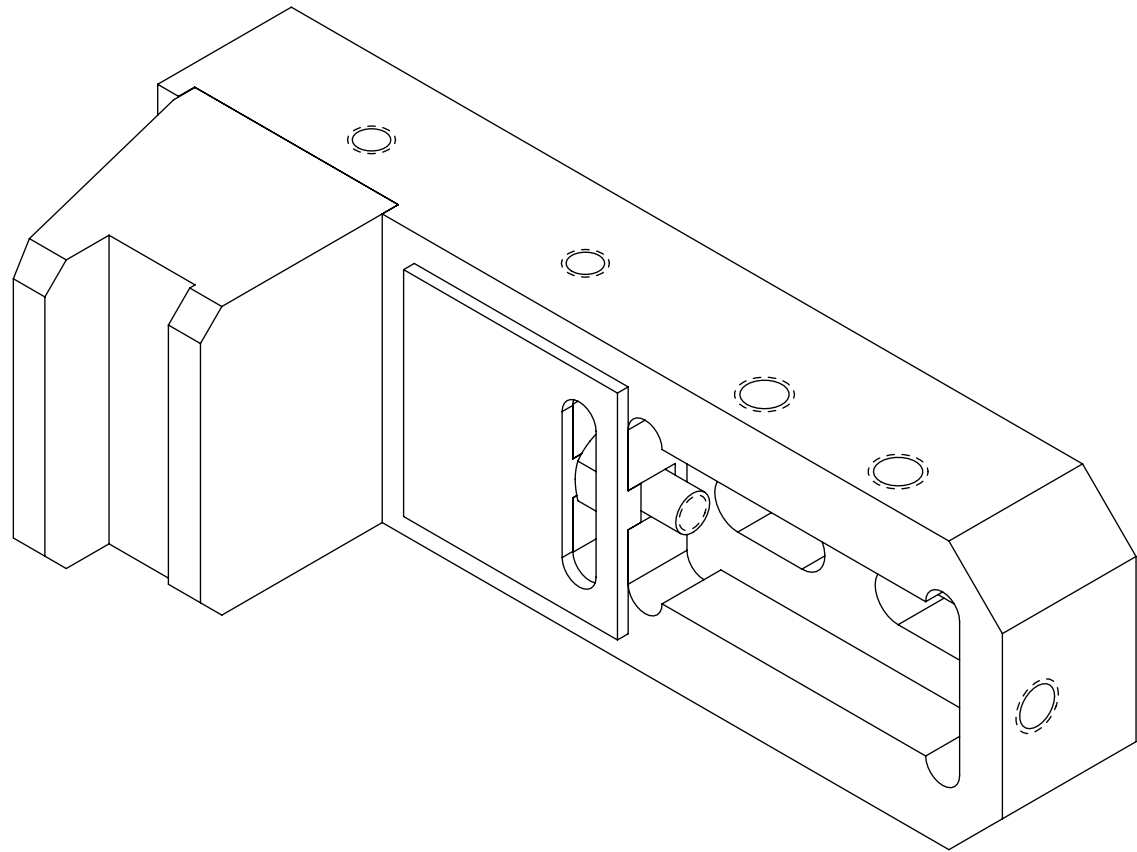
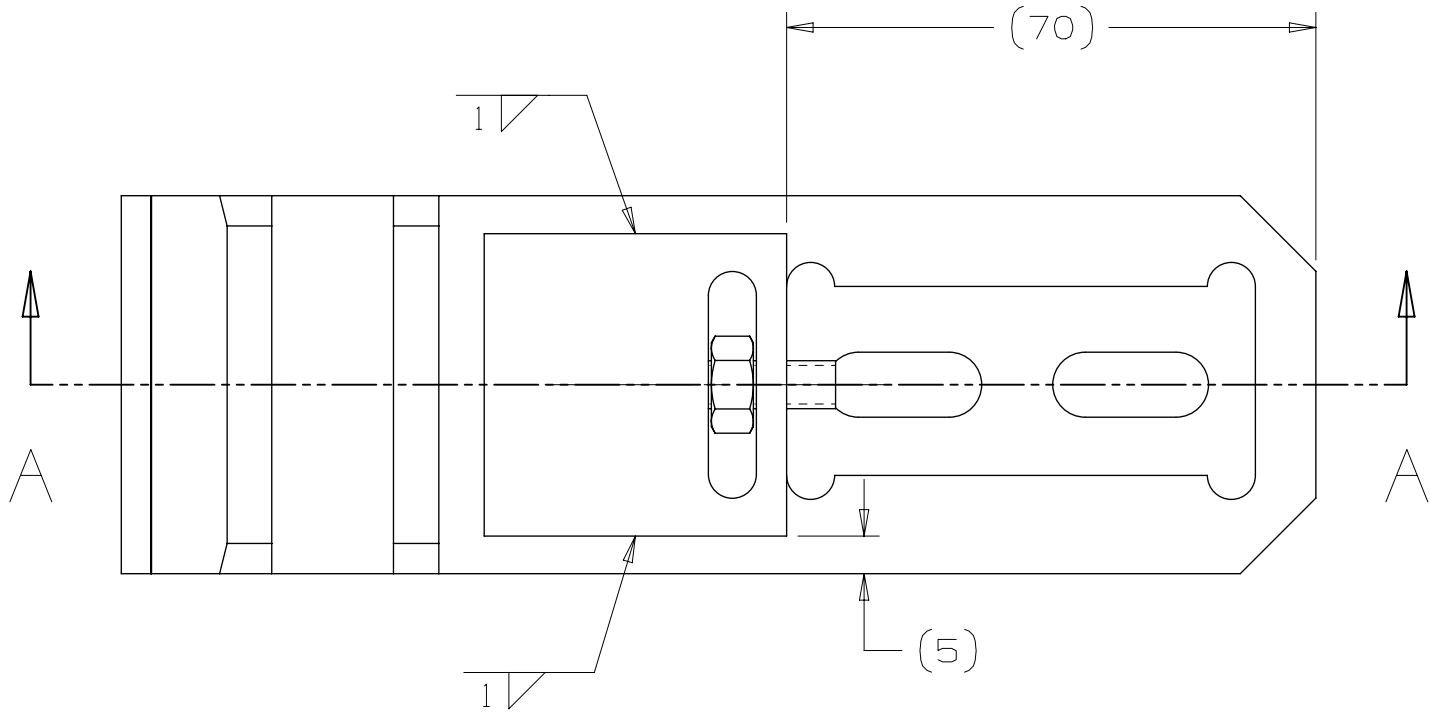
SHEET
1 of 1

REV
B

1	FC0016265	WASHER, M8-8.4×16×1.4, SS316L	1
ITEM	PART NUMBER	DESCRIPTION	QTY
PARTS LIST			

DESCRIPTION: WELDMENT, BELLOWS BRACE ARM 1
PROJECT: PIP-11_650Mhz
CATEGORY: WELDMENT

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
D	F10030937-D-RCD	15-Aug-2019	DRAWN	M.KRAMP
		27-Aug-2019	APPROVED	C.GRIMM



SECTION A - A

5	FC0014519	NUT-HEX, 1/4-20x0.2188,SB	1
4	FC0008961	HHCS,1/4-20x1.25LGxFT,5S316	1
3	F10030939	PLATE, SCREW LID	1
2	F10008697	PLATE, LCLS-II PP BELLOWS BRACE ARM 1	1
1	F10006861	PLATE, CAVITY SAFETY STOP	1
ITEM	PART #	DESCRIPTION	QTY.

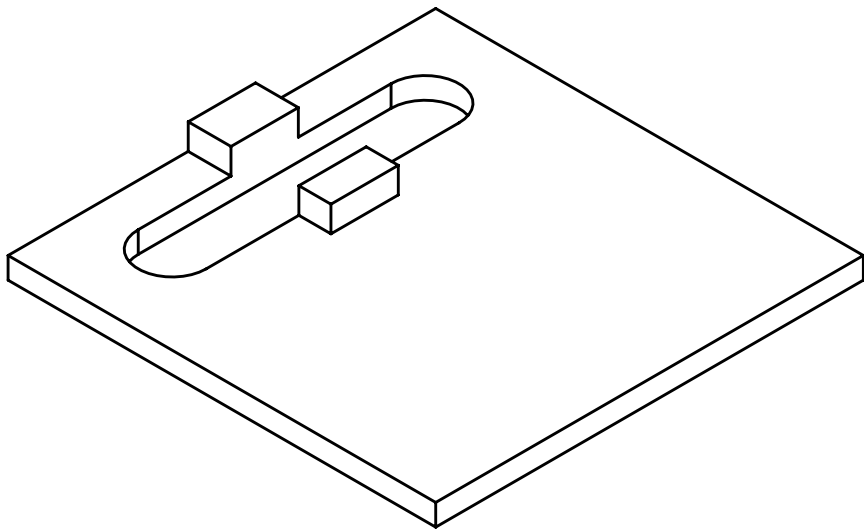
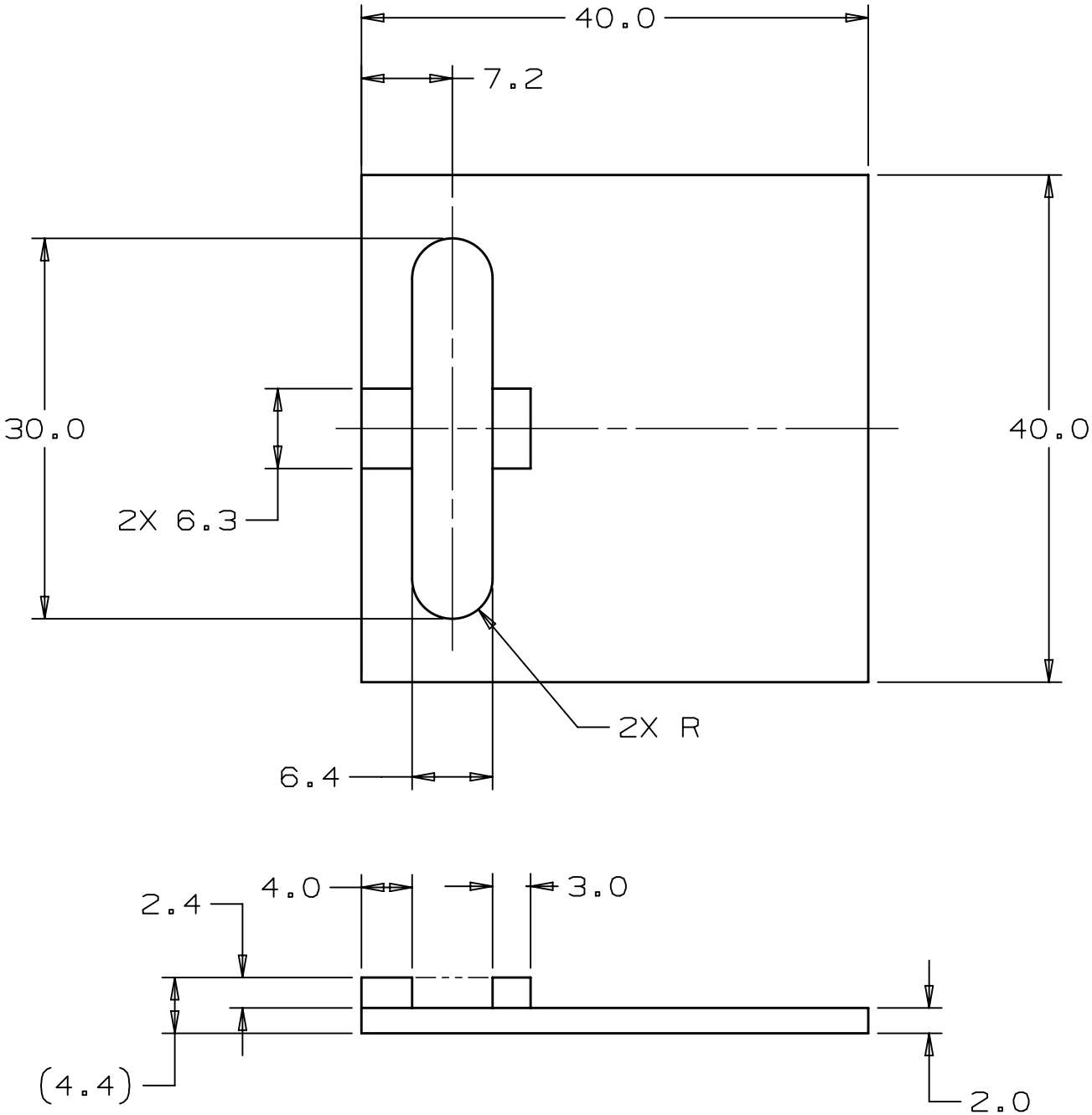
PARTS LIST			
NAME			
WELDMENT, BELLOWS BRACE ARM 1			
SCALE	SIZE	DRAWING NUMBER	SHEET
1:1	A2	F10030937	1 of 1
REV			D

UNLESS OTHERWISE SPECIFIED					DRAWN	B.DAMPHOUSSE	DATE	17-Nov-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	18-Nov-2014
2	0.3	0.12	N/A	1	APPROVED	E.BORISSOV	DATE	19-Nov-2014
BREAK ALL SHARP EDGES, MAX: 0.5					USED ON			
DO NOT SCALE DRAWING					F10017508			
DIMENSIONS BASED ON: ASME Y14.5-2009					MATERIAL			
MAX MACHINE ALL SURFACES: 3.2✓					SEE PARTS LIST			
DRAWING UNITS: MM					GROUP: Technical Division - Design and Drafting			
THIRD ANGLE PROJECTION					CAGE CODE: QUSR6			

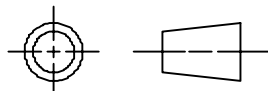
- NOTES: (UNLESS OTHERWISE SPECIFIED)
- 1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 - 2. PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 - 3. PLACE ITEMS 4 AND 5 IN CONFIGURATION SHOWN IN SECTION A-A BEFORE WELDING ITEM 3.

DESCRIPTION: PLATE, SCREW LID
CATEGORY: PLATE PROJECT: LCLS11Cryomodule

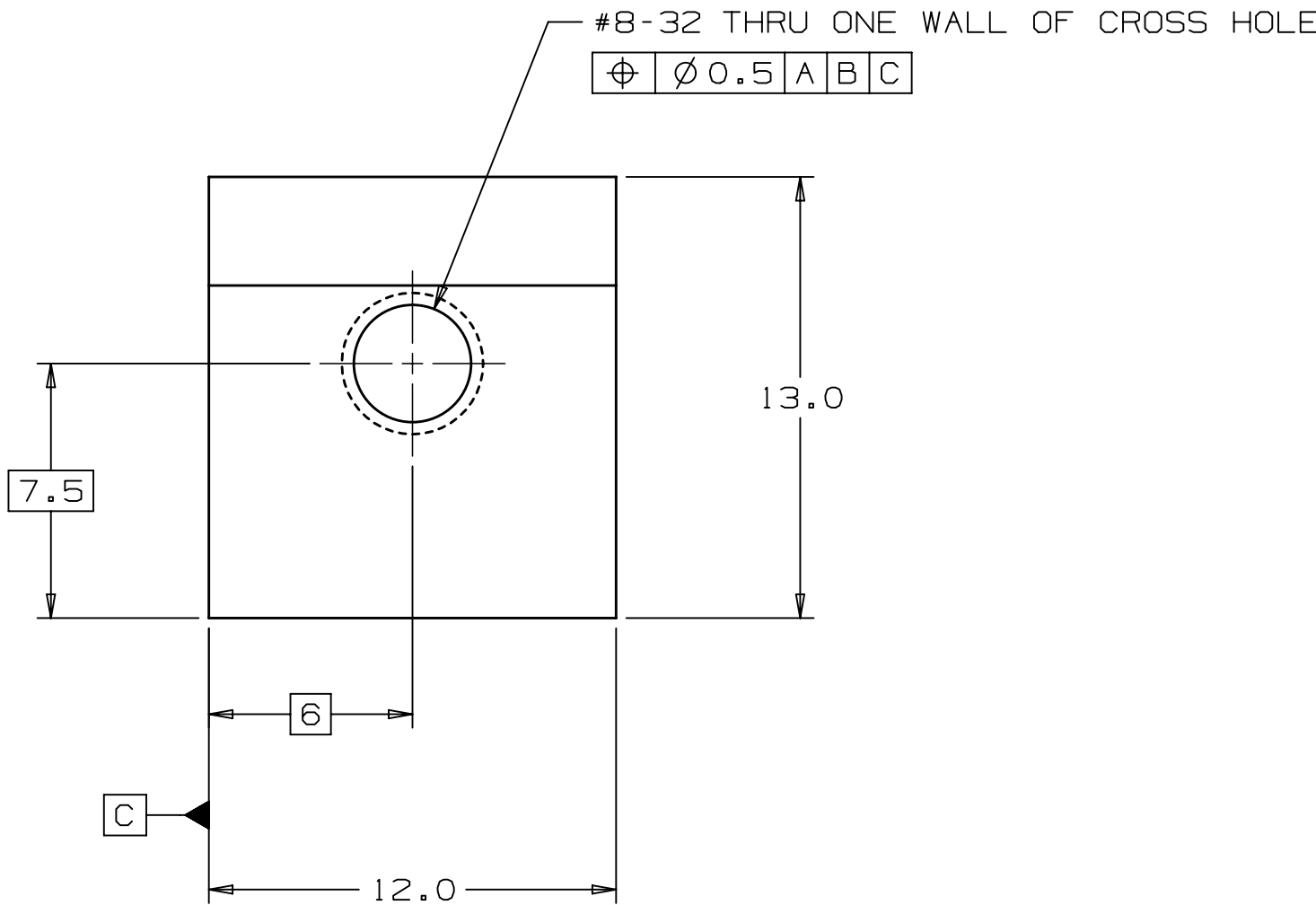
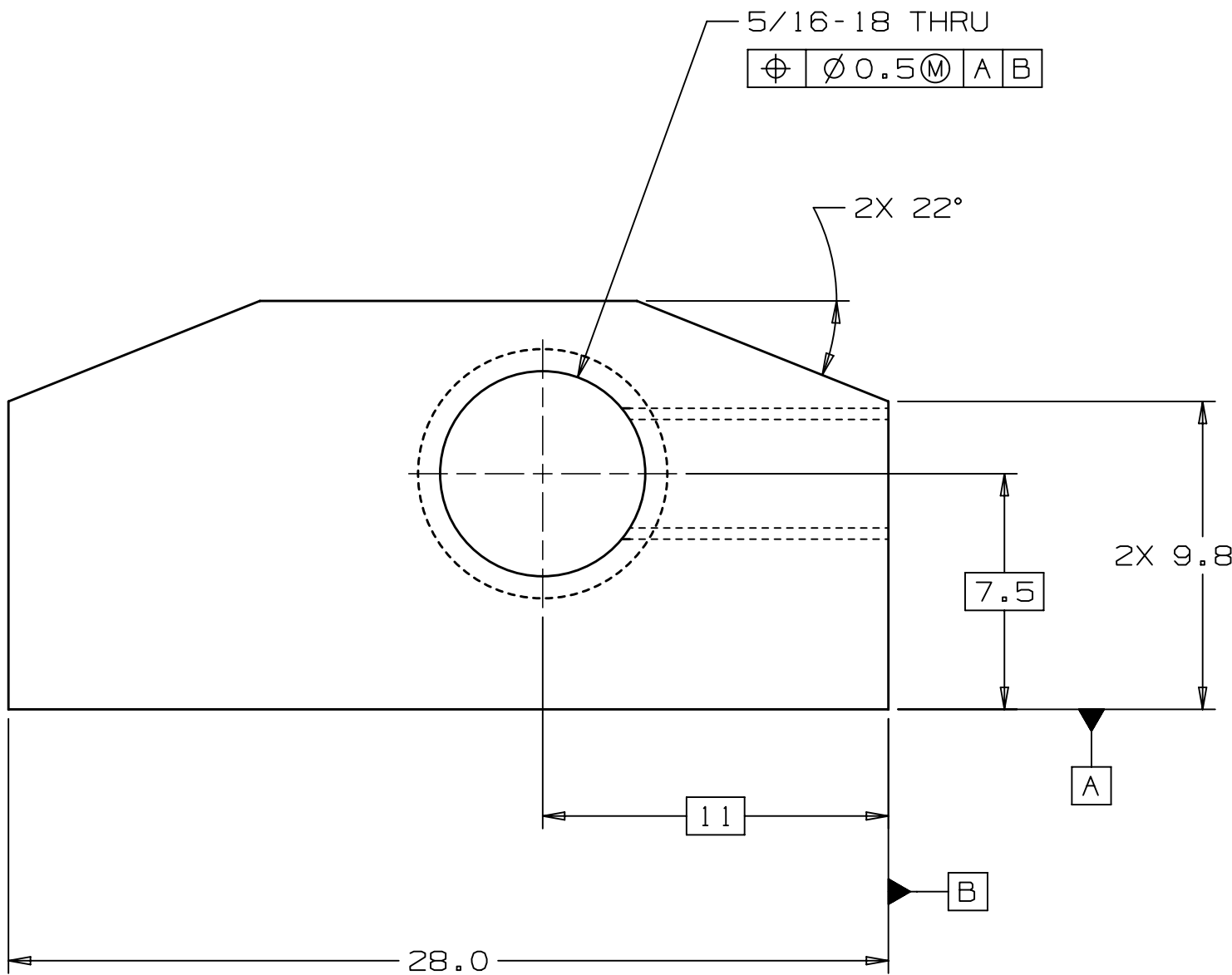
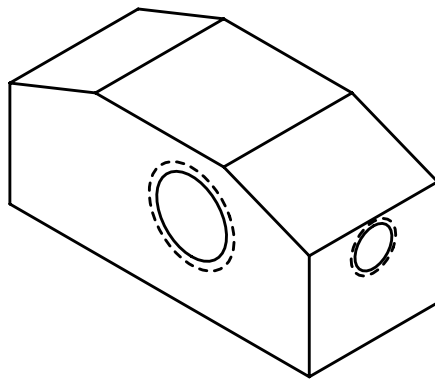
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
C	F10030939-C-RCD	10-Feb-2016	DRAWN	B.DAMPHOUSSE
		20-Apr-2016	APPROVED	C.GRIMM



- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE FROM DUST, GREASE, OIL, AND CHIPS.
 - ALL DIMENSIONS IN BRACKETS [X.XX] ARE IN INCHES.
 - DIMENSIONS WITH TRAILING ZEROS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	B.DAMPHOUSSE	DATE	18-Nov-2014		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP	DATE	19-Nov-2014						
2	0.3	0.12	N/A	1°	APPROVED	E.BORISSOV	DATE	20-Nov-2014						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 3.2✓ DRAWING UNITS: MM					USED ON				NAME PLATE, SCREW LID					
					F10030937, F10030938									
										MATERIAL				316LN STAINLESS STEEL
GROUP: Technical Division - Design and Drafting				CAGE CODE: 0U5R6						SCALE 1:1	SIZE A3	DRAWING NUMBER F10030939	SHEET 1 OF 1	REV C

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
C	F10031022-C-RCD	10-Feb-2016	DRAWN	B.DAMPHOUSSE
		20-Apr-2016	APPROVED	C.GRIMM

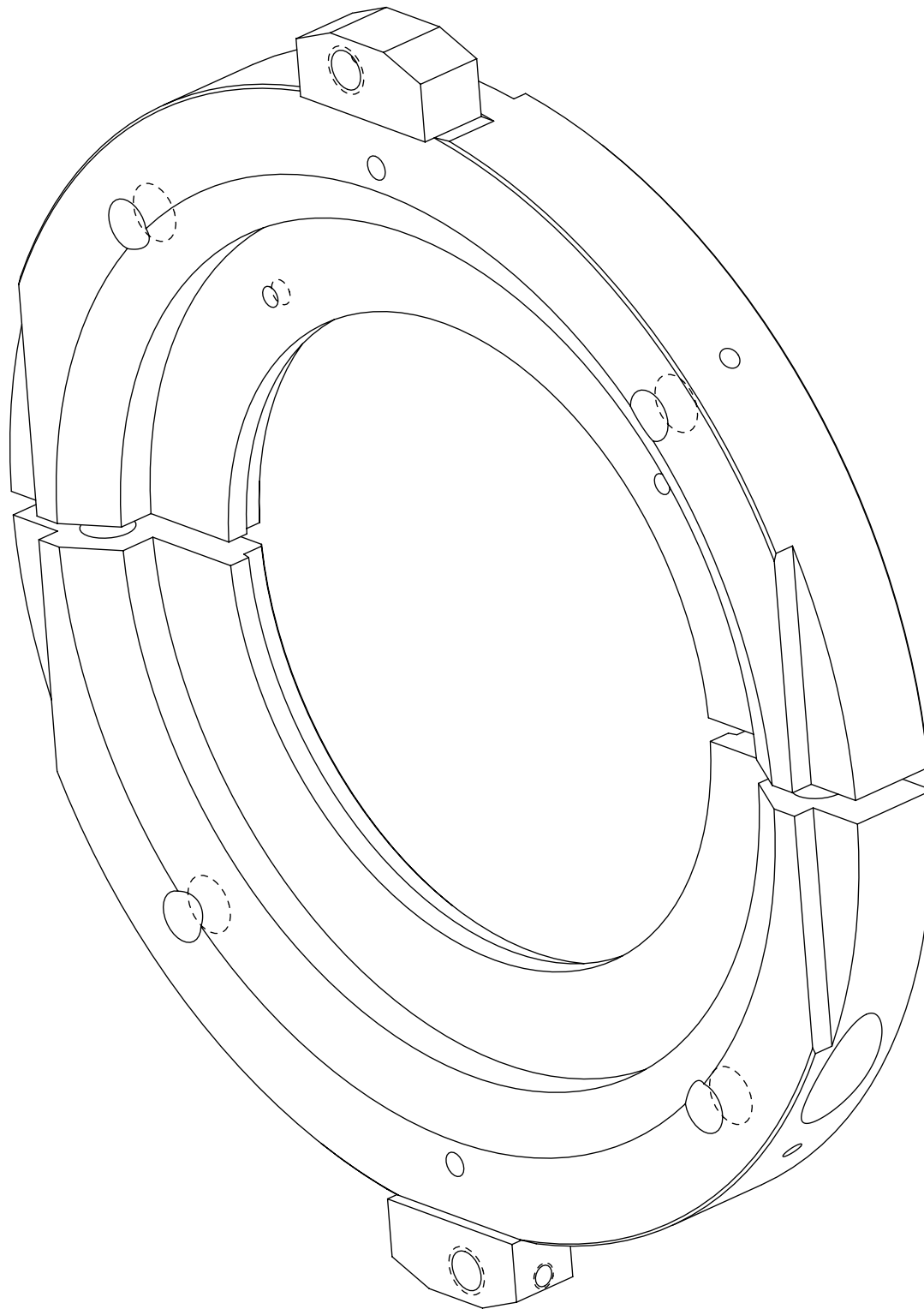
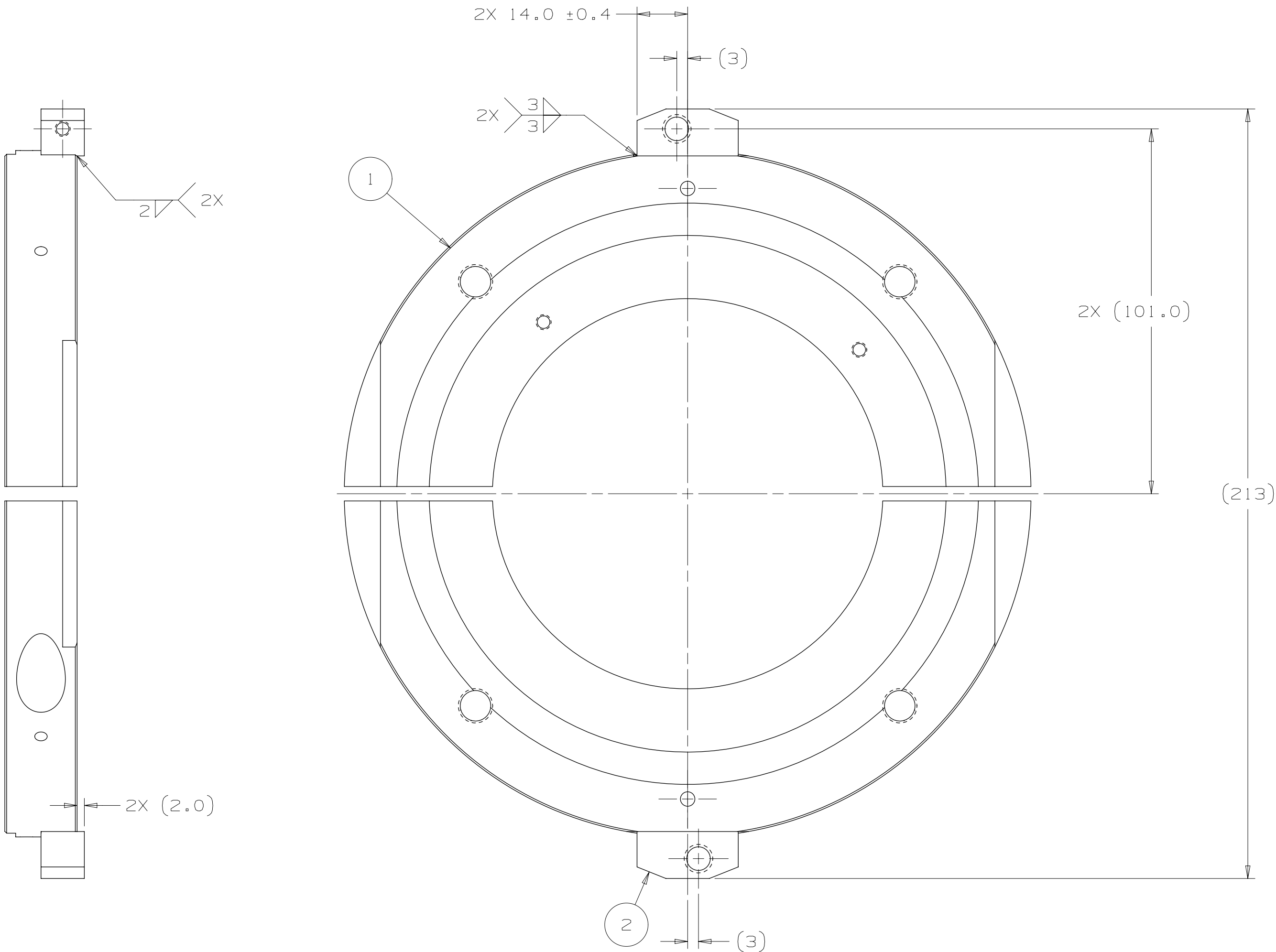


- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 - PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 - TRAILING ZEROS ON DIMENSIONS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	B.DAMPHOUSSE		DATE	17-Nov-2014			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY							
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP		DATE	19-Nov-2014										
2	0.3	0.12	N/A	1°	APPROVED	E.BORISSOV		DATE	19-Nov-2014										
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 3.2/ DRAWING UNITS: MM 					USED ON		F10031029					PLATE, STOP ROD HOLDER							
					MATERIAL														
										316LN STAINLESS STEEL									
					GROUP: Technical Division - Design and Drafting					CAGE CODE: QUSR6		SCALE 5:1		SIZE A2	DRAWING NUMBER F10031022		SHEET 1 of 1		REV C

DESCRIPTION: WELDMENT, SPLIT RING
PROJECT: PIP-11_650Mhz
CATEGORY: WELDMENT

REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
F	F10031029-F-RCD	15-Aug-2019	DRAWN	M.KRAMP	
		27-Aug-2019	APPROVED	C.GRIMM	



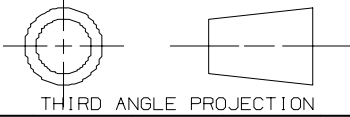
NOTES: (UNLESS OTHERWISE SPECIFIED)

1. ASSEMBLY MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
2. ASSEMBLY TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
3. TRAILING ZEROS ON DIMENSIONS DENOTE TOLERANCE.

2	F10031022	PLATE, STOP ROD HOLDER	2
1	F10008763	RING, SPLIT, CAVITY 1,3	1
ITEM	PART #	DESCRIPTION	QTY

PARTS LIST

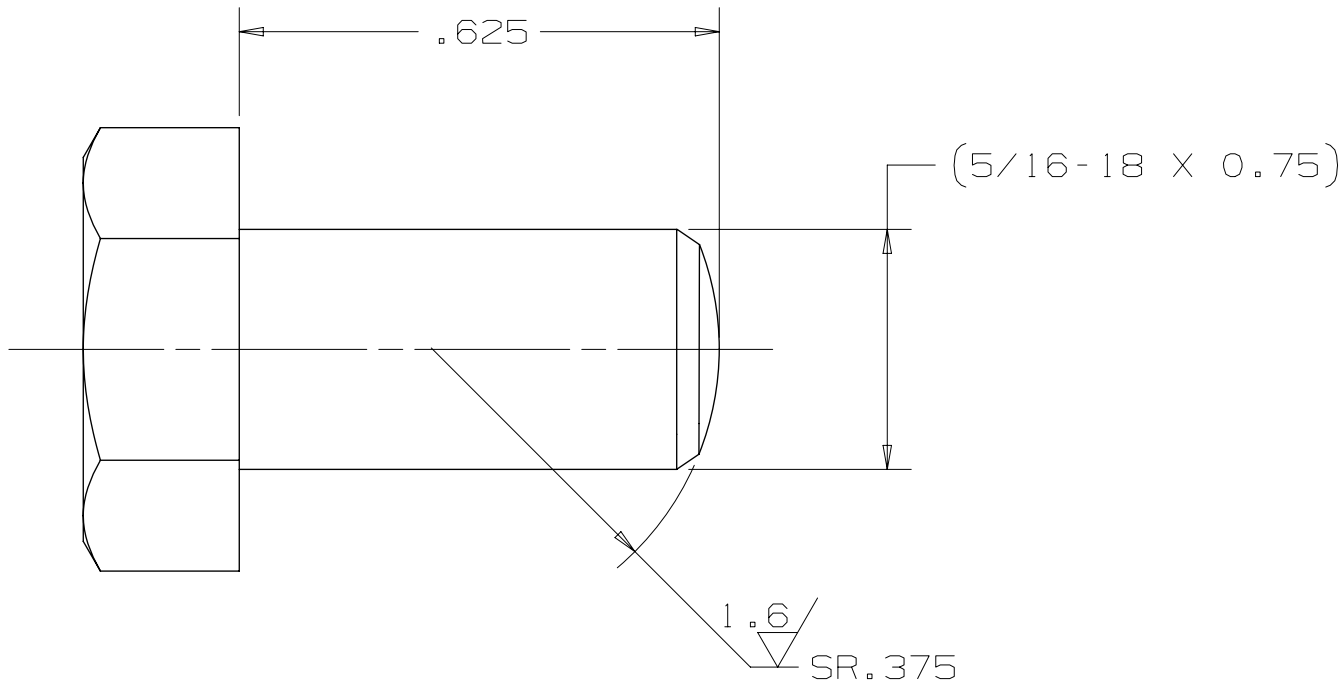
UNLESS OTHERWISE SPECIFIED					DRAWN	B.DAMPHOUSSE		DATE	17-Nov-2014			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY					
±X	±X.X	±X.XX	±X/X	±X*	CHECKED	M.KRAMP		DATE	19-Nov-2014								
2	0.3	0.12	N/A	1	APPROVED	E.BORISSOV		DATE	19-Nov-2014								
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5-2009 MAX MACHINE ALL SURFACES: 3.2✓ DRAWING UNITS: MM  THIRD ANGLE PROJECTION					USED ON F10017508						NAME WELDMENT, SPLIT RING						
					MATERIAL						SCALE						SIZE
SEE PARTS LIST						1:1						A2	F10031029		1 of 1	F	
GROUP: Technical Division - Design and Drafting						CAGE CODE: 005R6											



THIRD ANGLE PROJECTION

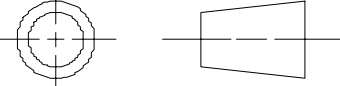
DESCRIPTION: SCREW SPECIAL
PROJECT: PIP-11_650Mhz
CATEGORY: BOLT

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10037798-A-RCD	19-Nov-2020	DRAWN	M.KRAMP
		01-Dec-2020	APPROVED	B.HARTSELL



1	FC0078503	HHCS, 5/16-18x1LGxFT, SB 651	1
ITEM	FERMI #	PART NAME	QTY

PARTS LIST

UNLESS OTHERWISE SPECIFIED					DRAWN	B.DAMPHOUSSE	DATE	30-Mar-2015
±.X	±.XX	±.XXX	±X/X	±X°	CHECKED	M.KRAMP	DATE	31-Mar-2015
.1	.02	.005	1/16	1	APPROVED	E.BORISSOV	DATE	07-Apr-2015
BREAK ALL SHARP EDGES, MAX: .015 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5-2009 MAX MACHINE ALL SURFACES: 125 DRAWING UNITS: INCHES					USED ON			
					F10006870, F10008759, F10147498, F10147499			
 THIRD ANGLE PROJECTION					MATERIAL			
					SEE PARTS LIST			
					GROUP: Technical Division - Design and Drafting CAGE CODE: OU5R6			



FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

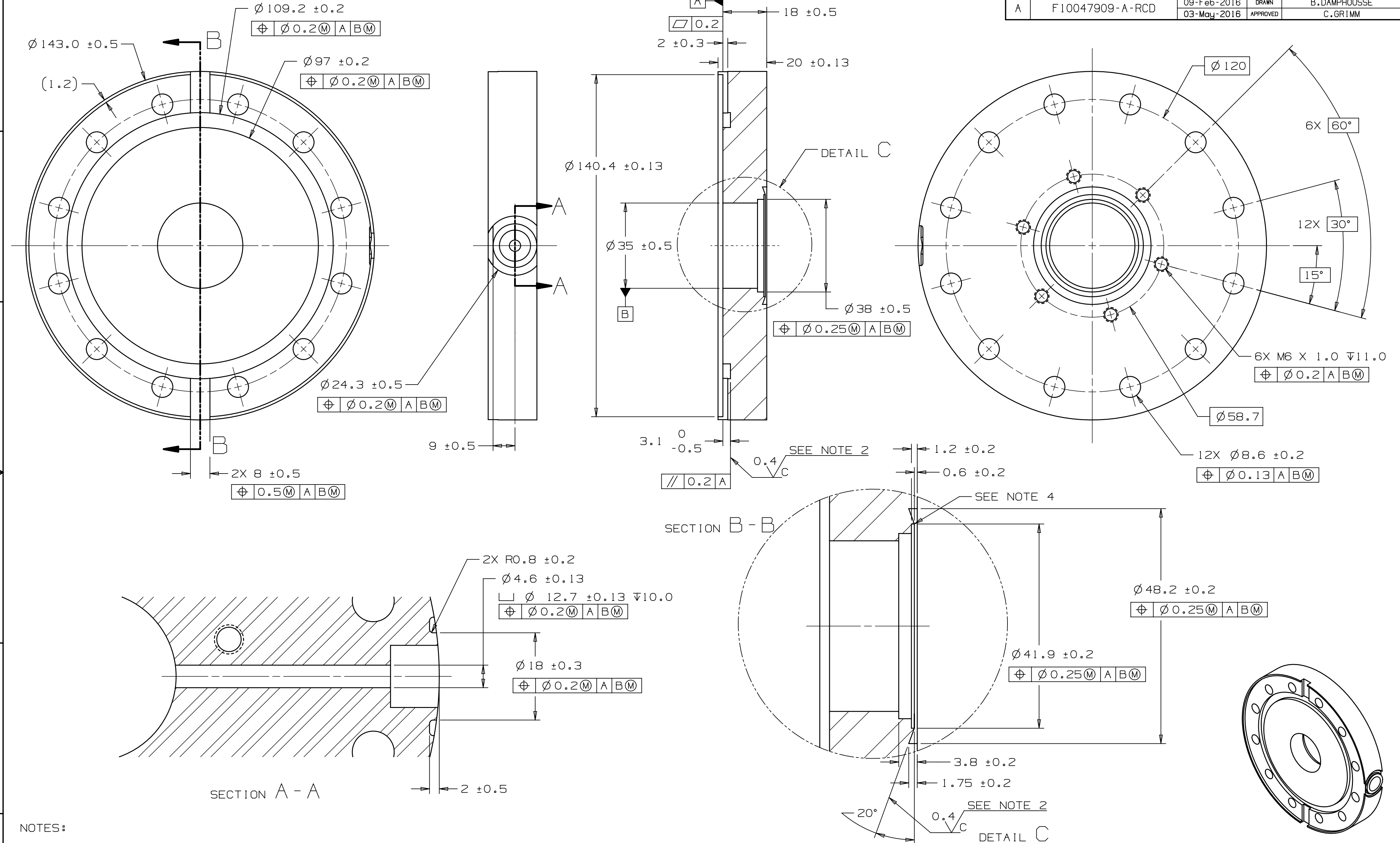
SCREW SPECIAL

SCALE 1:1	SIZE B	DRAWING NUMBER F10037798	SHEET 1 of 1	REV A
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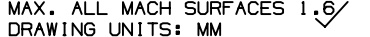
NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.

REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
A	F10047909-A-RCD	09-Feb-2016	DRAWN	B.DAMPHOUSSE	
		03-May-2016	APPROVED	C.GRIMM	

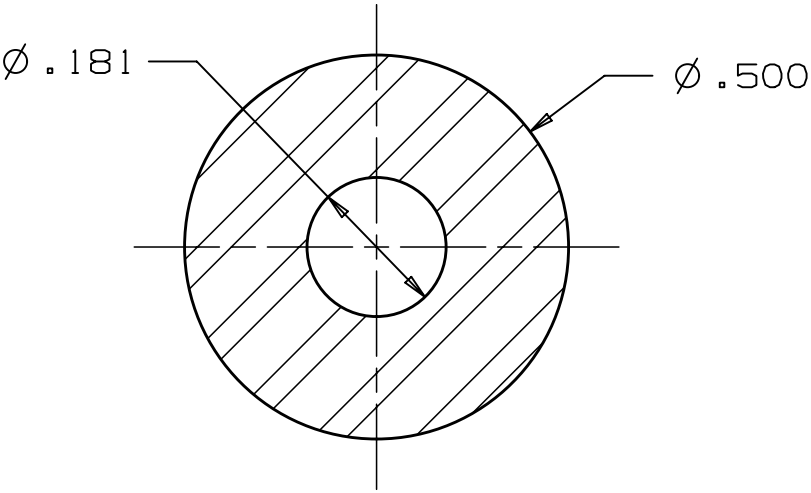
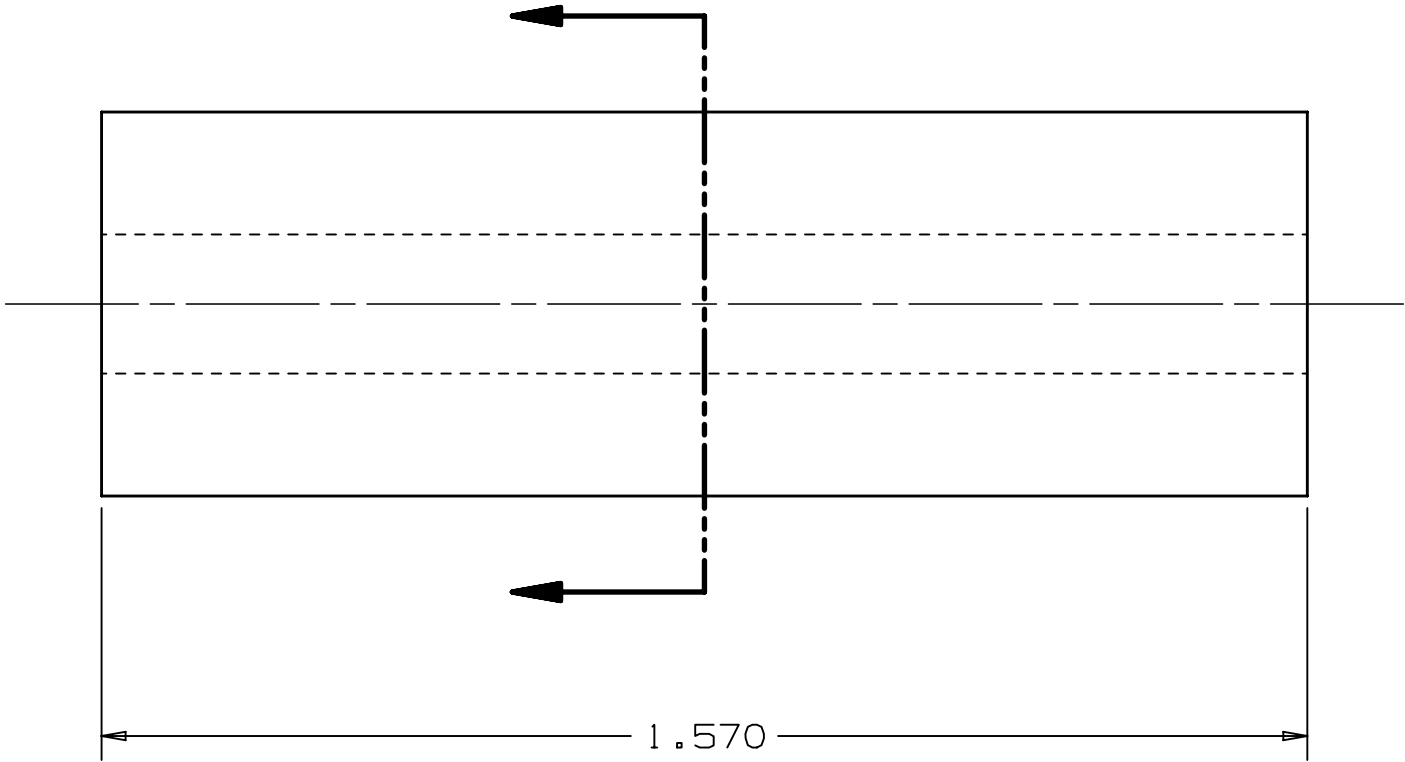


- NOTES:
1. PART IS TO BE CLEANED AND DEGREASED.
 2. SEALING SURFACE TO BE FREE OF SCRATCHES, DENTS AND RADIAL SCORING.
 3. VENDOR MUST SUPPLY MATERIAL CERTIFICATION.
 4. DO NOT BREAK KNIFE EDGE, KEEP SHARP.

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS		DATE	25-Sep-2015		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±X ±X.X ±X.XX ±X/X ±X*					CHECKED	M. KRAMP		DATE	29-Sep-2015						
2 0.3 0.12 N/A 1*					APPROVED	C. GRIMM		DATE	29-Sep-2015						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 1.6/ DRAWING UNITS: MM					USED ON	F10047913						NAME FLANGE WITH PORT CAVITY END MODIFIED			
					MATERIAL										
										GROUP: Technical Division - Design and Drafting	CAGE CODE: QUSR6	SCALE 1:1		SIZE A2	DRAWING NUMBER F10047909

DESCRIPTION: TUBE, FLANGE EXTENSION
CATEGORY: TUBE PROJECT:

REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
A	F10047910-A-RCD	09-Feb-2016	DRAWN	B.DAMPHOUSSE	
		03-May-2016	APPROVED	C.GRIMM	



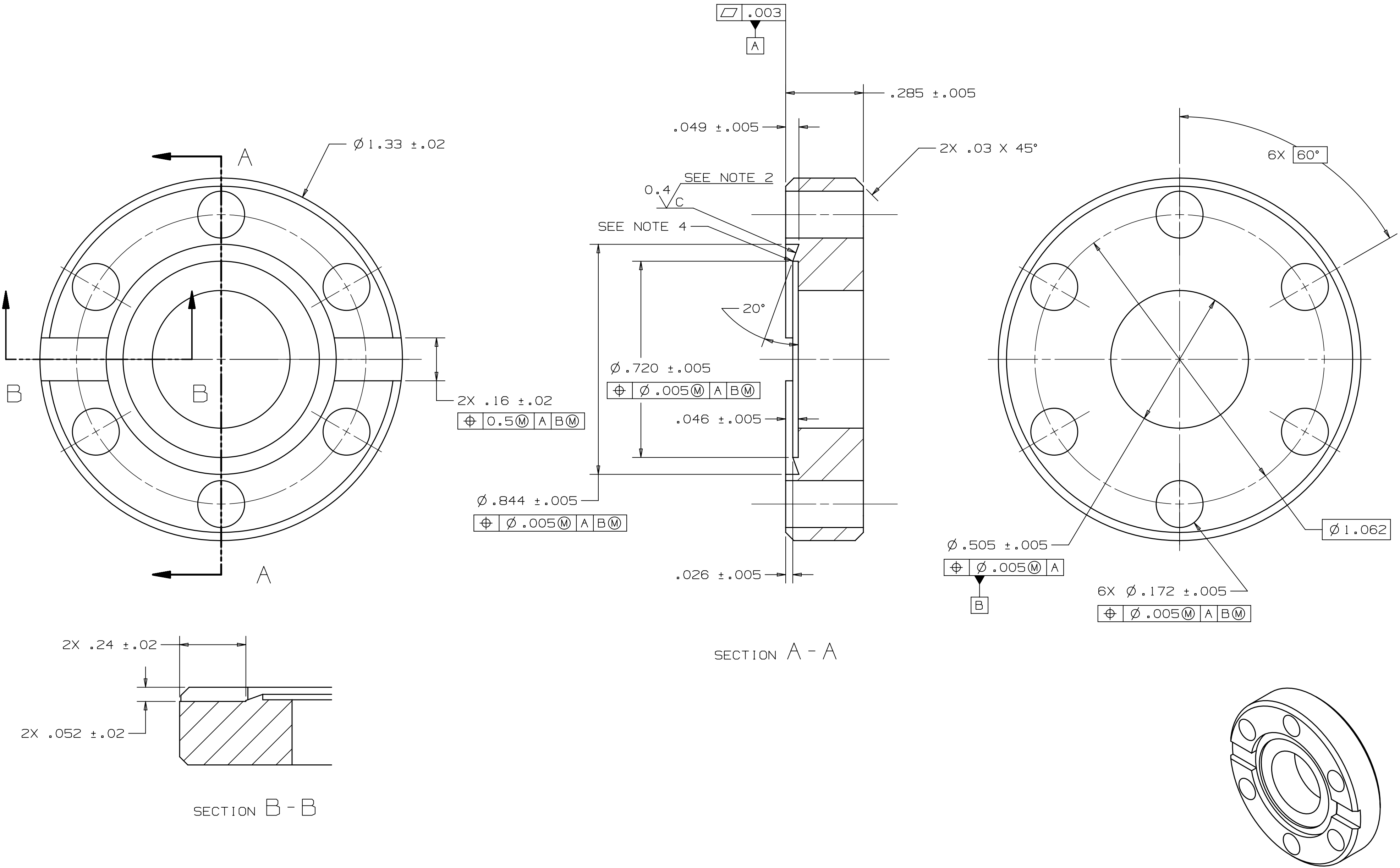
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- TRAILING ZEROS ON DIMENSIONS DENOTE TOLERANCE.

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	25-Sep-2015	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±.X	±.XX	±.XXX	±X/X	±X°	CHECKED	M. KRAMP	DATE	29-Sep-2015					
.1	.02	.005	1/16	1°	APPROVED	C. GRIMM	DATE	29-Sep-2015					
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 125/ DRAWING UNITS: INCHES  					USED ON				NAME TUBE, FLANGE EXTENSION				
					F10047913								
					MATERIAL  316LN STAINLESS STEEL 								
GROUP: Technical Division - Design and Drafting					CAGE CODE: QUSR6				SCALE 1:1	SIZE B	DRAWING NUMBER F10047910	SHEET 1 OF 1	REV A

DESCRIPTION: FLANGE-CF, 1.33 X .5 TUBE, NR
CATEGORY: FLANGE PROJECT: LCLSIIICryogenicSystem

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10047912-A-RCD	10-Feb-2016	DRAWN	B.DAMPHOUSSE
		03-May-2016	APPROVED	C.GRIMM



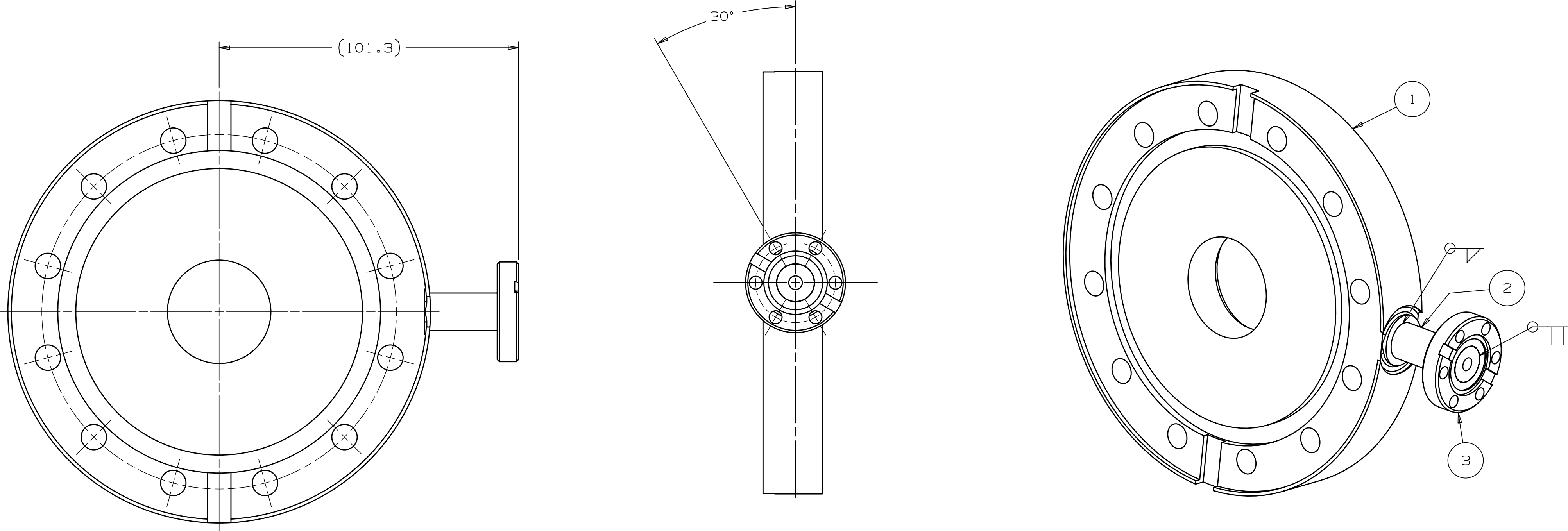
- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 - SEALING SURFACE TO BE FREE OF SCRATCHES, DENTS AND RADIAL SCORING.
 - TRAILING ZEROS ON DIMENSIONS DENOTE TOLERANCE.
 - DO NOT BREAK KNIFE EDGE, KEEP SHARP.

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	25-Sep-2015
$\pm .X$	$\pm .XX$	$\pm .XXX$	$\pm X/X$	$\pm X^\circ$	CHECKED	M. KRAMP	DATE	29-Sep-2015
$.1$	$.02$	$.005$	$1/16$	1°	APPROVED	C. GRIMM	DATE	29-Sep-2015
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 125 DRAWING UNITS: INCHES					USED ON	F10047913		
					MATERIAL	316LN STAINLESS STEEL A		
					GROUP: Technical Division - Design and Drafting	CAGE CODE: OUSR6		

		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
NAME					
FLANGE-CF, 1.33 X .5 TUBE, NR					
SCALE 1:1	SIZE C	DRAWING NUMBER F10047912		SHEET 1 OF 1	REV A

DESCRIPTION: NBTI WELDMENT FLANGE TO BURST DISC PORT
CATEGORY: WELDMENT PROJECT:

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10047913-A-RCD	11-Feb-2016 03-May-2016	DRAWN APPROVED	B.DAMPHOUSSE C.GRIMM

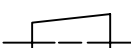


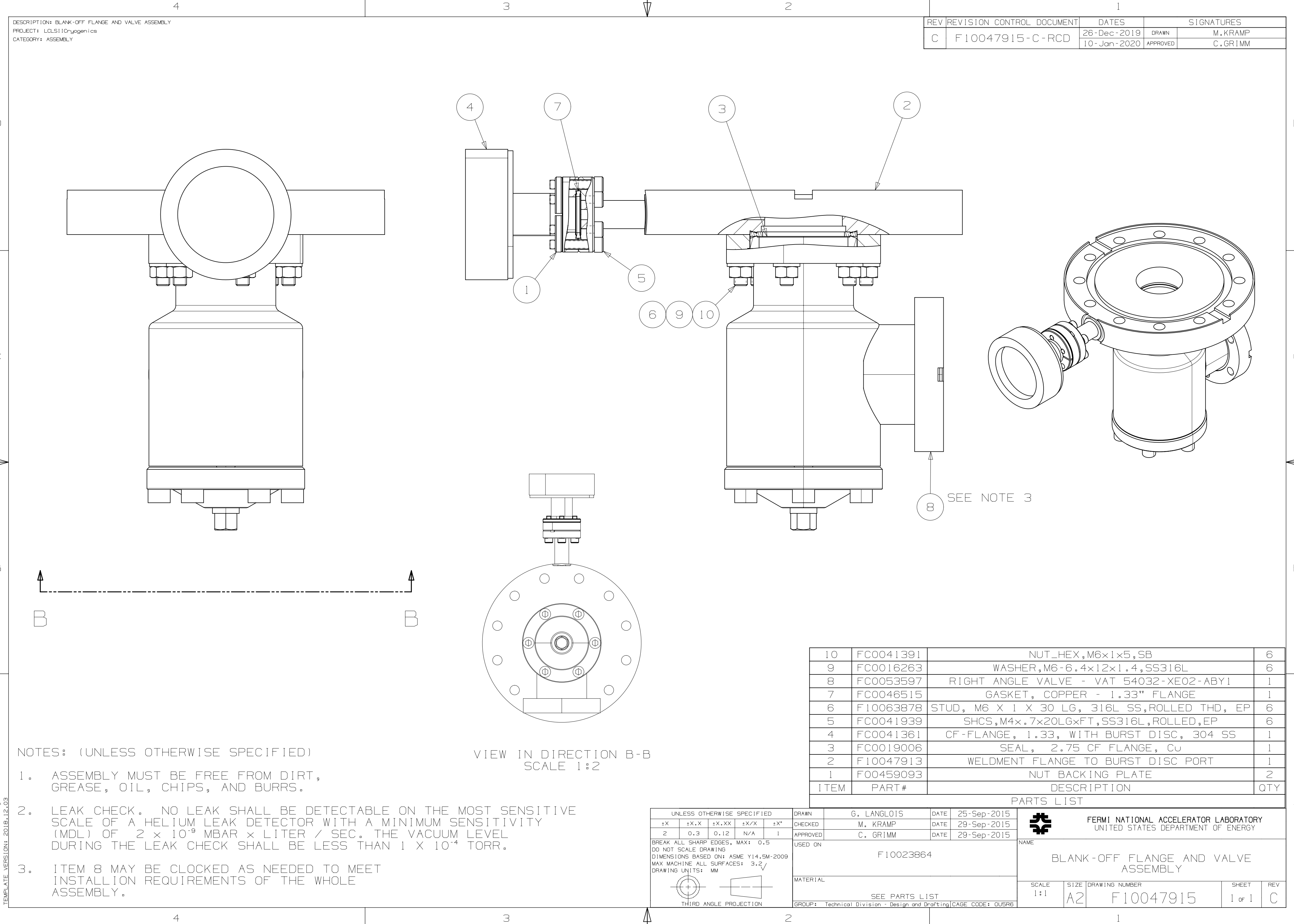
NOTES (UNLESS OTHERWISE SPECIFIED):

- WELDMENT MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- WELDMENT TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- LEAK CHECK. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY (MDL) OF 2×10^{-9} MBAR $\times$ LITER / SEC. THE VACUUM LEVEL DURING THE LEAK CHECK SHALL BE LESS THAN 1×10^{-4} TORR.

3	F10047912	FLANGE-CF, 1.33 X .5 TUBE, NR,C, TI	1
2	F10047910	TUBE, FLANGE EXTENSION	1
1	F10047909	FLANGE WITH PORT CAVITY END MODIFIED	1
ITEM	PART#	DESCRIPTION	QTY.

PARTS LIST

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS		DATE	25-Sep-2015			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY										
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M.KRAMP		DATE	29-Sep-2015													
2	0.3	0.12	N/A	1°	APPROVED	C. GRIMM		DATE	29-Sep-2015													
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM 					USED ON		F10047914					NAME WELDMENT FLANGE TO BURST DISC PORT										
					MATERIAL																	
										SEE PARTS LIST							SCALE 1:1		SIZE A2		DRAWING NUMBER F10047913	
					GROUP: Technical Division - Design and Drafting					CAGE CODE: 0U5R6												



DESCRIPTION: BLANK-OFF FLANGE AND VALVE ASSEMBLY
PROJECT: LCLSII Cryogenics
CATEGORY: ASSEMBLY

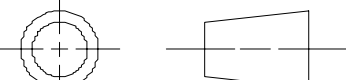
REV	REVISION CONTROL DOCUMENT	DATES		SIGNATURES	
C	F10047915-C-RCD	26-Dec-2019	DRAWN	M. KRAMP	
		10-Jan-2020	APPROVED	C. GRIMM	

NOTES: (UNLESS OTHERWISE SPECIFIED)

- ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL, CHIPS, AND BURRS.
- LEAK CHECK. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY (MDL) OF 2×10^{-9} MBAR $\times$ LITER / SEC. THE VACUUM LEVEL DURING THE LEAK CHECK SHALL BE LESS THAN 1×10^{-4} TORR.
- ITEM 8 MAY BE CLOCKED AS NEEDED TO MEET INSTALLION REQUIREMENTS OF THE WHOLE ASSEMBLY.

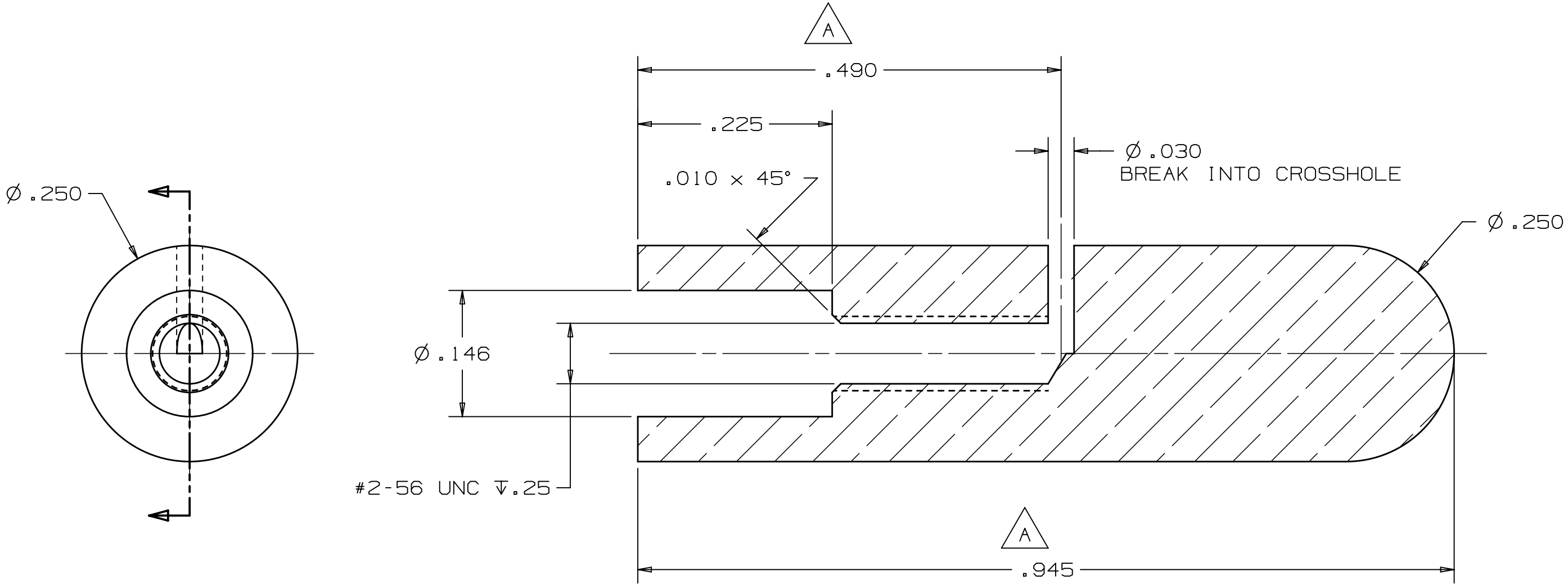
VIEW IN DIRECTION B-B
SCALE 1:2

10	FC0041391	NUT_HEX, M6x1x5, SB	6
9	FC0016263	WASHER, M6-6.4x12x1.4, SS316L	6
8	FC0053597	RIGHT ANGLE VALVE - VAT 54032-XE02-ABY1	1
7	FC0046515	GASKET, COPPER - 1.33" FLANGE	1
6	F10063878	STUD, M6 X 1 X 30 LG, 316L SS, ROLLED THD, EP	6
5	FC0041939	SHCS, M4x.7x20LGxFT, SS316L, ROLLED, EP	6
4	FC0041361	CF-FLANGE, 1.33, WITH BURST DISC, 304 SS	1
3	FC0019006	SEAL, 2.75 CF FLANGE, Cu	1
2	F10047913	WELDMENT FLANGE TO BURST DISC PORT	1
1	F00459093	NUT BACKING PLATE	2
ITEM	PART#	DESCRIPTION	QTY
PARTS LIST			

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	25-Sep-2015
±X	±X.X	±X.XX	±X/X	±X"	CHECKED	M. KRAMP	DATE	29-Sep-2015
2	0.3	0.12	N/A	1	APPROVED	C. GRIMM	DATE	29-Sep-2015
BREAK ALL SHARP EDGES, MAX: 0.5 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-2009 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM					USED ON F10023864			
					MATERIAL SEE PARTS LIST			
THIRD ANGLE PROJECTION					GROUP: Technical Division - Design and Drafting CAGE CODE: QUSR6			

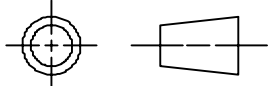
 FERMIONATIONALACCELERATORLABORATORY UNITED STATES DEPARTMENT OF ENERGY					NAME BLANK-OFF FLANGE AND VALVE ASSEMBLY			
SCALE 1:1	SIZE A2	DRAWING NUMBER F10047915		SHEET 1 of 1	REV C			

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10057230-A-RCD	27-Mar-2019	DRAWN	B.DAMPHOUSSE
		27-Mar-2019	APPROVED	C.GRIMM



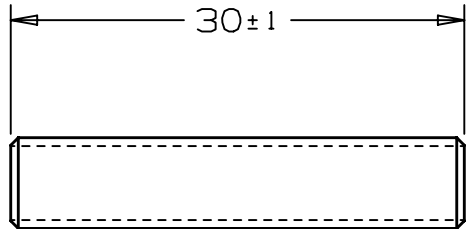
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- $Q_{EXT} = 1.49 \times 10^{10}$

UNLESS OTHERWISE SPECIFIED					DRAWN	B.DAMPHOUSSE		DATE	11-Apr-2016		 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY									
±.X	±.XX	±.XXX	±X/X	±X°	CHECKED	M.KRAMP		DATE	03-May-2016											
.1	.02	.005	1/16	1°	APPROVED	C.GRIMM		DATE	03-May-2016		NAME									
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 125/ DRAWING UNITS: INCHES 					USED ON						HIGH "Q" FIXED ANTENNA TIP									
					F10023864															
					MATERIAL															
					OXYGEN FREE HIGH CONDUCTIVITY COPPER, UNS C10200						SCALE									
											1:1		SIZE		DRAWING NUMBER		SHEET		REV	
													B		F10057230		1 OF 1		A	
					GROUP: Technical Division - Design and Drafting						CAGE CODE: QUSR6									

DESCRIPTION: STUD, M6 X 1 X 30 LG, 316L SS,ROLLED THD, EP
CATEGORY: STUD PROJECT: LCLSII CryogenicSystem

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10063878---RCD		DRAWN	
			APPROVED	

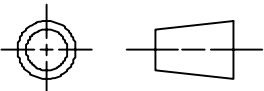


2X 0.5 x 45° M6 X 1 - ROLLED THREAD

NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.

UNLESS OTHERWISE SPECIFIED				
±X	±X.X	±X.XX	±X/X	±X°
2	0.3	0.12	N/A	1°
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM				



DRAWN	B.DAMPHOUSSE	DATE	17-Aug-2016
CHECKED	M.KRAMP	DATE	25-Aug-2016
APPROVED	C.GRIMM	DATE	30-Aug-2016
USED ON			
F10047915			
MATERIAL		316L STAINLESS STEEL FINISH: ELECTROPOLISH	
GROUP: Technical Division - Design and Drafting			CAGE CODE: 0U5R6

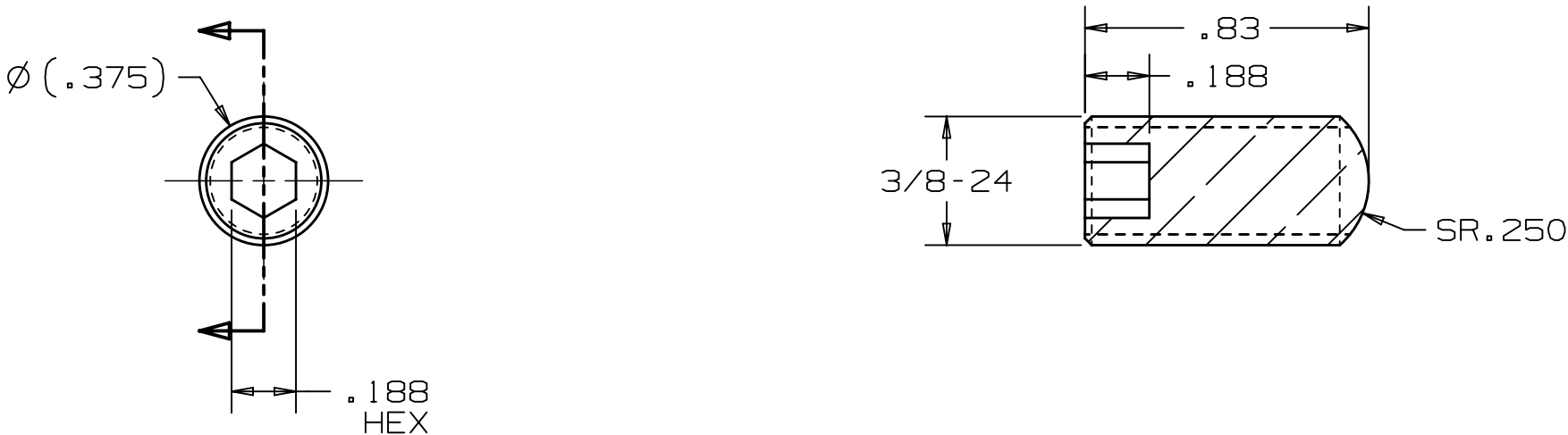


FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

NAME				
STUD, M6 X 1 X 30 LG, 316L SS,ROLLED THD, EP				
SCALE 1:1	SIZE A3	DRAWING NUMBER F10063878	SHEET 1 OF 1	REV -

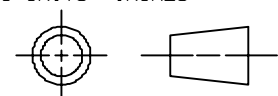
DESCRIPTION: SET SCREW, SPECIAL, 3/8-24
CATEGORY: SCREW PROJECT: LCLS ITCryogenicSystem

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10072215-A-RCD		DRAWN	M.KRAMP
		07-Jun-2017	APPROVED	J.YUN

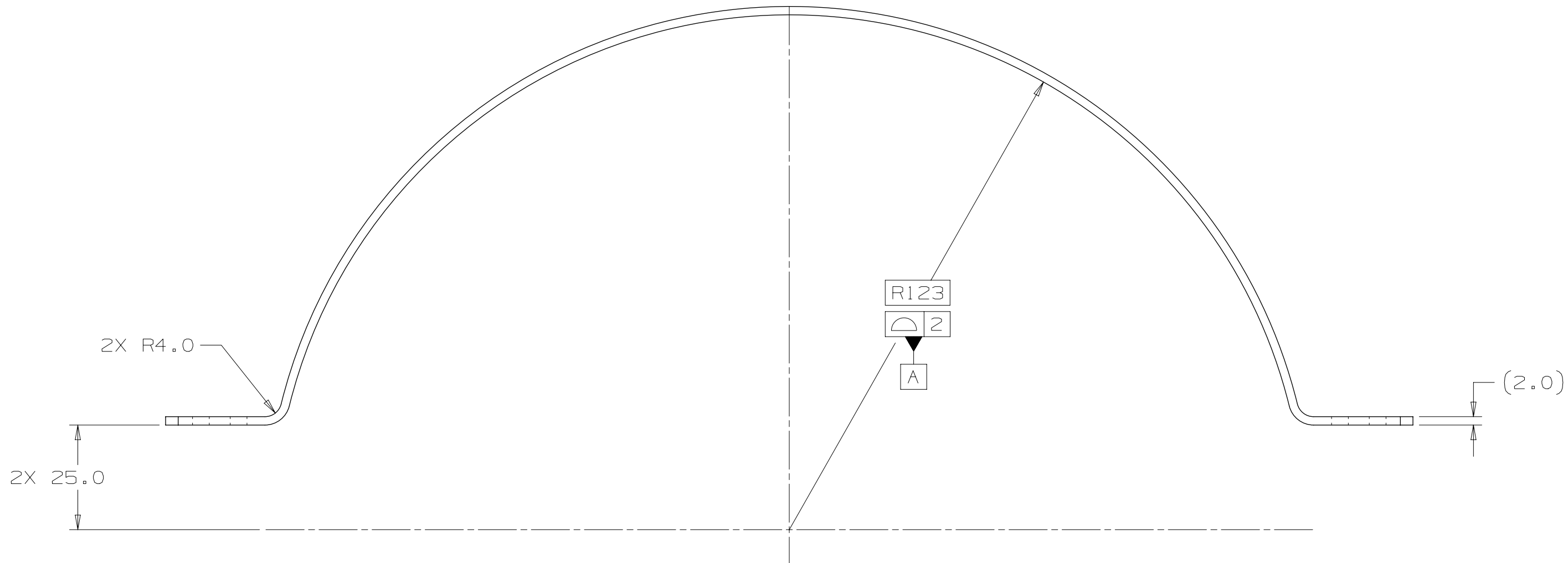
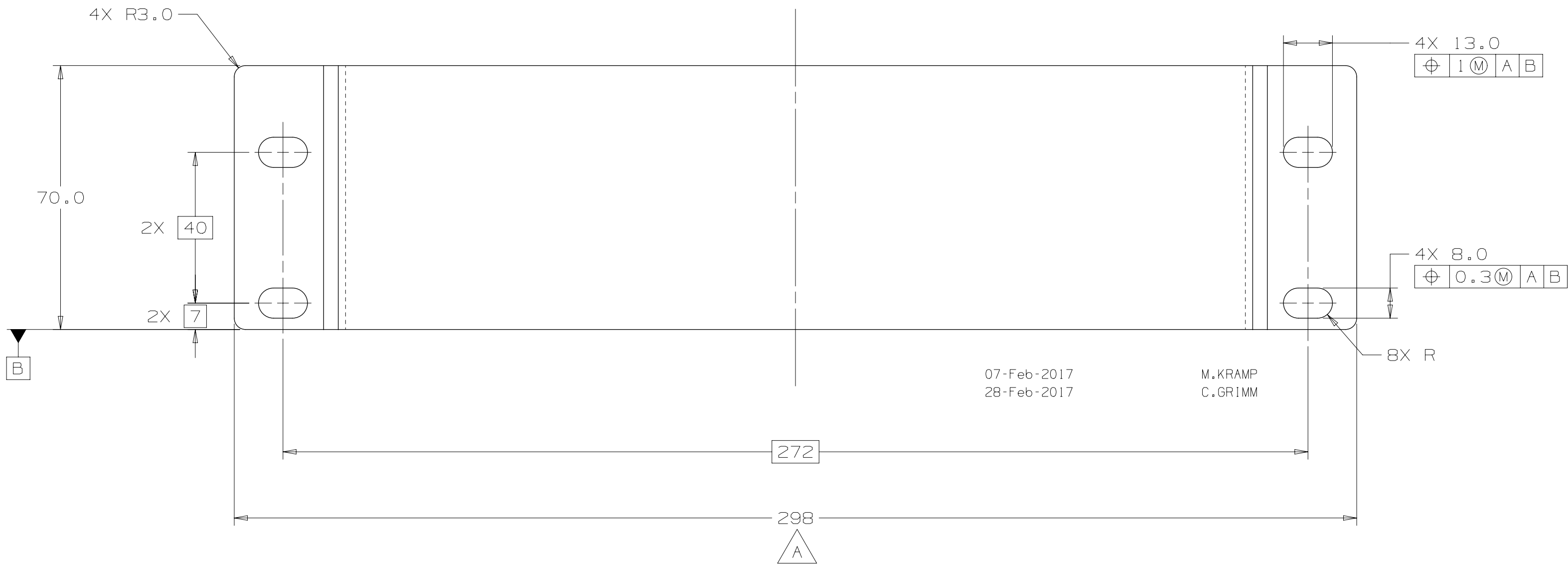


NOTES (UNLESS OTHERWISE SPECIFIED):

- 1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- 2. PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.KRAMP	DATE	13-Dec-2016	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				
±.X	±.XX	±.XXX	±X/X	±X°	CHECKED	J.COGHILL	DATE	14-Dec-2016					
.1	.02	.005	1/16	1°	APPROVED	C.GRIMM	DATE	11-Nov-2016					
BREAK ALL SHARP EDGES .015 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5-2009 MAX. ALL MACH SURFACES 125/ DRAWING UNITS: INCHES 					USED ON F10017508				NAME SET SCREW, SPECIAL, 3/8-24				
					MATERIAL ALUMINUM NICKEL BRONZE C63000 								
					GROUP: Technical Division - Design and Drafting				CAGE CODE: 0U5R6				SCALE 2:1

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
A	F10073799-A-RCD	07-Feb-2017 28-Feb-2017	DRAWN APPROVED	M.KRAMP C.GRIMM



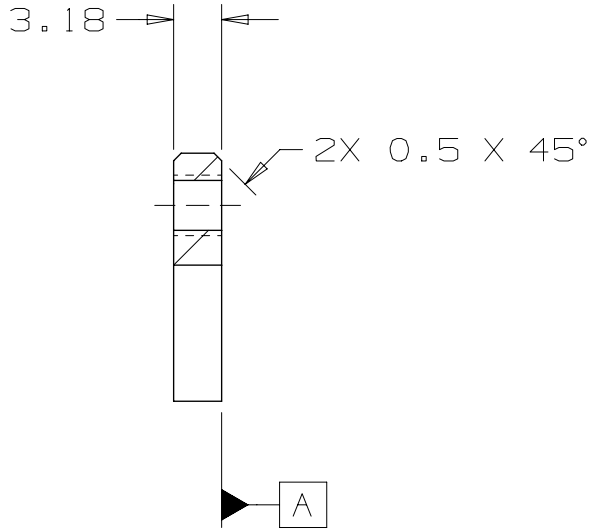
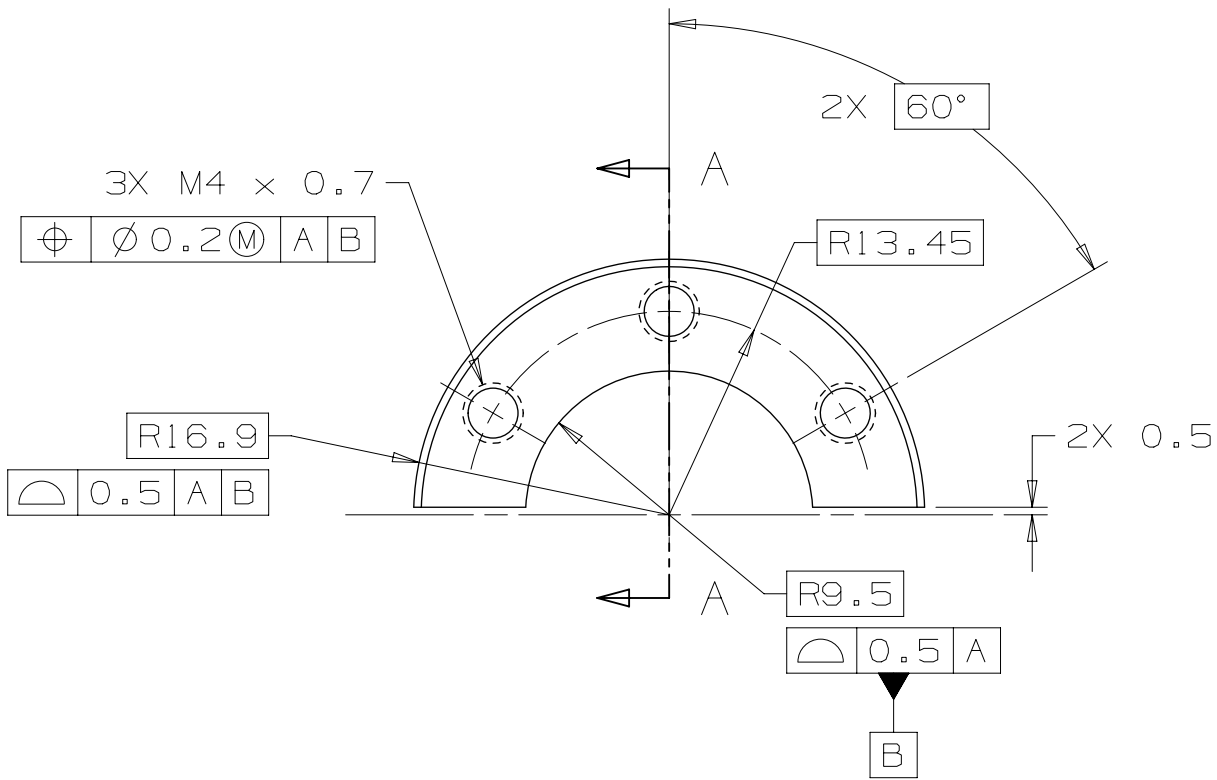
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.KRAMP		DATE	12-Jan-2017			FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	N.TANOVIC		DATE	24-Jan-2017						
2	0.3	0.12	N/A	1°	APPROVED	C.GRIMM		DATE	24-Jan-2017						
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM 					USED ON		NAME								
					MATERIAL		BELLOWS COVER								
					6061-T6 ALUMINUM 2MM THK STOCK										
GROUP: Technical Division - Design and Drafting					CAGE CODE: 0U5R6		SCALE 1:1	SIZE A2	DRAWING NUMBER F10073799		SHEET 1 of 1	REV A			

DESCRIPTION: NUT BACKING PLATE
PROJECT: LCLSII-HE-CM
CATEGORY: NUT

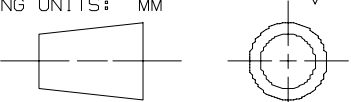
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10143973---RCD		DRAWN	
			APPROVED	



SECTION A - A

NOTES: (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.

UNLESS OTHERWISE SPECIFIED					DRAWN	M.KRAMP	DATE	26-Aug-2020
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	J.COGHILL	DATE	26-Aug-2020
2	0.3	0.12	N/A	1	APPROVED	B.HARTSELL	DATE	27-Aug-2020
BREAK ALL SHARP EDGES, MAX: 0.3 DO NOT SCALE DRAWING DIMENSIONS BASED ON: ASME Y14.5M-1994 MAX MACHINE ALL SURFACES: 3.2 DRAWING UNITS: MM  THIRD ANGLE PROJECTION					USED ON			
					F10023864			
					MATERIAL SILICON BRONZE PER ED0011399			
					GROUP: Technical Division - Design and Drafting CAGE CODE: 0U5R6			



FERMI NATIONAL ACCELERATOR LABORATORY
UNITED STATES DEPARTMENT OF ENERGY

NUT BACKING PLATE

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
2:1	A3	F10143973	1 of 1	-