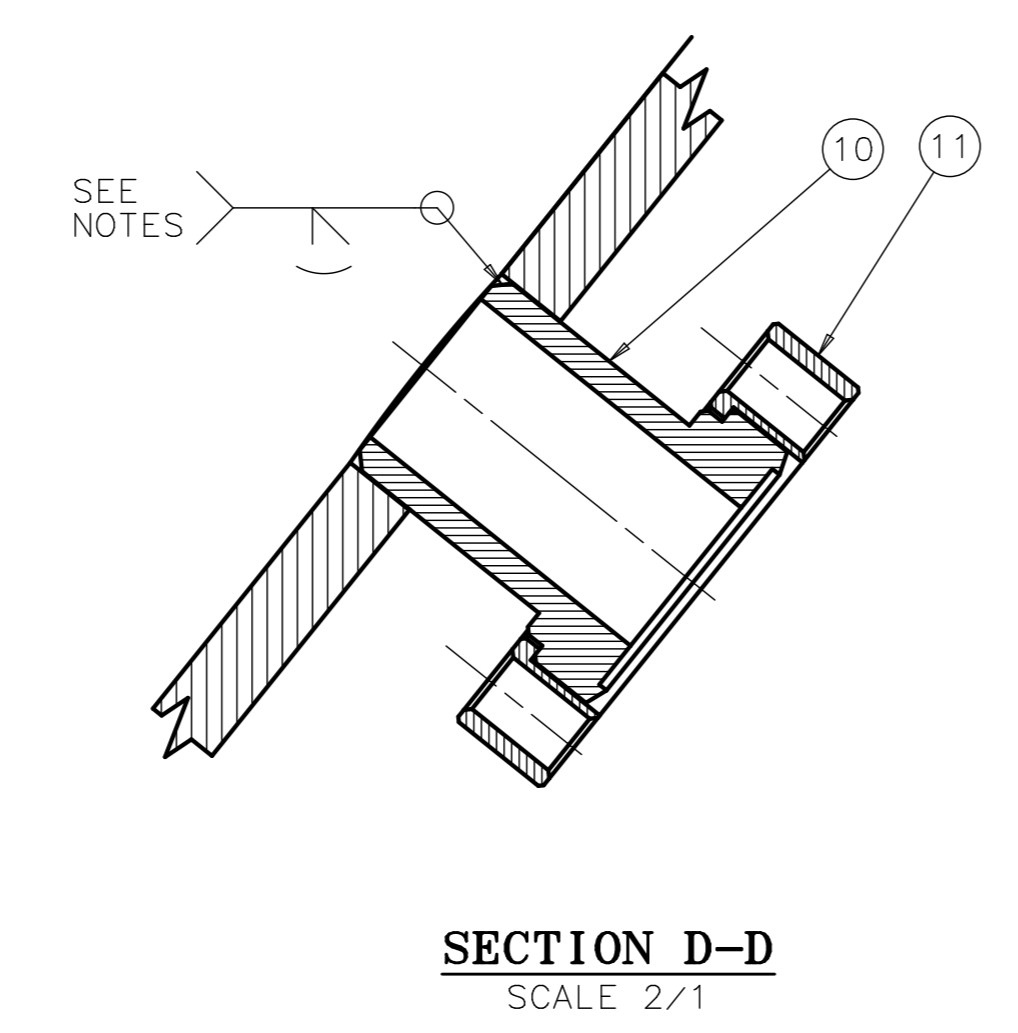
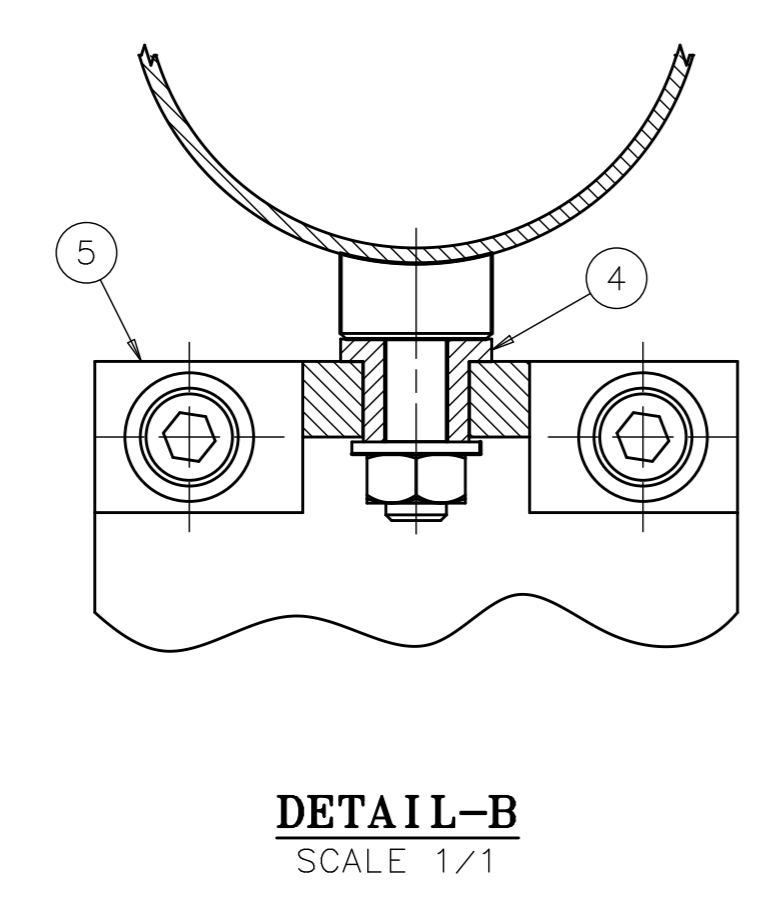
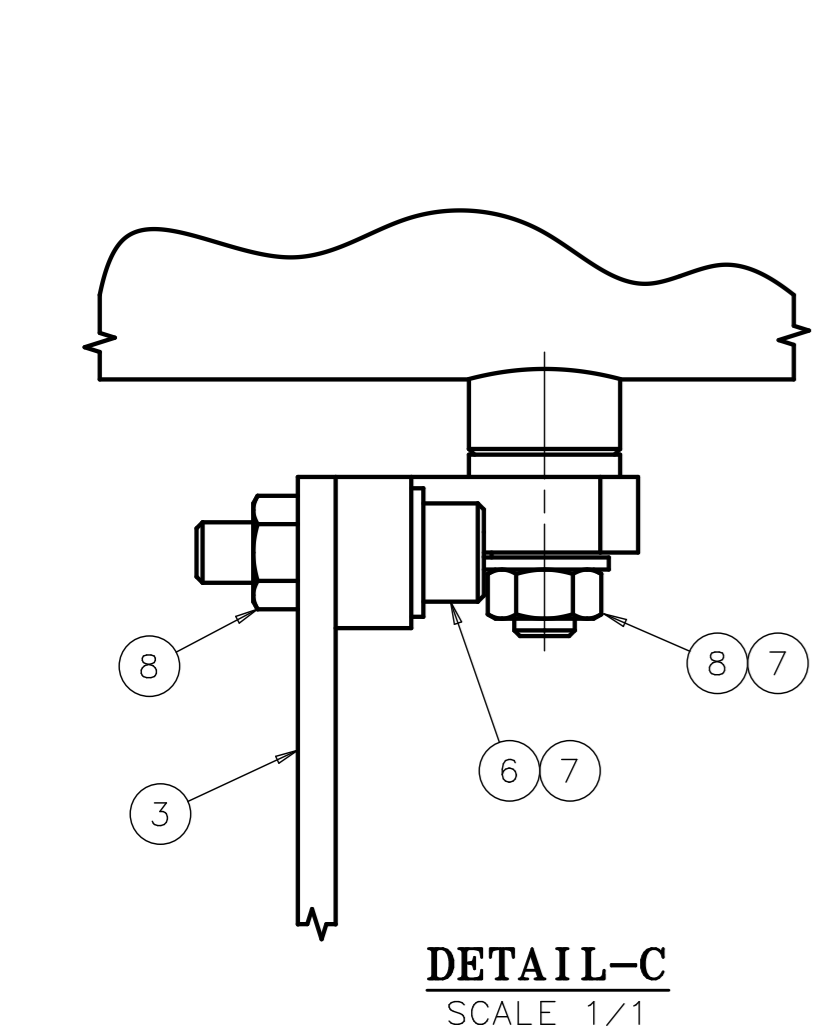
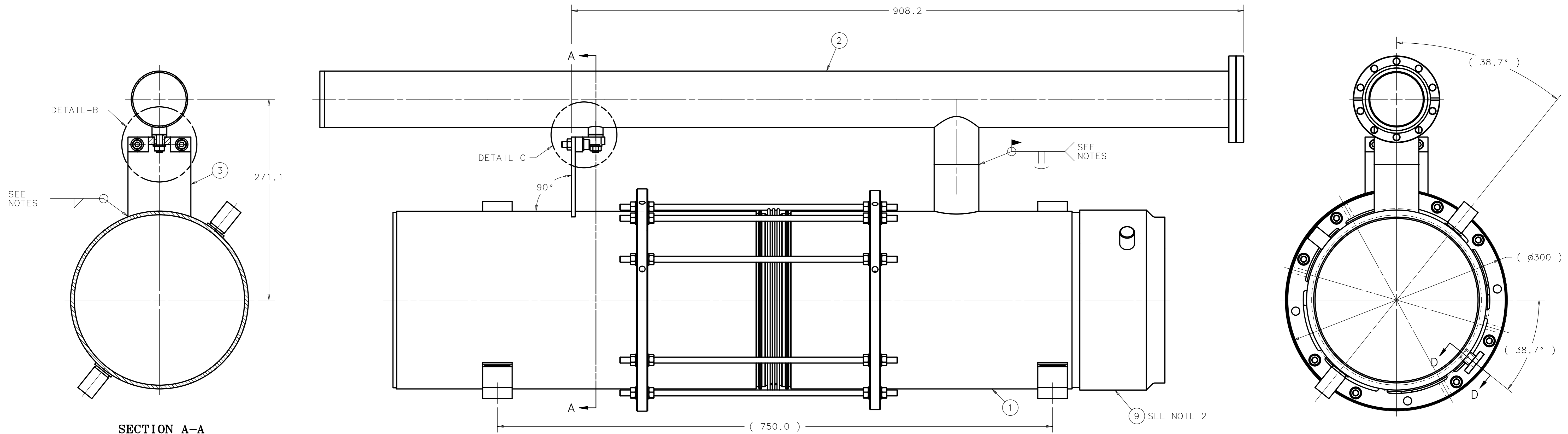
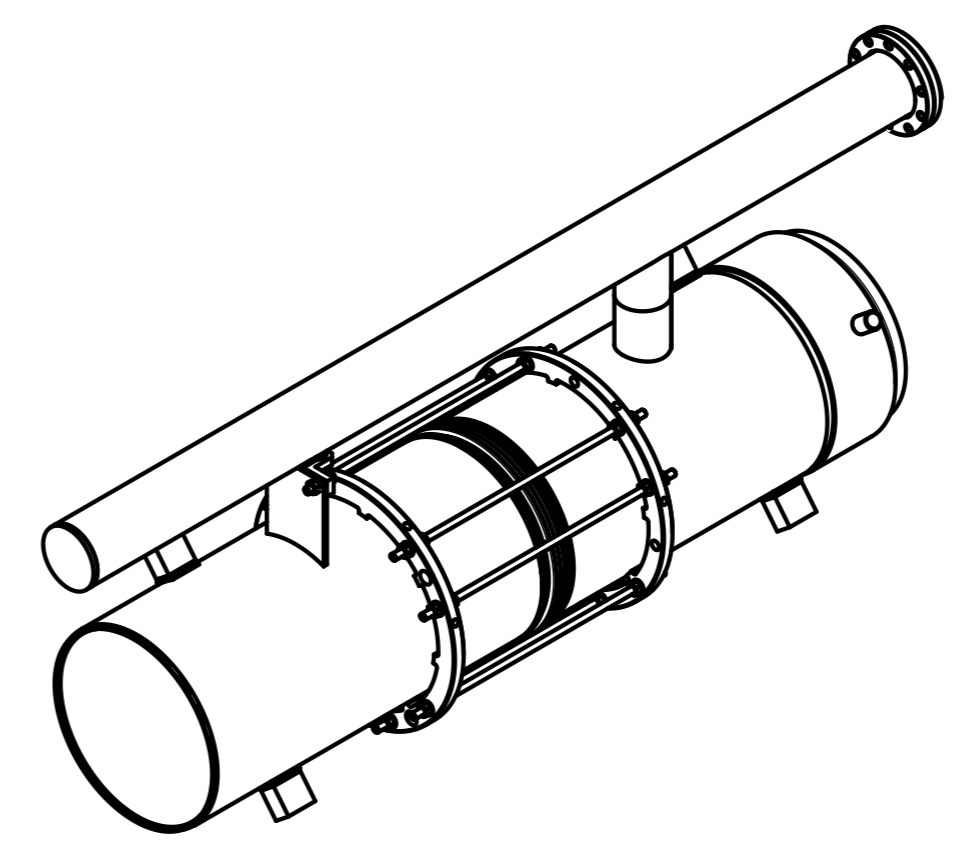


NOTES:

- ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
- ITEM 9 (ADJUSTER WELDMENT) IS WELDED TO THIS ASSEMBLY IN THE WELDING FIXTURE ALONG WITH THE 9-CELL CAVITY. IT IS NOT MECHANICALLY FASTENED TO THIS ASSEMBLY AT THIS TIME, IT'S SHOWN FOR REFERENCE ONLY.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- SEALING SURFACES ON FLANGES MUST BE FREE FROM ANY NICKS AND RADIAL SCRATCHES.
- ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
- ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
- CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
- FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.

- AS AN ALTERNATE TO NOTES 7 & 8 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
- ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.
- WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
- INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT 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  $2 \times 10^{-10}$  ATM. CC/SEC.
- MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



ITEM	P. I. N.	DESCRIPTION	QTY
11	COM'L	FLANGE OF 1-1/3" ROTATABLE BODY 316L S.S. KURT LESKER PT.# F0133X00R	1
10	791845	CF FLANGE ROTATE INSERT	1
9	777981	ADJUSTER WELDMENT	1
8	COM'L	MB NUT	3
7	COM'L	MB WASHER	3
6	COM'L	SCREW HSH ISO M8 X 30 LG.	2
5	781941	2-PHASE SUPPORT PLT ADAPTER	1
4	777851	2-PHASE PIPE BUSHING	1
3	777841	2-PHASE SUPPORT PLATE	1
2	777921	2-PHASE PIPE ASSY	1
1	777901	VESSEL WELDMENT	1

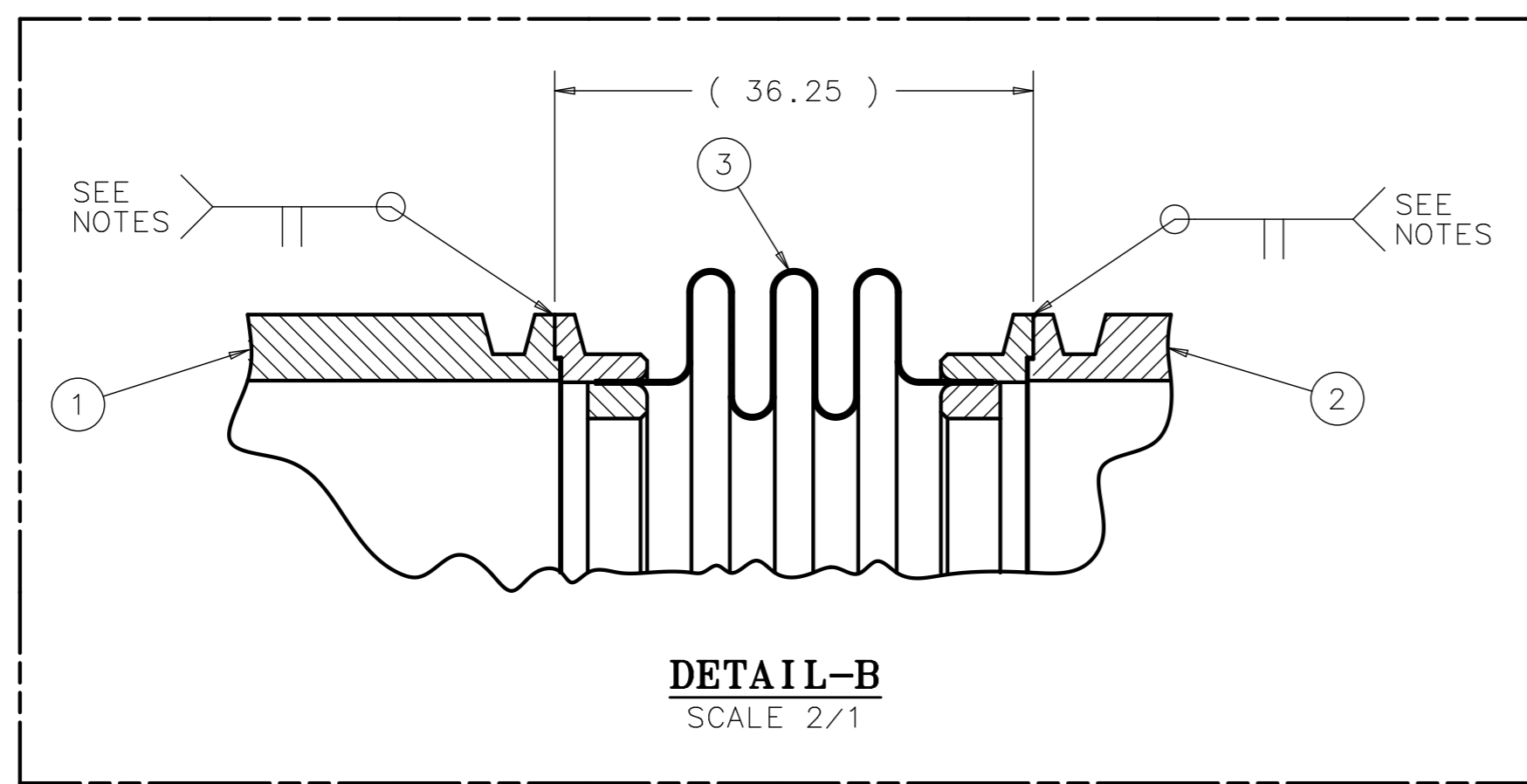
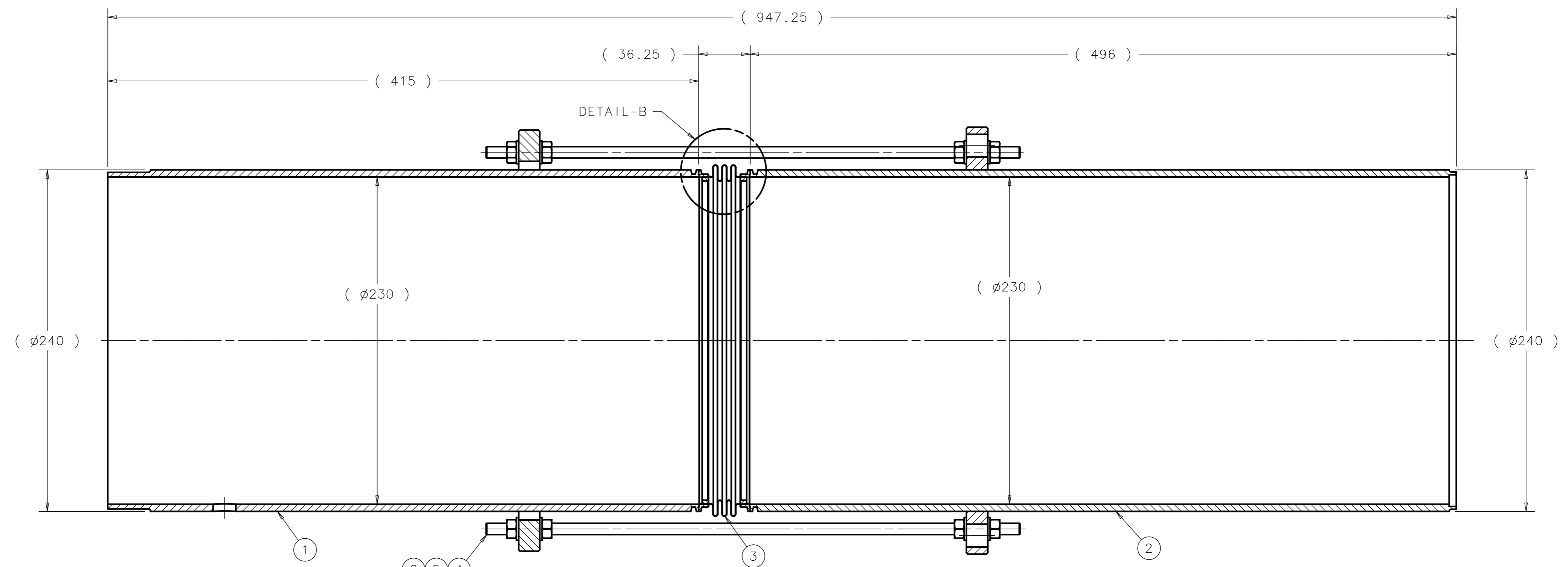
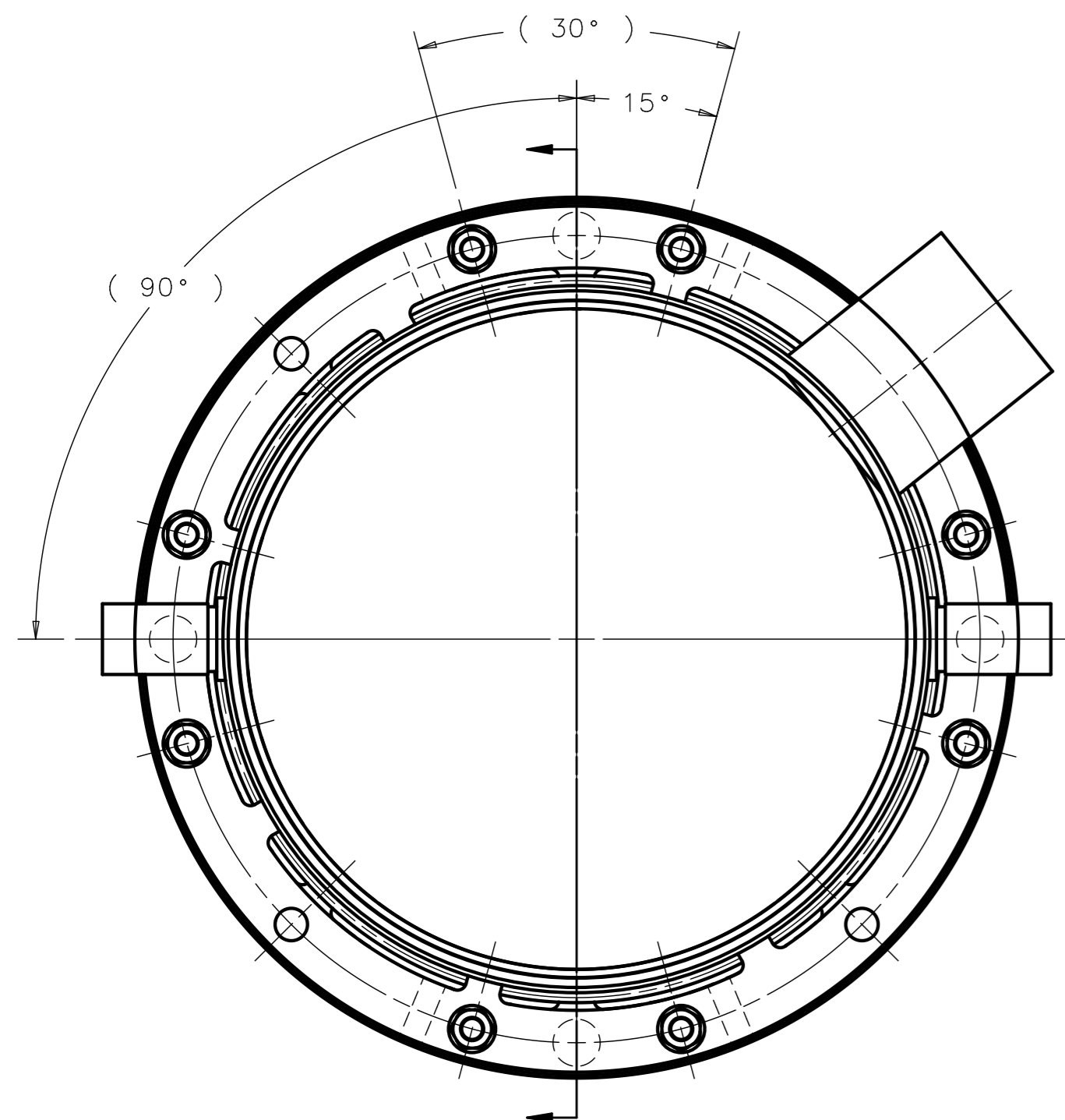
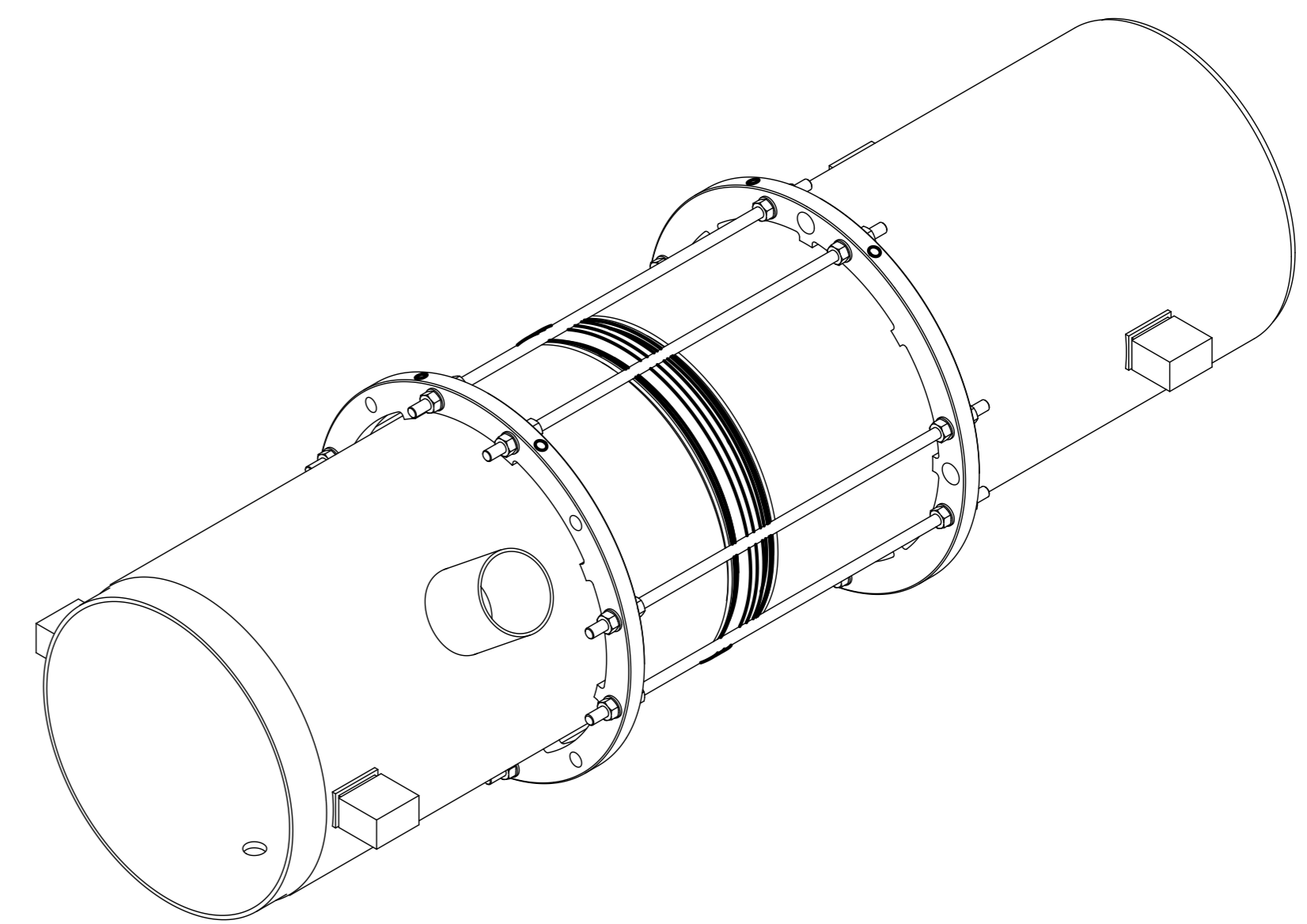
FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES 0.75 MAX. ALL MACH. SURFACES 3.2/ MAX.	DRAWN BY V. MARTINEZ	DATE	
MATERIAL	SEE PARTS LIST	TOLERANCES	DESIGNED BY DESY EDMS	DATE	
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	
			DATABASE CAD	TEAM/GROUP T4CM DESIGN	
			I-DEAS	SOLID MODEL NO. D0000000578173	
			<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500		
			<b>TITLE</b> ILC CRYO MODULE HELIUM VESSEL - BLADE TUNER VESSEL_ASSEMBLY		
			SIZE A1	CAGE CODE OU5R6	DWG NO. D00000000781951
			SCALE 3:8 & AS NOTED DO NOT SCALE DRAWING SHEET 1 OF 1		

FOR REFERENCE ONLY  
 NOT FOR FABRICATION  
 MAY NOT BE CURBED  
 NEXT ASSY USED ON APPLICATION

NOTE:

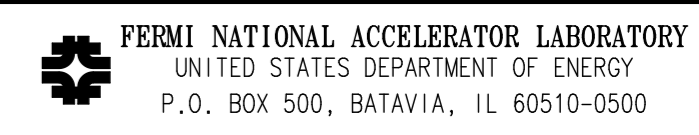
1. ALL WELDS TO BE VACUUM TIGHT. NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF  $2 \times 10^{-10}$  ATM. CC/SEC.
2. ALL WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
3. ITEMS 4,5 AND 6 MUST BE INSTALLED AS SHOWN, PRIOR TO LEAK TEST TO PROTECT BELLOWS ASSY.
4. ALL DIMENSIONS ARE IN MILLIMETERS.
5. ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING. ITEMS 4, 5 & 6 MUST BE INSTALLED DURING SHIPPING TO AVOID DAMAGE TO THE BELLOWS.
6. MOUNTING HOLES FROM FLANGES, ITEM 1 AND ITEM 2 ARE TO BE IN-LINE WITHIN  $\pm 0.15$ mm.
7. ITEMS 1 AND 2 MUST BE CONCENTRIC WITH EACH OTHER WITHIN  $\phi 0.15$ mm.
8. ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
9. CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
10. FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.
11. AS AN ALTERNATE TO NOTES 9 & 10 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
12. ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.
13. WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
14. INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT ACCEPTANCE.
15. MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.

REVISION HISTORY			
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.			
ZONE	REV	DESCRIPTION	DATE
	A	INITIAL RELEASE	



ITEM	P. I. N.	DESCRIPTION	QTY
6	COM'L	M8 FLAT WASHER - A2 SS	32
5	COM'L	M8 X 1.25 HEX NUT - A2 SS	32
4	COM'L	M8 X 1.25 X 375 LG - A2 SS THD ROD	8
3	791765	BELLOWS ASSEMBLY G2	1
2	777971	COUPLER SIDE WELDMENT	1
1	777951	TUNER SIDE WELDMENT	1

FINISH N/A		UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.		DRAWN BY V. MARTINEZ	DATE 12-12-06
MATERIAL SEE PARTS LIST		TOLERANCES X ± 2 XX ± 0.8 XXX ± 0.13 ANGLE ± 1°		CHECKED BY	DATE
THIRD ANGLE PROJECTION		DRAWING SYMBOL		ENGINEERED BY	DATE
FOR REFERENCE ONLY NEXT ASSY USED ON APPLICATION		781951		DATABASE CAD	TEAM/GROUP
SCALE 3:4 & AS NOTED		DO NOT SCALE DRAWING		SOLID MODEL NO. 578183	REV A



TITLE  
**ILC CRYO MODULE  
HELIUM VESSEL - BLADE TUNER  
VESSEL\_WELDMENT**

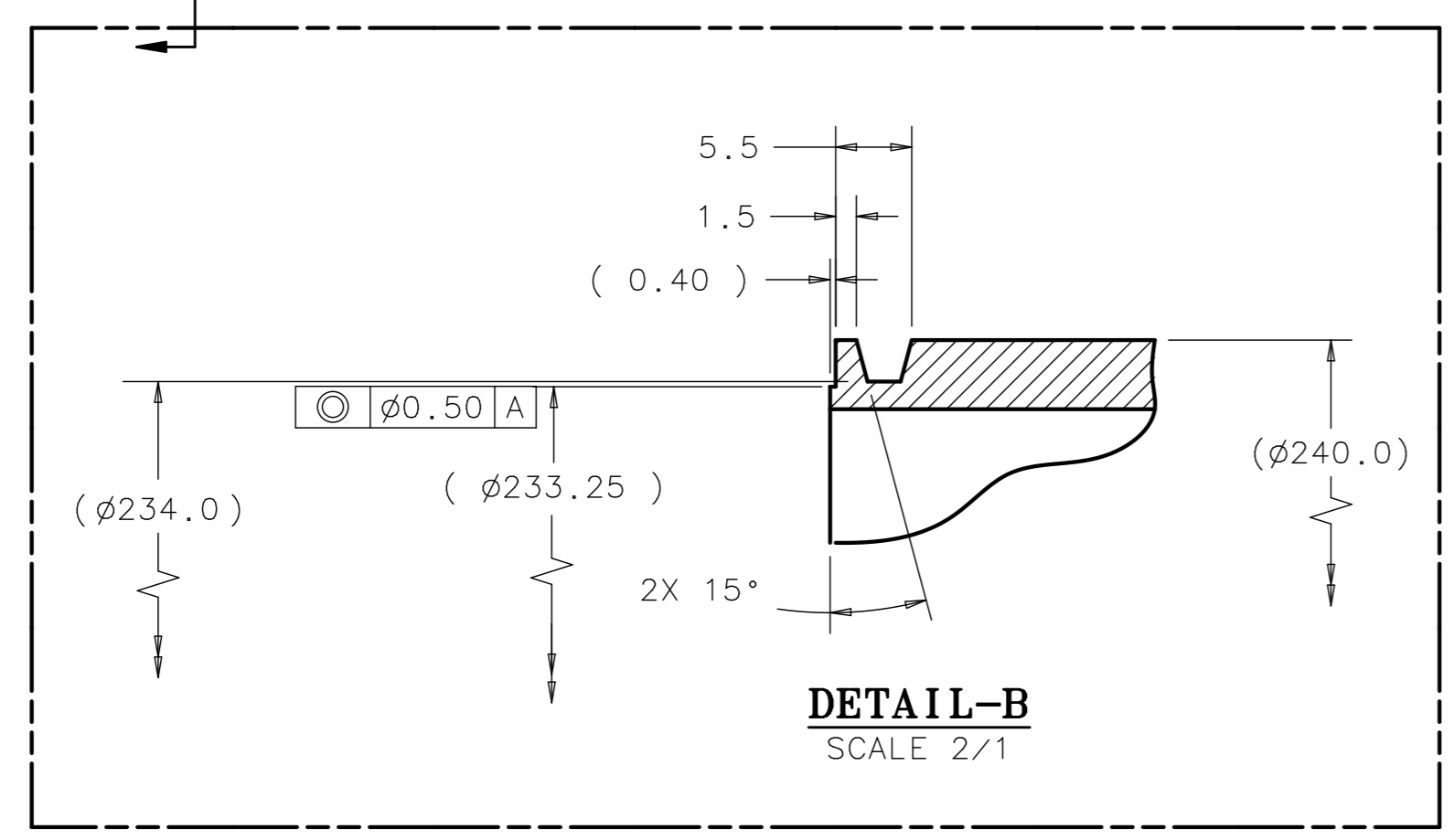
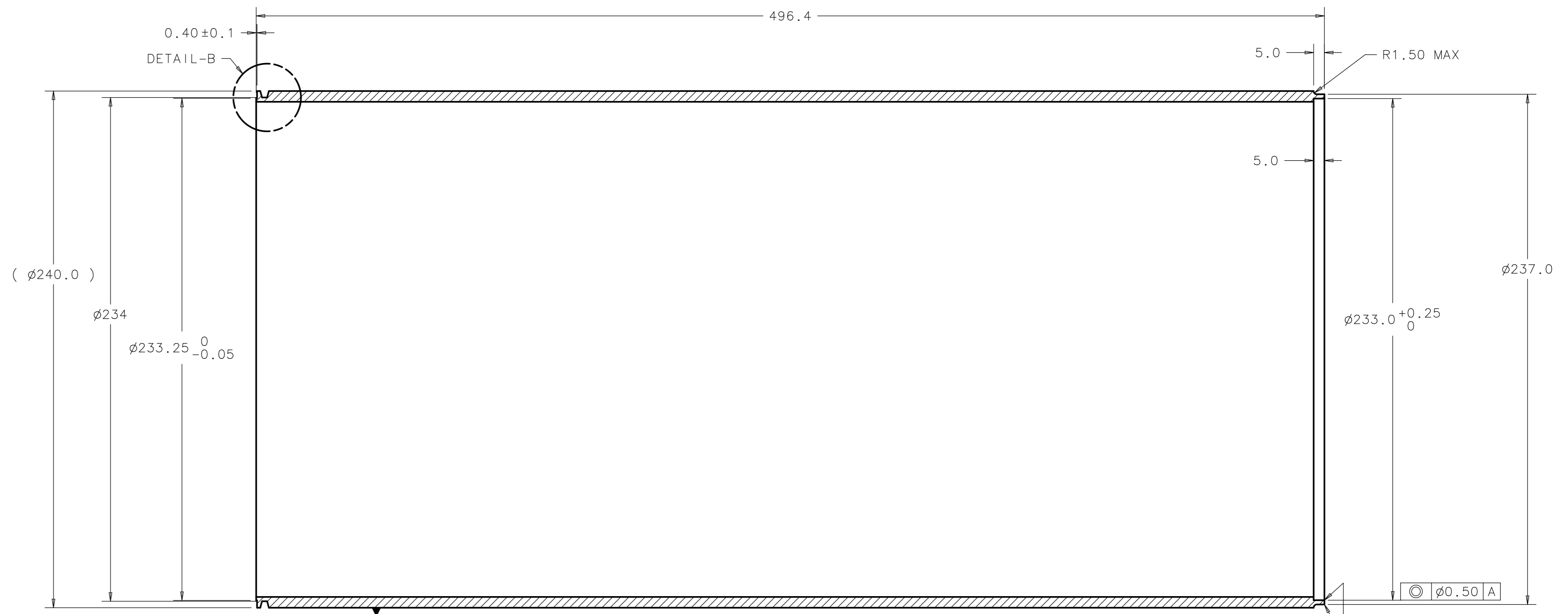
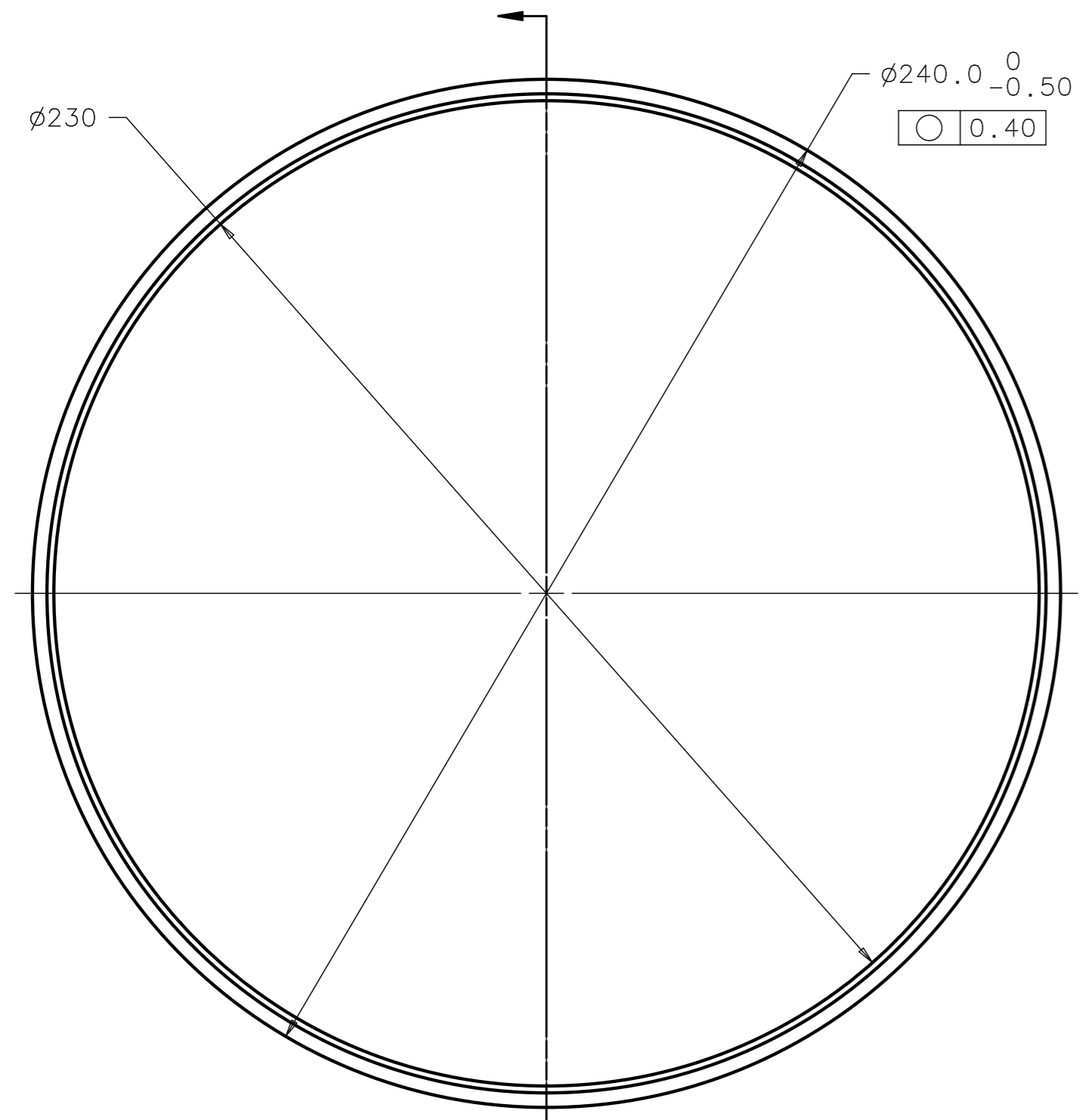
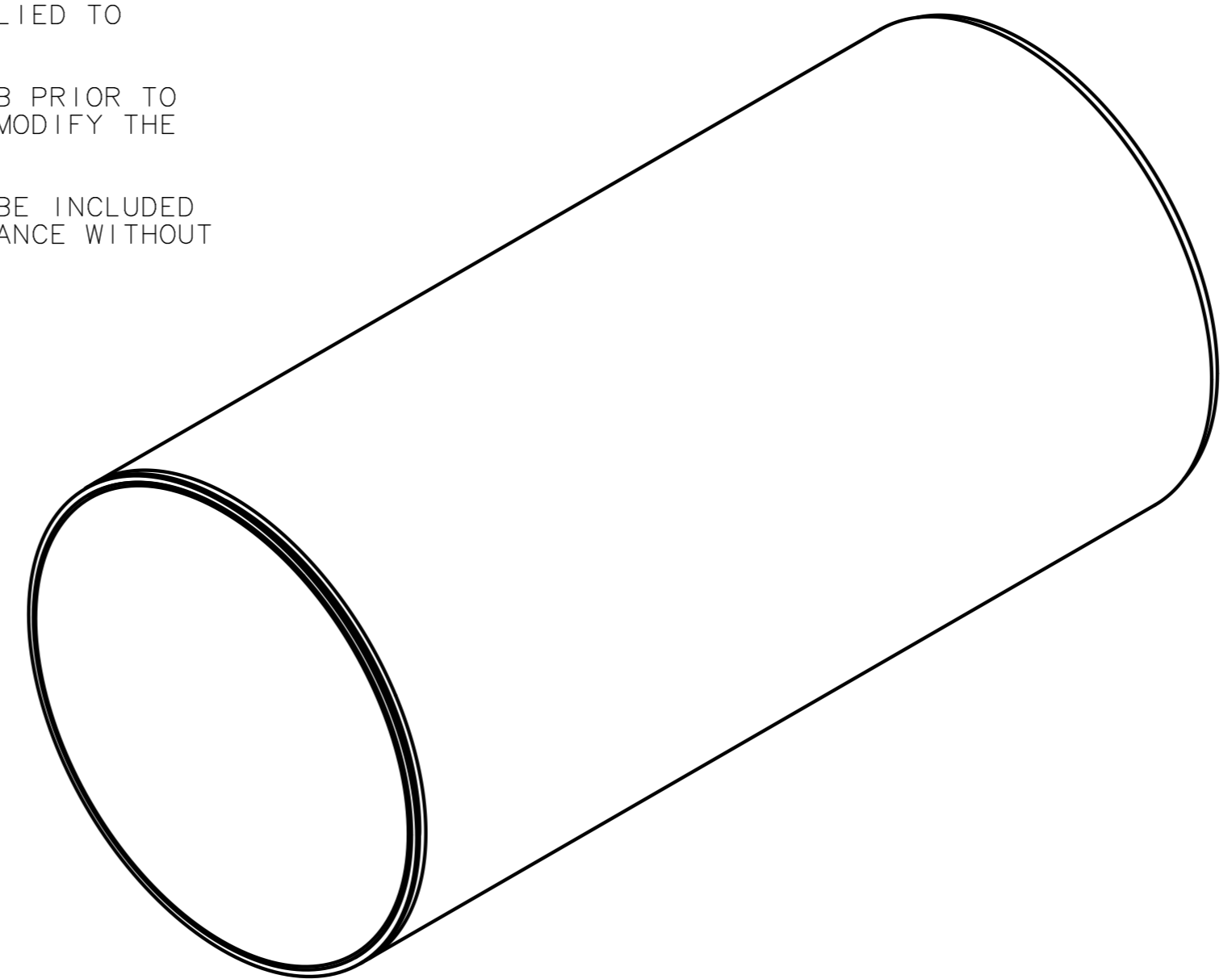
SIZE: A1  
CAGE CODE: 0U5R6  
DWG NO.: D00000000777901  
SHEET 1 OF 1

NOTES:

1. TUBE MAY BE ROLLED AND WELDED TO ACHIEVE DESIRED PART. ANY OUTSIDE WELDS ARE TO BE GROUND FLUSH AND PART IS TO BE VACUUM LEAK CHECKED. 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  $2 \times 10^{-10}$  ATM. CC/SEC
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. SEALING SURFACES ON FLANGES MUST BE FREE FROM ANY NICKS AND RADIAL SCRATCHES.
4. ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
5. ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
6. CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
7. FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.
8. AS AN ALTERNATE TO NOTES 6 & 7 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
9. ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.

10. WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
11. INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT ACCEPTANCE.
12. MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.

REVISION HISTORY			
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.			
ZONE	REV	DESCRIPTION	DATE
	A	INITIAL RELEASE	

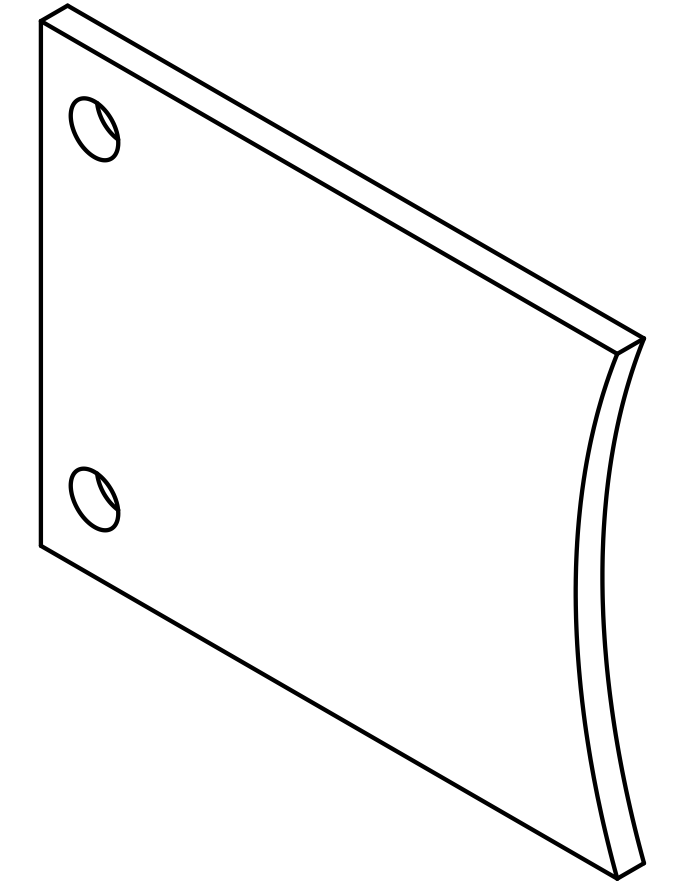
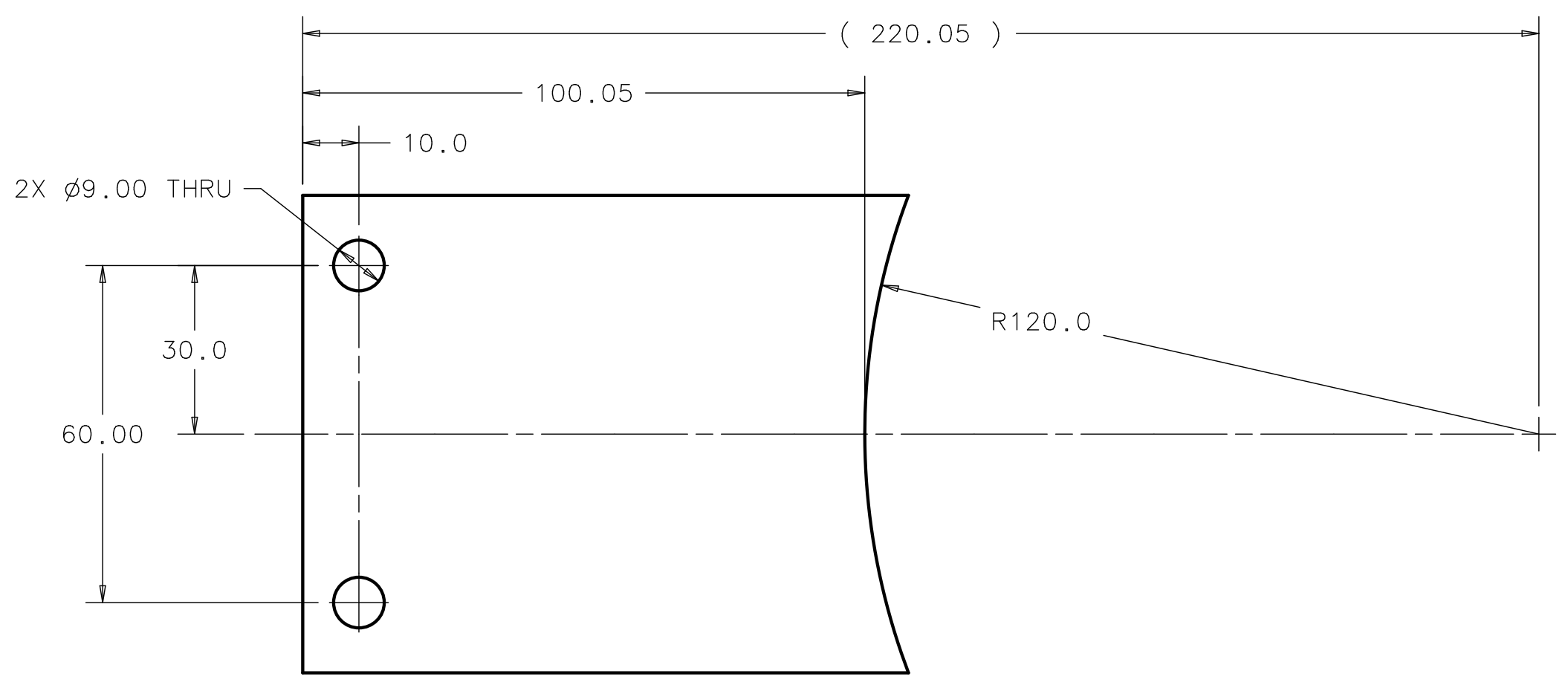
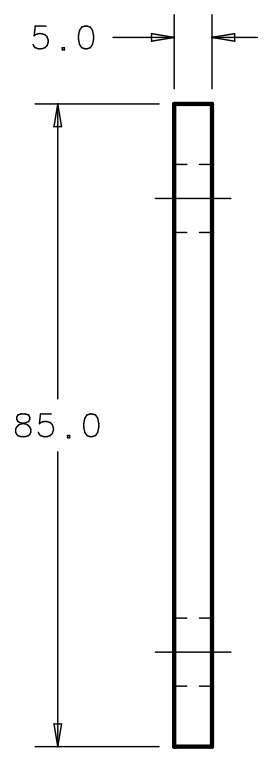


FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY V. MARTINEZ	DATE 12-08-06	<p>UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500</p>								
MATERIAL	TITANIUM GRADE 2	TOLERANCES	CHECKED BY	DATE									
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE								
		<table border="1"> <tr> <td>X ± 2</td> <td></td> </tr> <tr> <td>.X ± 0.8</td> <td></td> </tr> <tr> <td>.XX ± 0.13</td> <td></td> </tr> <tr> <td>ANGLE ± 1°</td> <td></td> </tr> </table>	X ± 2		.X ± 0.8		.XX ± 0.13		ANGLE ± 1°		DATABASE DESY EDMS	TEAM/GROUP	HEL IUM VESSEL - BLADE TUNER TUBE-COUPLER_SIDE
X ± 2													
.X ± 0.8													
.XX ± 0.13													
ANGLE ± 1°													
			CAD I-DEAS	SOLID MODEL NO. 680282	SIZE A1								
					CAGE CODE OU5R6								
					DWG NO. D00000000777831								
					REV A								
					SCALE 3:4								
					DO NOT SCALE DRAWING								
					SHEET 1 OF 1								

FOR REFERENCE ONLY  
NEXT ASSY USED ON APPLICATION  
NOT FOR FABRICATION  
MAY NOT BE CURBELED

NOTE:  
1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



FOR REFERENCE MATERIAL  
**- NOT FOR FABRICATION -**  
 781051  
 USED ON CURRENT  
 APPLICATION  
 TITANIUM  
 GRADE 2

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.		DRAWN BY V. MARTINEZ	DATE 12-13-06	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500	
				CHECKED BY	DATE	TITLE ILC CRYO MODULE HELIUM VESSEL - BLADE TUNER 2-PHASE_SUPPORT_PLATE	
				ENGINEERED BY	DATE	SIZE A2	CAGE CODE OU5R6
				DATABASE DESY EDMS	TEAM/GROUP	DWG NO. D0000000777841	REV A
				CAD I-DEAS	SOLID MODEL NO. 680262	SCALE 1:1	DO NOT SCALE DWG
							SHEET 1 OF 1

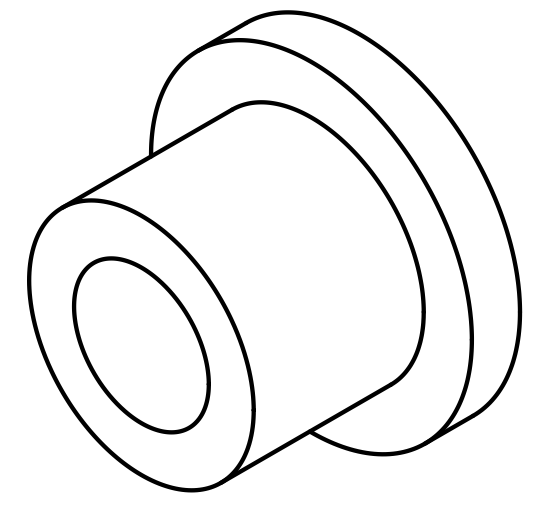
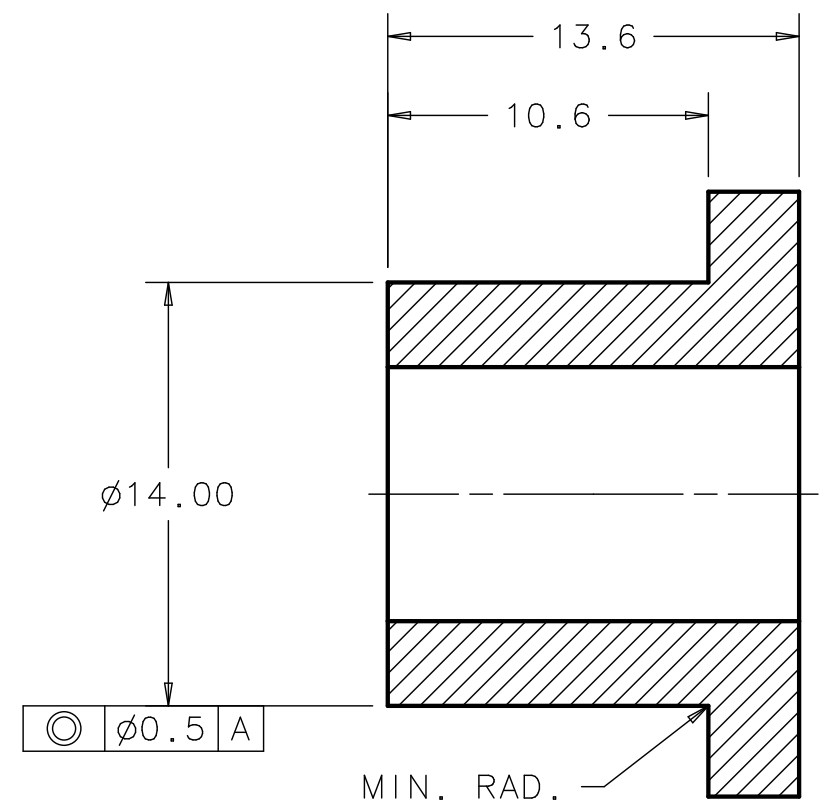
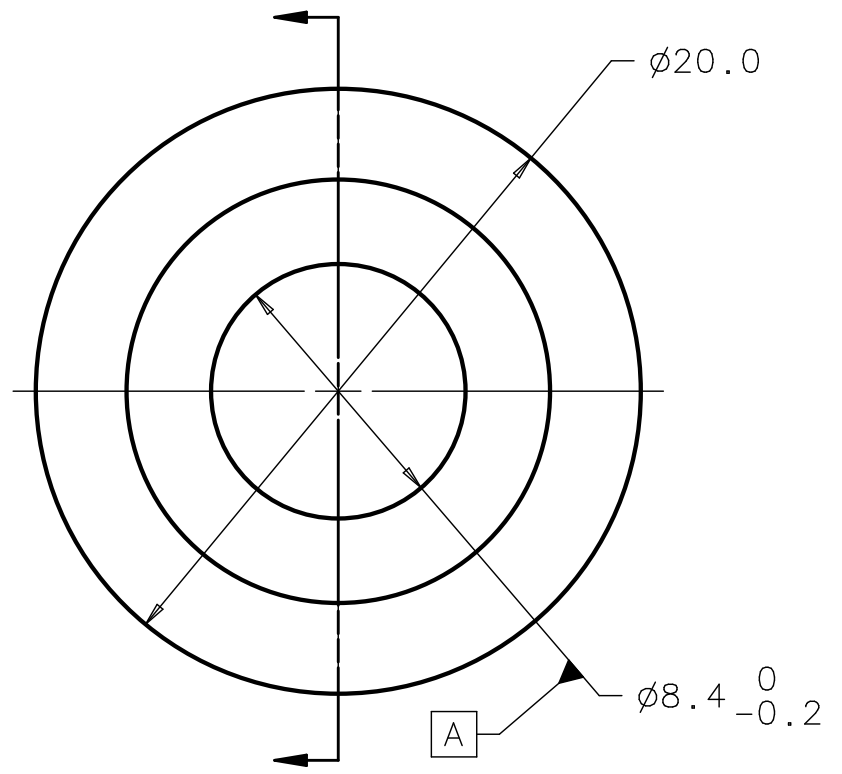
REVISION HISTORY

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		

NOTE:

1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.



FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 / MAX.	DRAWN BY	DATE
MATERIAL	TITANIUM GRADE 2		V. MARTINEZ	12-13-06
APPLICATION		TOLERANCES ON THIRD ANGLE PROJECTION X ± 0.8 Y ± 0.8 Z ± 0.13 ANGLE ± 1°	CHECKED BY	DATE
NEXT ASSY	781951		ENGINEERED BY	DATE
USED ON		<p style="text-align: center;"><b>NOT FOR FABRICATION</b></p> <p style="text-align: center;">MAY NOT BE CURRENT</p>	DATABASE	TEAM/GROUP
APPLICATION			DESY EDMS	SOLID MODEL NO.
			I-DEAS	680192

**FERMI NATIONAL ACCELERATOR LABORATORY**  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

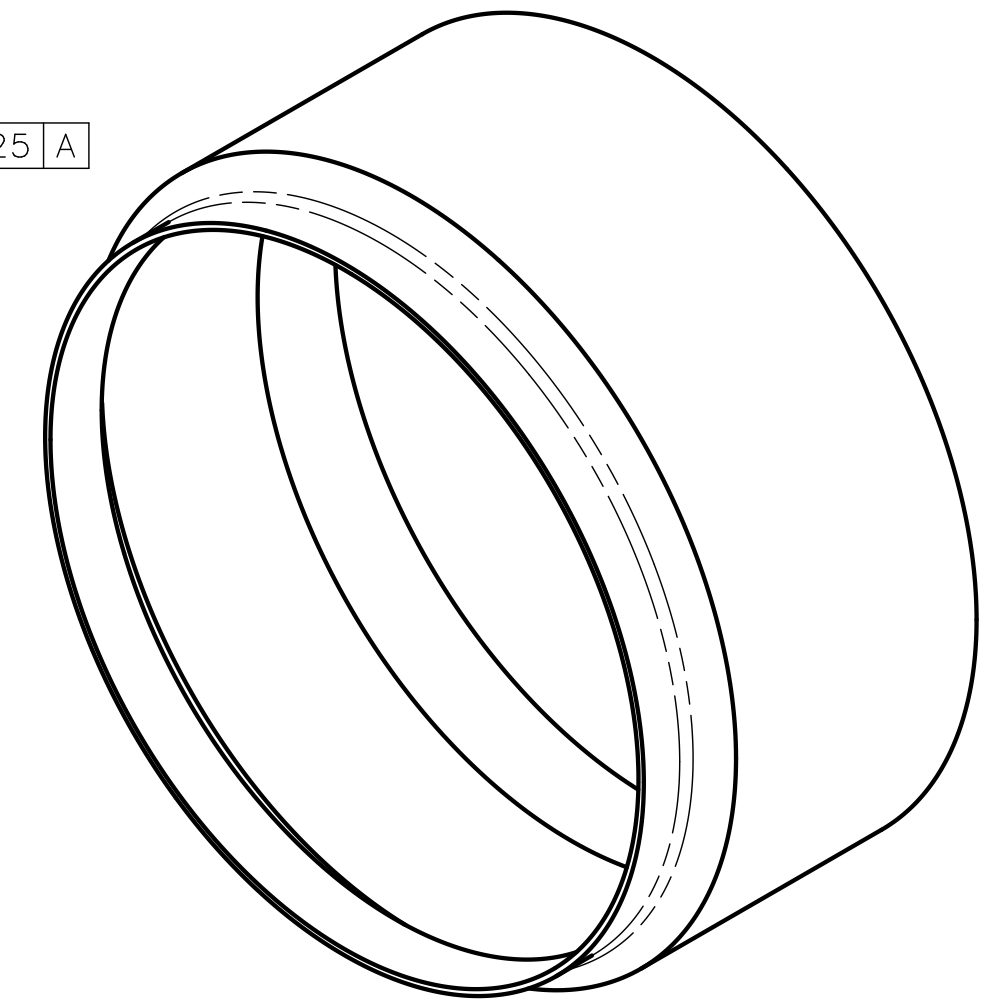
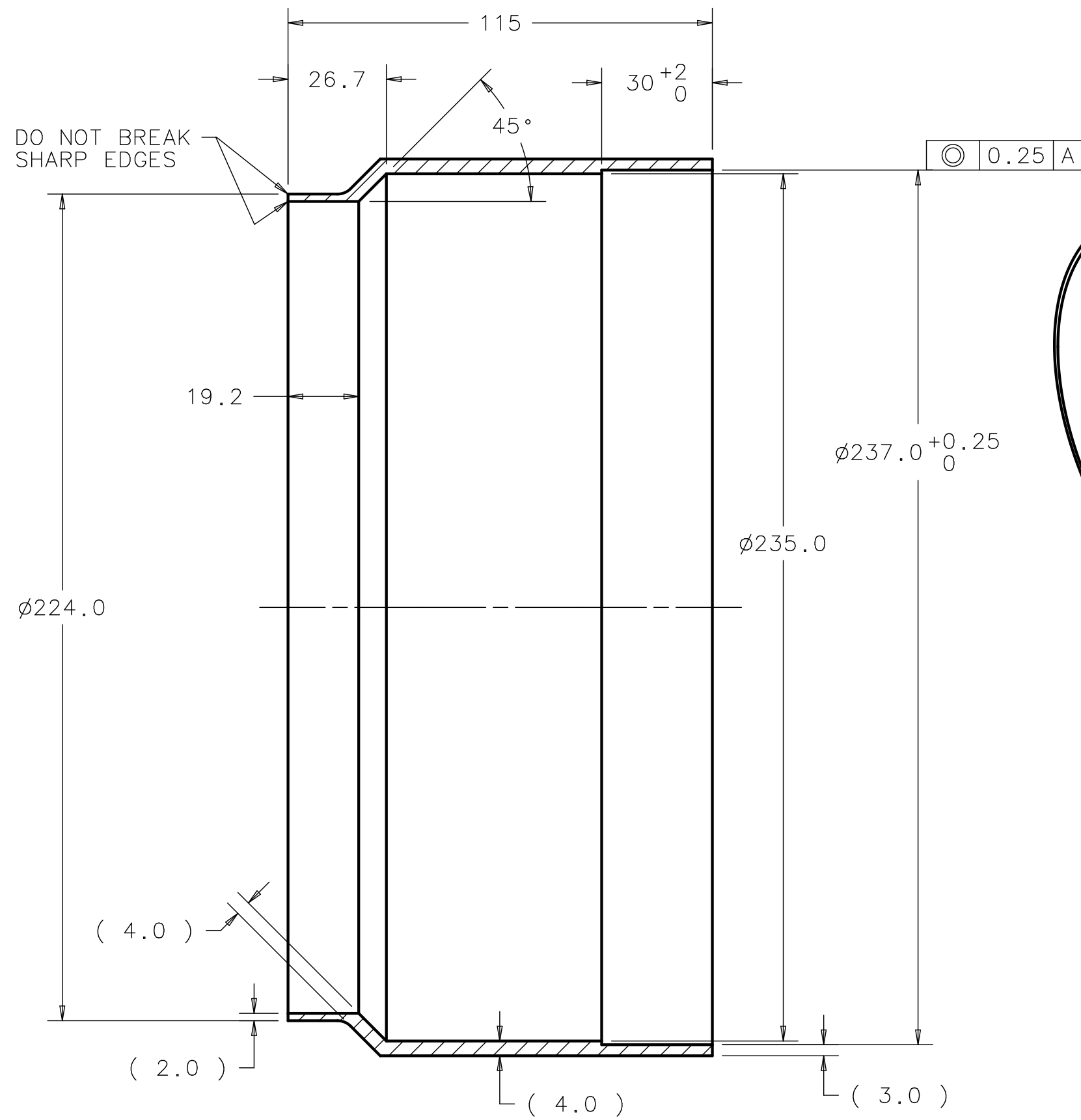
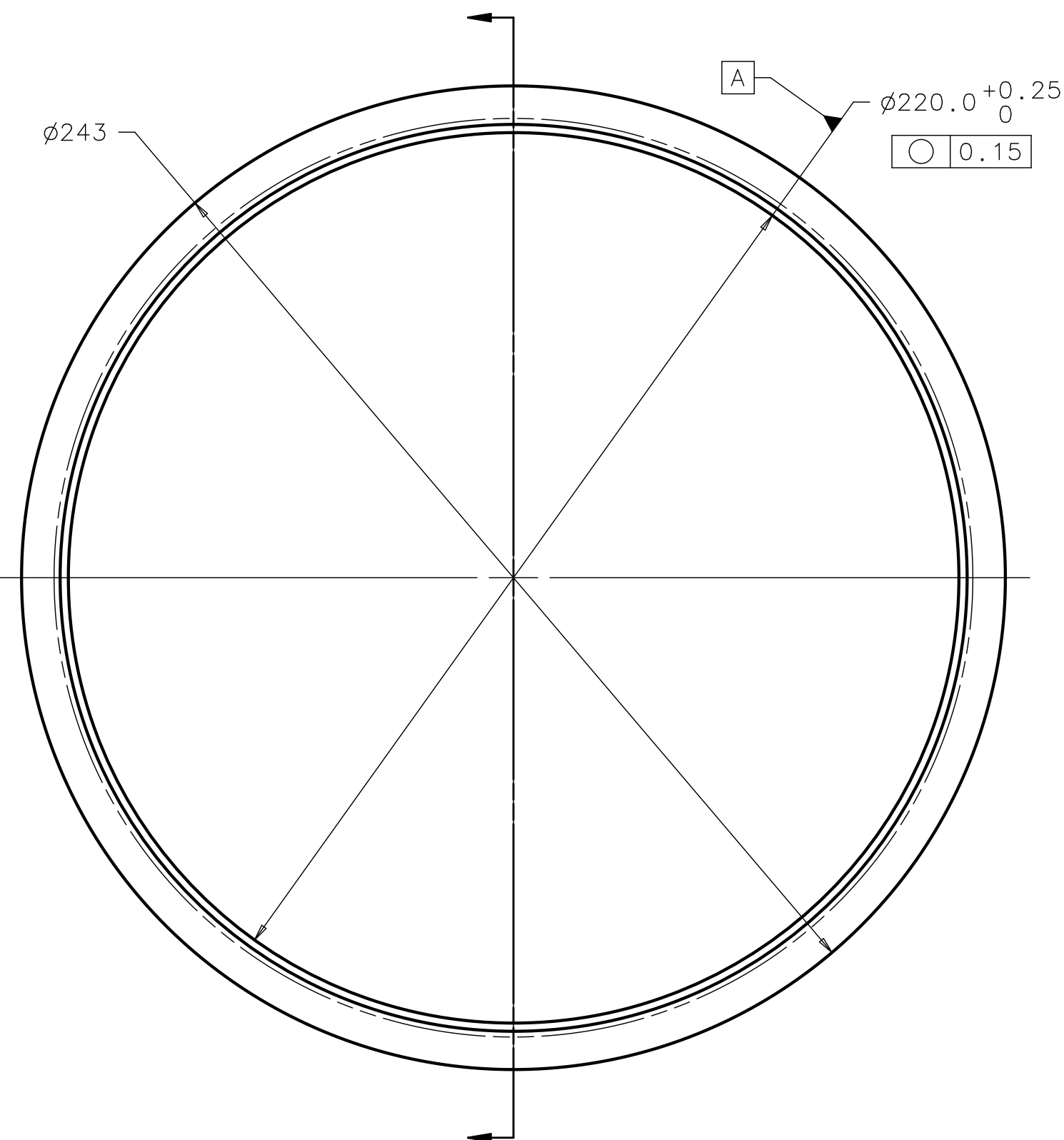
TITLE  
**ILC CRYO MODULE  
HELIUM VESSEL - BLADE TUNER  
2-PHASE\_PIPE\_BUSHING**

SIZE	CAGE CODE	DWG NO.	REV
A3	OU5R6	D00000000777851	A
SCALE	4:1	DO NOT SCALE DWG	SHEET 1 OF 1

NOTE:

1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



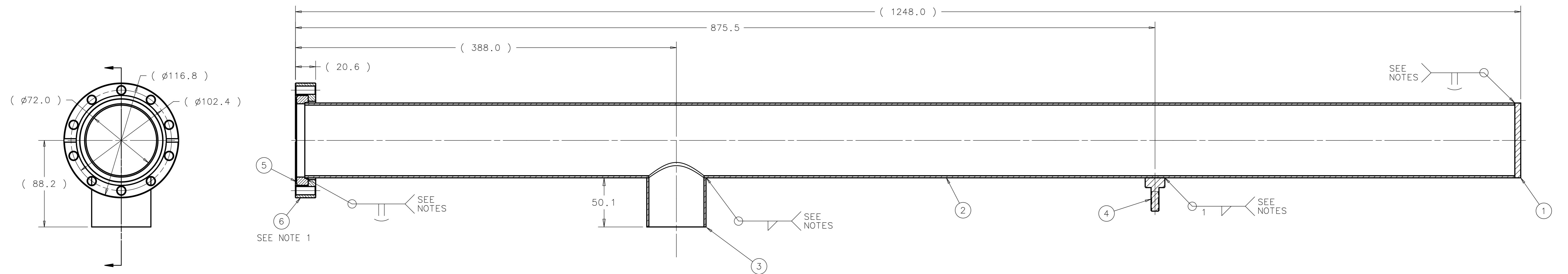
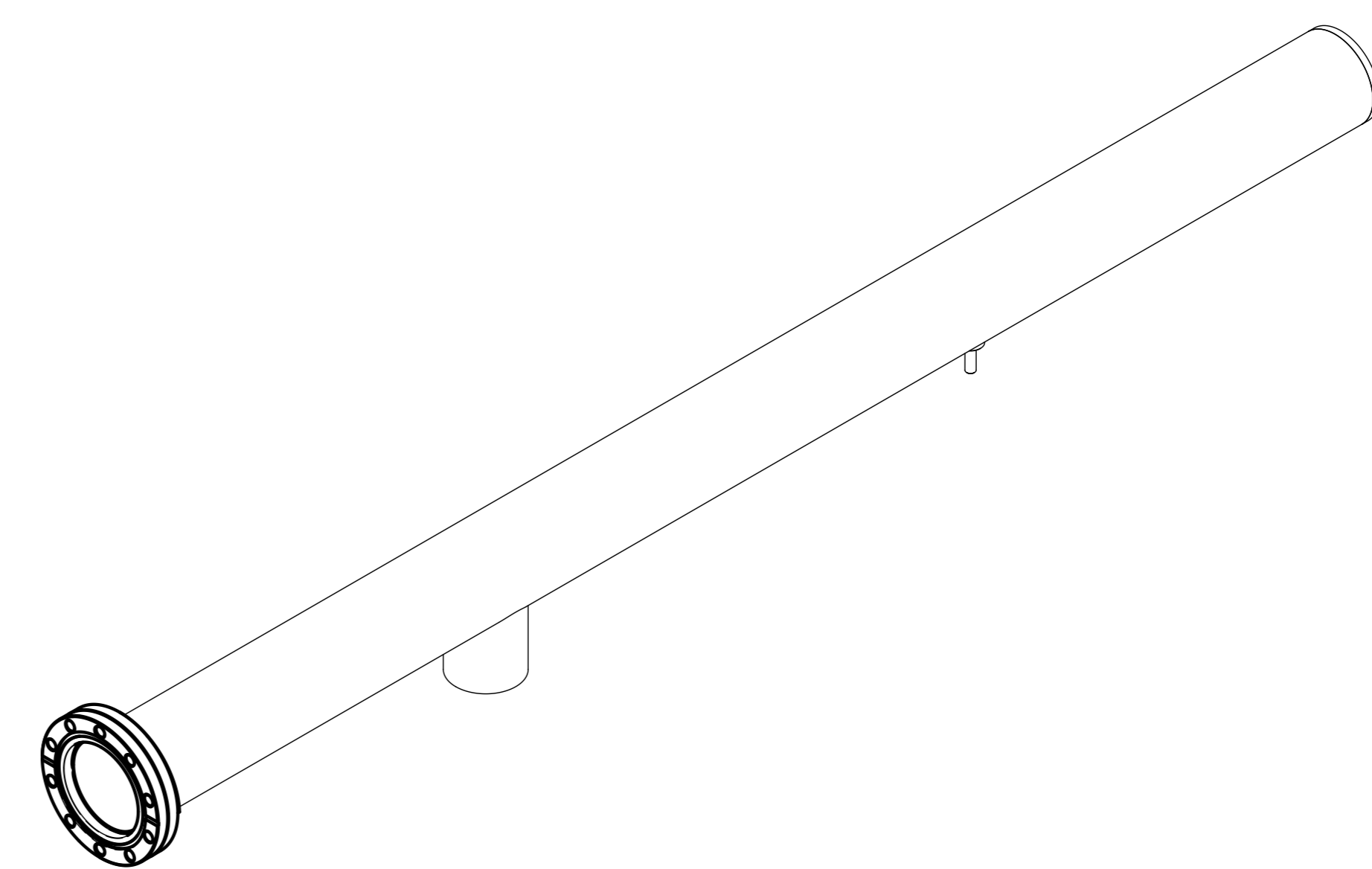
781951	777081	TITANIUM
NEXT ASSY	MADE ON	GRADE 2
APPLICATION		

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES $3.2/\sqrt{\text{MAX}}$ .	DRAWN BY V. MARTINEZ	DATE 11/28/06	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL	TITANIUM GRADE 2	TOLERANCES	CHECKED BY	DATE	
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE
		$X \pm 2$ $.X \pm 0.8$ $.XX \pm 0.13$ ANGLE $\pm 1^\circ$	DATABASE DESY EDMS	TEAM/GROUP	<b>ILC CRYO MODULE          HELIUM VESSEL - BLADE TUNER          ADJUSTER_TUBE</b>
			CAD I-DEAS	SOLID MODEL NO. 680272	
					SIZE <b>A2</b> CAGE CODE OU5R6 DWG NO. <b>D0000000777911</b> SCALE 3:4 DO NOT SCALE DWG
					REV <b>A</b> SHEET 1 OF 1

NOTES:

1. ONLY USE ROTATABLE FLANGE FROM ASSEMBLY P/N# F0462X300R (ITEM 6). INSTALL BEFORE WELDING ITEM 5.
2. ITEM 6, PART SPECIFICATION IS IN INCHES.
3. ALL WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
4. ALL DIMENSIONS ARE IN MILLIMETERS.
5. SEALING SURFACES ON FLANGES MUST BE FREE FROM ANY NICKS AND RADIAL SCRATCHES.
6. ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
7. ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
8. CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
9. FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.
10. AS AN ALTERNATE TO NOTES 8 & 9 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
11. ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.
12. WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
13. INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT ACCEPTANCE.
14. 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  $2 \times 10^{-10}$  ATM. CC/SEC.
15. MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.

REVISION HISTORY			
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.			
ZONE	REV	DESCRIPTION	DATE
	A	INITIAL RELEASE	



ITEM	P. I. N.	DESCRIPTION	QTY
6	COM'L	FLANGE OF ROTATABLE 4.625" O.D. KURT J. LESKER, CO. P/N# F0462X300R	1
5	791535	FLANGE OF KNIFE EDGE BODY	1
4	790925	PIN - SUPPORT	1
3	778011	2-PHASE PIPE EXTENSION	1
2	778001	2-PHASE PIPE	1
1	790885	2-PHASE PIPE CAP	1

FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY V. MARTINEZ	DATE 12-13-06	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL SEE PARTS LIST	TOLERANCES X ± 2 X ± 0.8 .XX ± 0.13 ANGLE ± 1°	CHECKED BY	DATE	
THIRD ANGLE PROJECTION		ENGINEERED BY	DATE	<b>HELUM VESSEL - BLADE TUNER</b> <b>2-PHASE_PIPE_ASSY</b>
		DATABASE DESY EDMS	TEAM/GROUP	
		CAD I-DEAS	SOLID MODEL NO. 578193	SIZE A1
FOR REFERENCE ONLY NEXT ASSY USED ON APPLICATION NOT FOR FABRICATION		DWG NO. D00000000777921		REV A
		SCALE 1:2 & AS NOTED		SHEET 1 OF 1

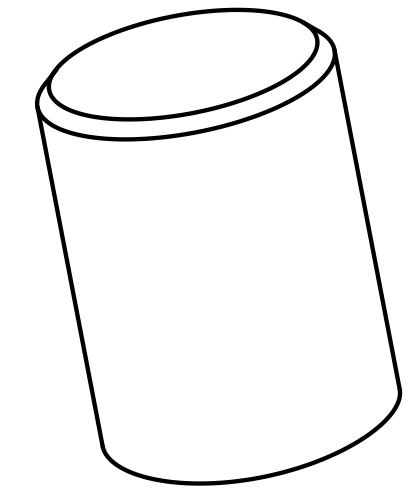
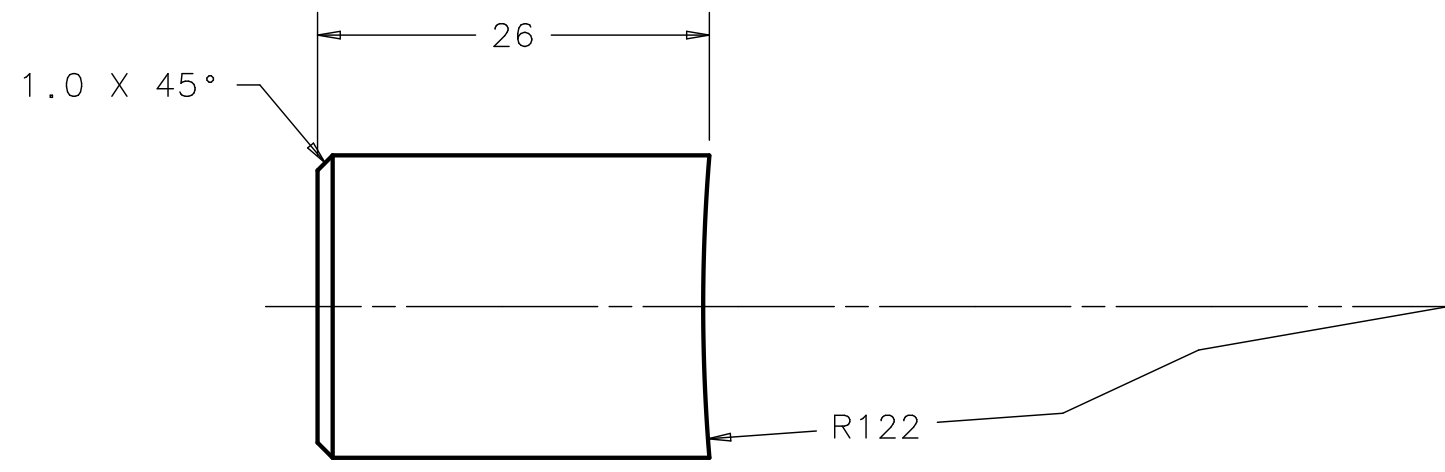
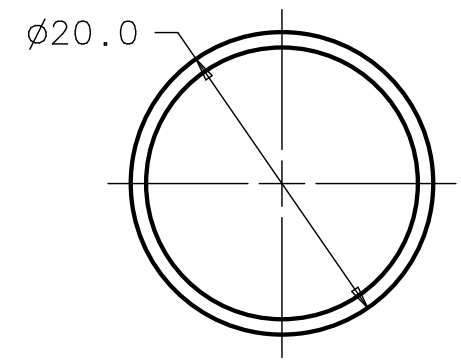
REVISION HISTORY

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		

NOTE:

1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.



FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 / MAX.	DRAWN BY V. MARTINEZ	DATE 12/03/06
MATERIAL TITANIUM GRADE 2	FOR TOLERANCES ONLY THIRD ANGLE PROJECTION <b>NOT FOR FABRICATION</b> MAY NOT BE CURRENT	CHECKED BY	DATE
		ENGINEERED BY	DATE
		DATABASE DESY EDMS	TEAM/GROUP
		CAD I-DEAS	SOLID MODEL NO. 680152

**FERMI NATIONAL ACCELERATOR LABORATORY**  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

TITLE  
**ILC CRYO MODULE  
HELIUM VESSEL - BLADE TUNER  
CLAMPING\_PIN**

SIZE <b>A3</b>	CAGE CODE OU5R6	DWG NO. <b>D00000000777941</b>	REV A
SCALE 2:1	DO NOT SCALE DWG	SHEET 1 OF 1	

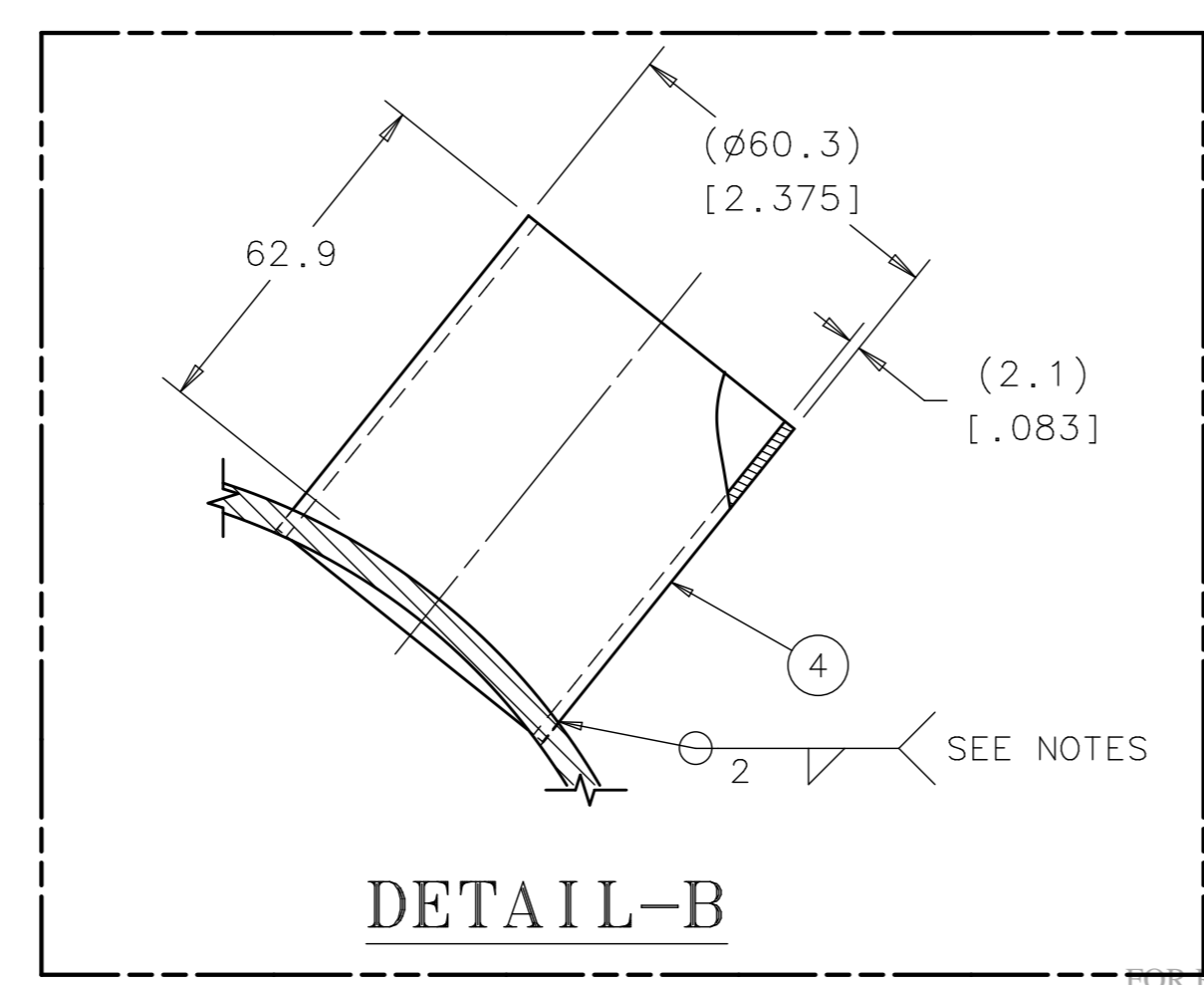
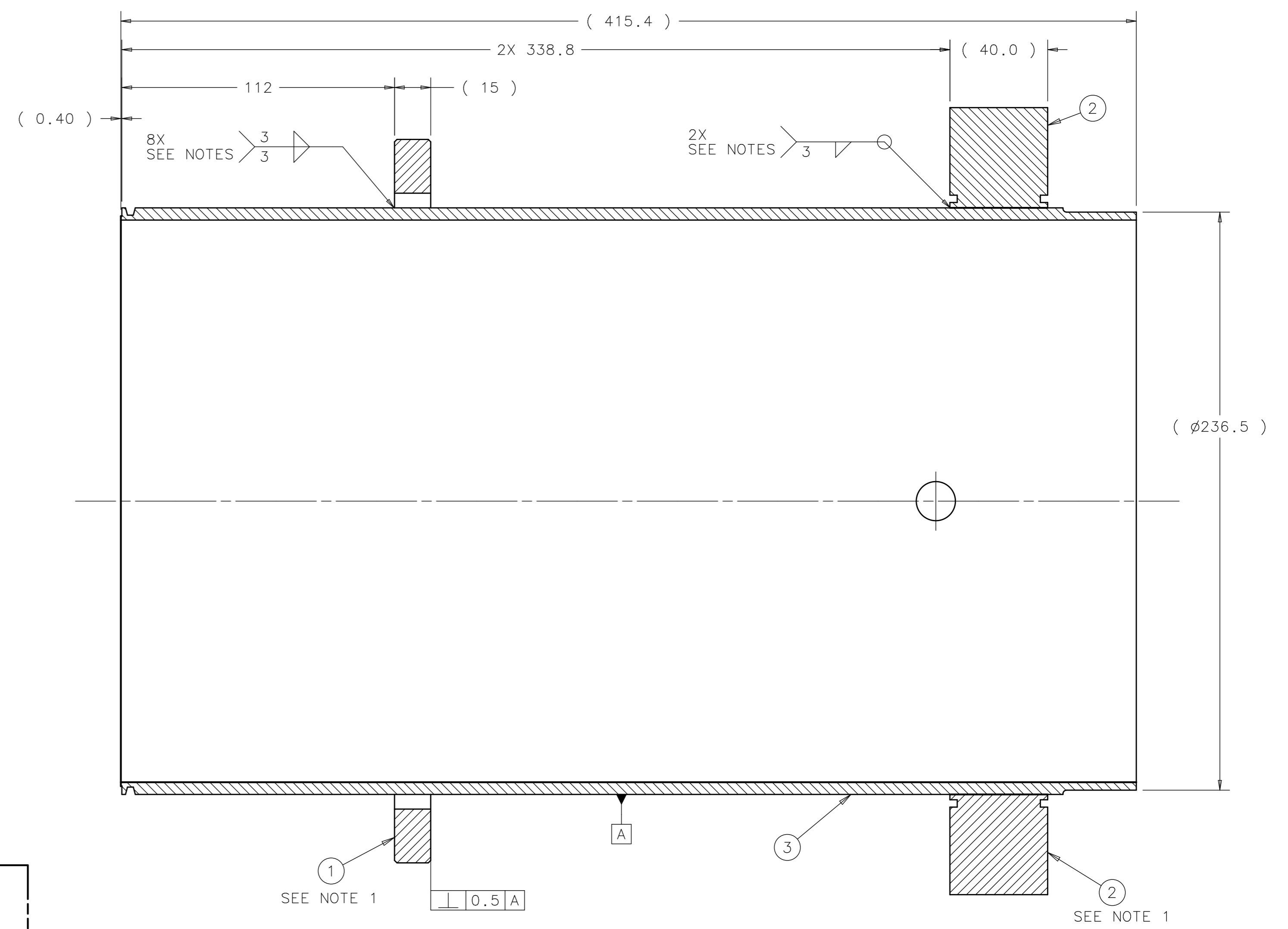
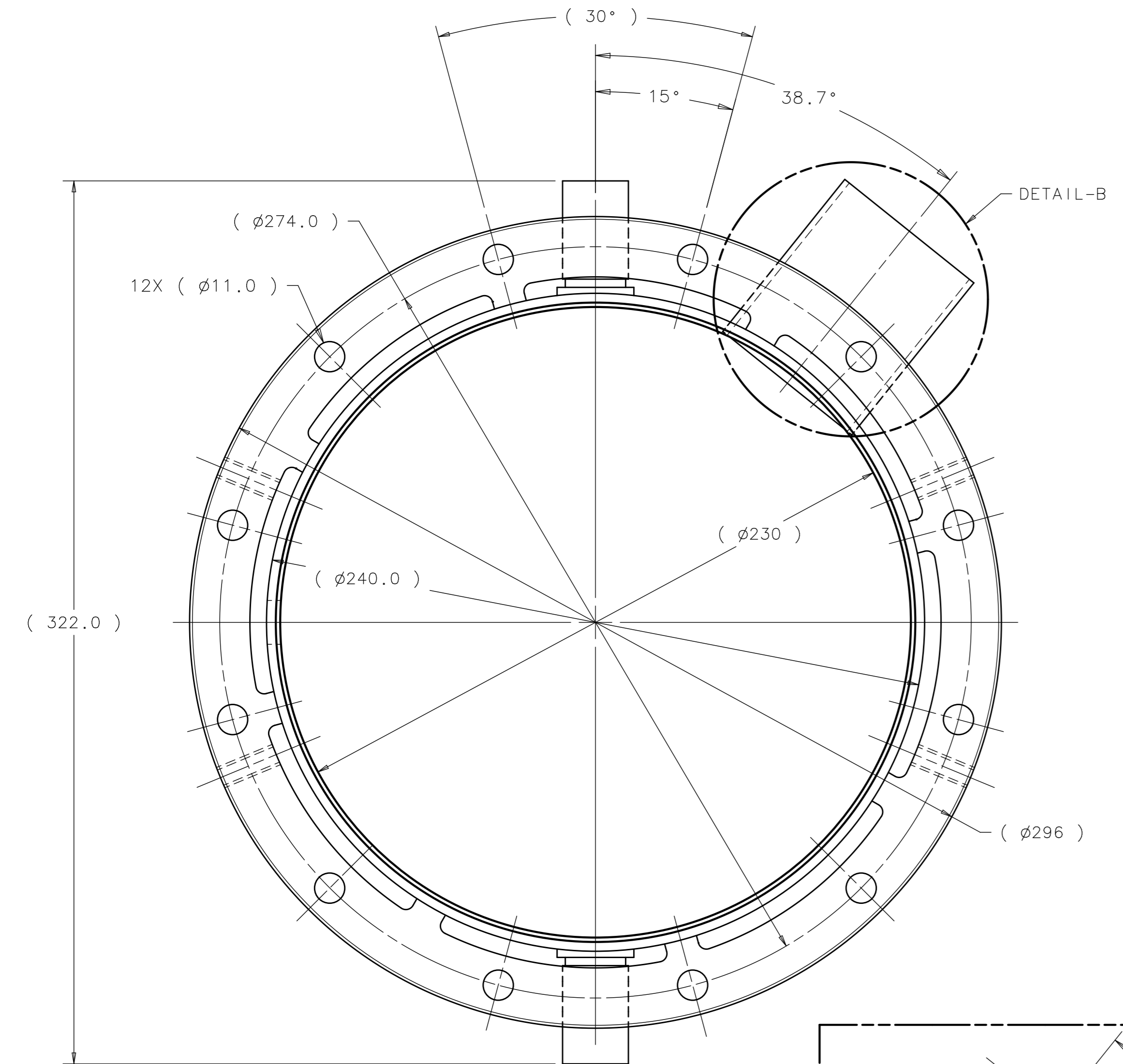
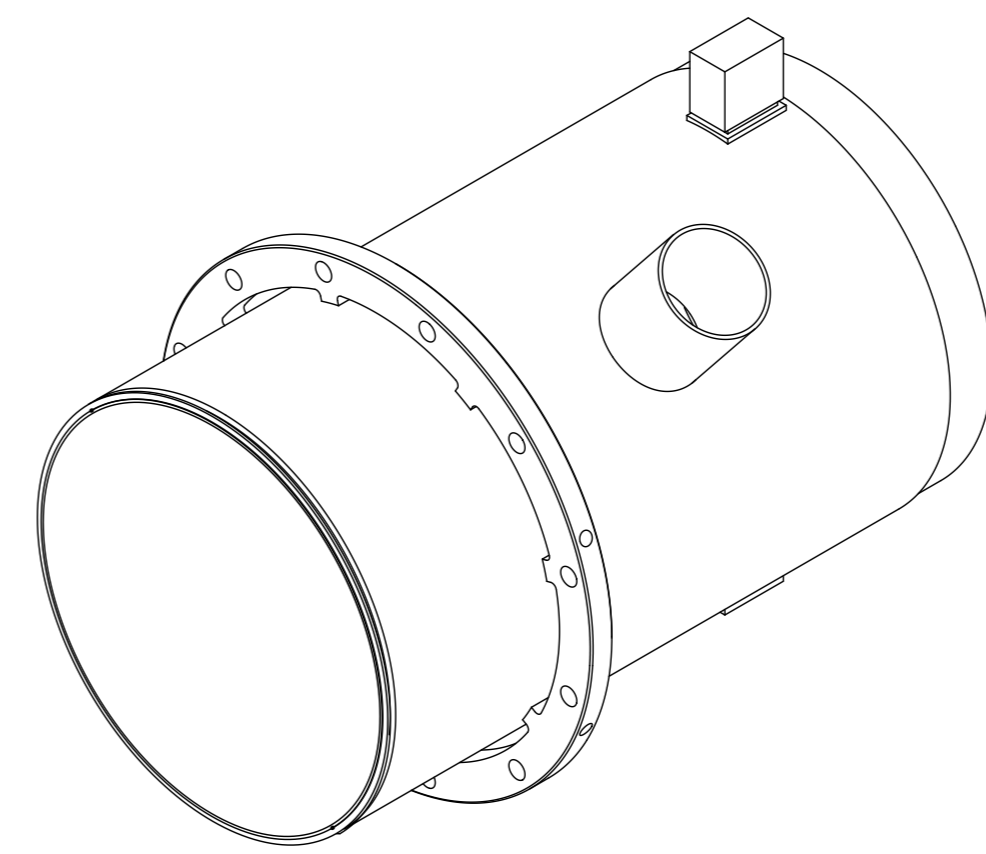
781951	777981
NEXT ASSY	USED ON
APPLICATION	



- NOTES:
- NOTE ORIENTATION OF TUNER RING HOLES AND WELDS TABS IN RELATION TO ROLLER PADS.
  - ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
  - DIMENSIONS IN [X.XX] ARE IN INCHES. MATERIAL SPECIFICATION FOR ITEM 4 IS IN INCHES. ALL OTHER DIMENSIONS ARE IN MILLIMETERS.
  - ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
  - ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
  - CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
  - FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.

- AS AN ALTERNATE TO NOTES 6 & 7 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
- ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.
- WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
- INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT 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  $2 \times 10^{-10}$  ATM. CC/SEC.
- MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



ITEM	P. I. N.	DESCRIPTION	QTY
4	COM'L	Ø2.375" X 0.083" WALL X 2.80" LG. TITANIUM TUBING - GRADE 2	1
3	777961	TUBE TUNER SIDE	1
2	790905	ROLLER PAD	2
1	790865	TUNER RING MOTOR SIDE	1

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY V. MARTINEZ	DATE 12-11-06
MATERIAL	SEE PARTS LIST	TOLERANCES X ± 2 .X ± 0.8 .XX ± 0.13 ANGLE ± 1°	CHECKED BY	DATE
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE
			DATABASE DESY EDMS	TEAM/GROUP
			CAD I-DEAS	SOLID MODEL NO. 578473

FOR REFERENCE ONLY  
NEXT ASSY USED ON APPLICATION  
781951 777901

FERMI NATIONAL ACCELERATOR LABORATORY  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

TITLE  
ILC CRYO MODULE  
HELIUM VESSEL - BLADE TUNER  
TUNER\_SIDE\_WELDMENT

SIZE  
A1

CAGE CODE  
OU5R6

DWG NO.  
D00000000777951

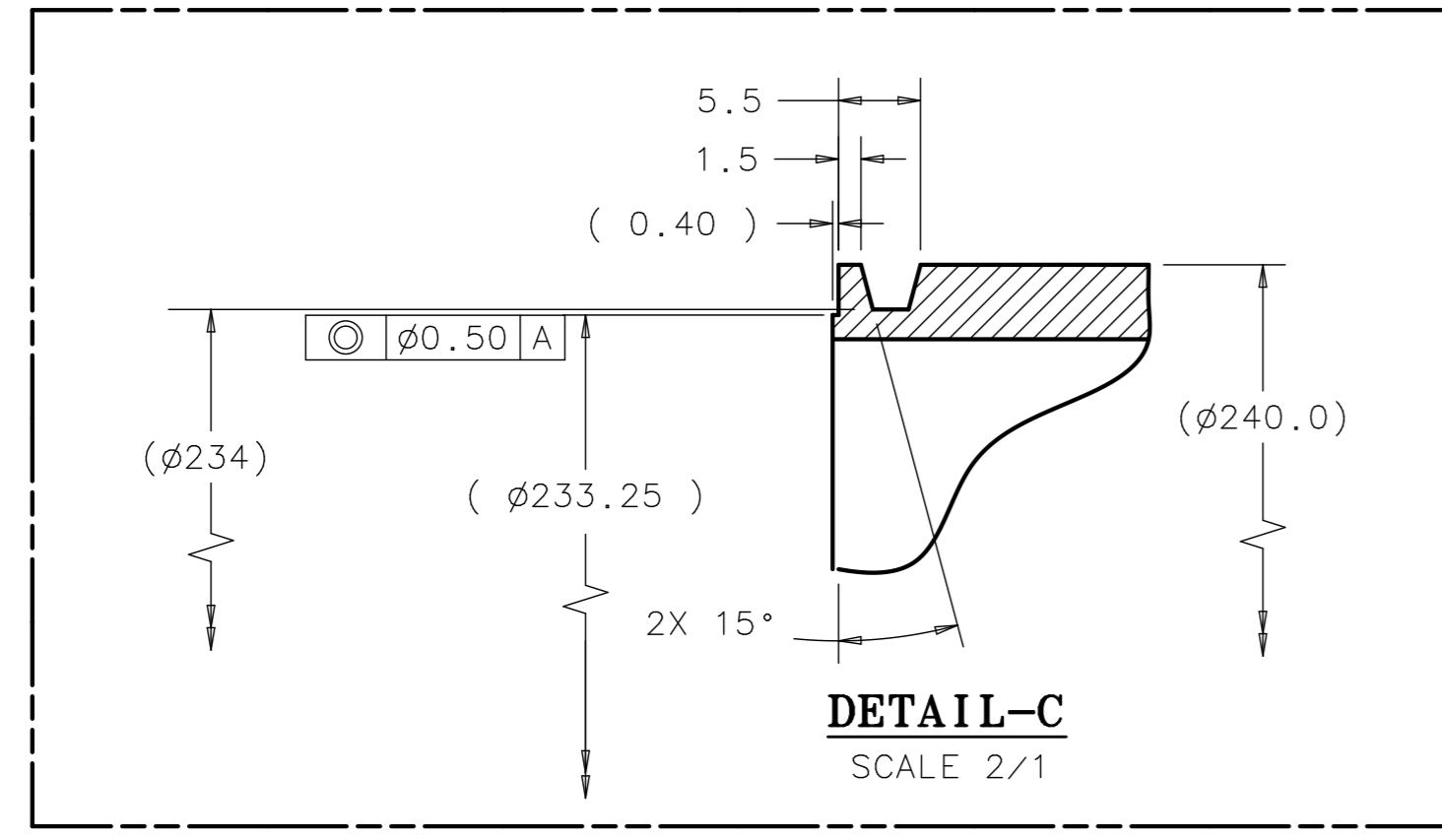
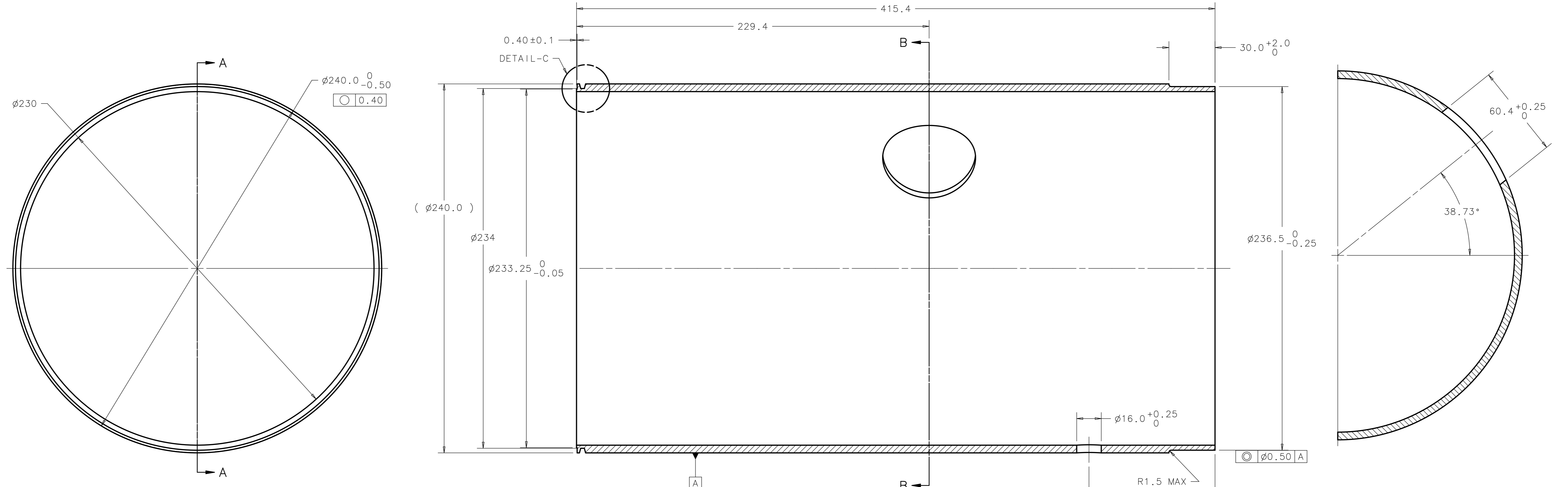
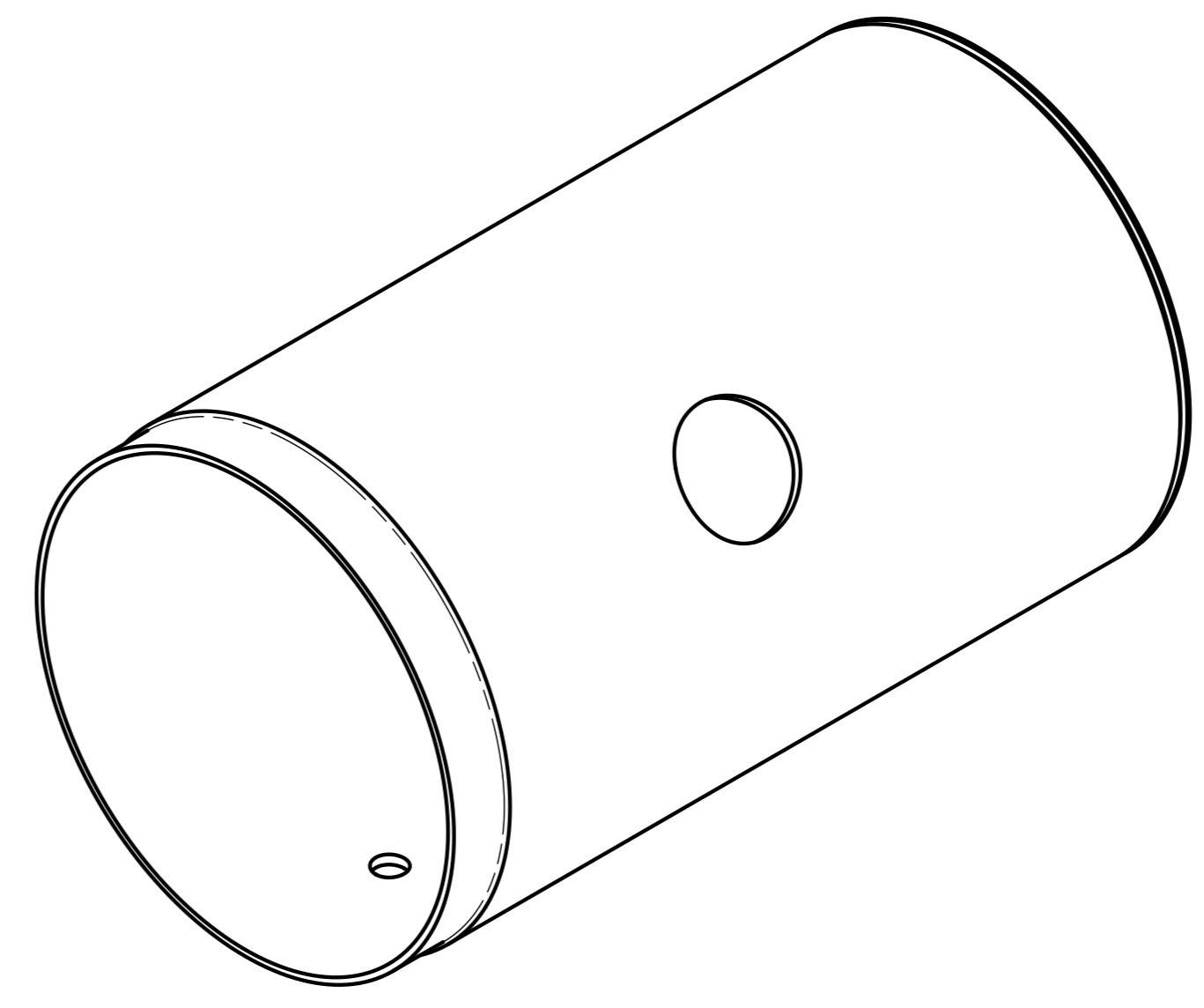
REV  
A

SCALE 3:4 & AS NOTED DO NOT SCALE DRAWING SHEET 1 OF 1

REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED
A	1	INITIAL RELEASE		

- NOTES:
1. TUBE MAY BE ROLLED AND WELDED TO ACHIEVE DESIRED PART. ANY OUTSIDE WELDS ARE TO BE GROUND FLUSH AND PART IS TO BE VACUUM LEAK CHECKED. 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  $2 \times 10^{-10}$  ATM. CC/SEC
  2. ALL DIMENSIONS ARE IN MILLIMETERS.
  3. SEALING SURFACES ON FLANGES MUST BE FREE FROM ANY NICKS AND RADIAL SCRATCHES.
  4. ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
  5. ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
  6. CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
  7. FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.
  8. AS AN ALTERNATE TO NOTES 6 & 7 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
  9. ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.

10. WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
11. INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT ACCEPTANCE.
12. MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.



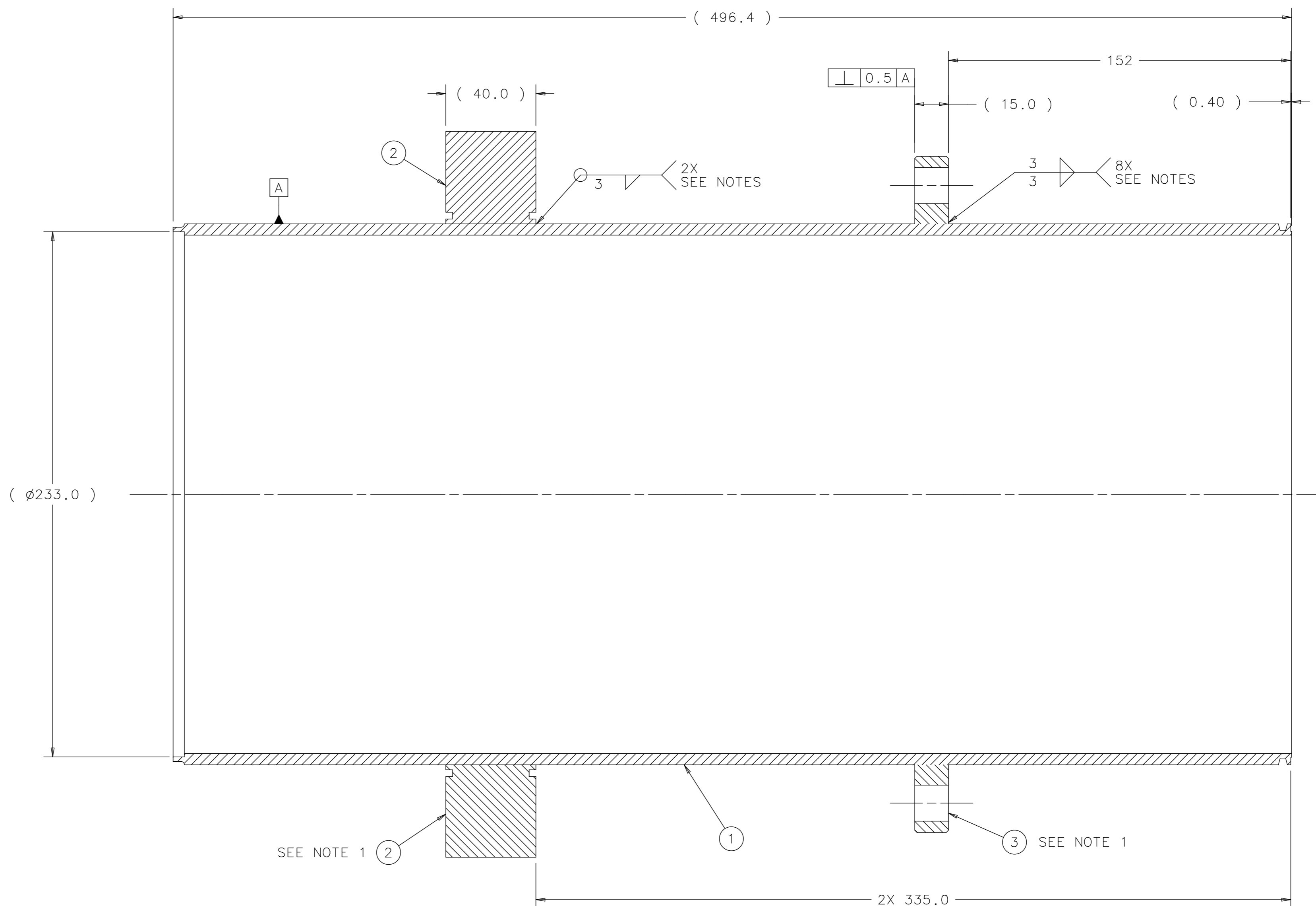
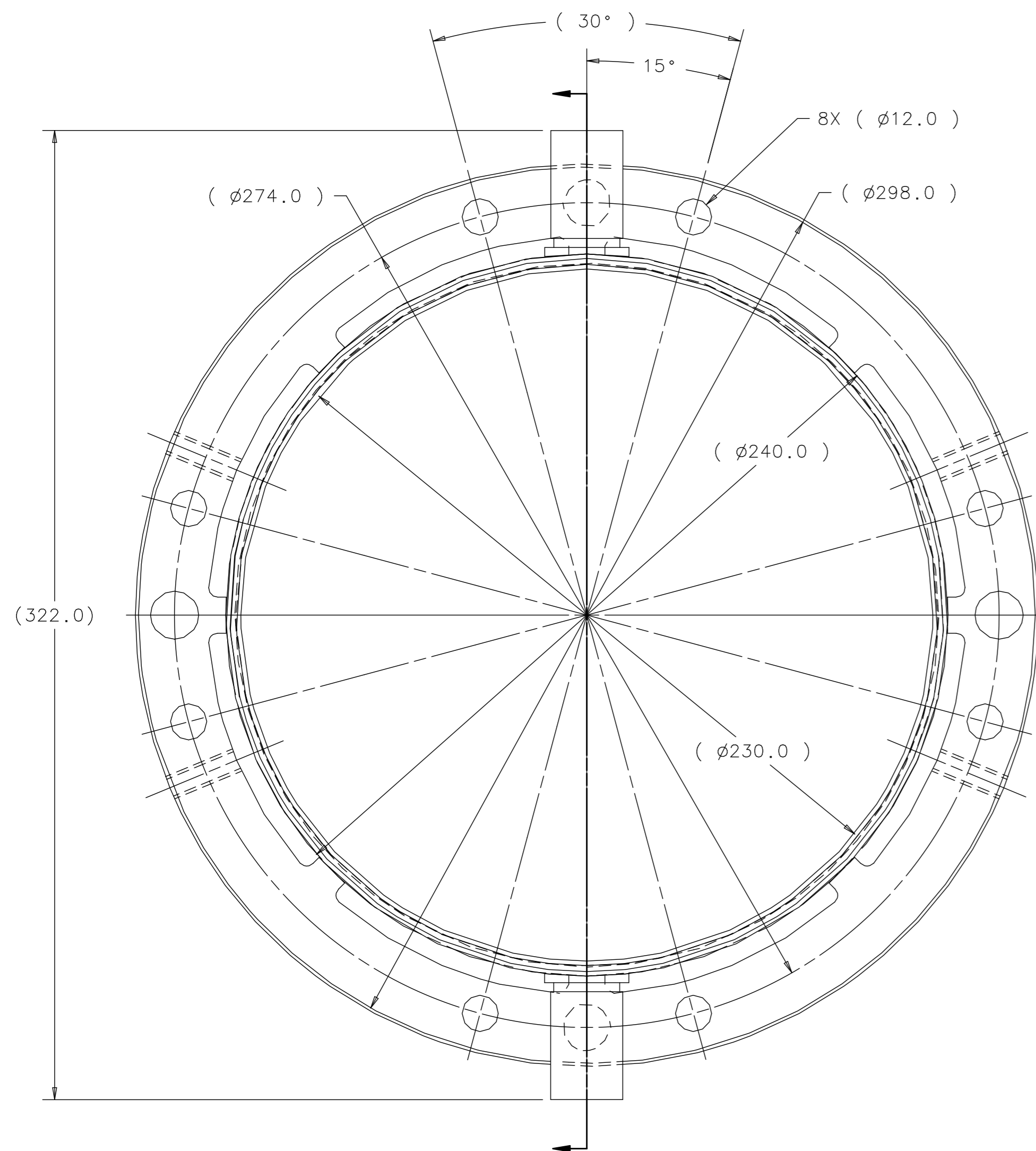
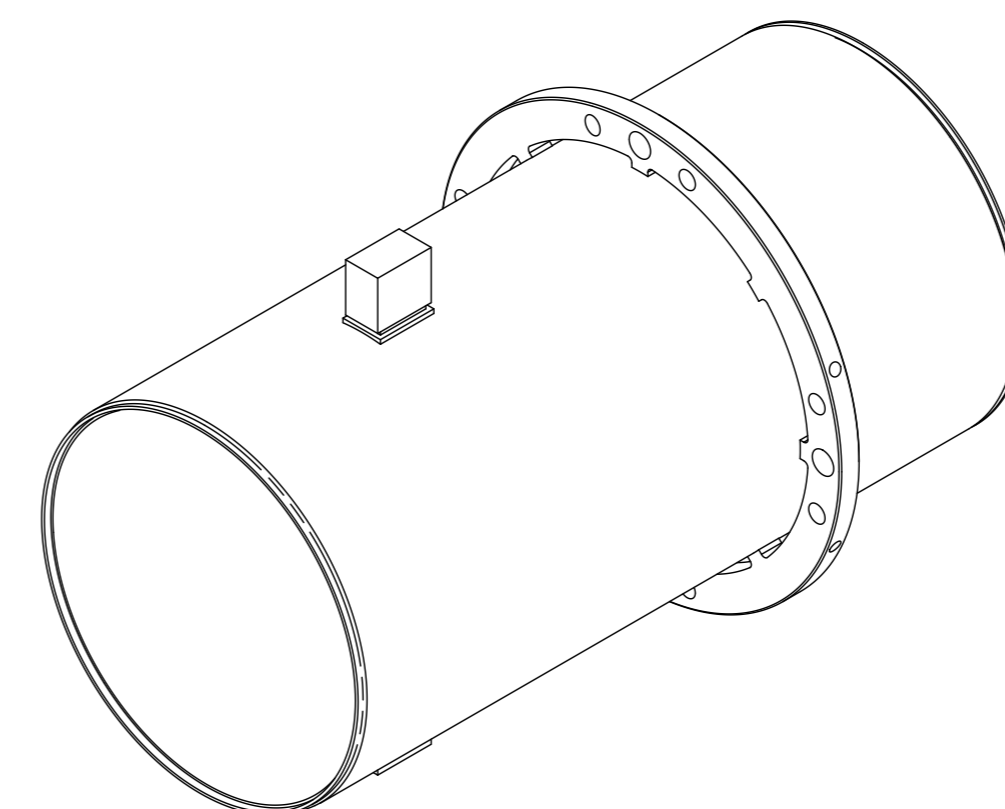
FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.		DRAWN BY V. MARTINEZ	DATE 12/06/06
	MATERIAL TITANIUM GRADE 2	TOLERANCES	THIRD ANGLE PROJECTION	CHECKED BY
X ± 2 .X ± 0.8 .XX ± 0.13 ANGLE ± 1°			ENGINEERED BY	DATE
		DATABASE DESY EDMS	TEAM/GROUP	
		CAD I-DEAS	SOLID MODEL NO. 680122	
FERMILAB NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500				
TITLE HELIUM VESSEL - BLADE TUNER TUBE_TUNER_SIDE				
SIZE A1	CAGE CODE OU5R6	DWG NO. D00000000777961	REV A	
SCALE 3:4	DO NOT SCALE DRAWING		SHEET 1 OF 1	

FOR REFERENCE ONLY  
 NOT FOR FABRICATION  
 MAY NOT BE CURRENT

REVISION HISTORY			
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.			
ZONE	REV	DESCRIPTION	DATE
	A	INITIAL RELEASE	

NOTES:

- NOTE ORIENTATION OF TUNER RING HOLES AND WELD TABS IN RELATION TO ROLLER PADS.
- ALL DIMENSIONS ARE IN MILLIMETERS.
- SEALING SURFACES ON FLANGES MUST BE FREE FROM ANY NICKS AND RADIAL SCRATCHES.
- ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
- ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
- CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
- FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.
- AS AN ALTERNATE TO NOTES 6 & 7 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
- ALL WELDS MUST BE PERFORMED INSIDE OF A PURGED GLOVEBOX WITH AN OXYGEN COUNT OF 20 PPM OR LESS. WELDS MUST BE FREE OF ALL TITANIUM OXIDATION AND DISCOLORATION.
- WELDER MUST BE QUALIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS AS WELL AS SAMPLE WELDS MUST BE SUPPLIED TO FERMILAB PRIOR TO ANY PRODUCT WELDING.
- INSPECTION OF WELDS TO BE CONDUCTED AT FERMILAB PRIOR TO ANY ULTRASONIC OR WIRE-BRUSH CLEANING. DO NOT MODIFY THE FINAL WELDS PRIOR TO PRODUCT 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  $2 \times 10^{-10}$  ATM. CC/SEC.
- MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.



ITEM	P. I. N.	DESCRIPTION	QTY
3	790915	TUNER RING PIEZO SIDE	1
2	790905	ROLLER PAD	2
1	777831	TUBE COUPLER SIDE	1

PARTS LIST			
3	790915	TUNER RING PIEZO SIDE	1
2	790905	ROLLER PAD	2
1	777831	TUBE COUPLER SIDE	1

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY V. MARTINEZ	DATE 12-11-06
MATERIAL	SEE PARTS LIST	TOLERANCES	CHECKED BY	DATE
		X ± 2 X ± 0.8 .XX ± 0.13 ANGLE ± 1°	ENGINEERED BY	DATE
		THIRD ANGLE PROJECTION	DATABASE CAD	TEAM/GROUP
			I-DEAS	SOLID MODEL NO. 578483

FERMILAB NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500			
TITLE ILC CRYO MODULE HELIUM VESSEL - BLADE TUNER COUPLER_SIDE_WELDMENT			
SIZE A1	CAGE CODE OU5R6	DWG NO. D00000000777971	REV A
SCALE 3:4	DO NOT SCALE DRAWING		SHEET 1 OF 1

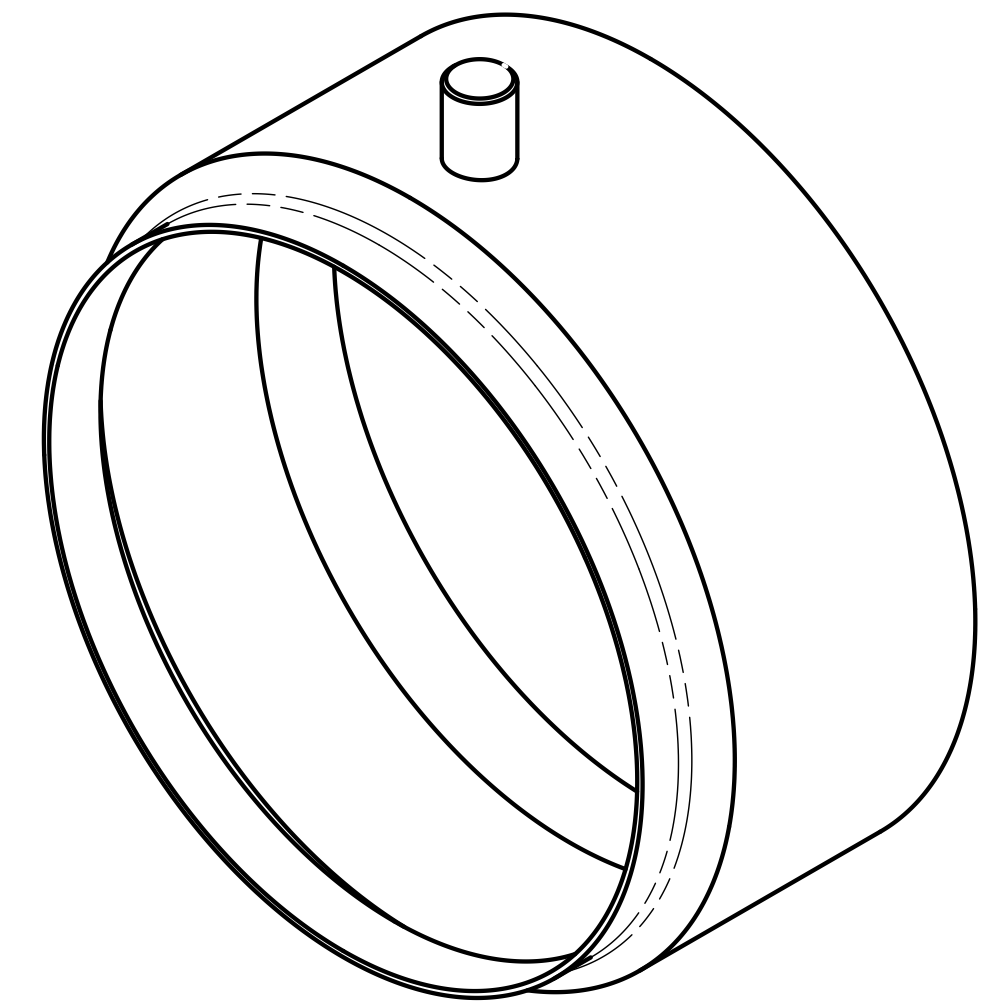
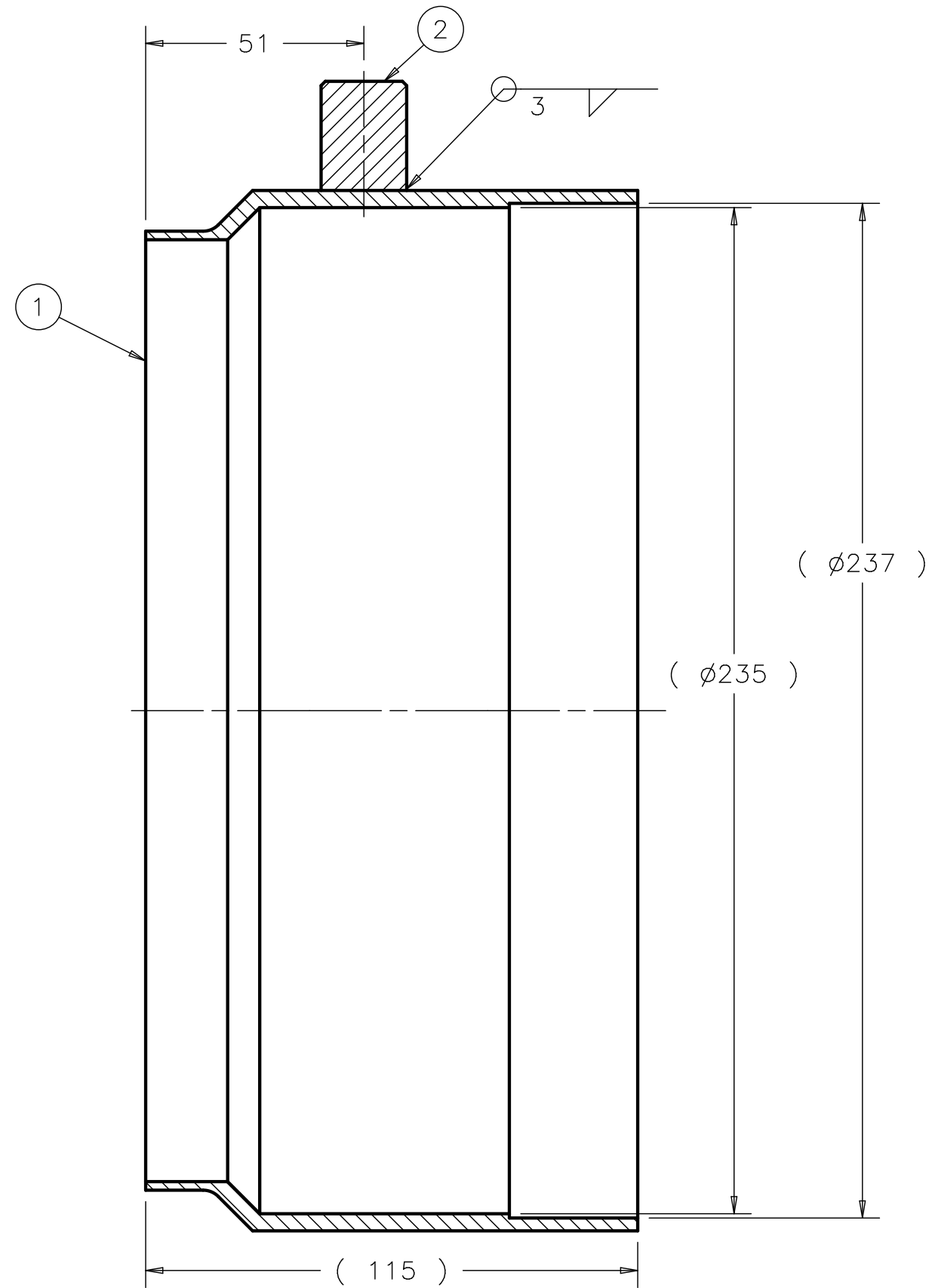
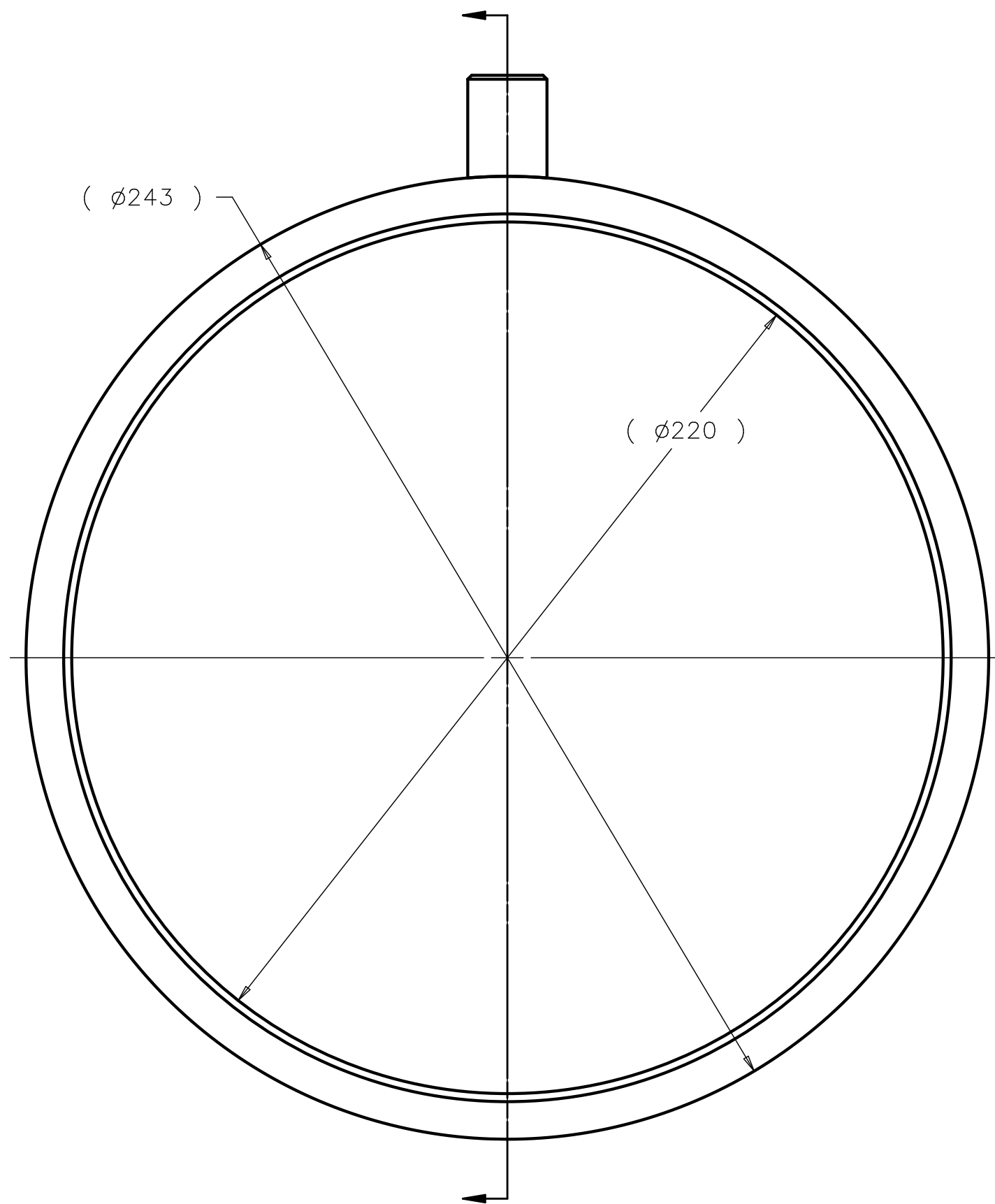
FOR REFERENCE ONLY  
NEXT ASSY USED ON APPLICATION  
NOT FOR FABRICATION  
MAY NOT BE CURBED

NOTES:

1. ASSEMBLY MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
2. ALL DIMENSIONS ARE IN MILLIMETERS.
3. ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
4. ALL WELDS MUST BE CONTAMINANT FREE. EACH JOINT MUST BE CLEANED PROPERLY TO REMOVE MILL SCALE, DIRT, DUST, GREASE OIL, MOISTURE AND OXIDATION.
5. CLEAN ALL AREAS WITHIN 25mm OF THE WELD JOINT USING A NONCHLORINATED SOLVENT SUCH AS ACETONE, TOLUENE OR METHYL ETHYL KETONE (MEK) AND A CLEAN, LINT FREE CLOTH.
6. FOLLOWING THE SOLVENT CLEANING AND IMMEDIATELY PRIOR TO WELDING, WIRE BRUSH THE ITEMS TO BE WELDED WITH A NEW, STAINLESS STEEL BRUSH. DO NOT USE A STEEL BRUSH OR STEEL WOOL.

7. AS AN ALTERNATE TO NOTES 5 & 6 ABOVE, AN ACCEPTABLE PICKLE BATH MAY BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A BATH OF 35% VOL. NITRIC ACID (70% CONCENTRATION) AND 5% VOL. HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT PARTS ARE CLEAN, COMPLETELY DRY AND OXIDATION FREE PRIOR TO WELDING.
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12. MATERIAL CERTIFICATIONS ARE REQUIRED AND MUST BE INCLUDED WITH SHIPPING. THERE WILL BE NO PRODUCT ACCEPTANCE WITHOUT THE PROPER MATERIAL CERTIFICATIONS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



ITEM	P. I. N.	DESCRIPTION	QTY
2	777941	CLAMPING PIN	1
1	777911	ADJUSTER TUBE	1

PARTS LIST

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY V. MARTINEZ	DATE 12/03/06	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL		TOLERANCES	CHECKED BY	DATE	
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE
			DATABASE DESY EDMS	TEAM/GROUP	<b>ILC CRYO MODULE          HELIUM VESSEL - BLADE TUNER          ADJUSTER_WELDMENT</b>
			CAD I-DEAS	SOLID MODEL NO. 578493	
NEXT ASSY	781951				SIZE A2
APPLICATION	USED ON				CAGE CODE OU5R6
					DWG NO. D0000000777981
					REV A
					SCALE 3:4
					DO NOT SCALE DWG
					SHEET 1 OF 1

12

11

10

9

8

7

6

5

4

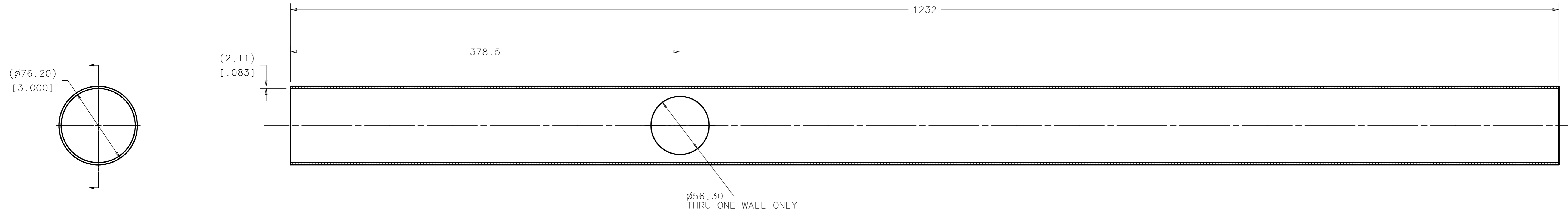
3

2

1

REVISION HISTORY			
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.			
ZONE	REV	DESCRIPTION	DATE
	A	INITIAL RELEASE	

- NOTES:
1. DIMENSIONS IN [X.XX] ARE IN INCHES. MATERIAL SPECIFICATION IS IN INCHES.
  2. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.



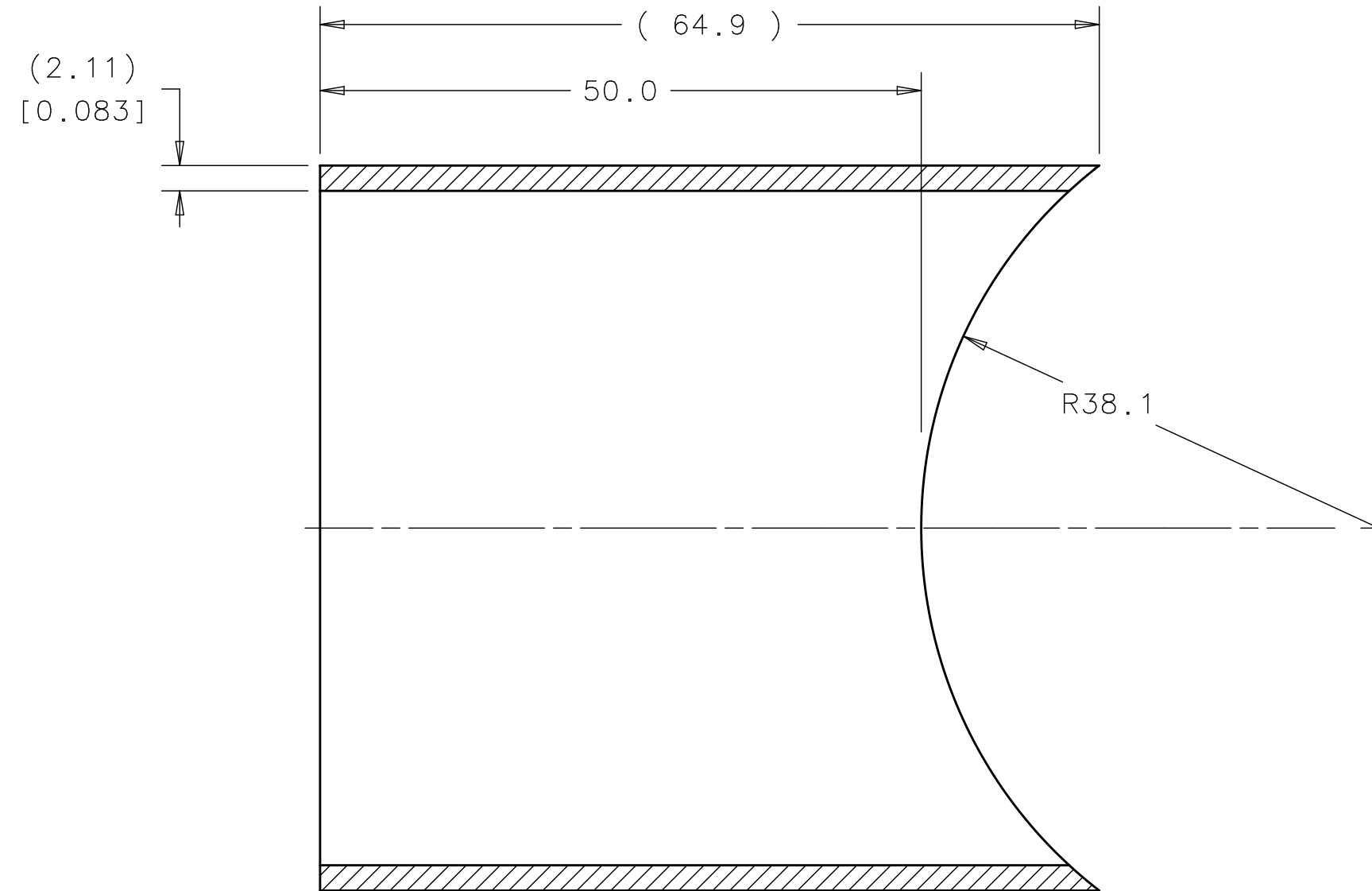
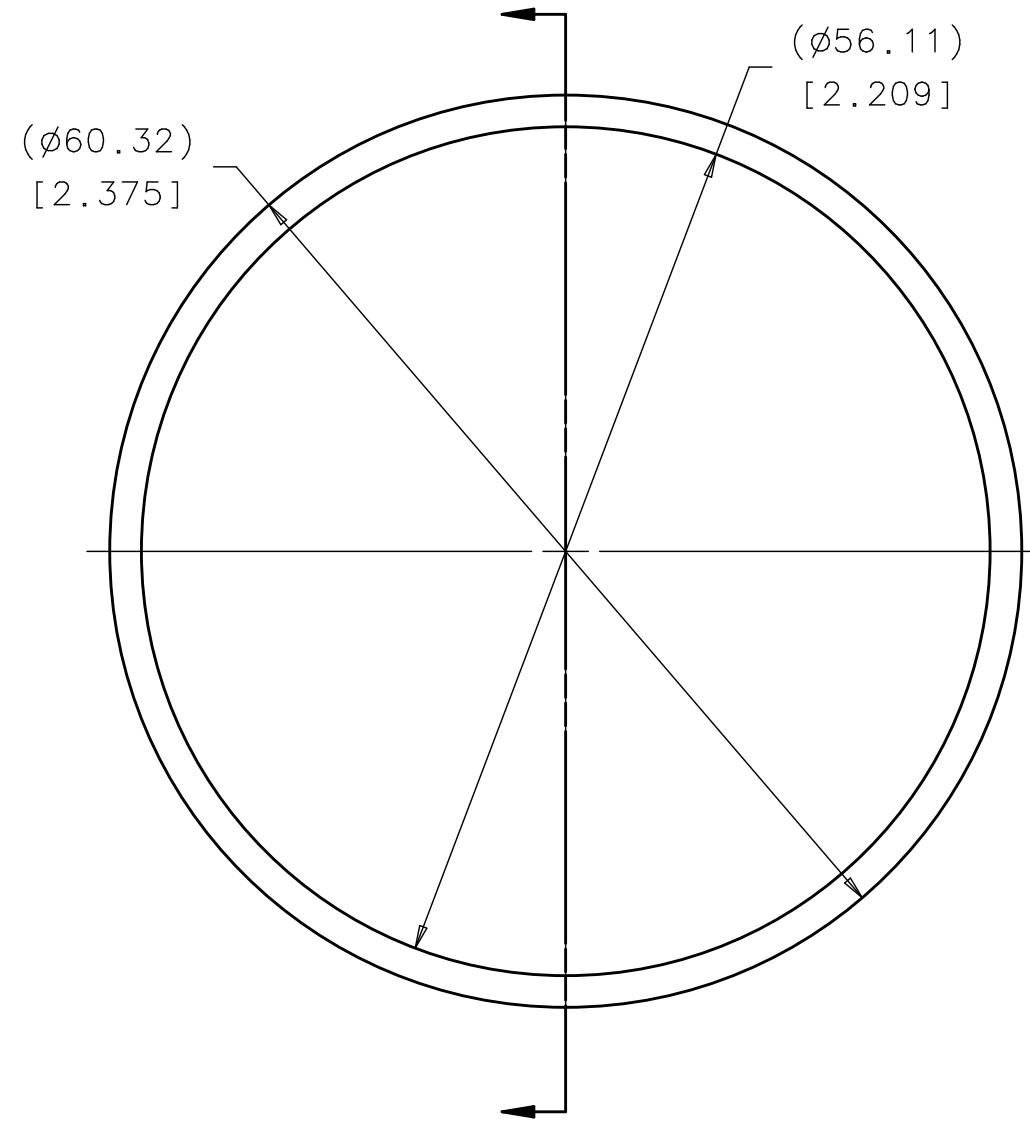
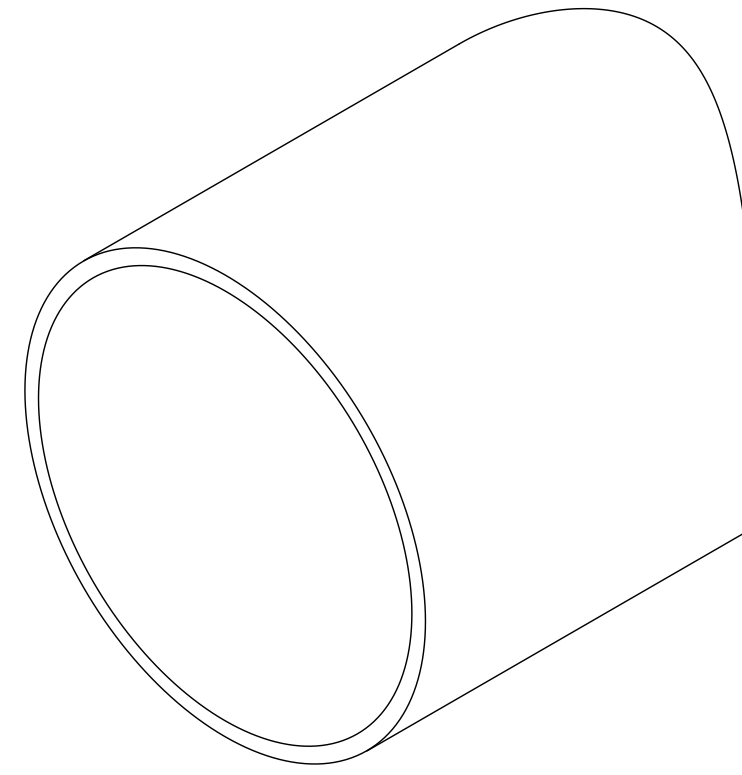
FOR REFERENCE ONLY  
 NEXT ASSY USED ON  
 NOT FOR FABRICATION  
 MAY NOT BE CURRENT

FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY V. MARTINEZ	DATE 12-13-06	 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL Ø3.000" X .083" WALL TITANIUM TUBING-GRADE 2	TOLERANCES X ± 2 .X ± 0.8 .XX ± 0.13 ANGLE ± 1°	CHECKED BY	DATE	
	THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE ILC CRYO MODULE HELIUM VESSEL - BLADE TUNER 2-PHASE_PIPE
		DATABASE DESY_EDMS	TEAM/GROUP	SIZE A1
		CAD I-DEAS	SOLID MODEL NO. 680242	CAGE CODE OU5R6
				DWG NO. D00000000778001
				REV A
				SCALE 1:2 & AS NOTED
				DO NOT SCALE DRAWING
				SHEET 1 OF 1

NOTES:

1. DIMENSIONS IN [X.XX] ARE IN INCHES.  
MATERIAL SPECIFICATION IS IN INCHES.
2. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



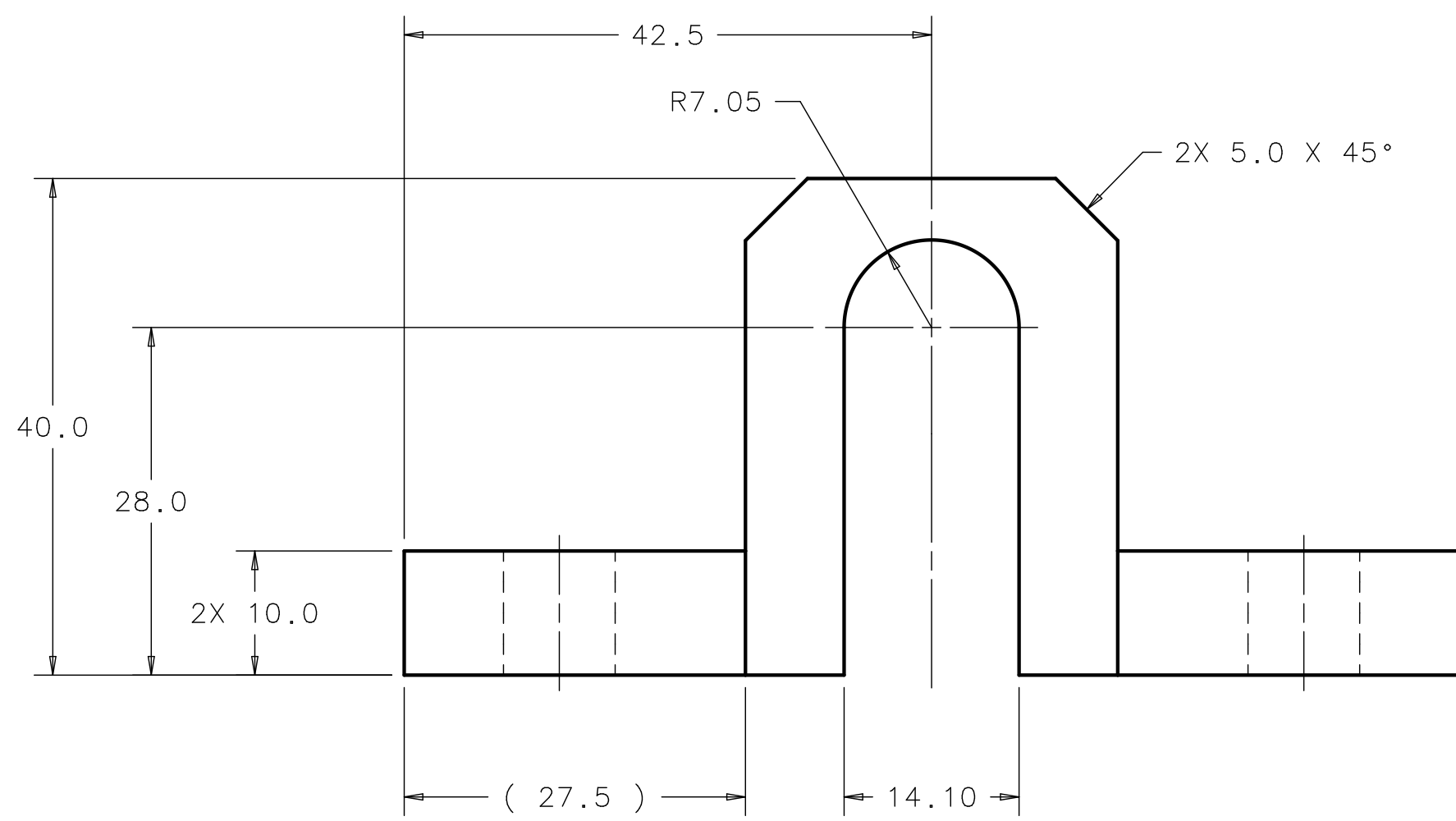
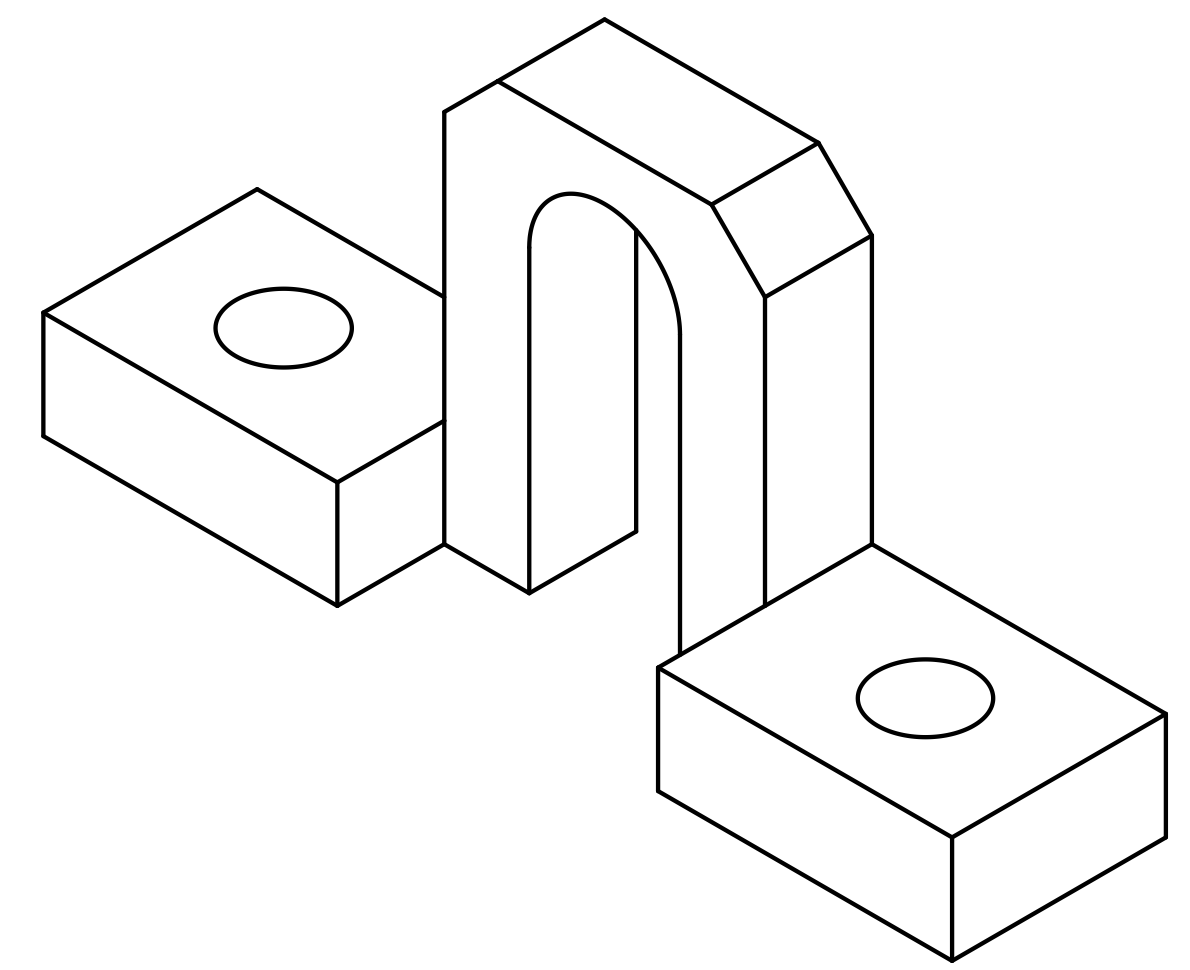
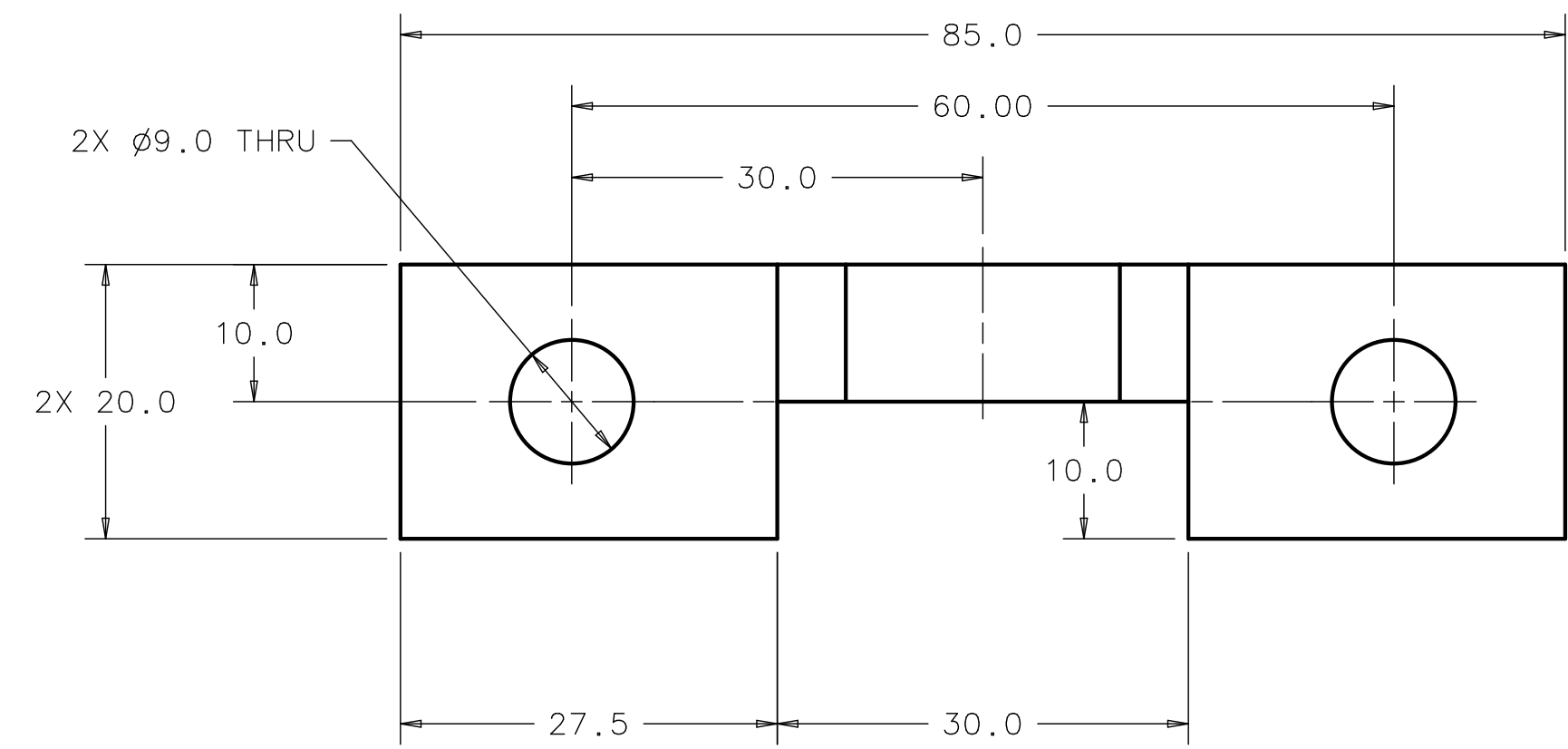
781951	797621
NEXT ASSY	USED ON
APPLICATION	

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES 0.75 MAX. ALL MACH. SURFACES $3.2/\text{MAX}$ .		DRAWN BY V. MARTINEZ	DATE 13DEC06	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500			
MATERIAL	$\phi 2.375 \times 0.083$ WALL TITANIUM TUBING-GRADE 2	TOLERANCES	THIRD ANGLE PROJECTION	CHECKED BY	DATE				
		$X \pm 2$ $X.X \pm 0.8$ $X.XX \pm 0.13$ ANGLE $\pm 1^\circ$		DATABASE DESY EDMS	TEAM/GROUP T4CM DESIGN	SIZE A2	CAGE CODE OU5R6	DWG NO. D0000000778011	REV A
				CAD I-DEAS	SOLID MODEL NO. D0000000680212	SCALE 2:1	DO NOT SCALE DWG	SHEET 1 OF 1	

NOTE:

1. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



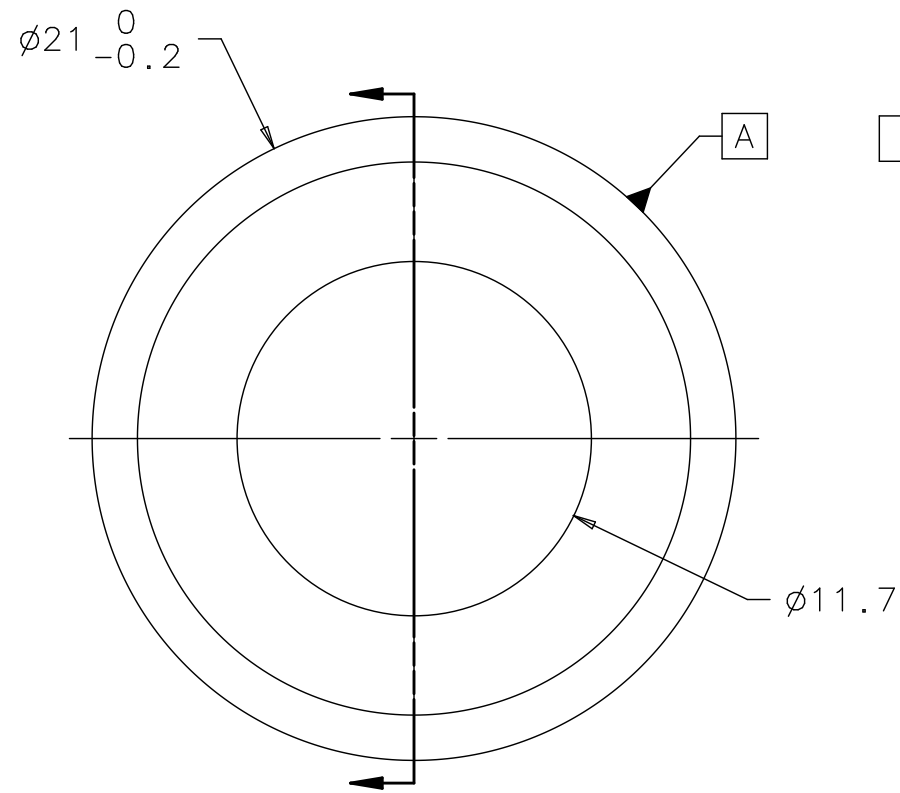
FOR REFERENCE MATERIAL  
**NOT FOR FABRICATION**  
 USED ON CURRENT APPLICATION  
 TITANIUM GRADE 2

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.		DRAWN BY V.MARTINEZ	DATE 12-20-06	FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500			
		TOLERANCES	THIRD ANGLE PROJECTION	CHECKED BY	DATE	TITLE ILC CRYO MODULE HELIUM VESSEL - BLADE TUNER 2-PHASE_SUPPORT_PLT_ADAPTER			
		X ± 2 .X ± 0.8 .XX ± 0.13 ANGLE ± 1°		ENGINEERED BY	DATE	SIZE A2	CAGE CODE OU5R6	DWG NO. D0000000781941	REV A
				DATABASE DESY EDMS	TEAM/GROUP	SCALE 2:1	DO NOT SCALE DWG	SHEET 1 OF 1	
				CAD I-DEAS	SOLID MODEL NO. 680202				

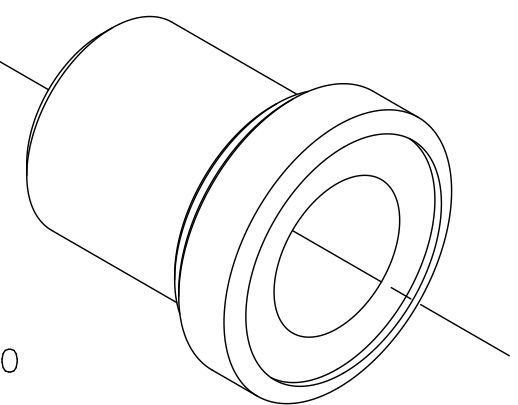
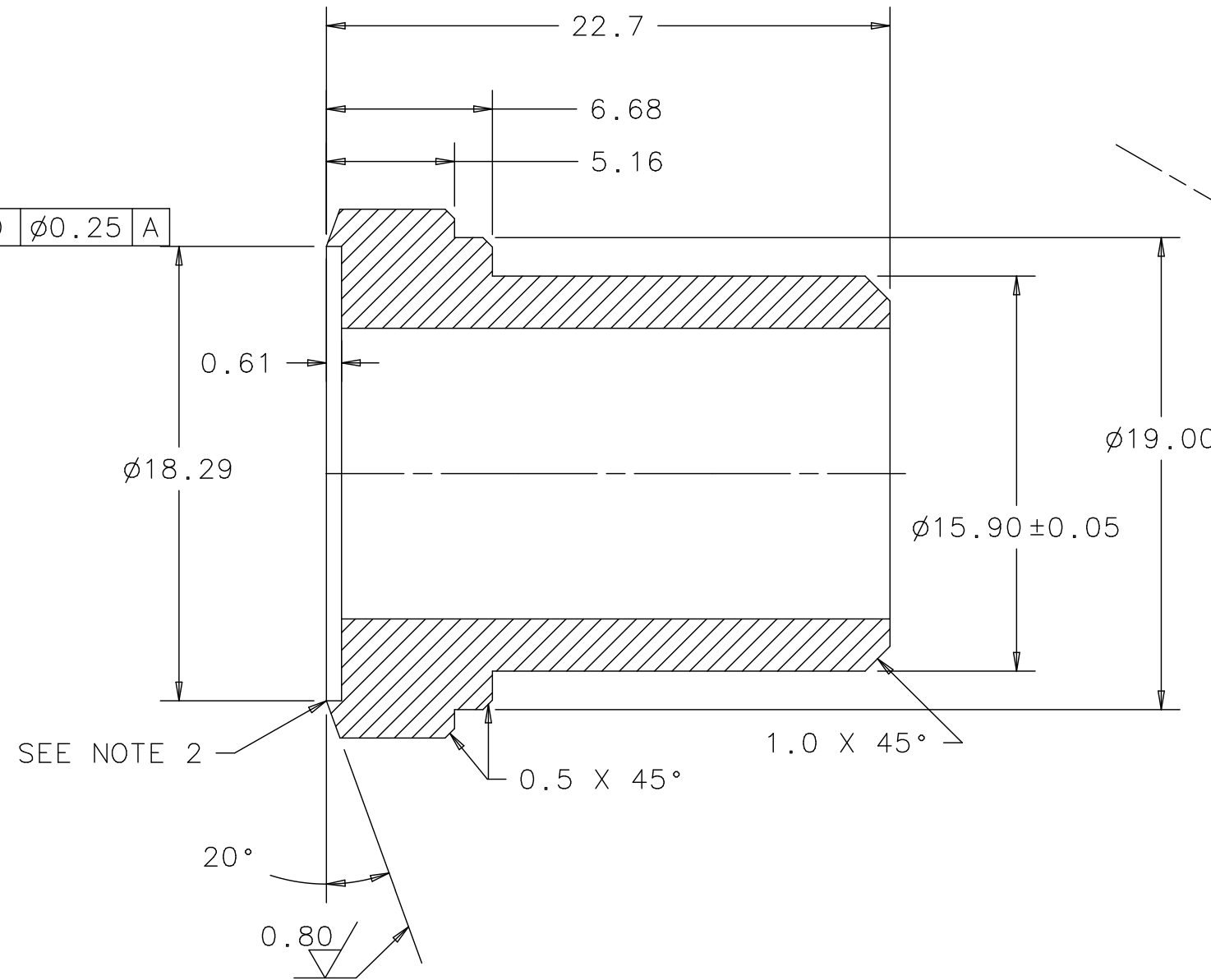
REVISION HISTORY

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



◎  $\phi 0.25$  A



NOTES:

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- DO NOT BREAK KNIFE EDGE, KEEP SHARP. ANGLE SURFACE TO BE FREE OF SCRATCHES, DENTS AND DIRT.

FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2/ MAX.	DRAWN BY L ROSINE	DATE 25JUN07
MATERIAL TITANIUM GRADE 2	TOLERANCES X $\pm 0.2$ Y $\pm 0.8$ XX $\pm 0.13$ ANGLE $\pm 1^\circ$	CHECKED BY	DATE
	THIRD ANGLE PROJECTION	ENGINEERED BY	DATE
		DATABASE DESY EDMS	TEAM/GROUP T4CM DESIGN
		CAD I-DEAS	SOLID MODEL NO. D00000000738182



FERMI NATIONAL ACCELERATOR LABORATORY  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

TITLE  
ILC TYPE IV CRYMODULE  
HELIUM VESSEL - BLADE TUNER  
CF\_FLANGE\_ROTATE\_INSERT

SIZE A3	CAGE CODE OU5R6	DWG NO. D00000000791845	REV A
SCALE 1:1	DO NOT SCALE DWG	SHEET 1 OF 1	

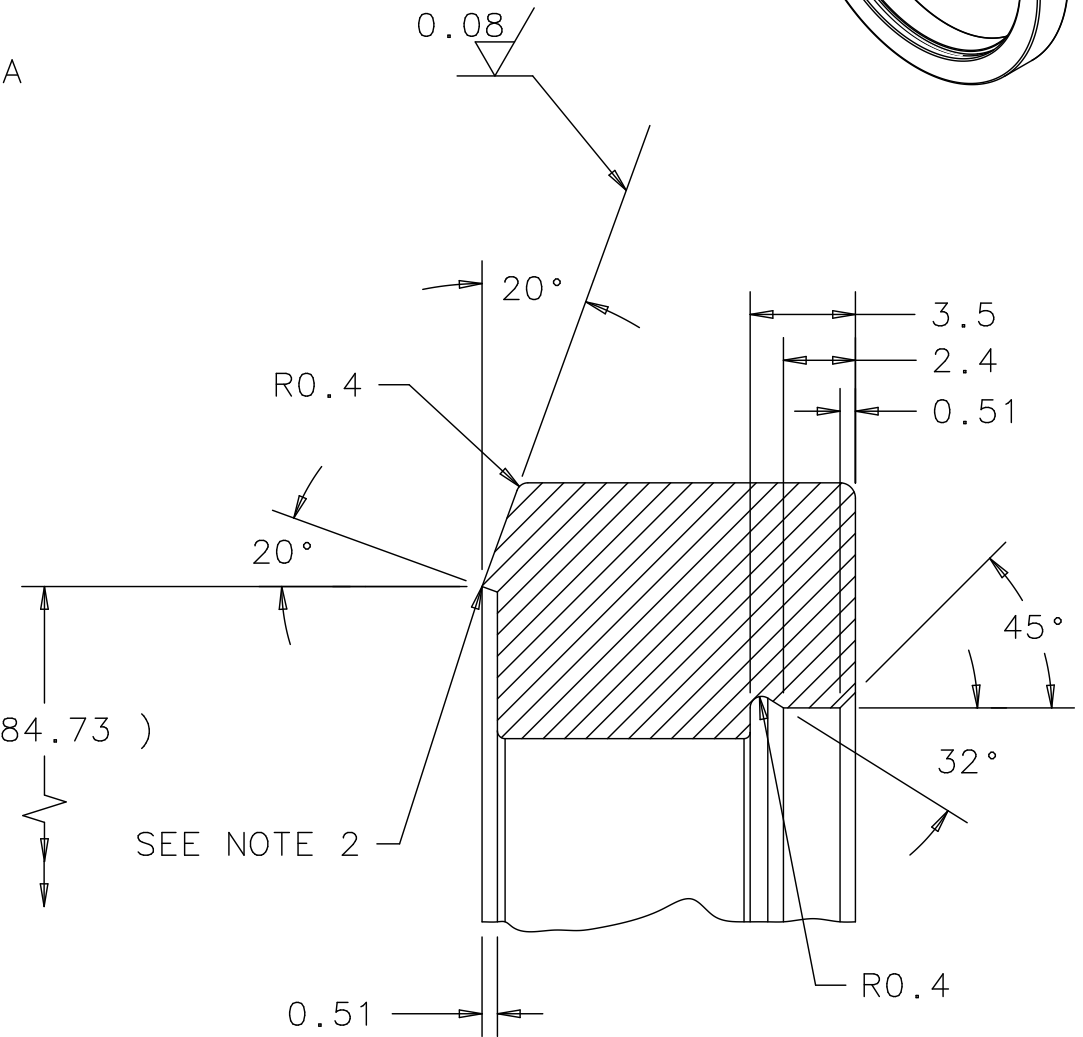
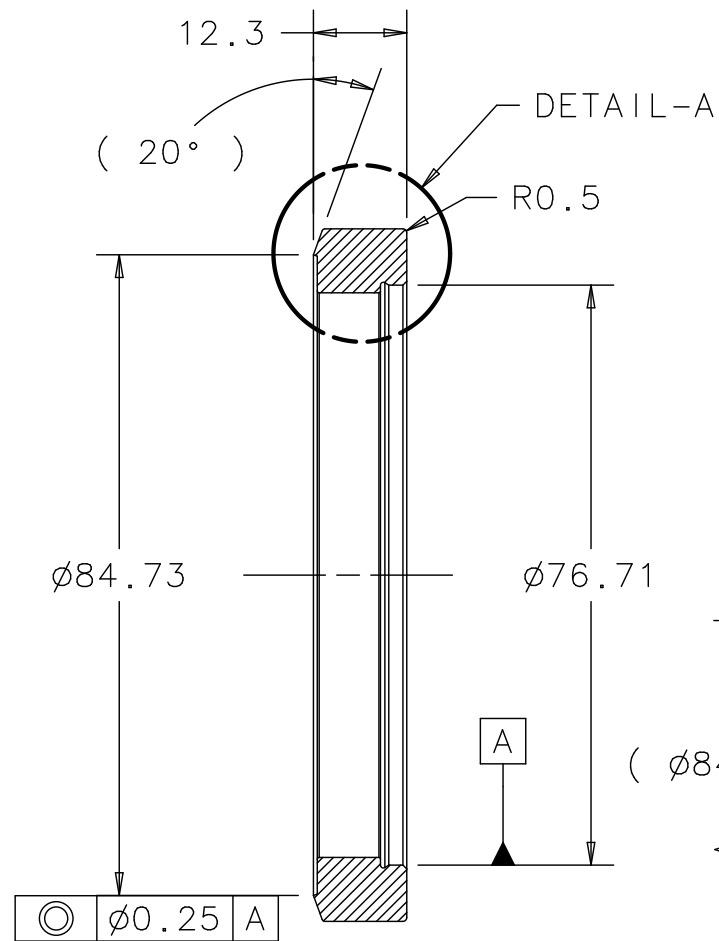
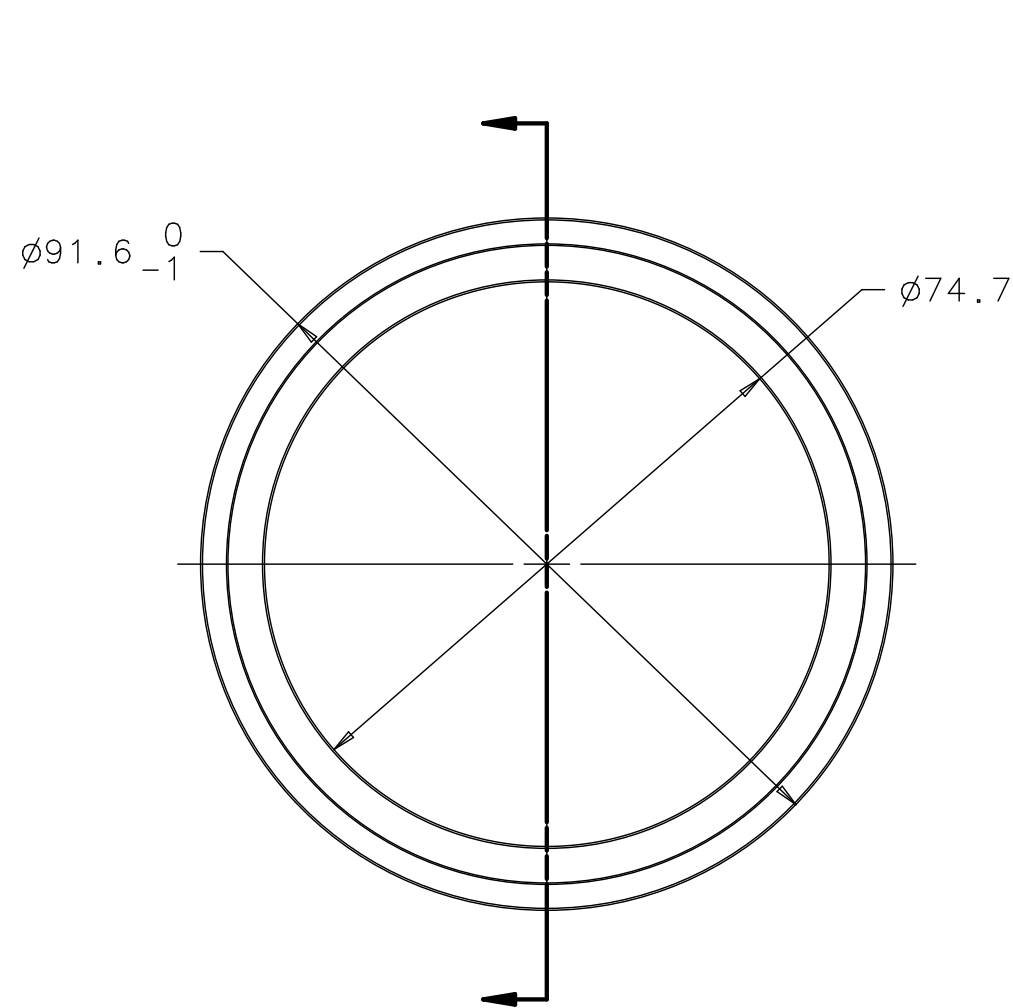
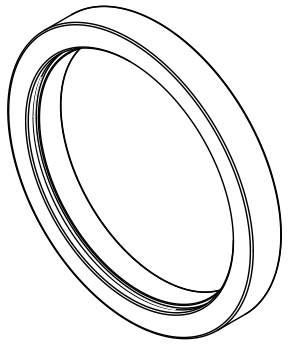
-	781951
NEXT ASSY	USED ON
APPLICATION	



NOTES:

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- DO NOT BREAK KNIFE EDGE, KEEP SHARP. ANGLE SURFACES TO BE FREE IF SCRATCHES, DENTS AND DIRT.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



**DETAIL-A**  
SCALE 4/1

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2/ MAX.	DRAWN BY V. MARTINEZ	DATE 05-11-07
MATERIAL	TITANIUM GRADE 2	TOLERANCES X ± 0.2 Y ± 0.8 XX ± 0.13 ANGLE ± 1°	CHECKED BY	DATE
			ENGINEERED BY	DATE
			DATABASE DESY EDMS	TEAM/GROUP
			CAD I-DEAS	SOLID MODEL NO. 759532

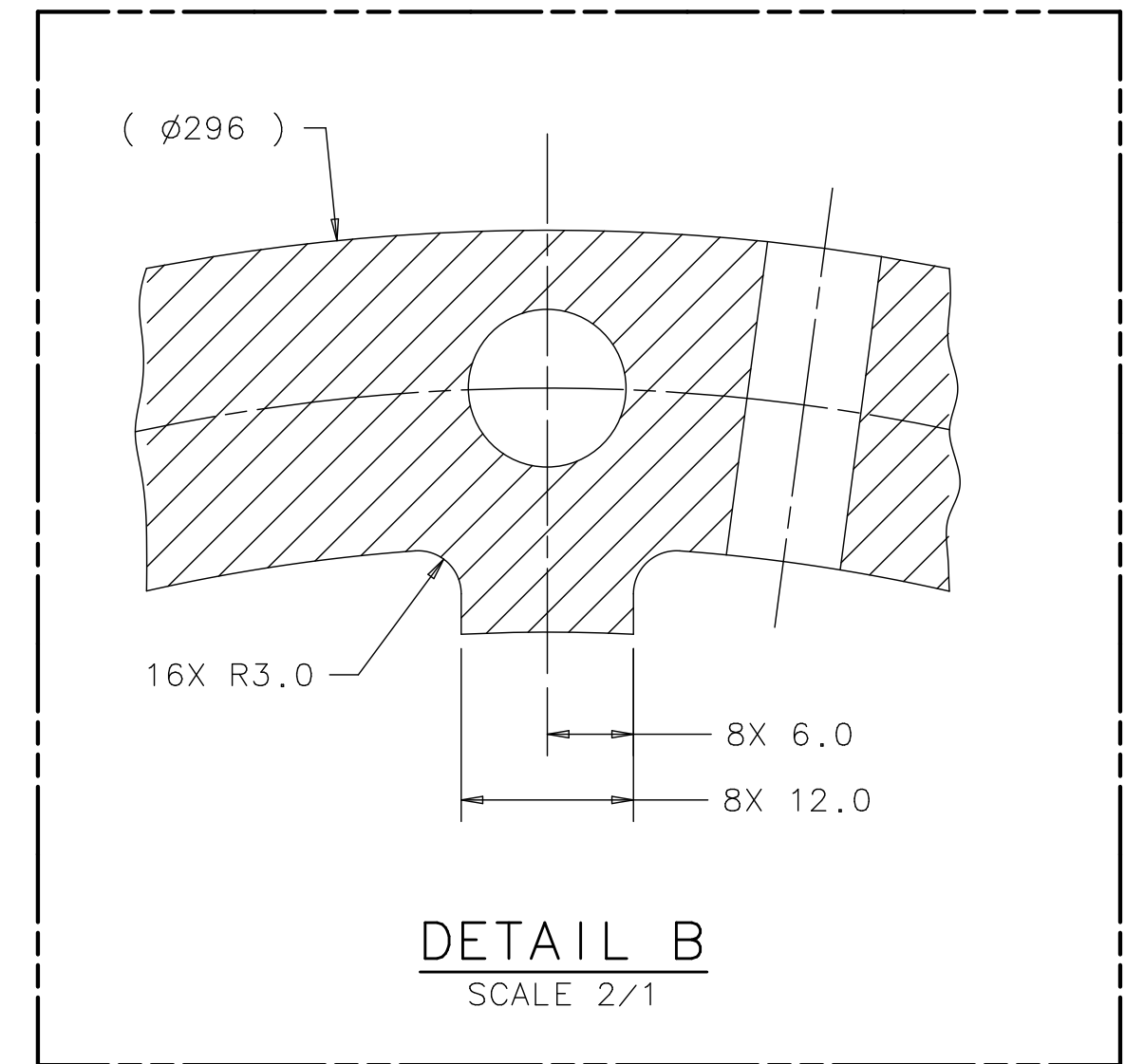
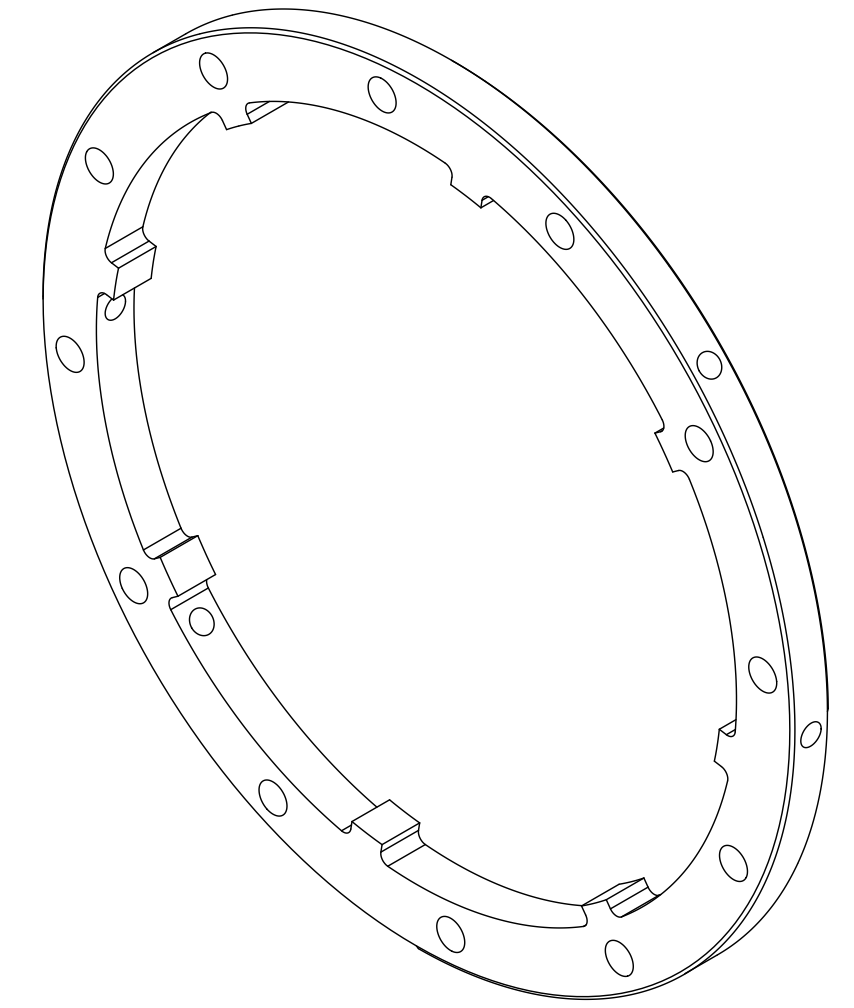
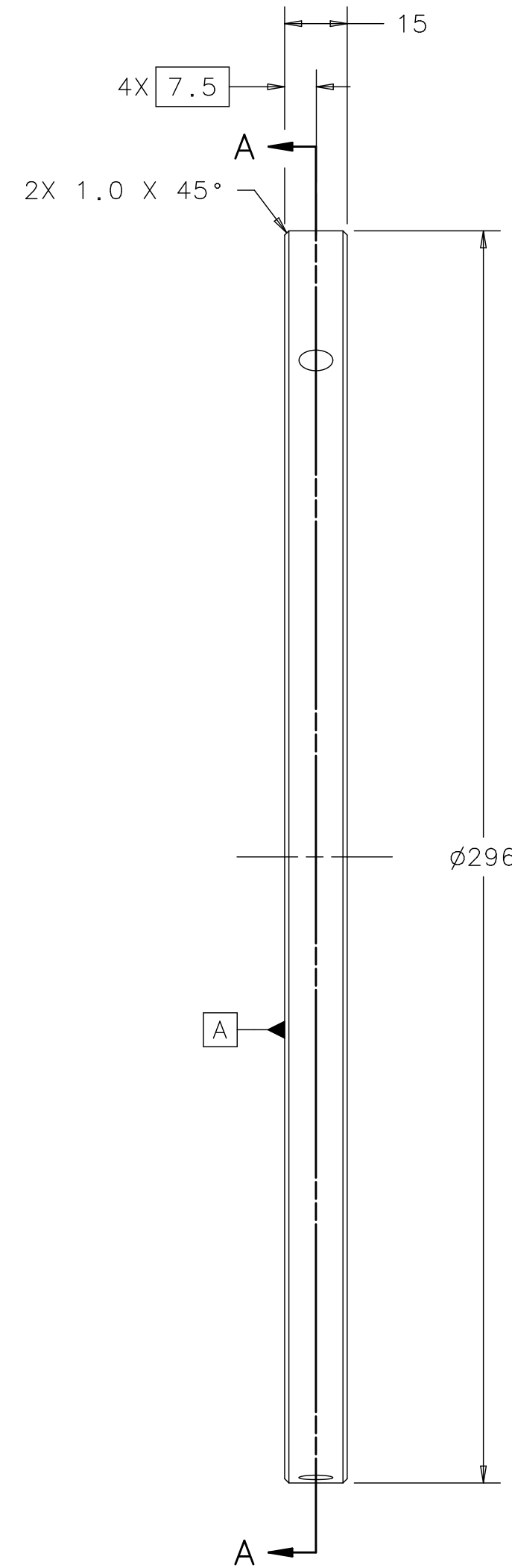
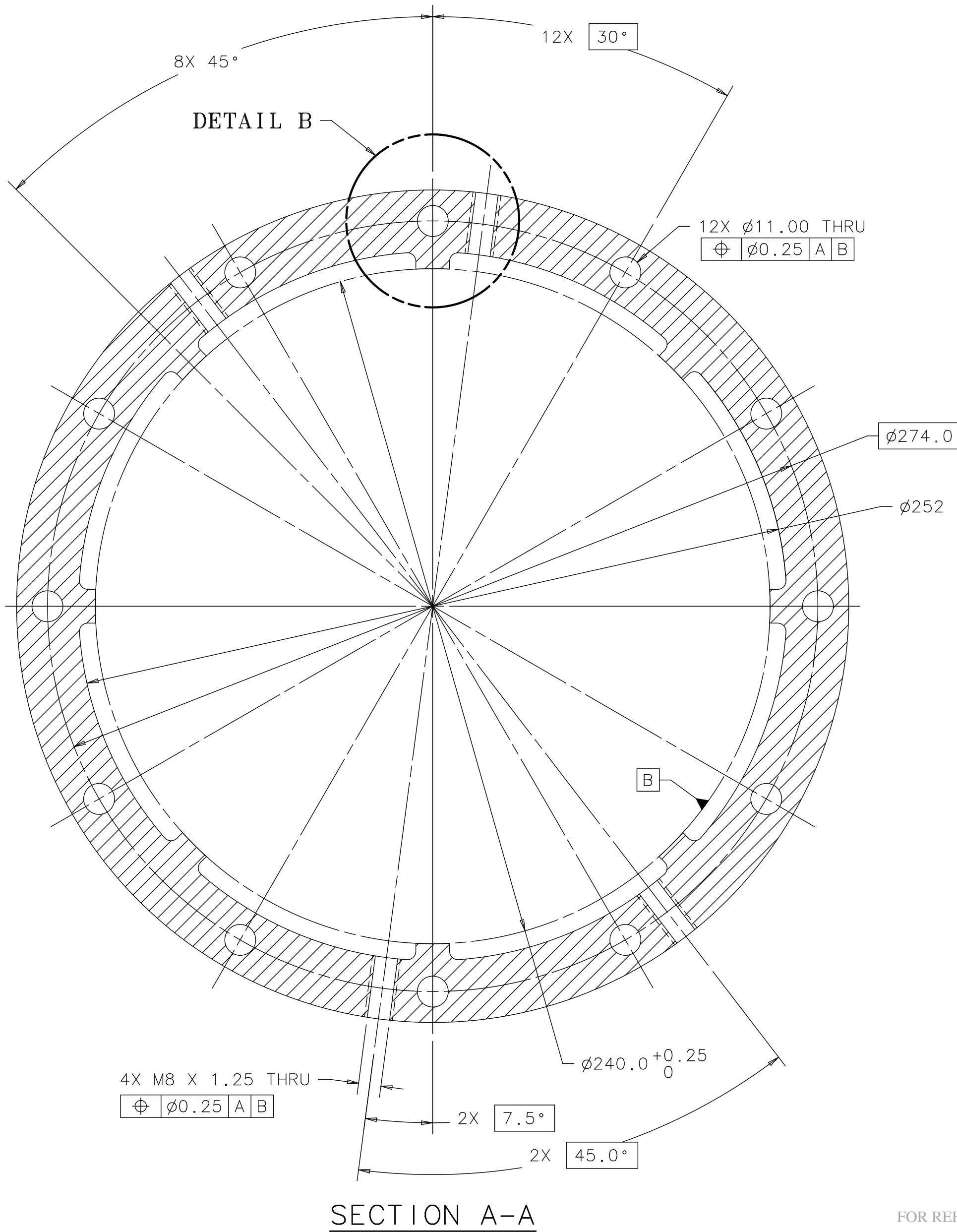
<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500			
<b>TITLE</b> ILC TYPE IV CRYMODULE HELIUM VESSEL - BLADE TUNER FLANGE_CF_KNIFE_EDGE_BODY			
SIZE <b>A3</b>	CAGE CODE OU5R6	DWG NO. <b>D0000000791535</b>	REV A
SCALE 1:1	DO NOT SCALE DWG	SHEET 1 OF 1	

781951	777921
NEXT ASSY	USED ON
APPLICATION	

NOTES:

1. PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS.  
A MAXIMUM OF 0.5mm X 45° IS ALLOWED.
2. ALL HOLES TO HAVE A 90° CSK 0.5mm TO 1.0mm LARGER THAN THE MAJOR DIAMETER. (TO REMOVE BURRS)
3. PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



777901	777051	TITANIUM
NEXT ASSY	USED ON	GRADE 2
APPLICATION		

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY S. POREMBA	DATE 01JUN07	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL	TOLERANCES	THIRD ANGLE PROJECTION	CHECKED BY	DATE	
	X ± 2 .X ± 0.8 .XX ± 0.13 ANGLE ± 1°		ENGINEERED BY	DATE	TITLE ILC CRYMODULE HELIUM VESSEL - BLADE TUNER TUNER_RING_MOTOR_SIDE
			DATABASE DESY EDMS	TEAM/GROUP	SIZE A2
			CAD I-DEAS	SOLID MODEL NO. 680142	CAGE CODE 0U5R6
					DWG NO. D0000000790865
					REV A
					SCALE 3:4
					DO NOT SCALE DWG
					SHEET 1 OF 1

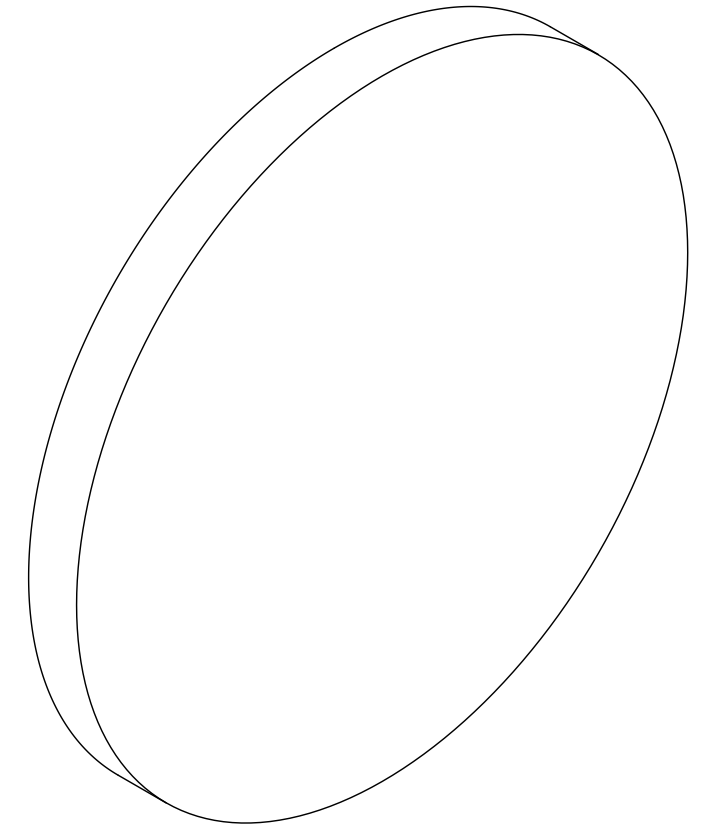
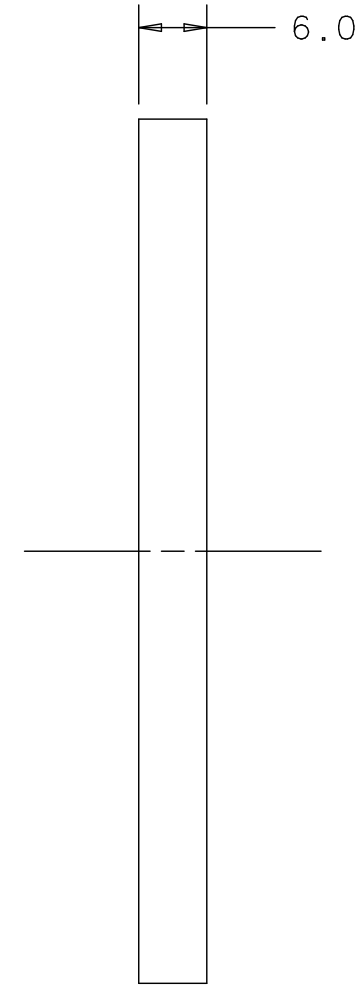
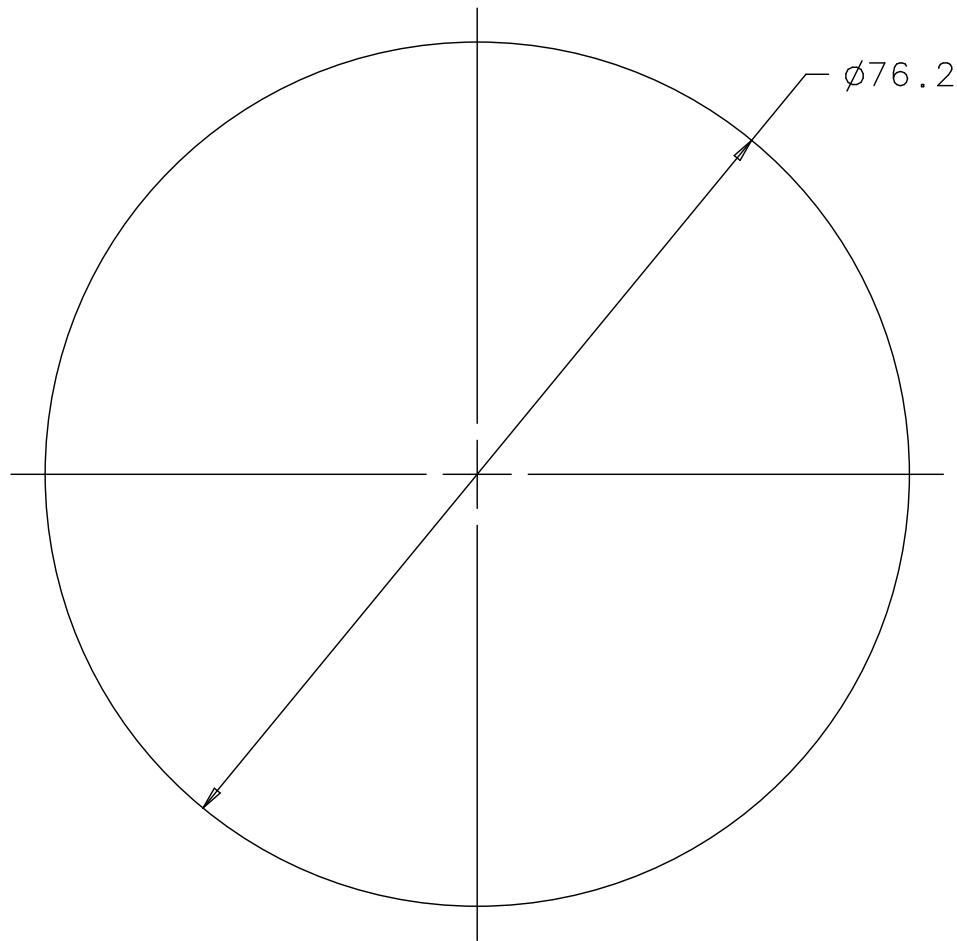
NOTES:

- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS. A MAXIMUM OF 0.5mm X 45° IS ALLOWED.
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 / MAX.	DRAWN BY S. POREMBA	DATE
MATERIAL TITANIUM GRADE 2	FOR TOLERANCES ONLY THIRD ANGLE PROJECTION <b>NOT FOR FABRICATION</b> MAY NOT BE CURRENT	CHECKED BY	DATE
		ENGINEERED BY	DATE
		DATABASE DESY EDMS	TEAM/GROUP
		CAD I-DEAS	SOLID MODEL NO. 680222



FERMI NATIONAL ACCELERATOR LABORATORY  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

TITLE ILC CRYOMODULE HELIUM VESSEL - BLADE TUNER 2-PHASE_PIPE_CAP			
SIZE A3	CAGE CODE OU5R6	DWG NO. D0000000790885	REV A
SCALE 1.5-1	DO NOT SCALE DWG	SHEET 1 OF 1	

781951	777921
NEXT ASSY	USED ON
APPLICATION	

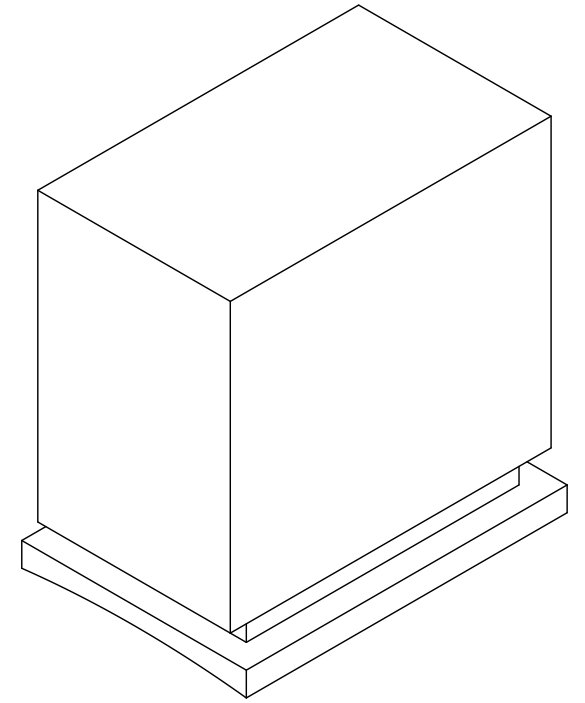
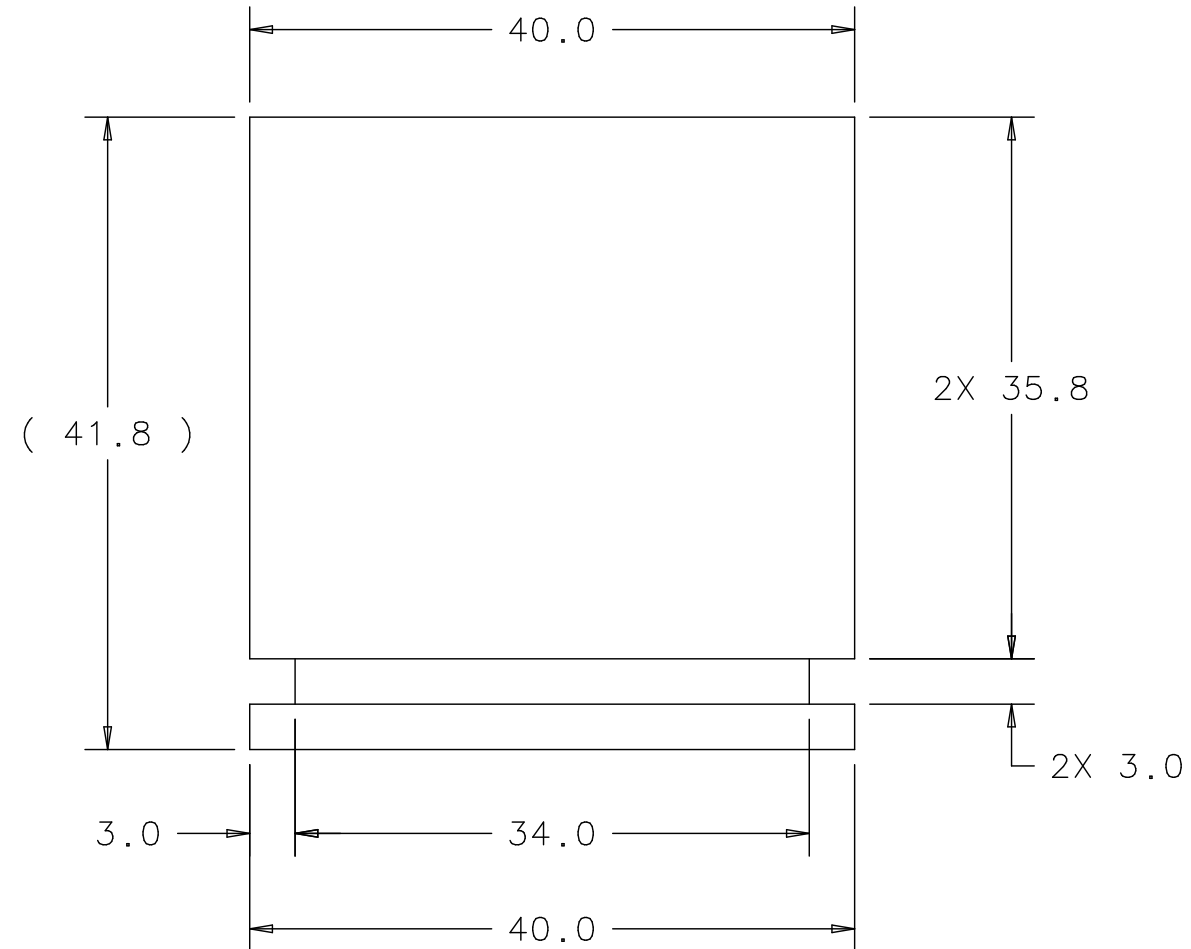
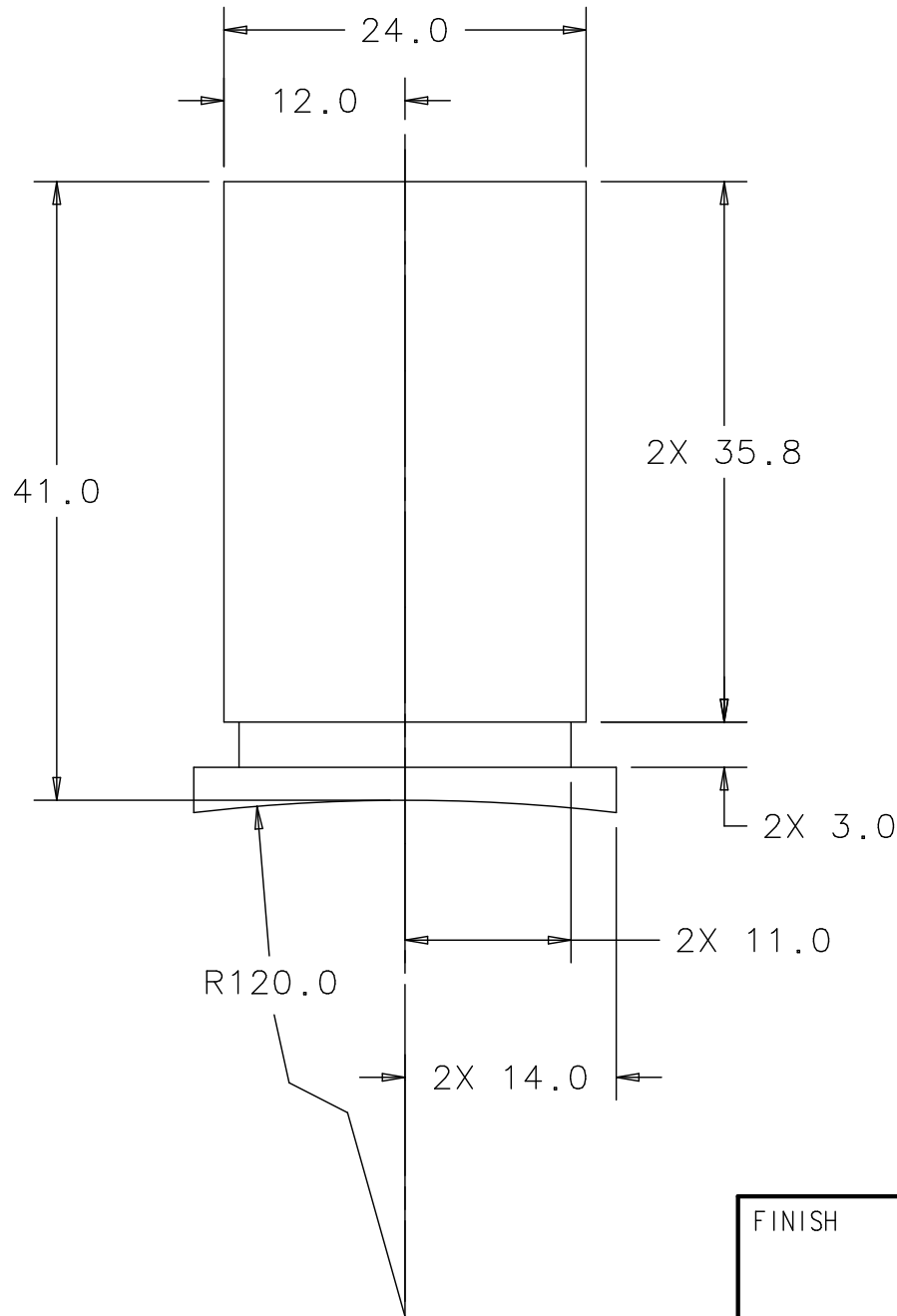
NOTES:

- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS. A MAXIMUM OF 0.5mm X 45° IS ALLOWED.
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 / MAX.	DRAWN BY S. POREMBA	DATE 01JUN07
MATERIAL TITANIUM GRADE 2	FOR TOLERANCES ON THIRD ANGLE PROJECTION X ± 0.8 XX ± 0.13 ANGLE ± 1°	CHECKED BY	DATE
		ENGINEERED BY	DATE
		DATABASE DESY EDMS	TEAM/GROUP
		CAD I-DEAS	SOLID MODEL NO. 680162



FERMI NATIONAL ACCELERATOR LABORATORY  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

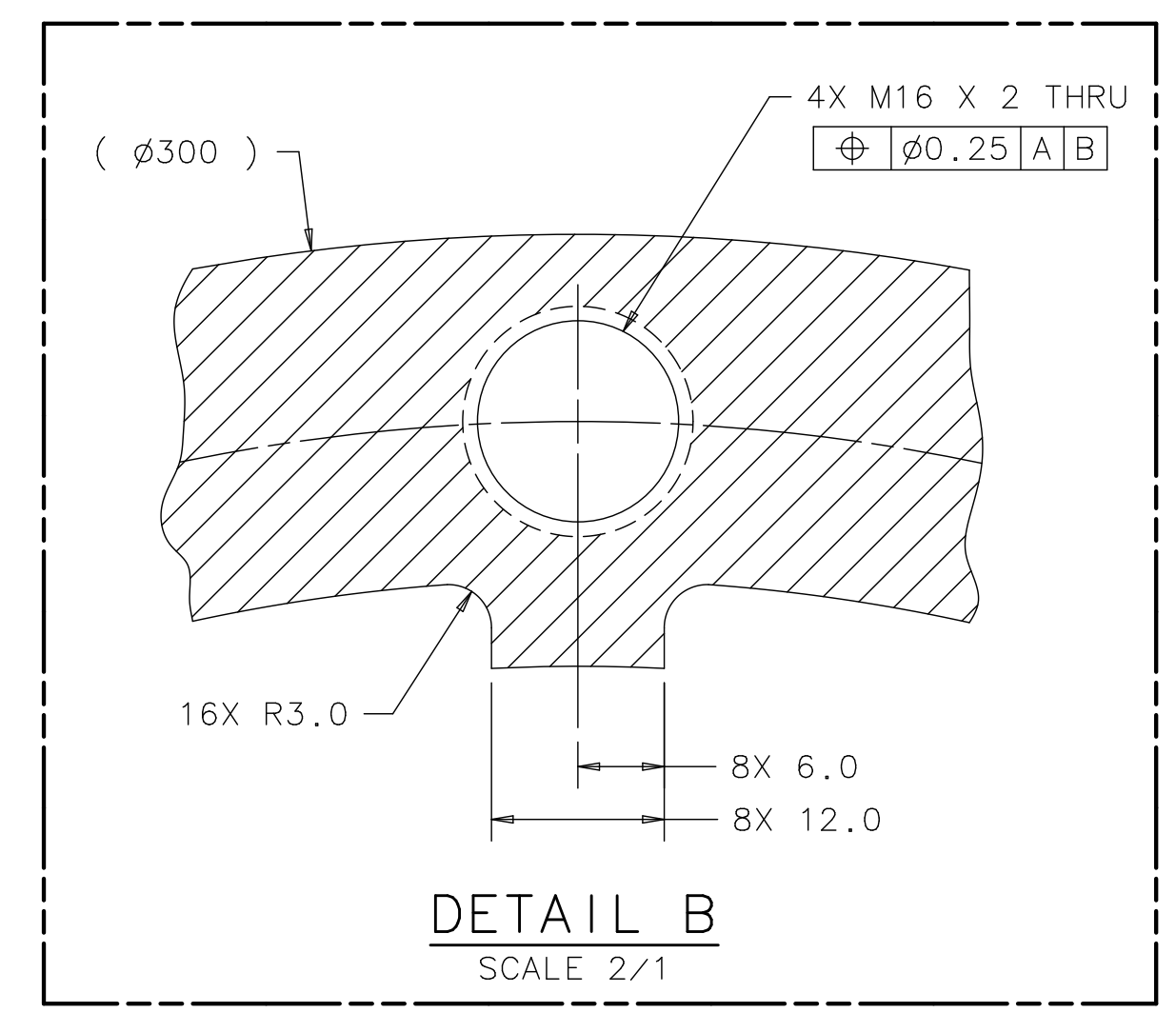
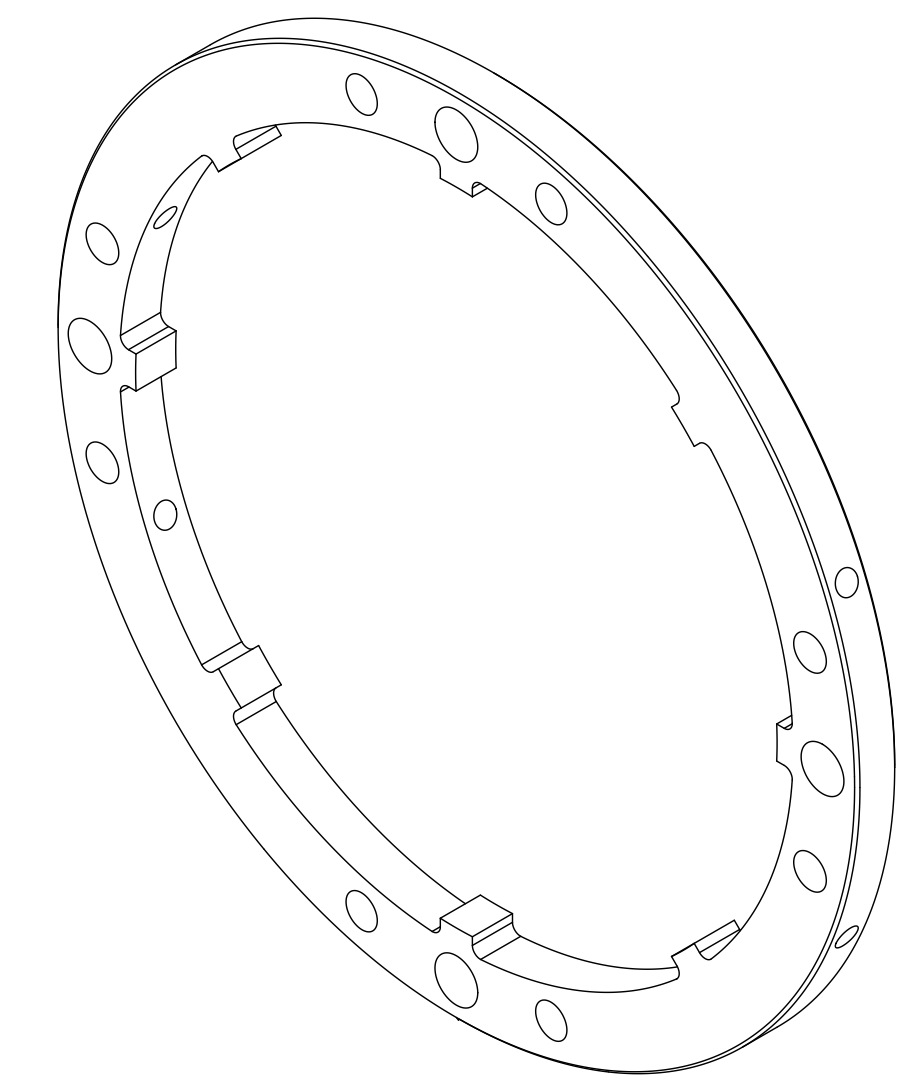
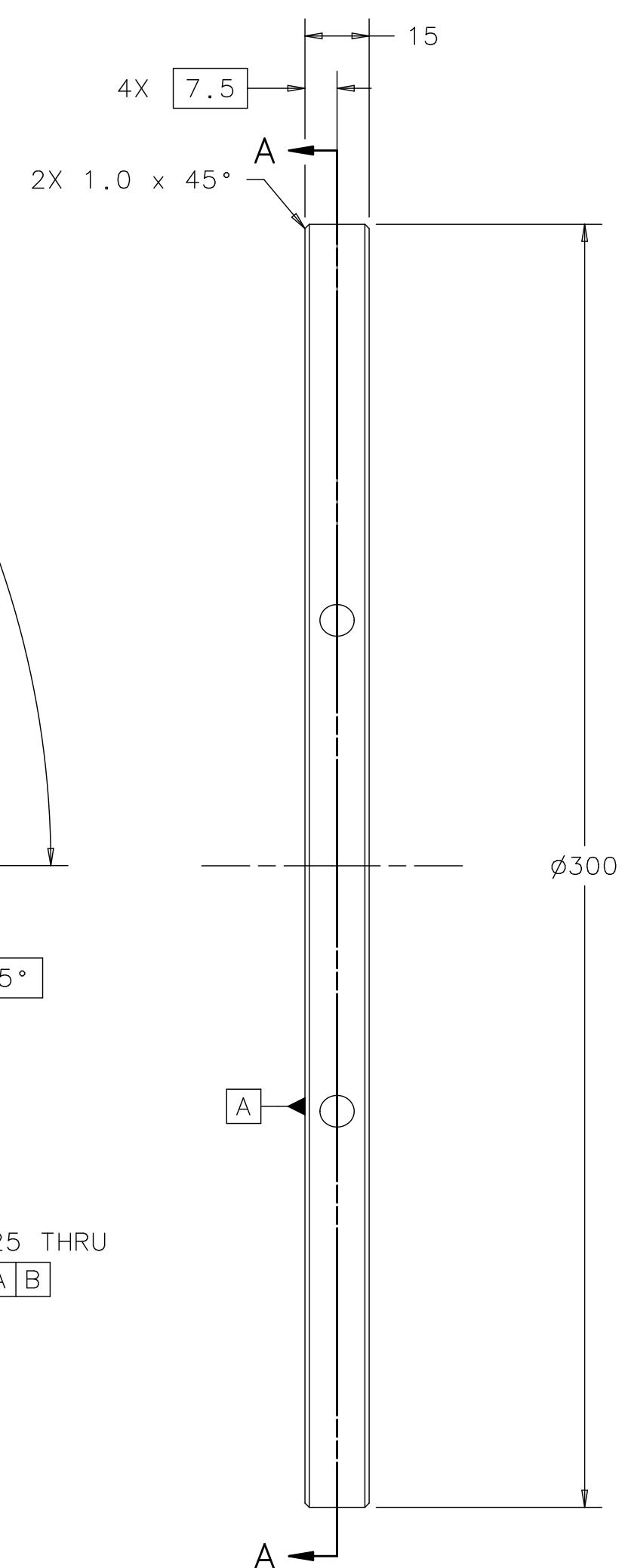
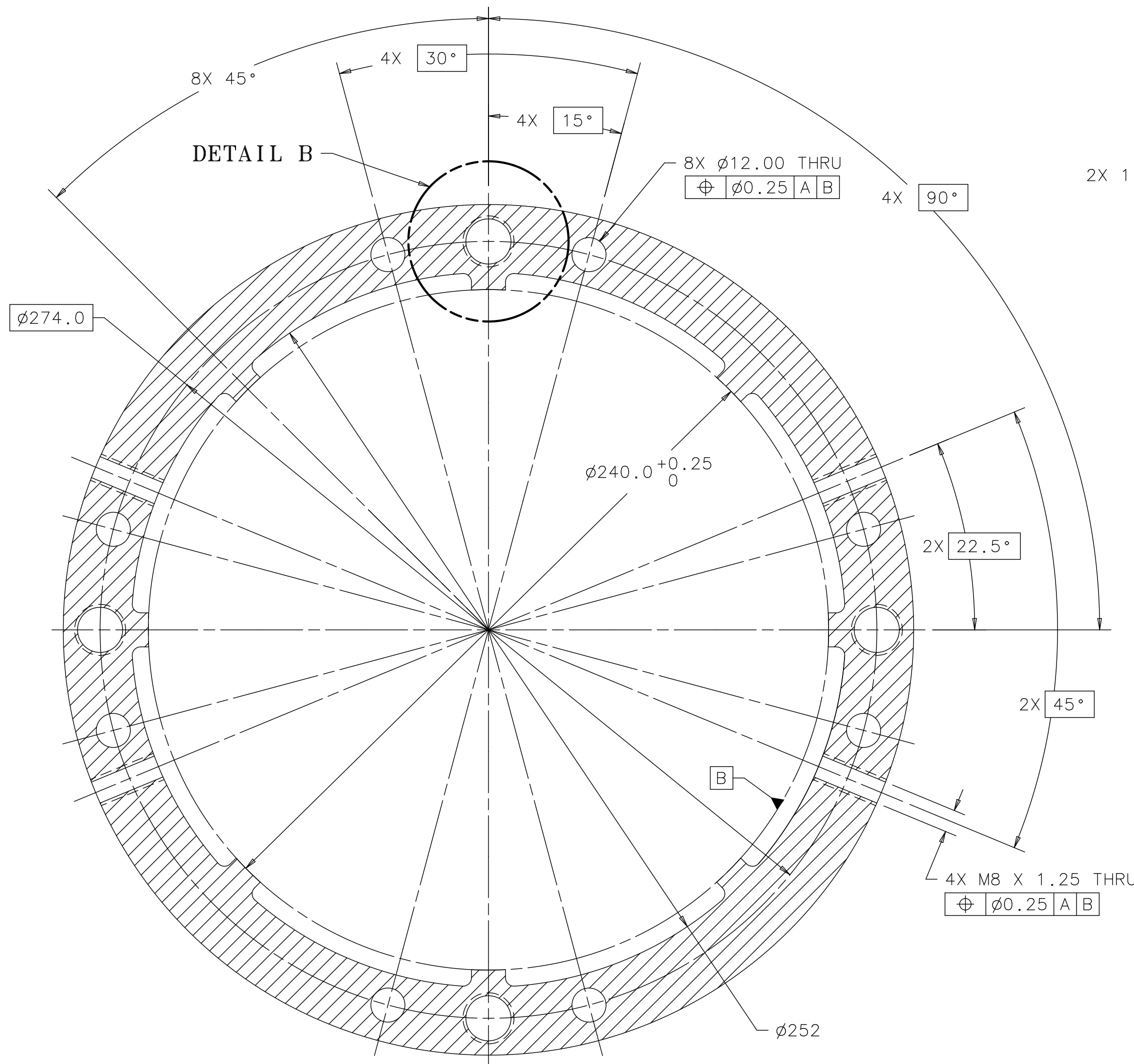
TITLE ILC CRYOMODULE HELIUM VESSEL - BLADE TUNER ROLLER_PAD			
SIZE A3	CAGE CODE OU5R6	DWG NO. D0000000790905	REV A
SCALE 2:1	DO NOT SCALE DWG	SHEET 1 OF 1	

777901	777951,777971
NEXT ASSY	USED ON
APPLICATION	

NOTES:

- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS. A MAXIMUM OF 0.5mm X 45° IS ALLOWED.
- ALL HOLES TO HAVE A 90° CSK 0.5mm TO 1.0mm LARGER THAN THE MAJOR DIAMETER. (TO REMOVE BURRS)
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



SECTION A-A

777901	777971	TITANIUM
NEXT ASSY	MADE IN CURRENT	GRADE 2
APPLICATION		

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY S. POREMBA	DATE 01JUN07	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL	TOLERANCES	THIRD ANGLE PROJECTION	CHECKED BY	DATE	
	X ± 2 .X ± 0.8 .XX ± 0.13 ANGLE ± 1°		ENGINEERED BY	DATE	TITLE <b>ILC CRYMODULE HELIUM VESSEL - PIEZO SIDE TUNER_RING_PIEZO_SIDE</b>
			DATABASE DESY EDMS	TEAM/GROUP	SIZE A2
			CAD I-DEAS	SOLID MODEL NO. 680132	CAGE CODE OU5R6
					DWG NO. <b>D0000000790915</b>
					REV A
					SCALE 3:4
					DO NOT SCALE DWG
					SHEET 1 OF 1

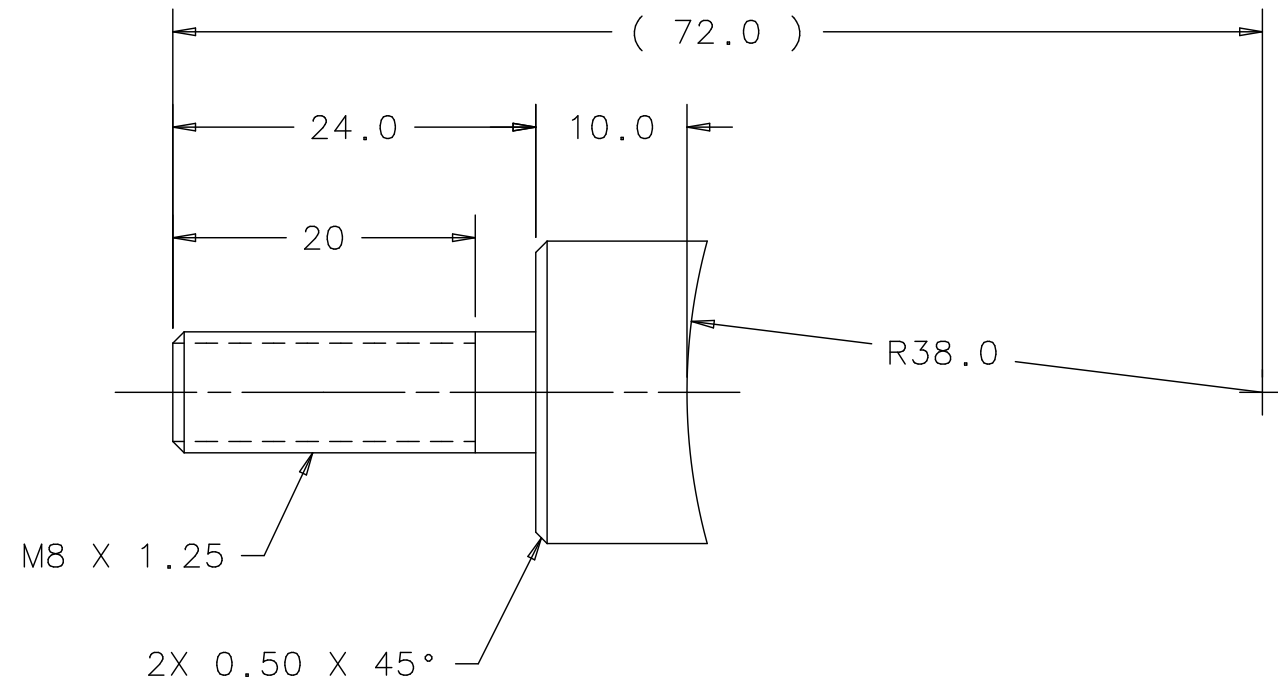
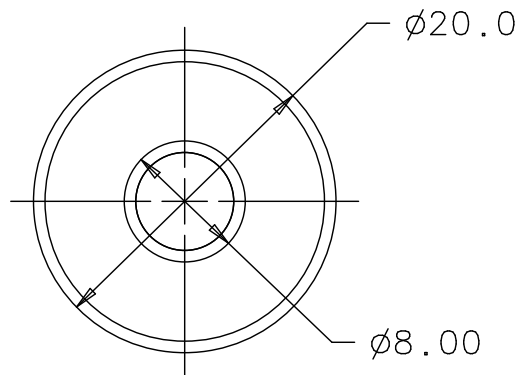
NOTES:

- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS. A MAXIMUM OF 0.5mm X 45° IS ALLOWED.
- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.

REVISION HISTORY

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



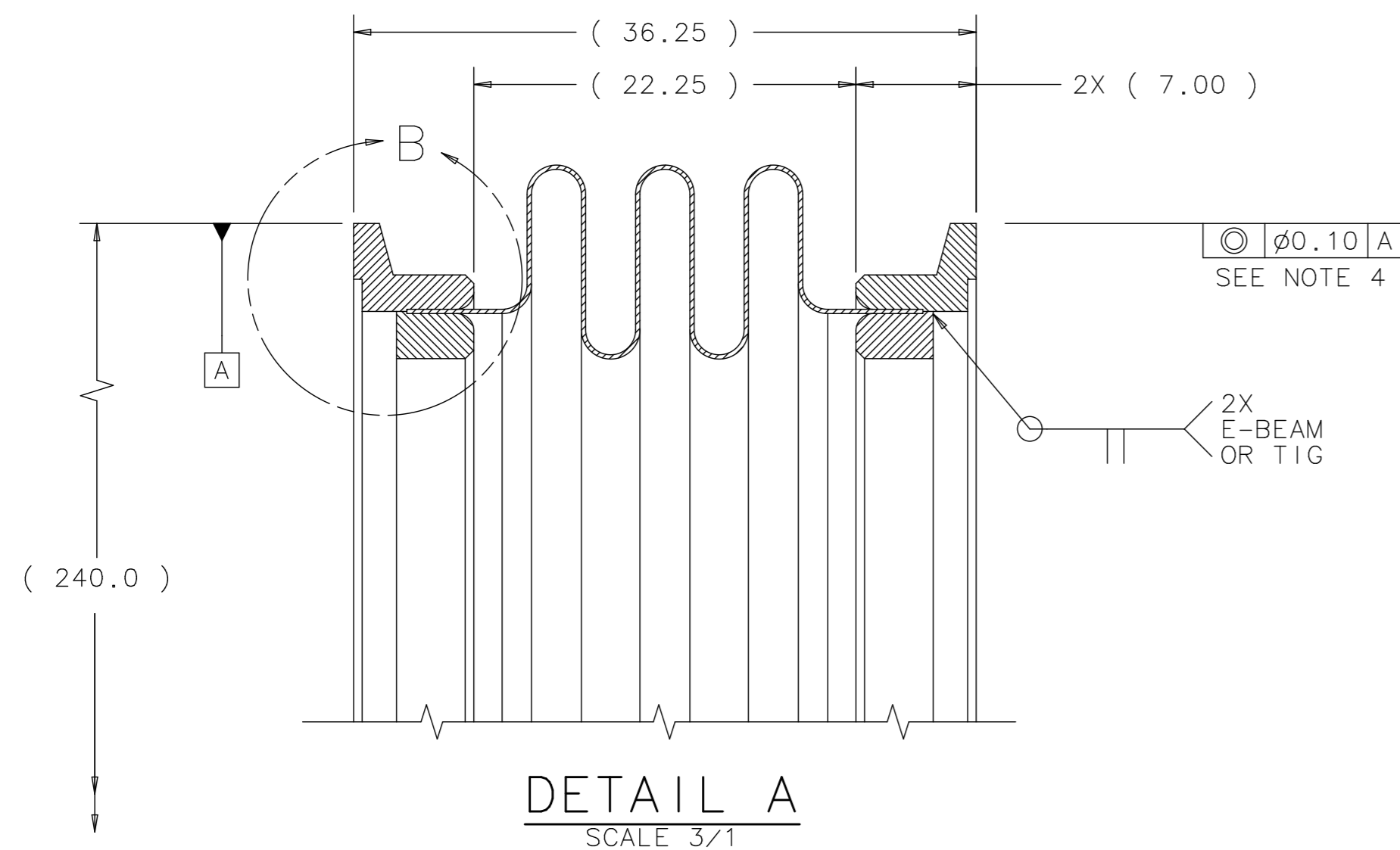
FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES .75 MAX. ALL MACH. SURFACES 3.2 / MAX.	DRAWN BY S. POREMBA	DATE 01JUN07
MATERIAL TITANIUM GRADE 2	FOR TOLERANCES ONLY THIRD ANGLE PROJECTION <b>NOT FOR FABRICATION</b> MAY NOT BE CURRENT	CHECKED BY	DATE
781951		ENGINEERED BY	DATE
NEXT ASSY		DATABASE DESY EDMS	TEAM/GROUP
USED ON		CAD I-DEAS	SOLID MODEL NO. 680252
APPLICATION			



FERMI NATIONAL ACCELERATOR LABORATORY  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

TITLE ILC CRYMODULE HELIUM VESSEL - BLADE TUNER PIN-SUPPORT			
SIZE A3	CAGE CODE OU5R6	DWG NO. D00000000790925	REV A
SCALE 2:1	DO NOT SCALE DWG	SHEET 1 OF 1	

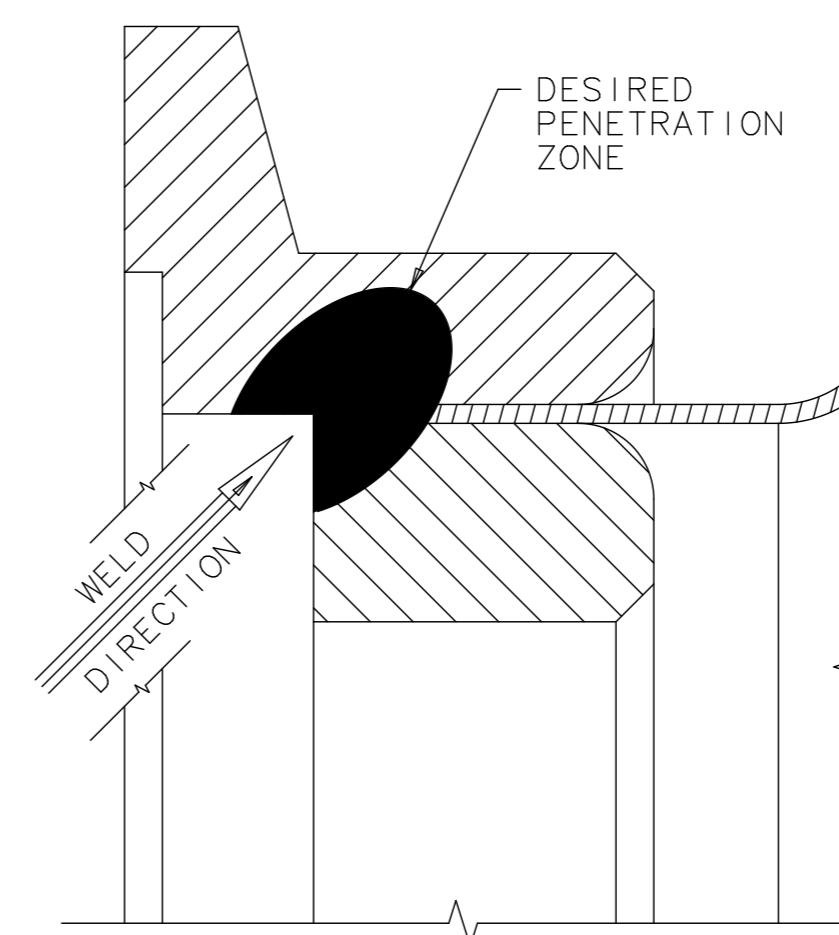
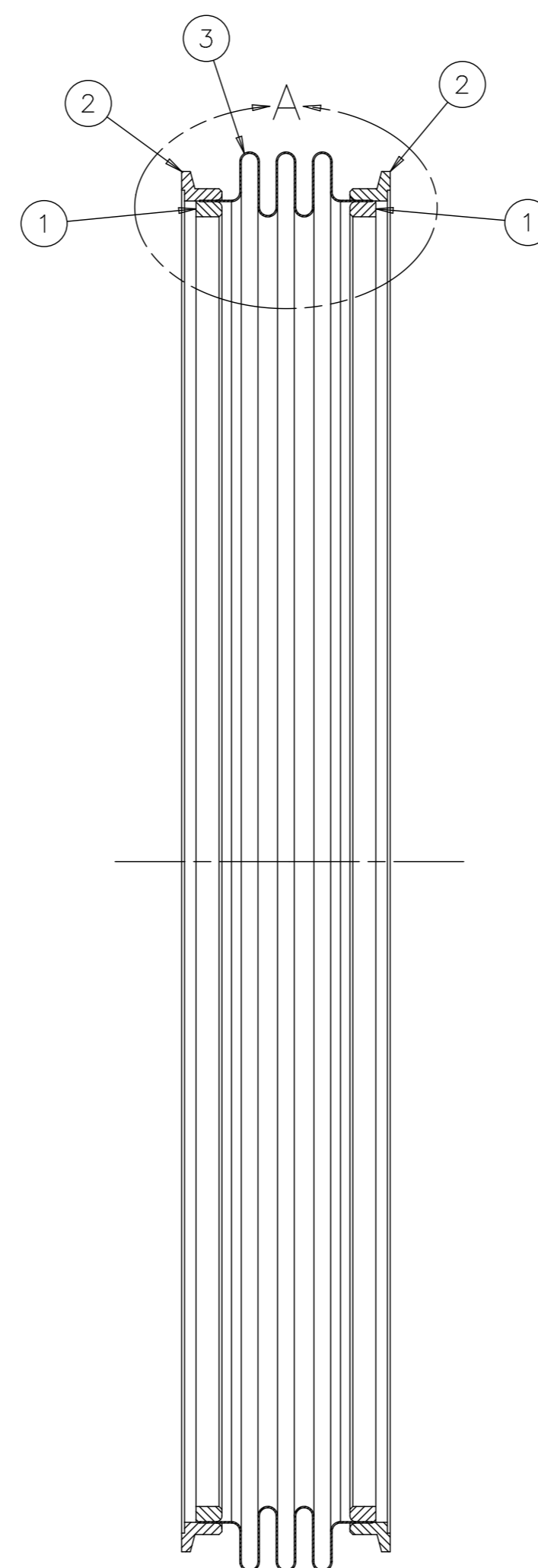
REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



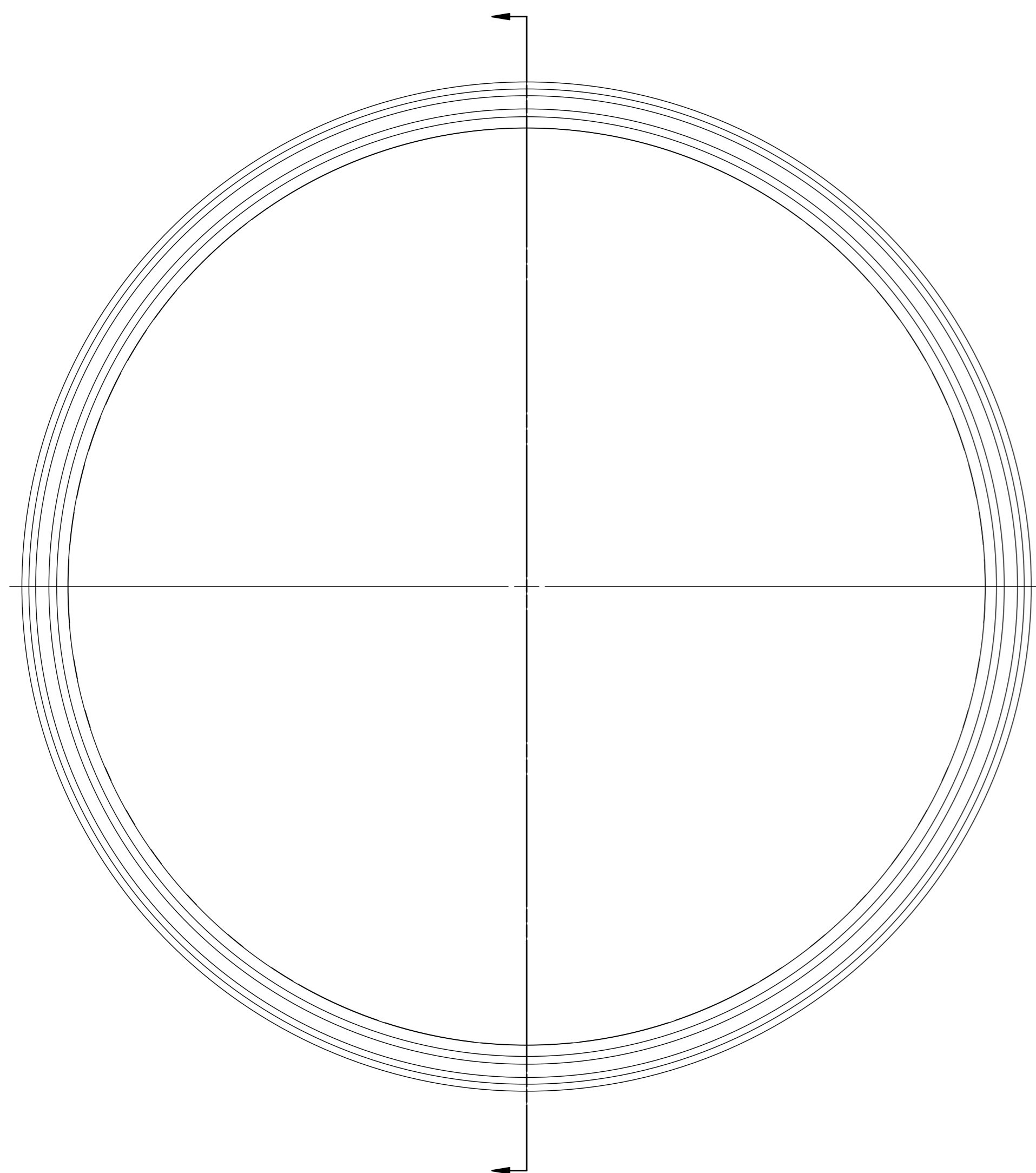
**DETAIL A**  
SCALE 3/1

**NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETERS.
- DO NOT BREAK SHARP CORNERS. E-BEAM WELDING REQUIRES SHARP, CRISP EDGES.
- ASSEMBLY MUST BE FREE FROM DIRT, GREASE, OIL AND CHIPS AND PROPERLY PACKAGED TO AVOID DAMAGE DURING SHIPPING.
- ITEM 2 (2 PLACES) MUST BE CONCENTRIC WITH EACH OTHER WITHIN  $\phi 0.10\text{mm}$ .
- ALL CLEANING AND WELDING PROCEDURES WILL CONFORM TO THE AMERICAN WELDING SOCIETY SPECIFICATION: AWS G2.4/G2.4M: 2007, \*GUIDE FOR THE FUSION WELDING OF TITANIUM AND TITANIUM ALLOYS.\*
- AN ACCEPTABLE PICKLE BATH MUST BE IMPLEMENTED TO CLEAN THE WELD JOINT MATERIAL. USE A RECOMMENDED BATH OF 35 VOL.% NITRIC ACID (70% CONCENTRATION), AND 5 VOL.% HYDROFLUORIC ACID (48% CONCENTRATION). RINSE WITH COLD WATER AND THEN RINSE WITH HOT WATER TO FACILITATE FASTER DRYING. INSURE THAT THE PARTS ARE CLEAN, COMPLETELY DRY, AND OXIDATION FREE PRIOR TO WELDING. CLEAN PARTS MUST BE USED WITHIN 4 HOURS OR STORED IN AN OXYGEN PURGED ENVIRONMENT.
- WELDERS MUST BE QUALIFIED AND CERTIFIED IN TITANIUM WELDING. VERIFICATION DOCUMENTS FOR EACH WELDER MUST BE SUPPLIED TO FERMILAB FOR WRITTEN APPROVAL PRIOR TO ANY PRODUCT WELDING.
- THE VENDOR WILL SUPPLY 1 COMPARABLE WELD SAMPLE TO FERMILAB FOR WRITTEN APPROVAL PRIOR TO ANY PRODUCT WELDING.
- THE VENDOR'S WRITTEN PROCEDURE DESCRIBING THE CLEANING AND WELDING PROCEDURES MUST BE SUPPLIED TO FERMILAB FOR WRITTEN APPROVAL PRIOR TO 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 PRODUCT 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  $2 \times 10^{-10}$  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.



**DETAIL B**  
2 PLACES  
SCALE 10/1



ITEM	P. I. N.	DESCRIPTION	QTY
3	791835	BELLOWS	1
2	791825	BELLOWS RING	2
1	791775	BACKING RING	2

FERMI NATIONAL ACCELERATOR LABORATORY  
UNITED STATES DEPARTMENT OF ENERGY  
P.O. BOX 500, BATAVIA, IL 60510-0500

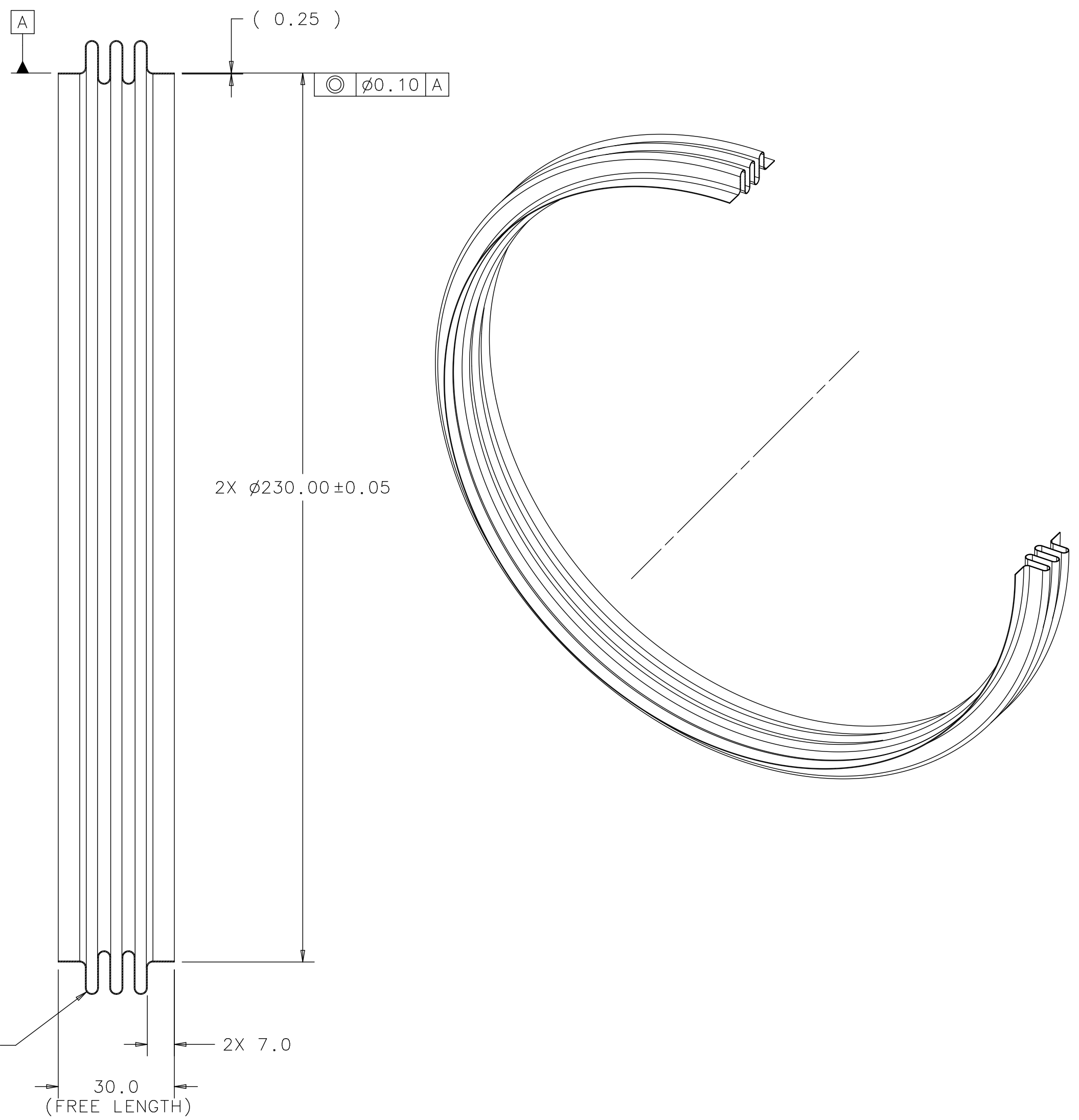
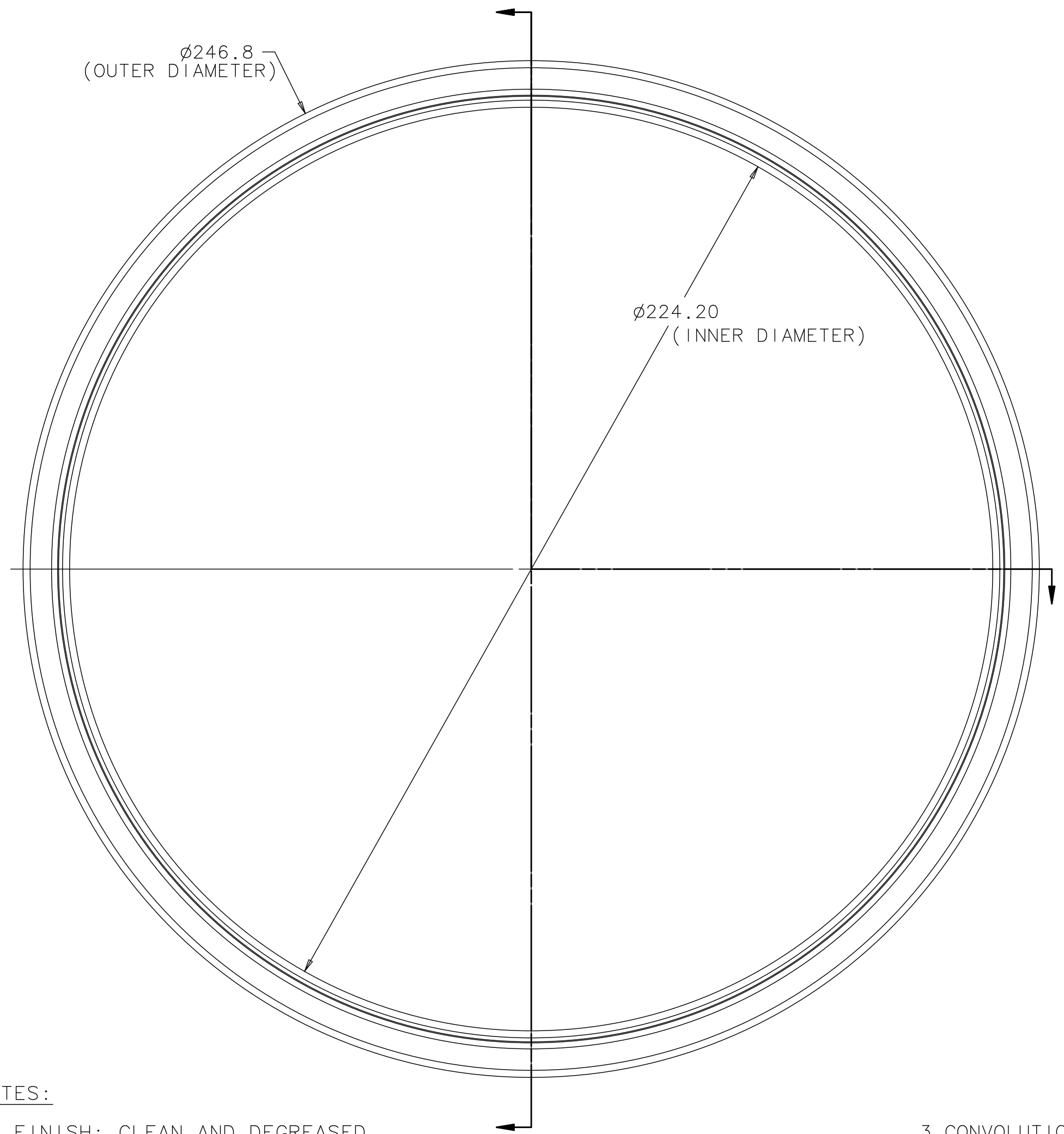
TITLE  
**ILC TYPE IV CRYOMODULE  
HELIUM VESSEL - BLADE TUNER  
BELLOWS\_ASSEMBLY\_G2**

FINISH N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES -- MAX. ALL MACH. SURFACES 3.2/ MAX.	DRAWN BY L ROSINE	DATE 22JUN07
MATERIAL SEE PARTS LIST	TOLERANCES X ± -- XX ± -- ANGLE ± --	CHECKED BY	DATE
	THIRD ANGLE PROJECTION	ENGINEERED BY	DATE
		DATABASE DESJ EDMS	TEAM/GROUP T4CM DESIGN
		CAD I-DEAS	SOLID MODEL NO. D00000000612083

FOR REFERENCE ONLY  
NEXT ASSY USED ON  
NOT FOR FABRICATION APPLICATION  
781951 777901

SIZE A1	CAGE CODE OU5R6	DWG NO. D00000000791765	REV A
SCALE 1:1	DO NOT SCALE DRAWING		SHEET 1 OF 1

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



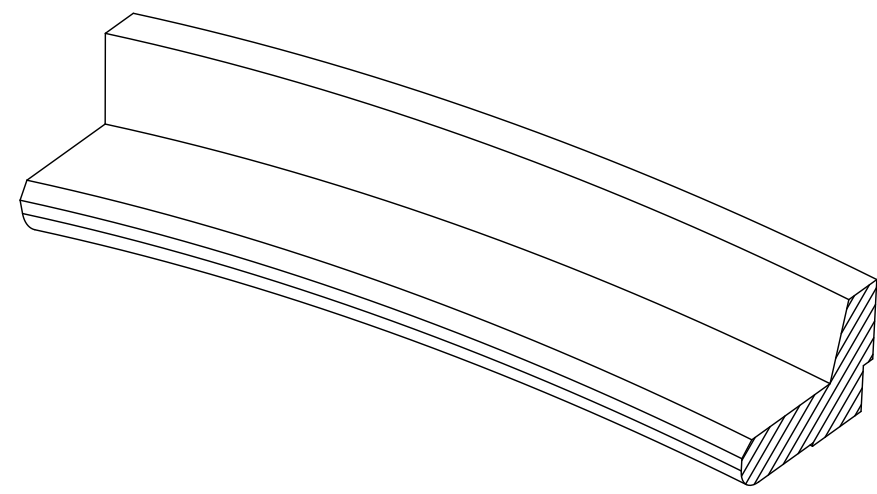
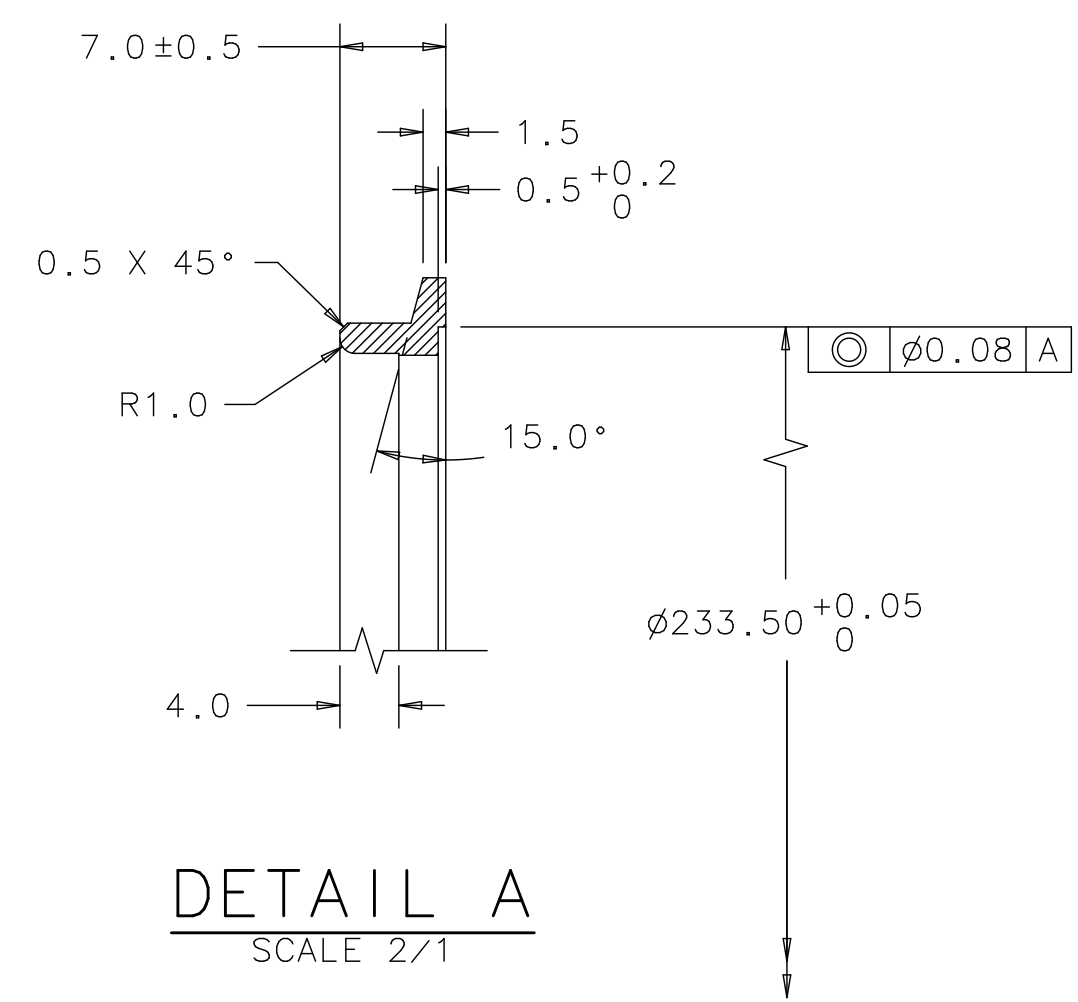
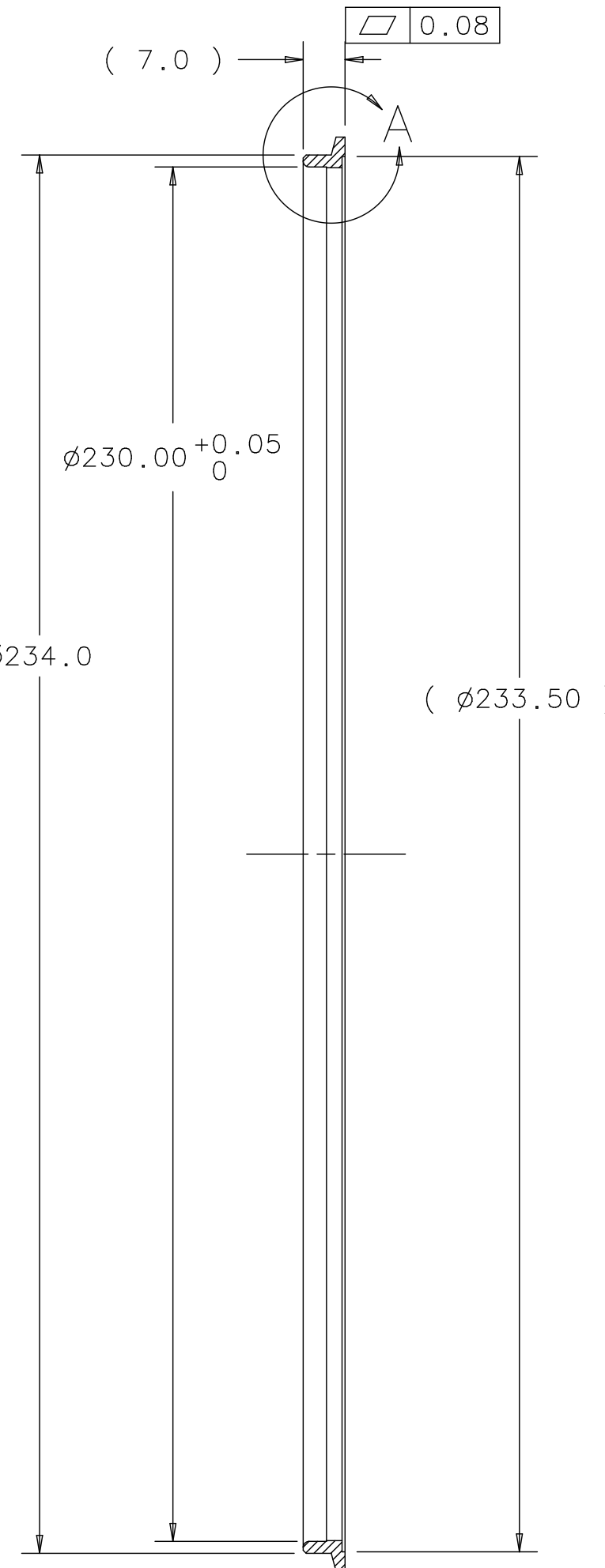
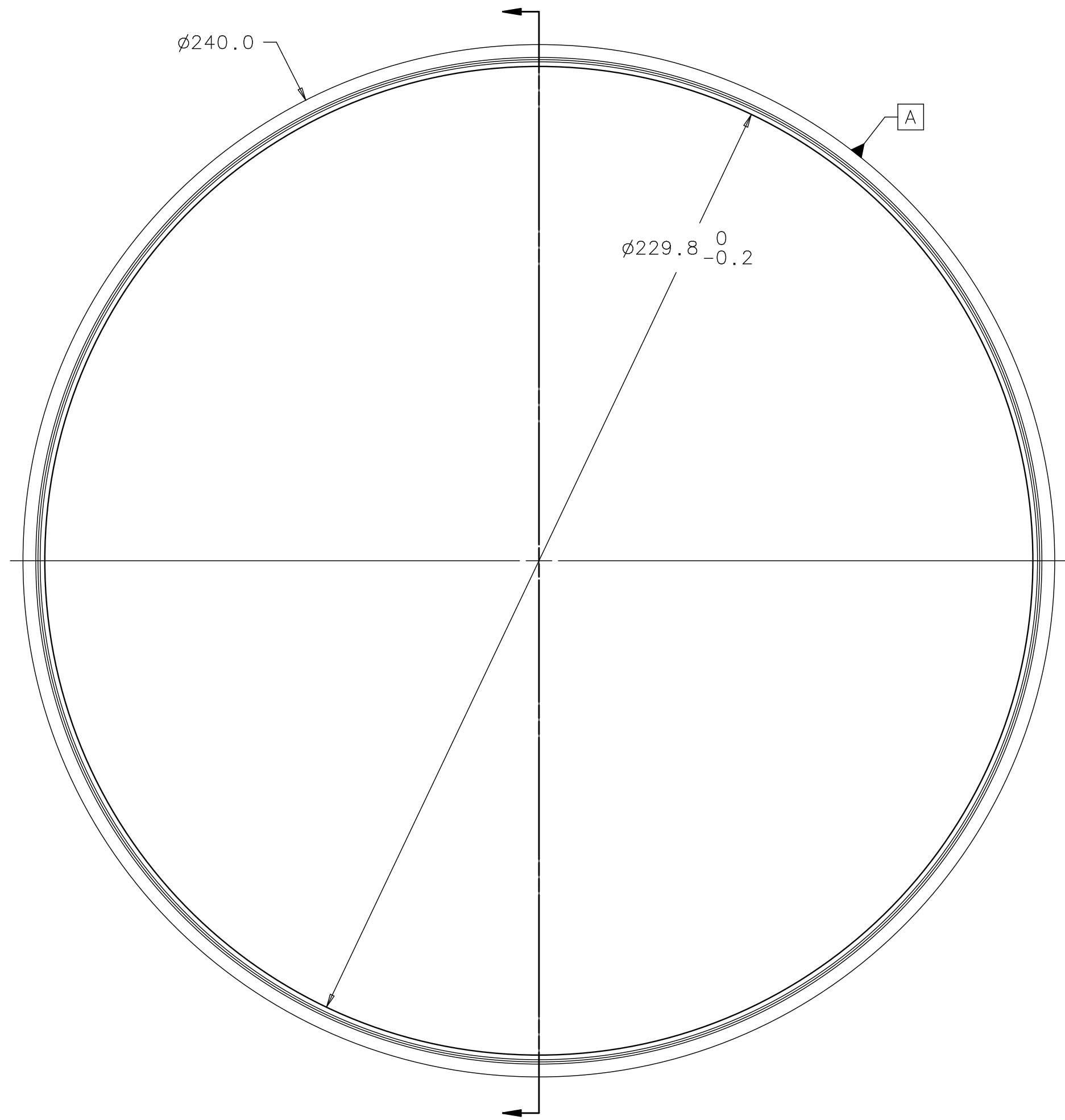
- NOTES:**
1. FINISH: CLEAN AND DEGREASED.
  2. PART TO BE FREE OF ALL BURRS.
  3. 3 CONVOLUTIONS ARE REQUIRED. CONVOLUTION DETAILS ARE TO BE SET BY THE SUPPLIER. INNER AND OUTER DIAMETERS ARE TO BE CONTROLLED BY THE DIMENSIONS SHOWN.
  4. BELLOWS SHALL BE HYDROFORMED WITH NO CRACKS, HOLES, PITS, DENTS, OR OTHER VISIBLE FLAWS THAT WOULD RENDER THE BELLOWS USELESS FOR CRYOGENIC VACUUM USE.
  5. MATERIAL CERTIFICATION IS REQUIRED. PRODUCT ACCEPTANCE IS SUBJECT TO THE RECEIPT OF MATERIAL CERTIFICATION.

777901	791765	TITANIUM GR. 2
NEXT ASSY	USED ON	0.25MM THICK SHEET
APPLICATION		

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES -- MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY L ROSINE	DATE 25JUN07	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL	TITANIUM GR. 2	TOLERANCES	CHECKED BY	DATE	
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE
			DATABASE DESY EDMS	TEAM/GROUP T4CM DESIGN	<b>ILC TYPE IV CRYOMODULE HELIUM VESSEL - BLADE TUNER BELLOWS</b>
			CAD I-DEAS	SOLID MODEL NO. D0000000077252	
					SIZE A2
					CAGE CODE OU5R6
					DWG NO. D00000000791835
					REV A
					SCALE 1:1
					DO NOT SCALE DWG
					SHEET 1 OF 1



REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



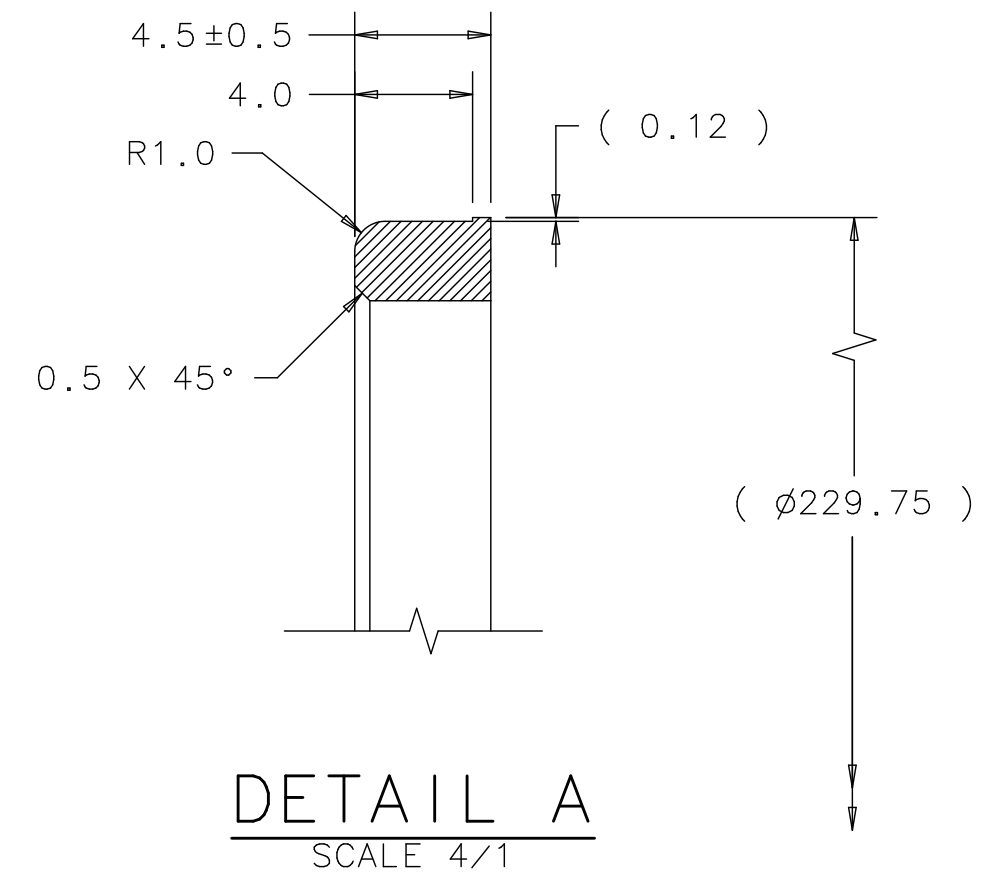
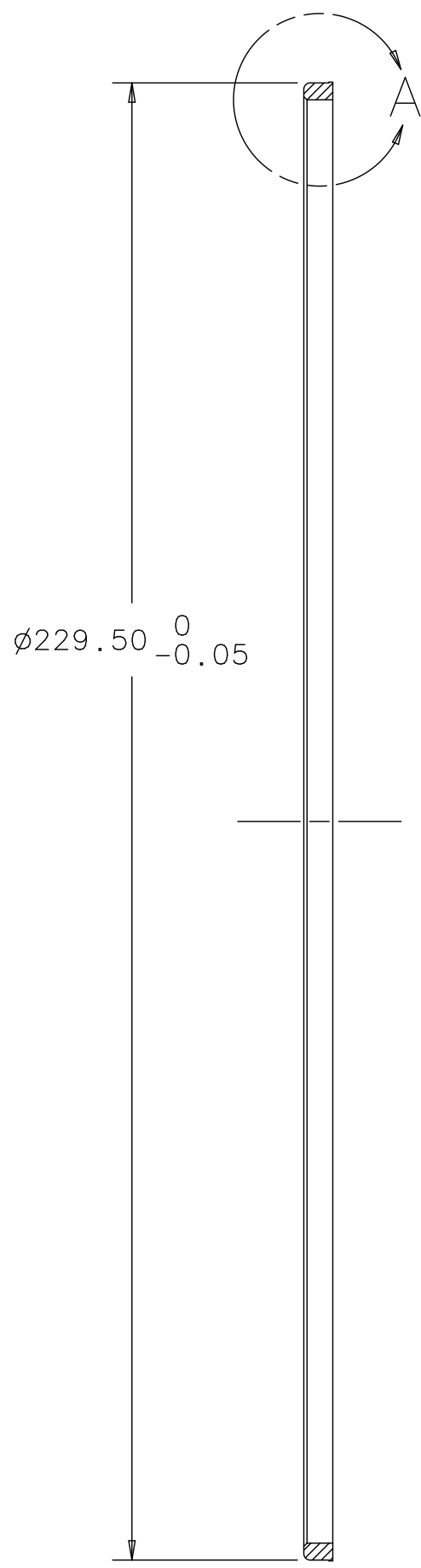
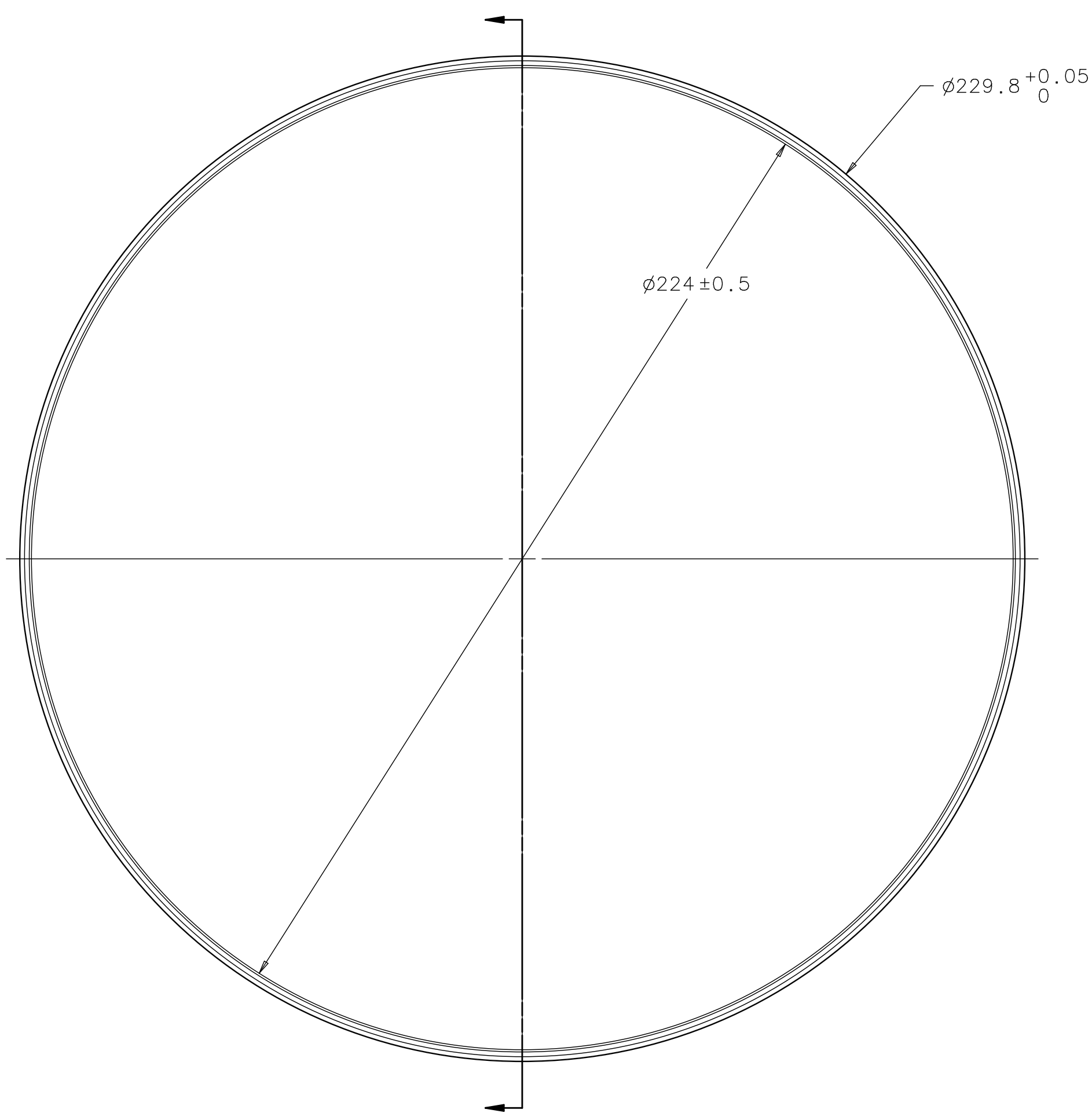
NOTES (UNLESS OTHERWISE SPECIFIED):

1. FINISH: CLEAN AND DEGREASED.
2. ALL UNITS ARE IN MILLIMETERS.
3. PART TO BE FREE OF ALL BURRS. DO NOT BREAK SHARP EDGES. E-BEAM WELDING REQUIRES SHARP, CRISP EDGES.
4. ALL MACHINE FINISHED SURFACES TO BE 3.2 MICRO-METERS OR BETTER UNLESS OTHERWISE SPECIFIED.

77904	791765	TITANIUM GR. 2
NEXT ASSY	USED ON	APPLICATION

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES -- MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY L ROSINE	DATE 25JUN07	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL	TITANIUM GR. 2	TOLERANCES	CHECKED BY	DATE	
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE
			DATABASE DESY EDMS	TEAM/GROUP T4CM DESIGN	<b>ILC TYPE IV CRYOMODULE HELIUM VESSEL - BLADE TUNER BELLOWS_RING</b>
			CAD I-DEAS	SOLID MODEL NO. D00000000772262	
					SIZE A2
					CAGE CODE OU5R6
					DWG NO. D00000000791825
					REV A
					SCALE 1:1
					DO NOT SCALE DWG
					SHEET 1 OF 1

REVISION HISTORY				
CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	INITIAL RELEASE		



- NOTES (UNLESS OTHERWISE SPECIFIED):
1. FINISH: CLEAN AND DEGREASED.
  2. ALL UNITS ARE IN MILLIMETERS.
  3. PART TO BE FREE OF ALL BURRS. DO NOT BREAK SHARP EDGES. E-BEAM WELDING REQUIRES SHARP, CRISP EDGES.
  4. ALL MACHINE FINISHED SURFACES TO BE 3.2 MICROMETERS OR BETTER UNLESS OTHERWISE SPECIFIED.

777901	791765	TITANIUM GR. 2
NEXT ASSY	MADE ON	USED ON
APPLICATION		

FINISH	N/A	UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS INTERPRET DIM PER ASME Y14.5M-1994 BREAK ALL SHARP EDGES -- MAX. ALL MACH. SURFACES 3.2 MAX.	DRAWN BY L ROSINE	DATE 22JUN07	<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY P.O. BOX 500, BATAVIA, IL 60510-0500
MATERIAL	TITANIUM GR. 2	TOLERANCES	CHECKED BY	DATE	
		THIRD ANGLE PROJECTION	ENGINEERED BY	DATE	TITLE
			DATABASE DESY EDMS	TEAM/GROUP T4CM DESIGN	<b>ILC TYPE IV CRYOMODULE HELIUM VESSEL - BLADE TUNER BACKING_RING</b>
			CAD I-DEAS	SOLID MODEL NO. D00000000772242	
					SIZE <b>A2</b> CAGE CODE <b>OU5R6</b> DWG NO. <b>D00000000791775</b> SCALE 1:1 DO NOT SCALE DWG
					REV <b>A</b> SHEET 1 OF 1