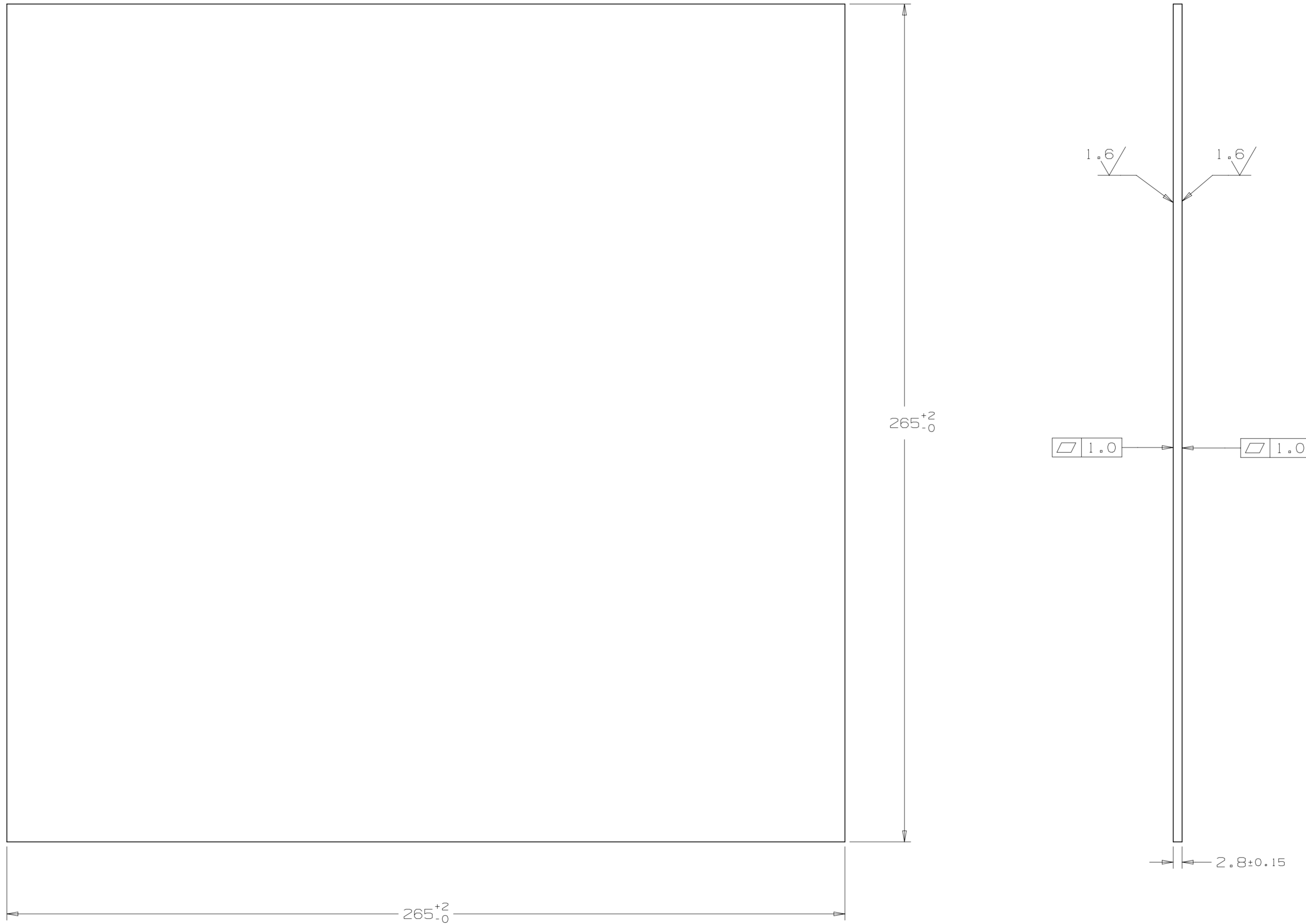


REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018326---RCD		DRAWN APPROVED



NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & 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°

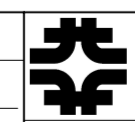
BREAK ALL SHARP EDGES 0.5 MAX.  
 DO NOT SCALE DRAWING  
 DIMENSIONS BASED ON ASME Y14.5M-1994  
 MAX. ALL MACH SURFACES 3.2  
 DRAWING UNITS: MM

DRAWN	G. LANGLOIS	DATE	18-Mar-2014
CHECKED	M. SAWTELL	DATE	21-Mar-2014
APPROVED	M. FOLEY	DATE	21-Mar-2014

USED ON

MATERIAL: NIObIUM, TYPE 5 RRR GRADE, UNS R04220

GROUP: Technical Division - Design and Drafting | CAGE CODE: OUSR6

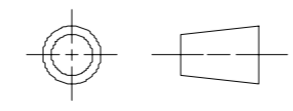


FERMI NATIONAL ACCELERATOR LABORATORY  
 UNITED STATES DEPARTMENT OF ENERGY

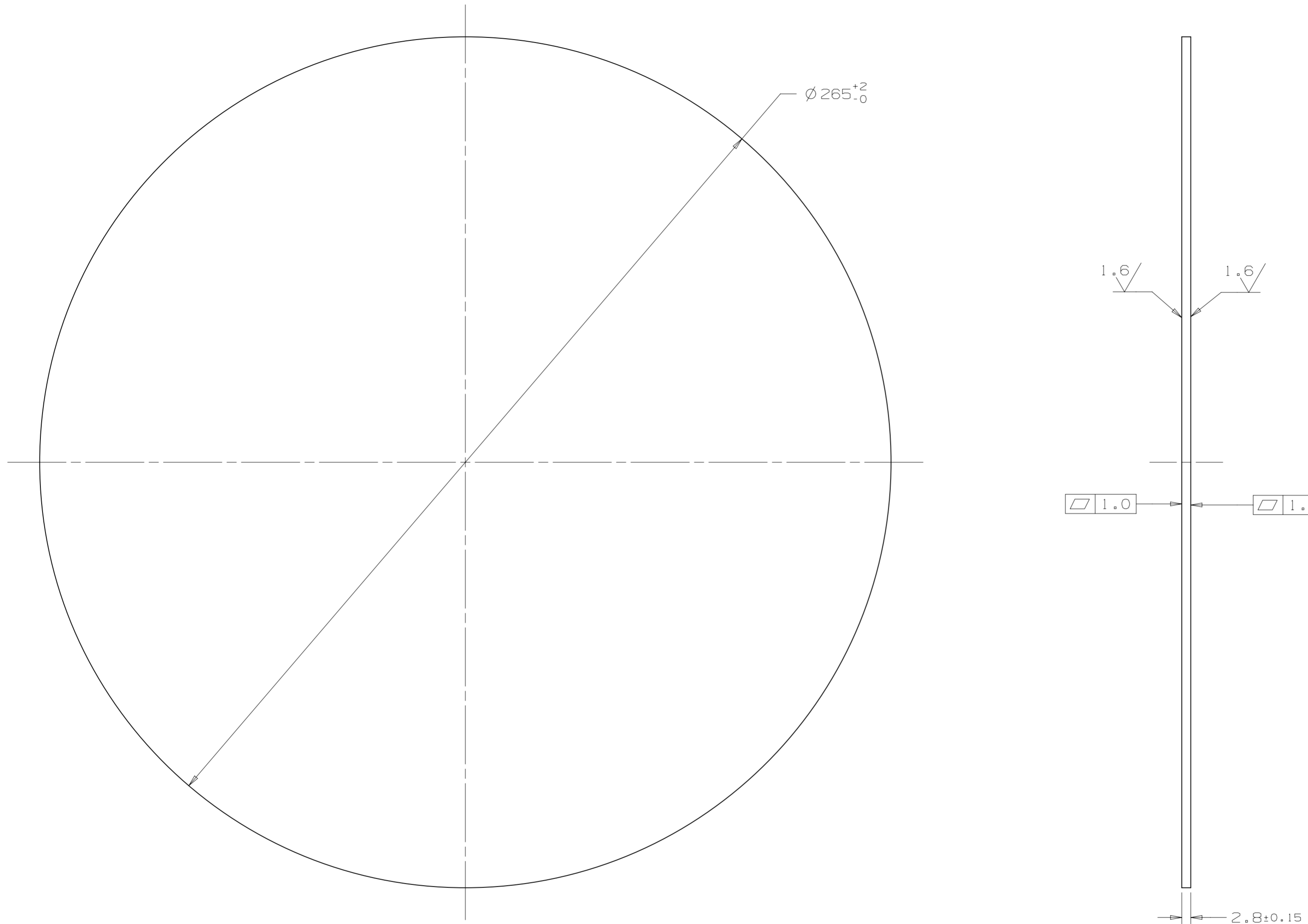
NAME

SHEET, No 2.8MM THK - HALF CELL PRODUCTION

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
1:1 AS SHOWN	A2	F10018326	1 OF 1	-



REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018335---RCD		DRAWN APPROVED



NOTES (UNLESS OTHERWISE SPECIFIED):

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

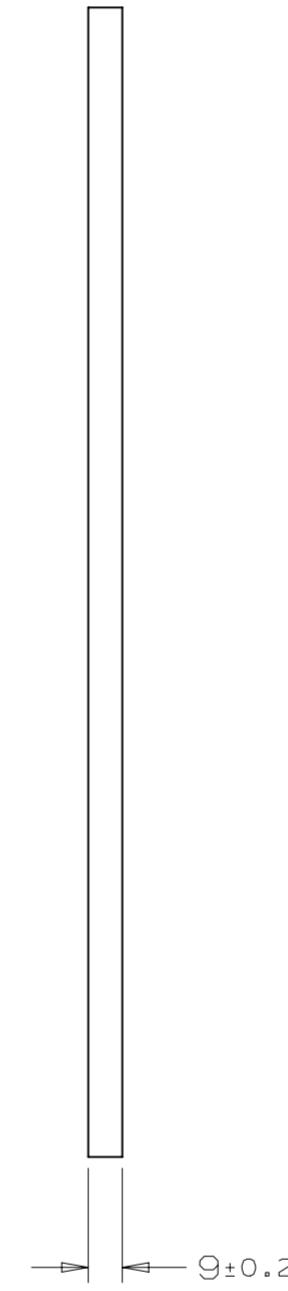
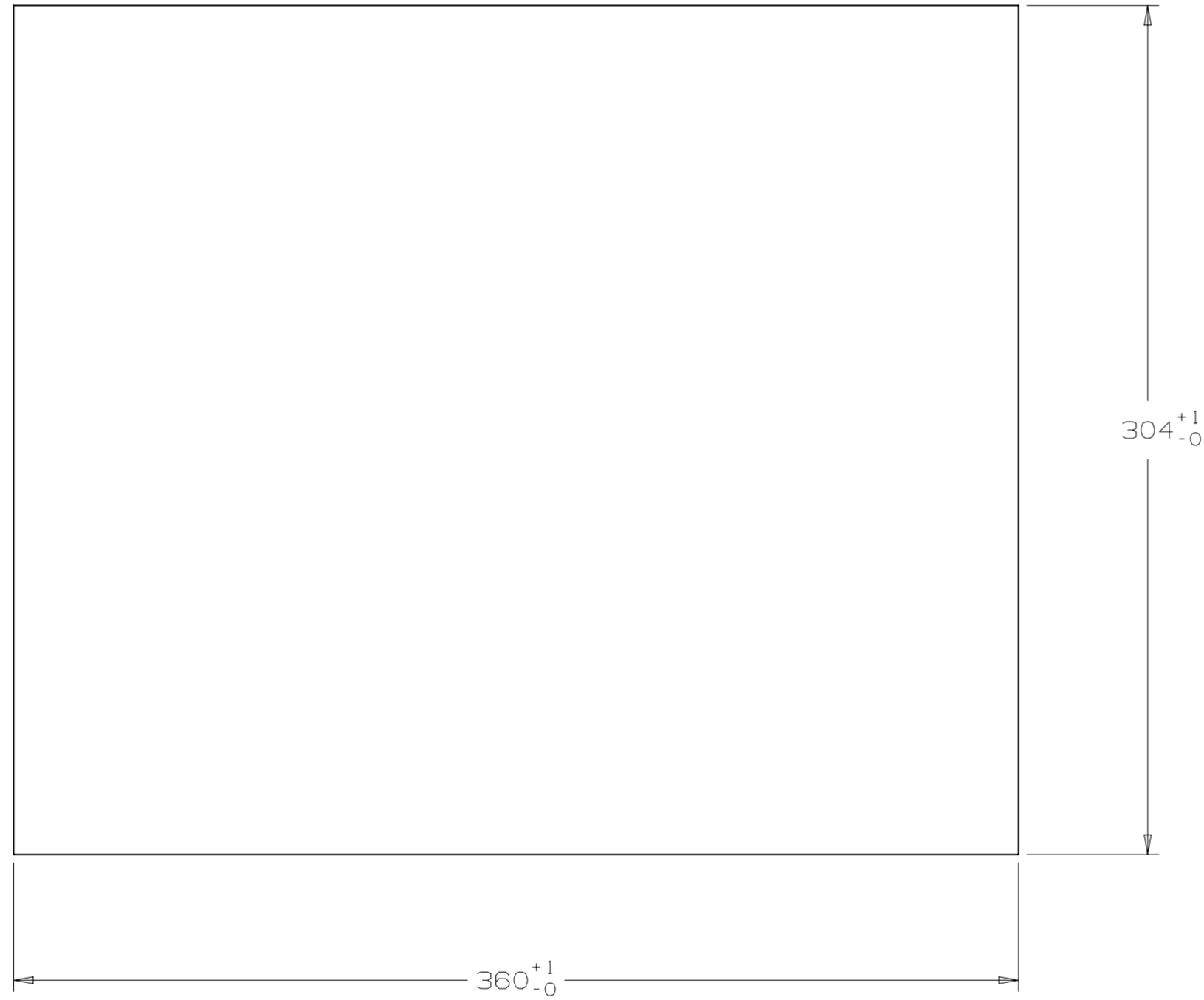
UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-2014
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON			
MATERIAL: NIOBIUM, TYPE 5 RRR GRADE, UNS R04220					GROUP: Technical Division - Design and Drafting   CAGE CODE: OUES6			

**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY

DISK, Nb 2.8MM THK - HALF CELL PRODUCTION

SCALE 1:1 AS SHOWN	SIZE A2	DRAWING NUMBER F10018335	SHEET 1 OF 1	REV -
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REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018337---RCD		DRAWN APPROVED



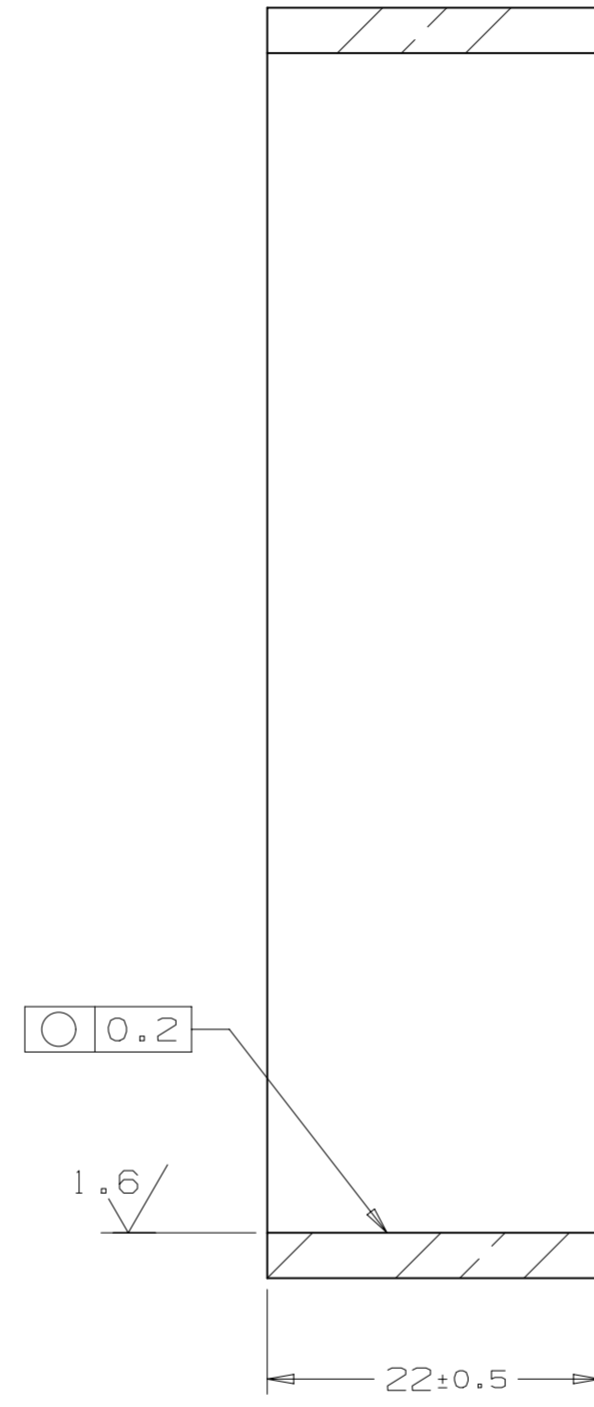
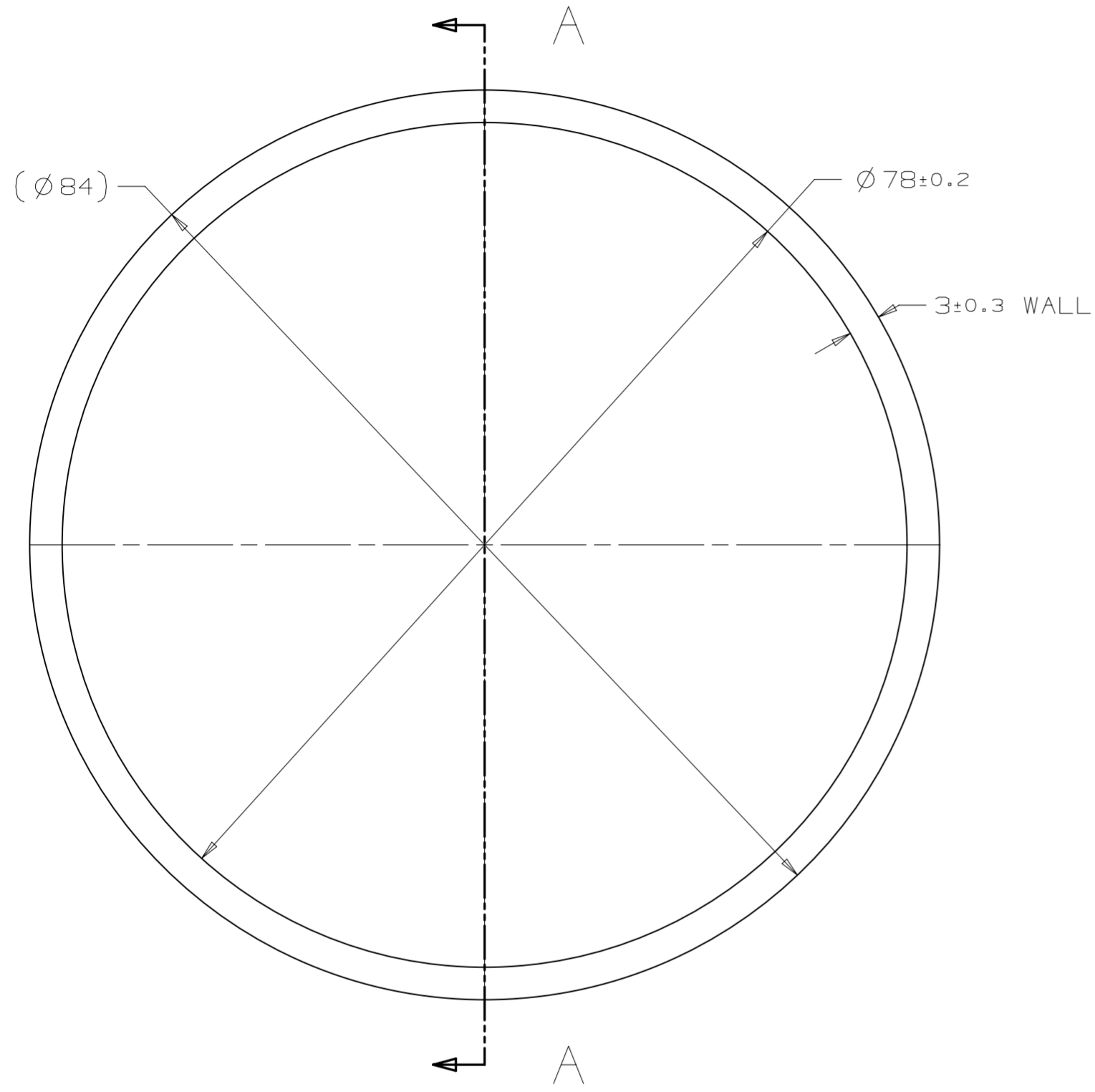
NOTES (UNLESS OTHERWISE SPECIFIED):

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

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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			
					MATERIAL: NIObIUM, TYPE 5 RRR GRADE, UNS R04220			
GROUP: Technical Division - Design and Drafting					CAGE CODE: OUSR6			

		FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
		NAME	
SHEET, No 9MM THK - F-PART PRODUCTION			
SCALE 1:2 AS SHOWN	SIZE A2	DRAWING NUMBER F10018337	SHEET 1 OF 1
		REV -	

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018340---RCD		DRAWN APPROVED

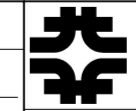


SECTION A-A

NOTES (UNLESS OTHERWISE SPECIFIED):

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

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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 MATERIAL: NIOTBIUM, TYPE 5 RRR GRADE, UNS R04220 GROUP: Technical Division - Design and Drafting   CAGE CODE: OUSR6			

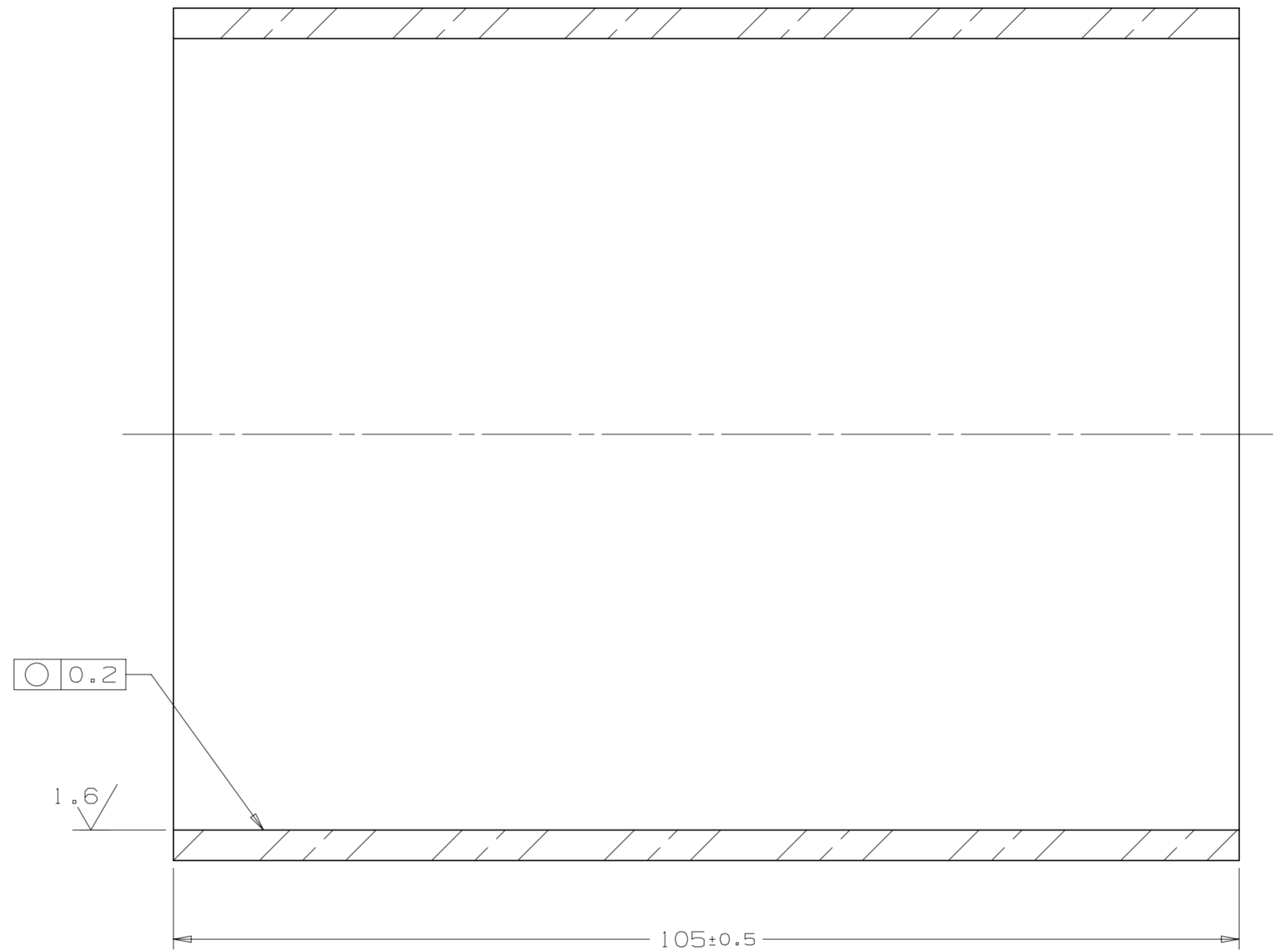
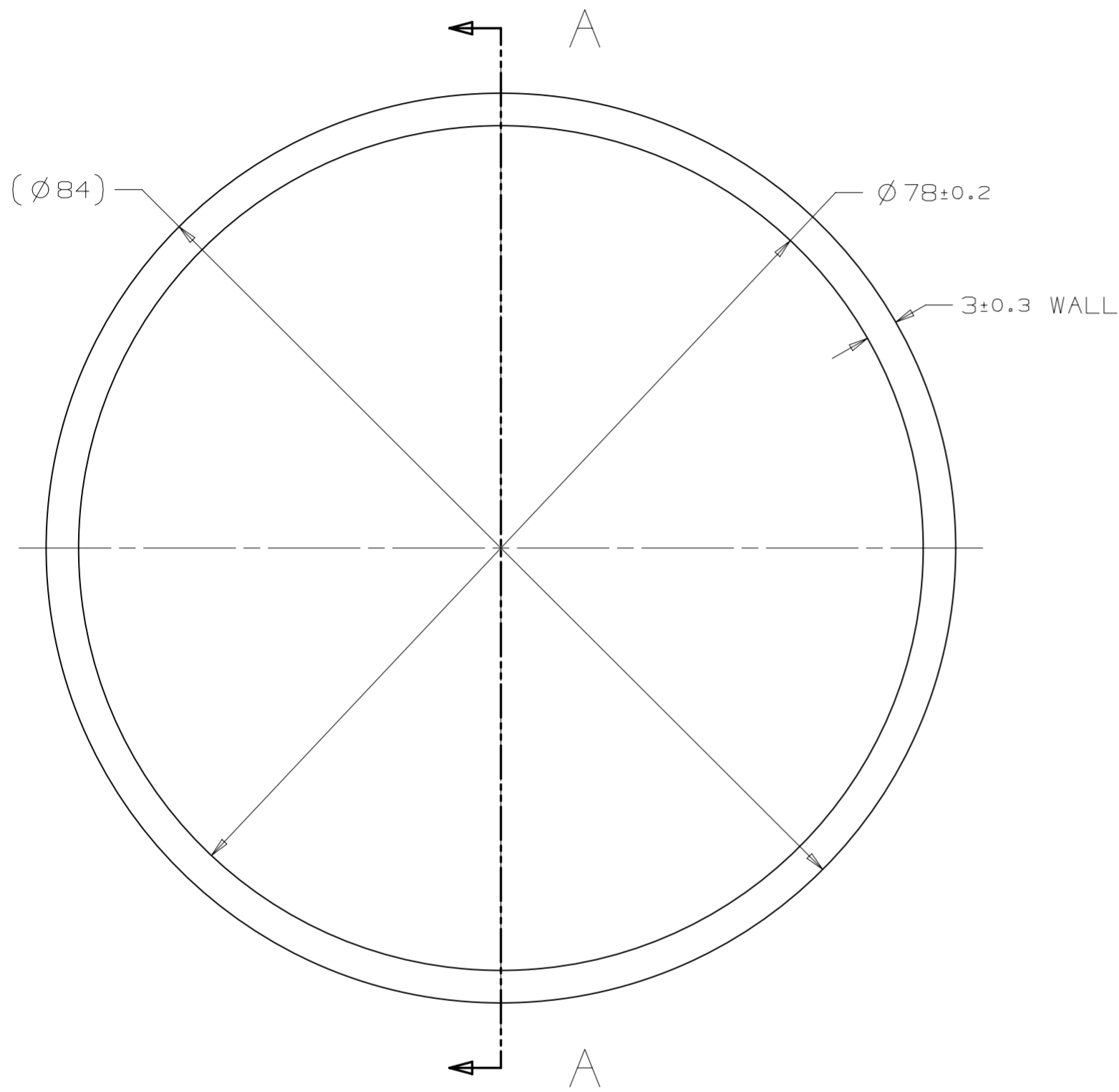


FERMI NATIONAL ACCELERATOR LABORATORY  
 UNITED STATES DEPARTMENT OF ENERGY

TUBE, Nb DN78\_22 - CONNECTION  
 END TUBE PRODUCTION

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
2:1 AS SHOWN	A2	F10018340	1 OF 1	-

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018343---RCD		DRAWN APPROVED



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.

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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 MATERIAL: NIOTIUM, TYPE 5 RRR GRADE, UNS R04220 GROUP: Technical Division - Design and Drafting   CAGE CODE: OUES6			

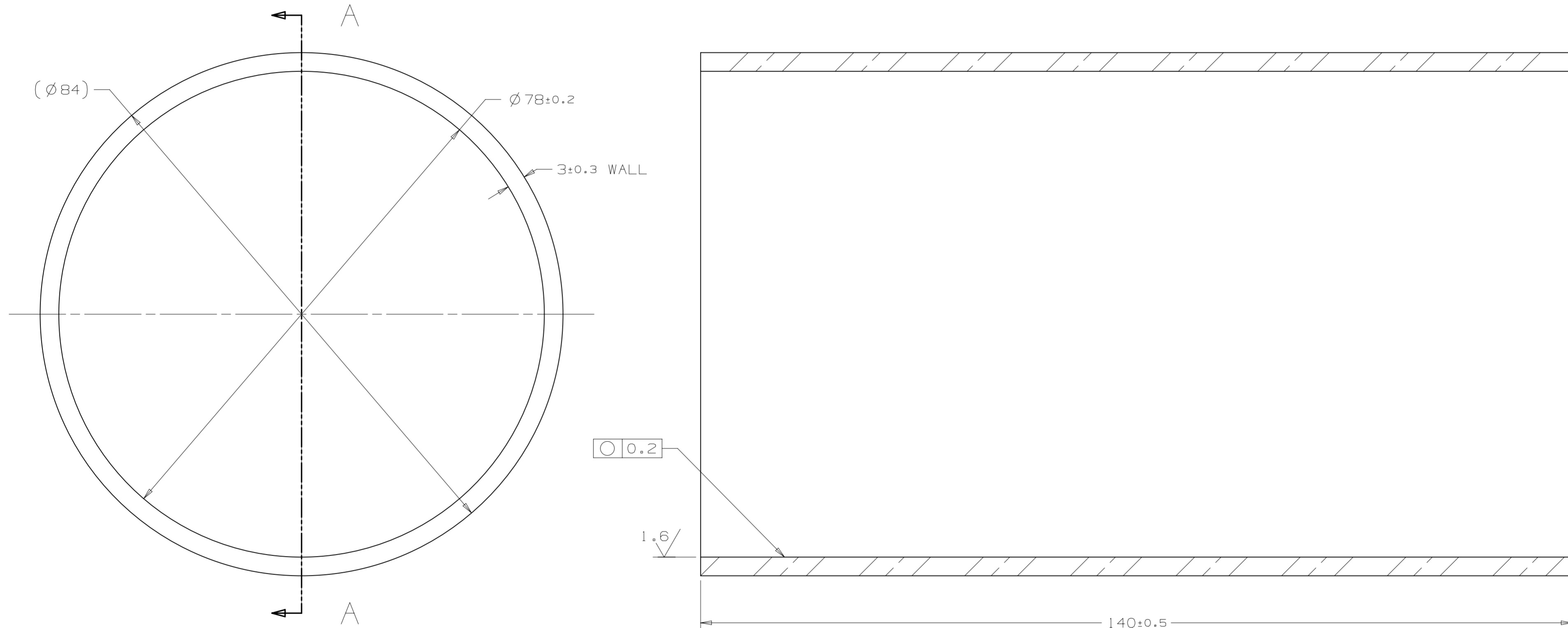


FERMI NATIONAL ACCELERATOR LABORATORY  
 UNITED STATES DEPARTMENT OF ENERGY

NAME  
 TUBE, Nb DN78\_105 - SHORT END TUBE PRODUCTION

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
2:1 AS SHOWN	A2	F10018343	1 OF 1	-

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018344---RCD		DRAWN APPROVED



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.

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	18-Mar-2014
CHECKED	M. SAWTELL	DATE	21-Mar-2014
APPROVED	M. FOLEY	DATE	21-Mar-2014

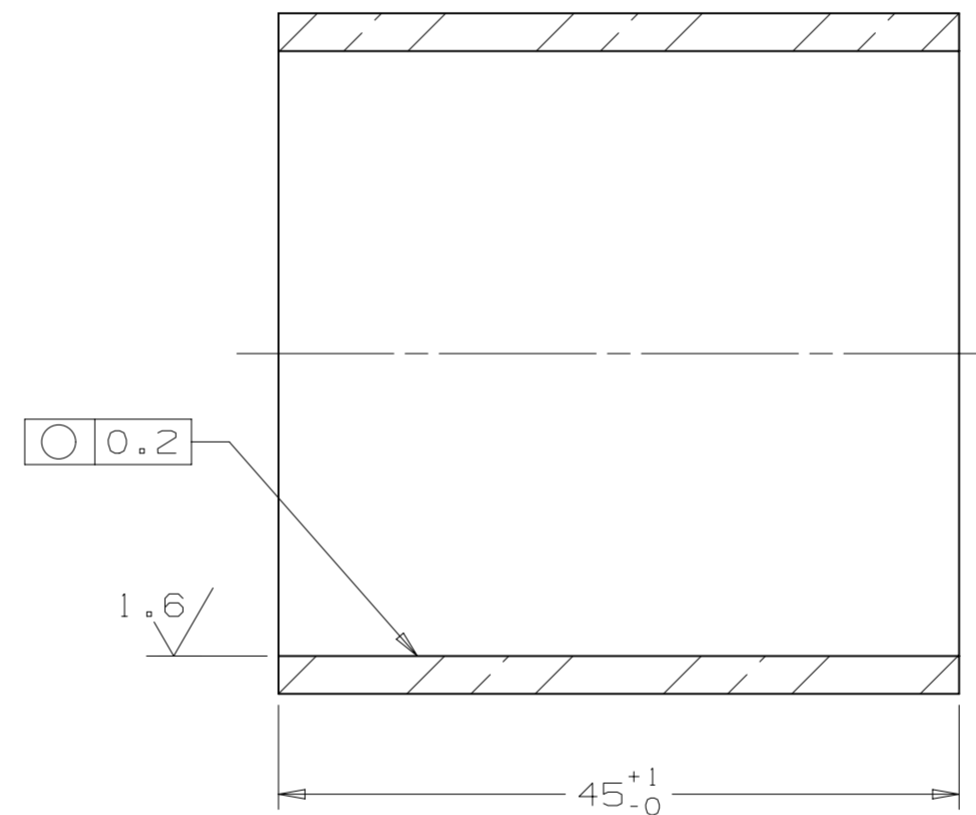
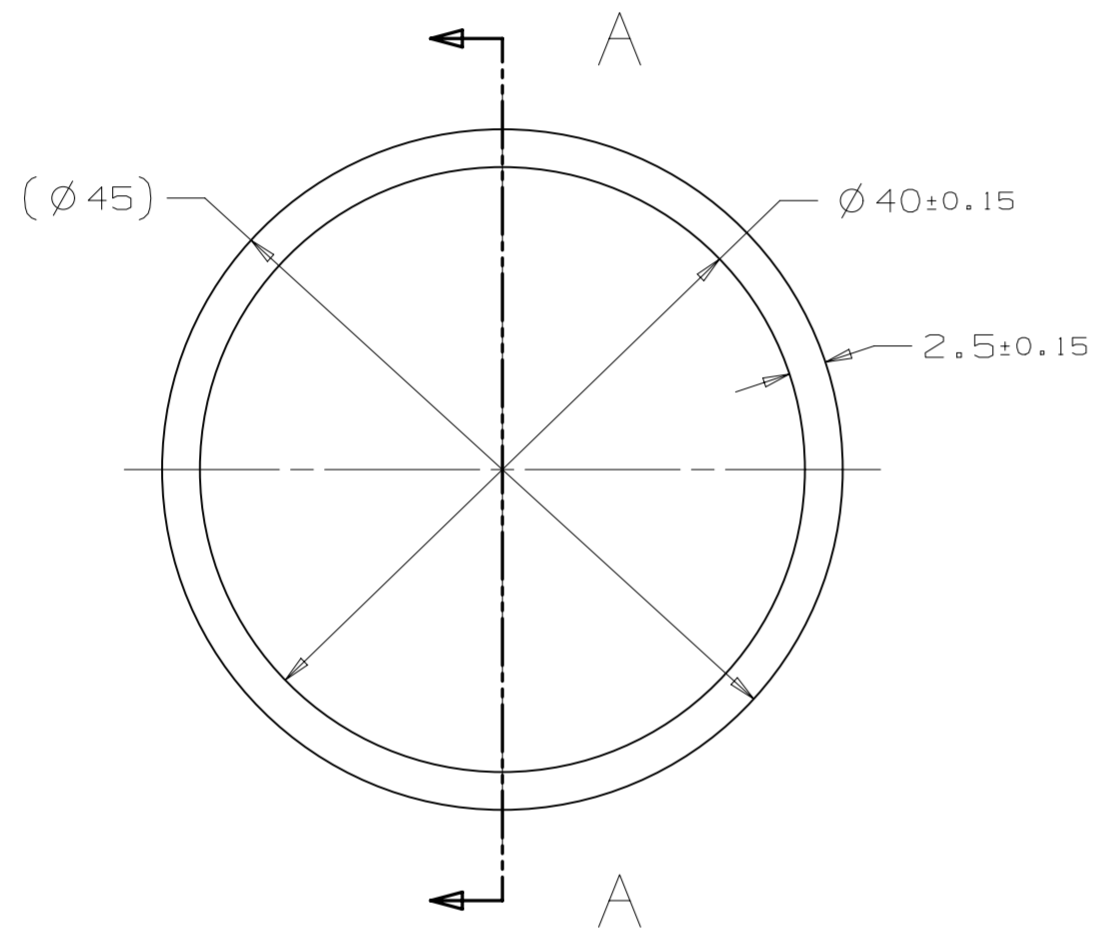
USED ON: \_\_\_\_\_  
 MATERIAL: NIOTIUM, TYPE 5 RRR GRADE, UNS R04220  
 GROUP: Technical Division - Design and Drafting | CAGE CODE: OUSR6

**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY

NAME: TUBE, Nb DN78\_140 - LONG END TUBE PRODUCTION

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
2:1 AS SHOWN	A2	F10018344	1 OF 1	-

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018345---RCD		DRAWN APPROVED



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.

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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			
					MATERIAL: NIObIUM, TYPE 5 RRR GRADE, UNS R04220			
GROUP: Technical Division - Design and Drafting					CAGE CODE: OUES6			



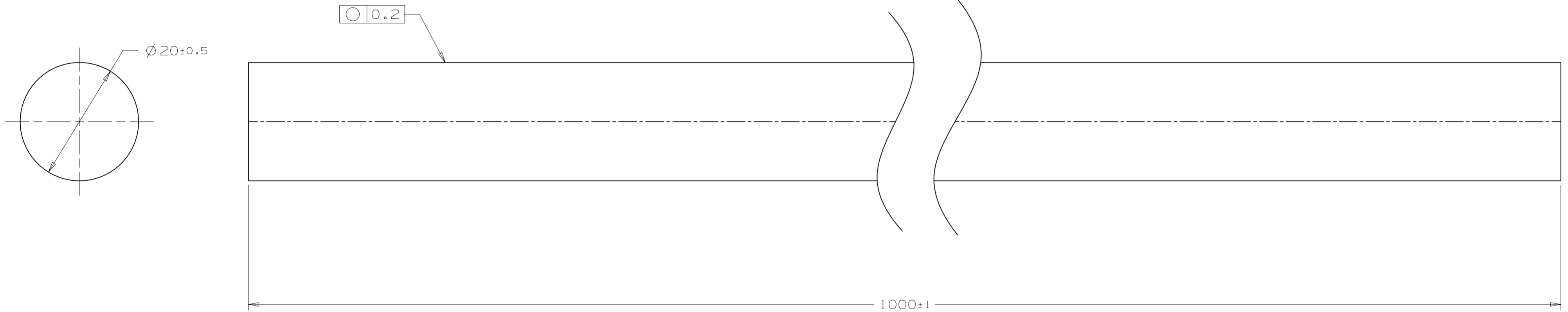
FERMI NATIONAL ACCELERATOR LABORATORY  
 UNITED STATES DEPARTMENT OF ENERGY

NAME  
 TUBE, Nb DN40\_45 - MAIN COUPLER PORT PRODUCTION

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
2:1 AS SHOWN	A2	F10018345	1 OF 1	-

DESCRIPTION: ROD, Nb D20 - NOZZLE HOM/NOZZLE PICK-UP PRODUCTION  
 CATEGORY: ROD PROJECT: LCLS11Crmodule

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018346---RCD		DRAWN APPROVED



NOTES (UNLESS OTHERWISE SPECIFIED):

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

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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			
					MATERIAL: NIObIUM, TYPE 5 RRR GRADE, UNS R04220			
GROUP: Technical Division - Design and Drafting					CAGE CODE: OUSR6			

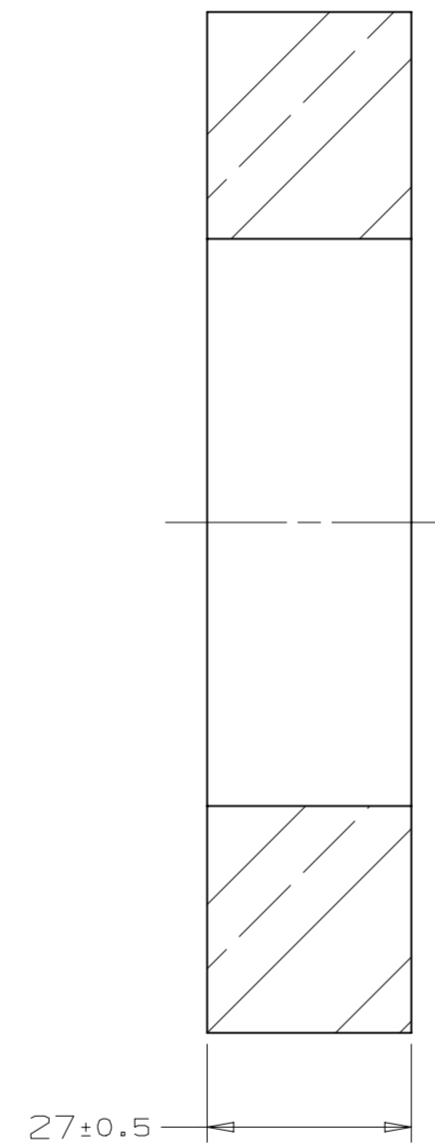
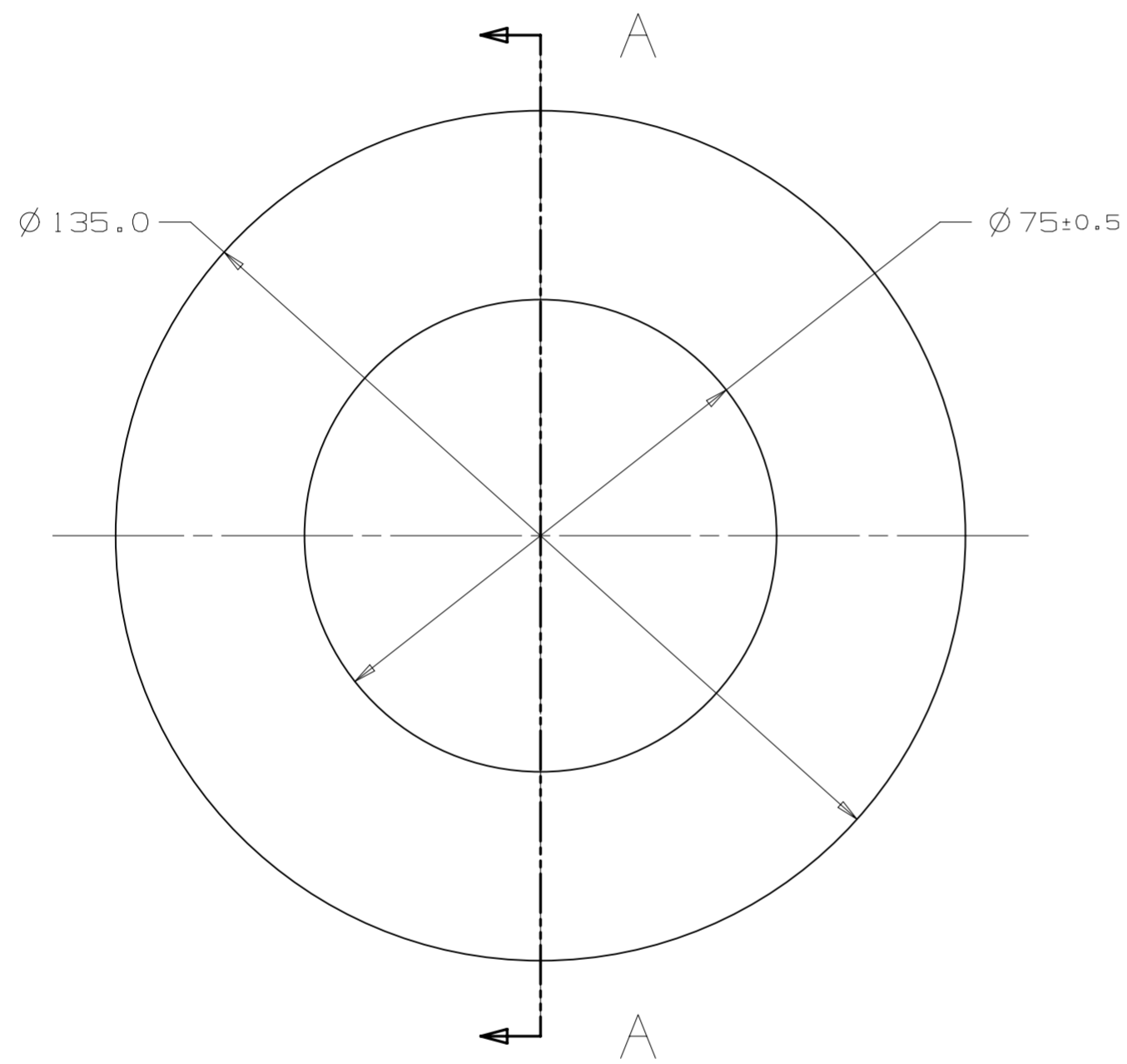
**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY

NAME  
 ROD, Nb D20 - NOZZLE  
 HOM/NOZZLE PICK-UP PRODUCTION

SCALE 2:1 AS SHOWN	SIZE A2	DRAWING NUMBER F10018346	SHEET 1 OF 1	REV -
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REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018351---RCD		DRAWN APPROVED



SECTION A-A

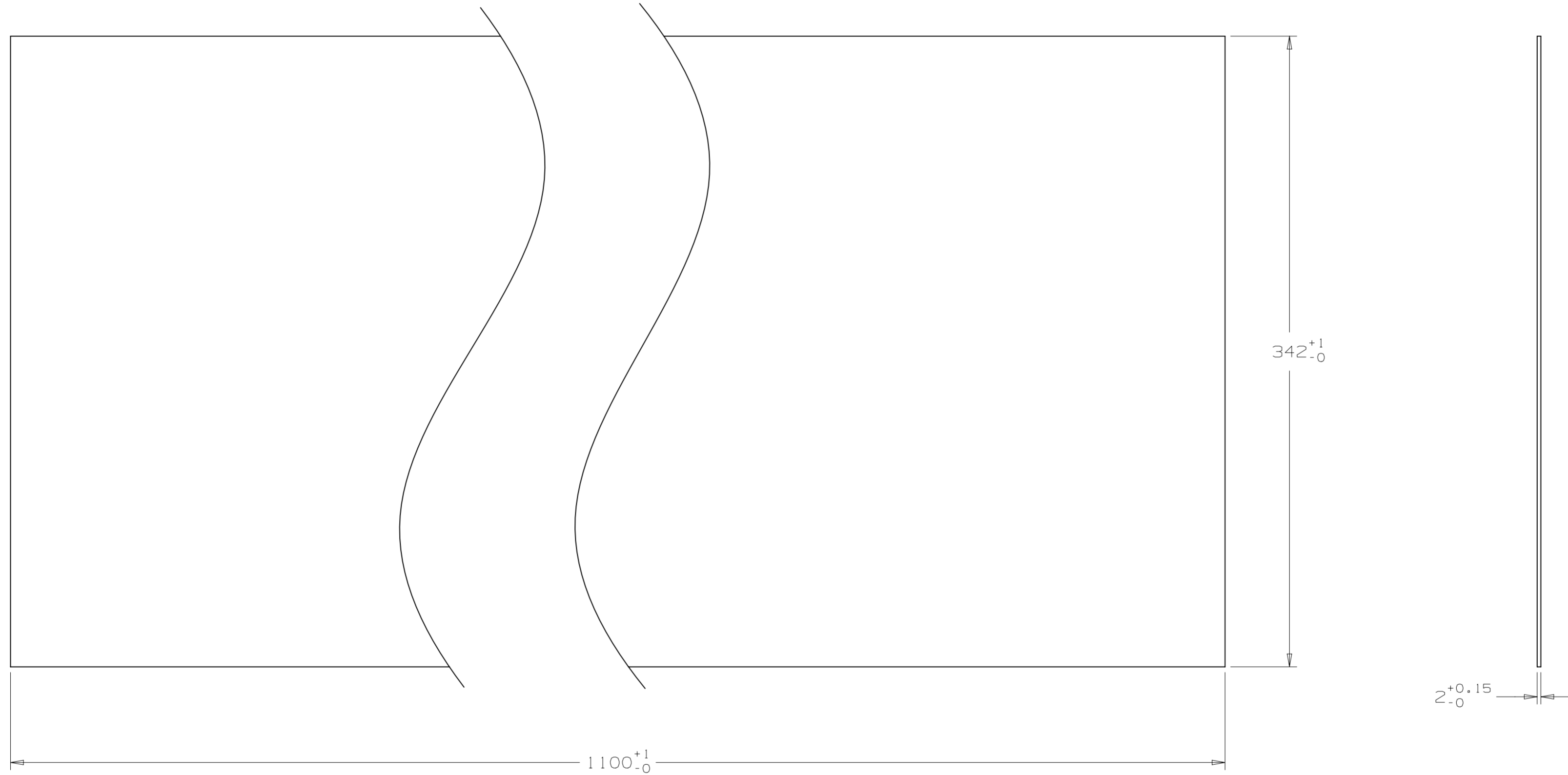
NOTES (UNLESS OTHERWISE SPECIFIED):

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

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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 NITENIUM, TYPE 1 REACTOR GRADE, UNS R04200			
					GROUP: Technical Division - Design and Drafting   CAGE CODE: OUSR6			

FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY			
NAME RING, Nb D135_d75 - CONNECTING FLANGE PRODUCTION			
SCALE	SIZE	DRAWING NUMBER	SHEET
1:1	A2	F10018351	1 OF 1
AS SHOWN			REV
			-

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018352---RCD		DRAWN APPROVED



- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
  - PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.

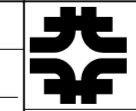
UNLESS OTHERWISE SPECIFIED				
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2	0.3	0.12	N/A	1°

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	18-Mar-2014
CHECKED	M. SAWTELL	DATE	21-Mar-2014
APPROVED	M. FOLEY	DATE	21-Mar-2014

USED ON: NITENIUM, TYPE 1 REACTOR GRADE, UNS R04200

GROUP: Technical Division - Design and Drafting | CAGE CODE: OUSR6

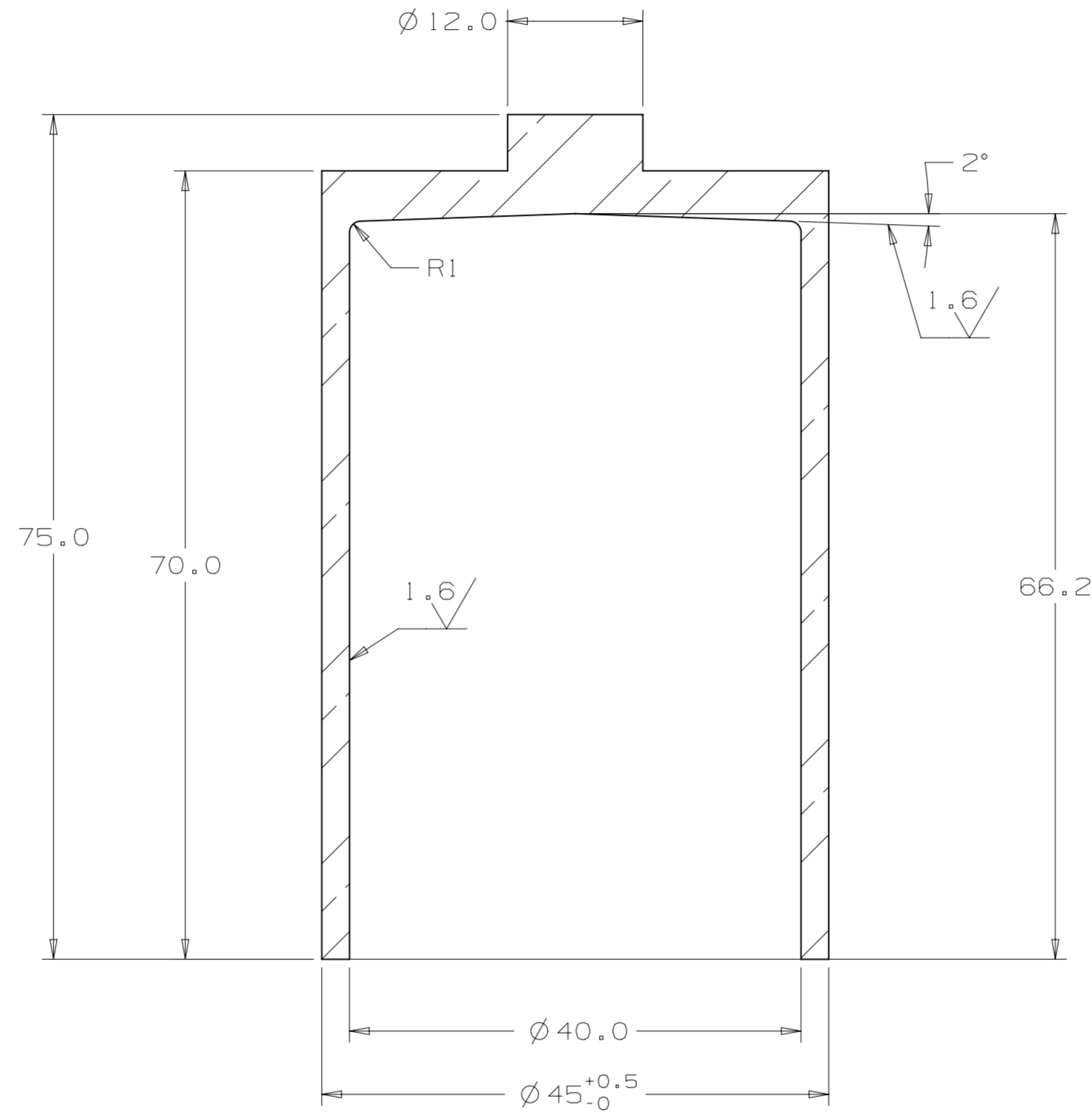
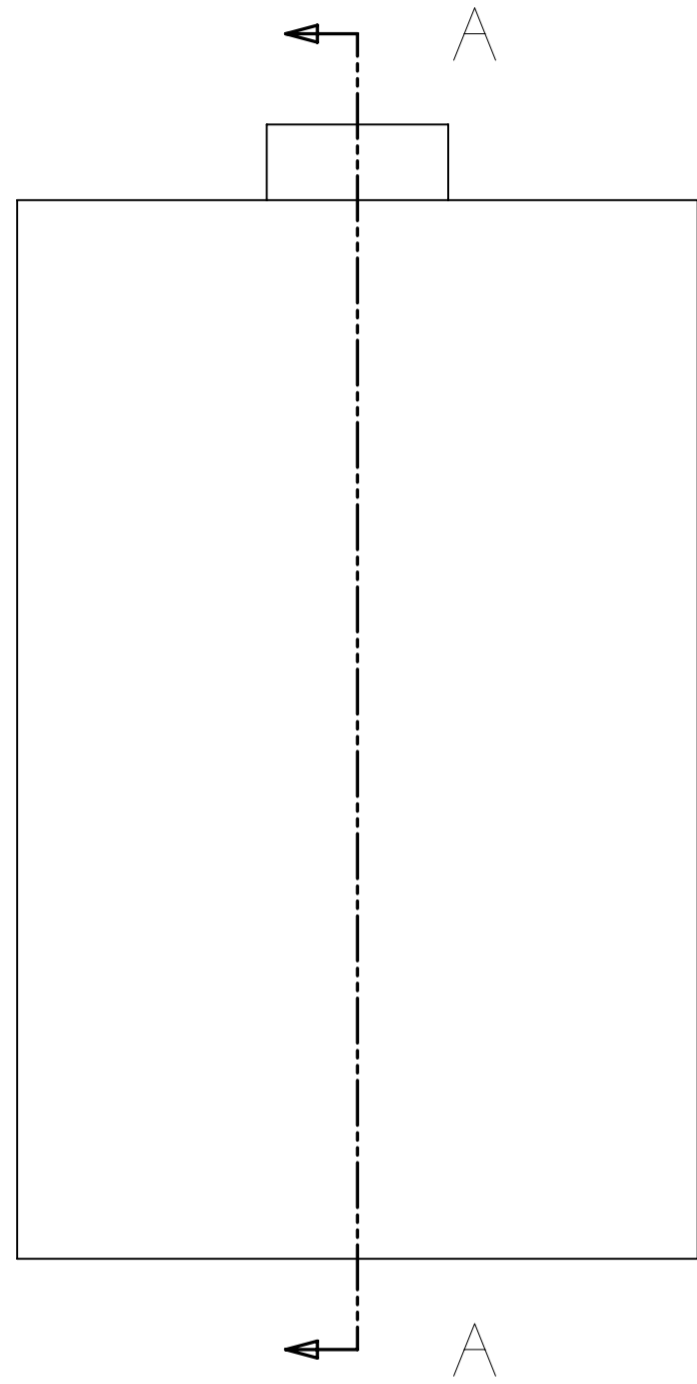


**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY

NAME: SHEET, No 2MM THK - STIFFENING RING PRODUCTION

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
1:2 AS SHOWN	A2	F10018352	1 OF 1	-

REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018353---RCD		DRAWN APPROVED



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.
- TRAILING ZEROS DENOTE TOLERANCE.

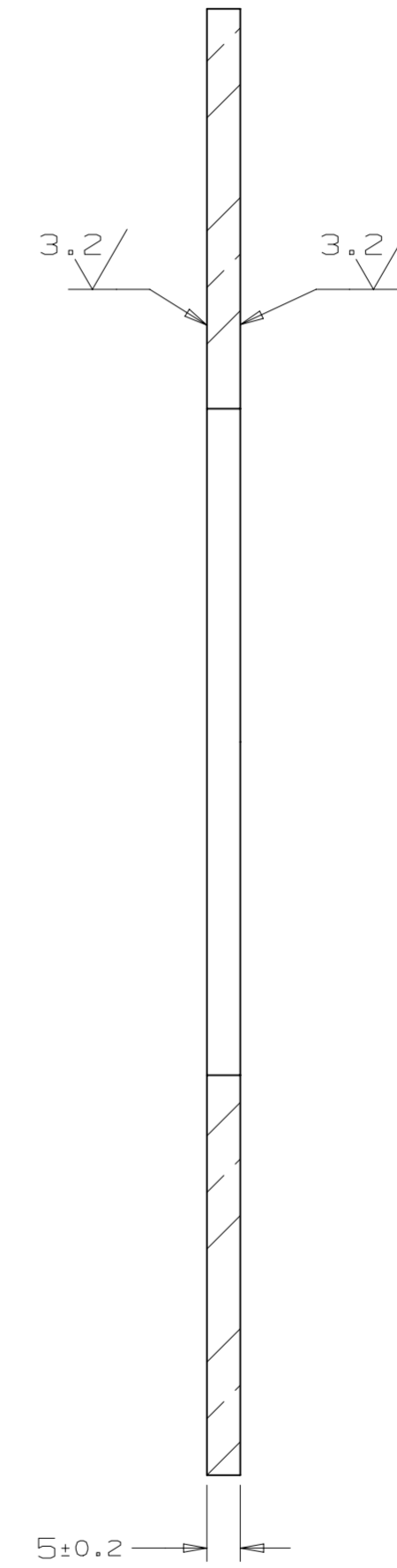
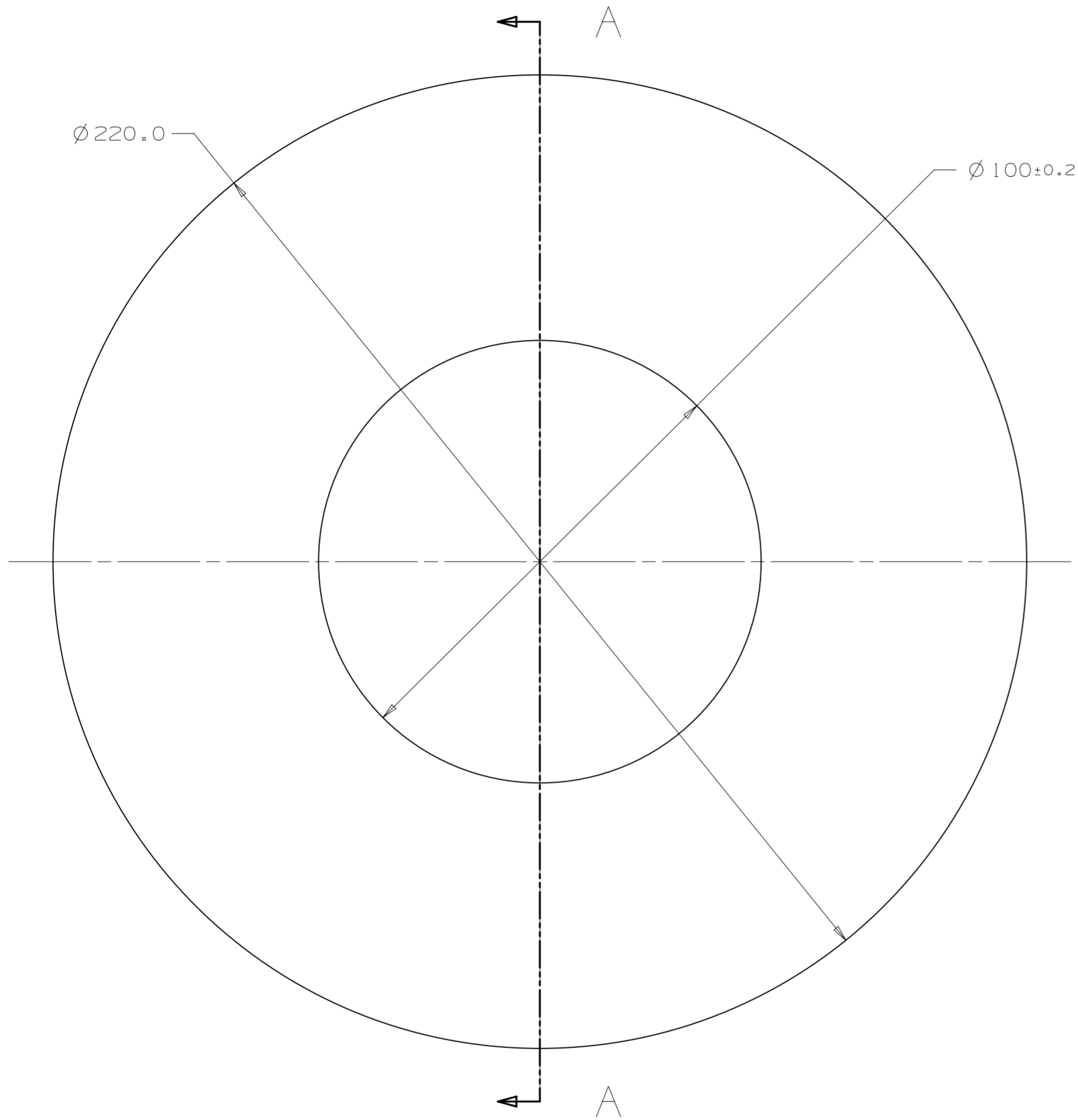
UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-2014
BREAK ALL SHARP EDGES 0.5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM					USED ON MATERIAL: NIOTIUM, TYPE 5 RRR GRADE, UNS R04220			
					GROUP: Technical Division - Design and Drafting   CAGE CODE: OUSR6			

**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY

NAME  
**COUPLER, HOUSING - COUPLER HOUSING PRODUCTION**

SCALE 2:1 AS SHOWN	SIZE A2	DRAWING NUMBER F10018353	SHEET 1 OF 1	REV -
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REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES
-	F10018355---RCD		DRAWN APPROVED



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.
- 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	G. LANGLOIS	DATE	18-Mar-2014
CHECKED	M. SAWTELL	DATE	21-Mar-2014
APPROVED	M. FOLEY	DATE	21-Mar-2014

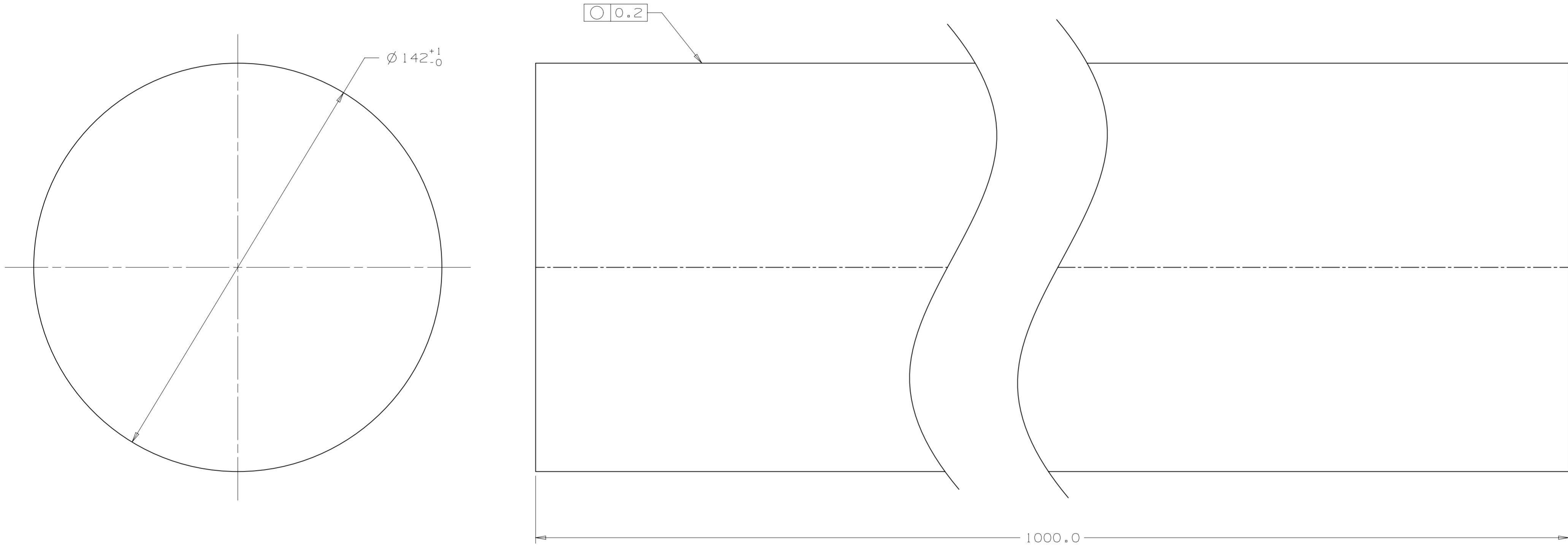
GROUP: Technical Division - Design and Drafting CAGE CODE: OUES6

**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY

NAME  
**NbTi-RING, D220\_d100 - CONICAL DISC PRODUCTION**

SCALE	SIZE	DRAWING NUMBER	SHEET	REV
1:1 AS SHOWN	A2	F10018355	1 OF 1	-

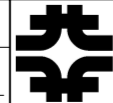
REV	REVISION CONTROL DOCUMENT	DATES	SIGNATURES	
-	F10018358---RCD		DRAWN	
			APPROVED	



NOTES (UNLESS OTHERWISE SPECIFIED):

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

UNLESS OTHERWISE SPECIFIED					DRAWN	G. LANGLOIS	DATE	18-Mar-2014
±X	±X.X	±X.XX	±X/X	±X°	CHECKED	M. SAWTELL	DATE	21-Mar-2014
2	0.3	0.12	N/A	1°	APPROVED	M. FOLEY	DATE	21-Mar-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 MATERIAL: NIObIUM 55 TITANIUM ALLOY ASTM B-265 GROUP: Technical Division - Design and Drafting   CAGE CODE: OUSR6			

 FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY				NAME	
				NbTi-ROD, D142 - FLANGE PRODUCTION	
SCALE	SIZE	DRAWING NUMBER	SHEET	REV	
1:1 AS SHOWN	A2	F10018358	1 OF 1	-	