

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-------------------|
| - | F10010054---RCD | | DRAWN APPROVED |



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.
- DIMENSIONS IN [.XX] IS 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 .5 MAX.
 DO NOT SCALE DRAWING
 DIMENSIONS BASED ON ASME Y14.5M-1994
 MAX. ALL MACH SURFACES 3.2
 DRAWING UNITS: MM

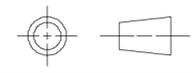
| | | | |
|----------|-------------|------|-------------|
| DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

USED ON
 F10026618

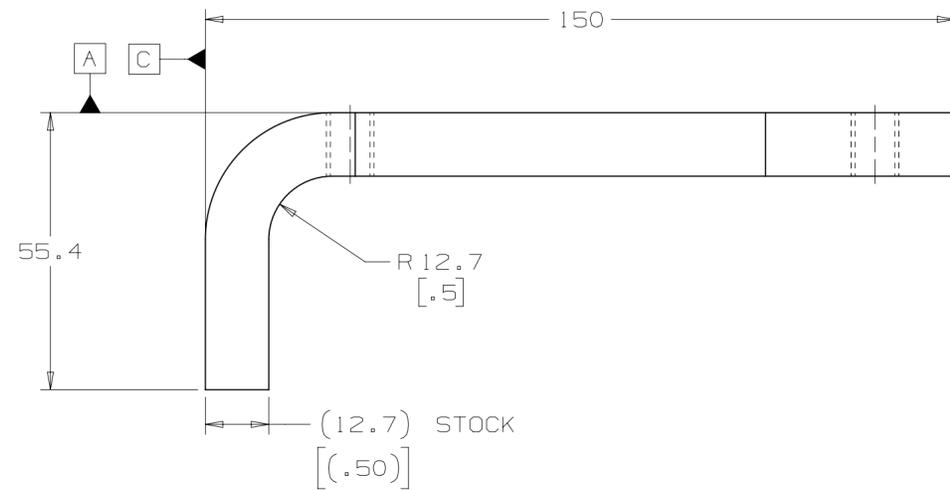
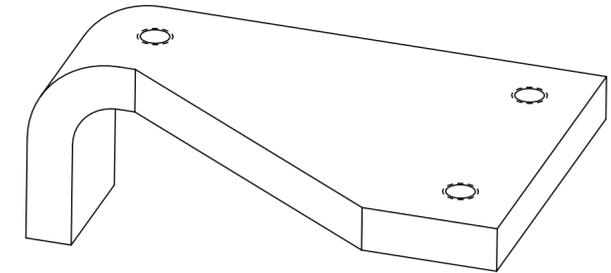
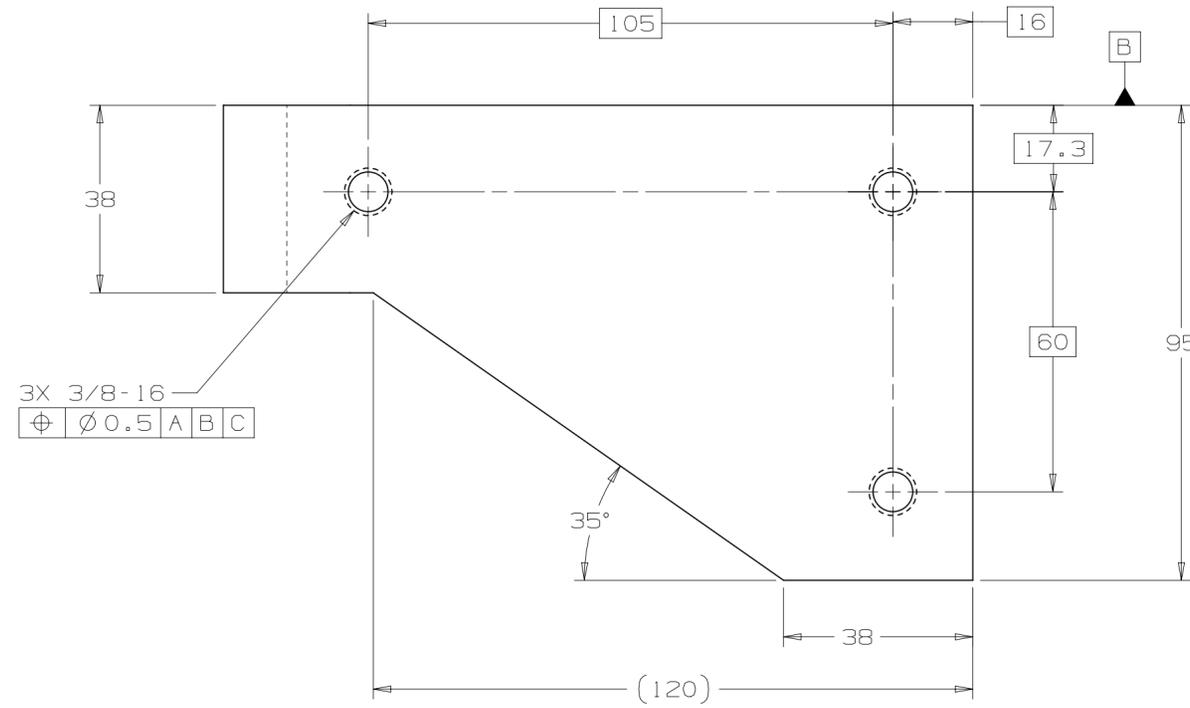
MATERIAL: 304 STAINLESS STEEL, UNS S30400

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

| | | | | |
|--------------|------------|---|-----------------|----------|
| | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | |
| | | NAME PIPE, CONTROL VALVE, SNOUT FEED | | |
| SCALE 1:1 | SIZE A2 | DRAWING NUMBER F10010054 | SHEET 1 OF 1 | REV - |



| REV | REVISION CONTROL DOCUMENT | DATES | | SIGNATURES | |
|-----|---------------------------|-------------|----------|-------------|--|
| A | F10010335-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS | |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV | |



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.
- DIMENSIONS IN (.XX) ARE IN INCHES.

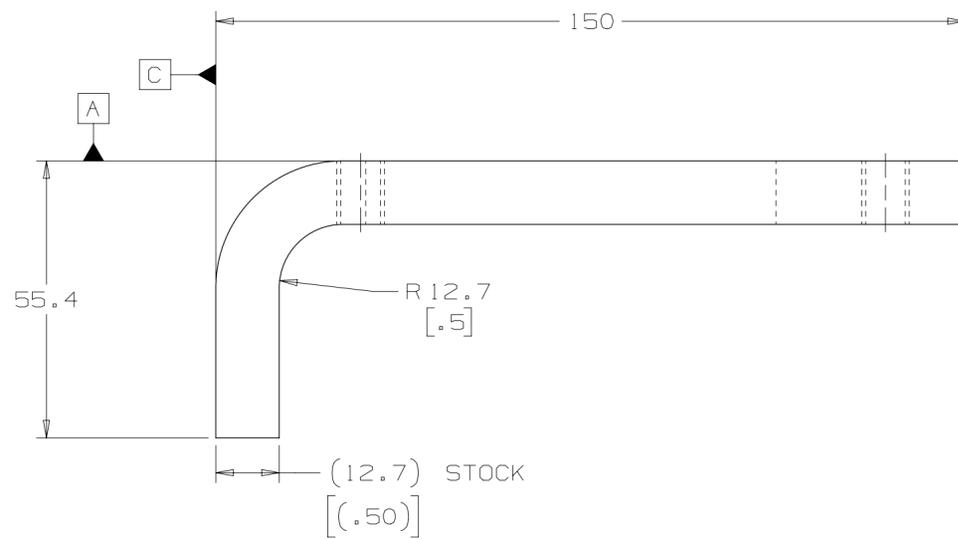
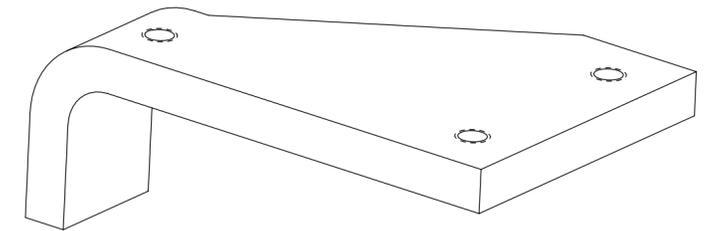
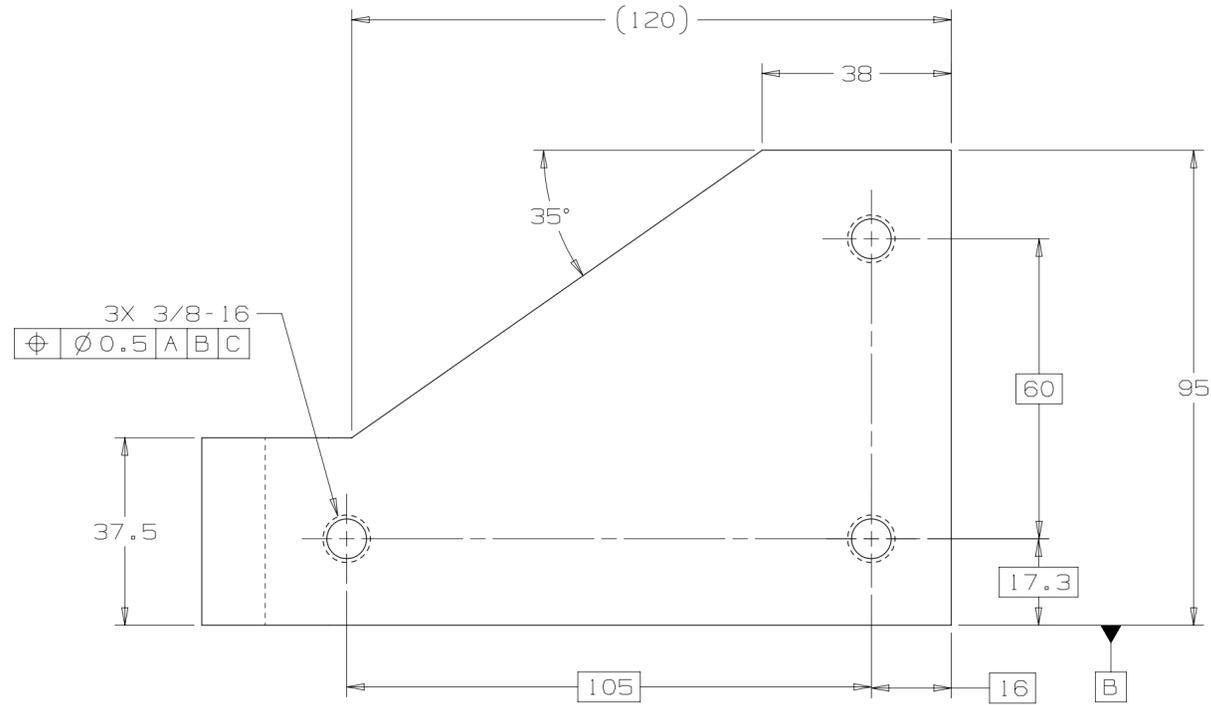
| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | |
| GROUP: Technical Division - Design and Drafting | | | | | CAGE CODE: OUSR6 | | | |



FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

| | | | | | | | | |
|--------------------|--|--|--|--------------|------------|-----------------------------|-----------------|----------|
| NAME SUPPORT LH | | | | SCALE 1:1 | SIZE A2 | DRAWING NUMBER F10010335 | SHEET 1 OF 1 | REV A |
|--------------------|--|--|--|--------------|------------|-----------------------------|-----------------|----------|

| REV | REVISION CONTROL DOCUMENT | DATES | | SIGNATURES | |
|-----|---------------------------|-------------|----------|-------------|--|
| A | F10017456-A-RCD | 26-Feb-2015 | DRAWN | G. LANGLOIS | |
| | | 26-Feb-2015 | APPROVED | Y. ORLOV | |



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.
- DIMENSIONS IN (.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 .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 | 02-Jul-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

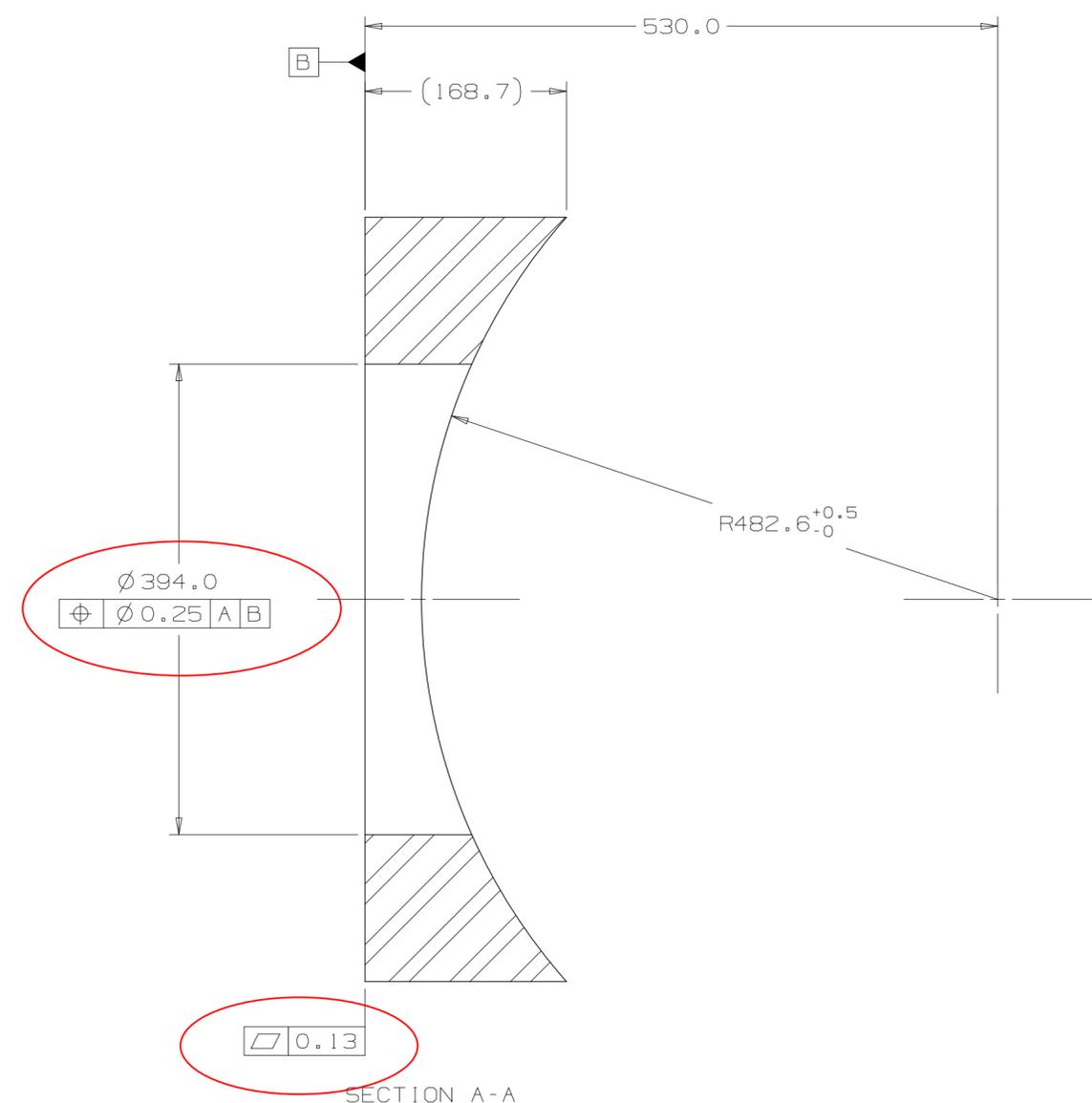
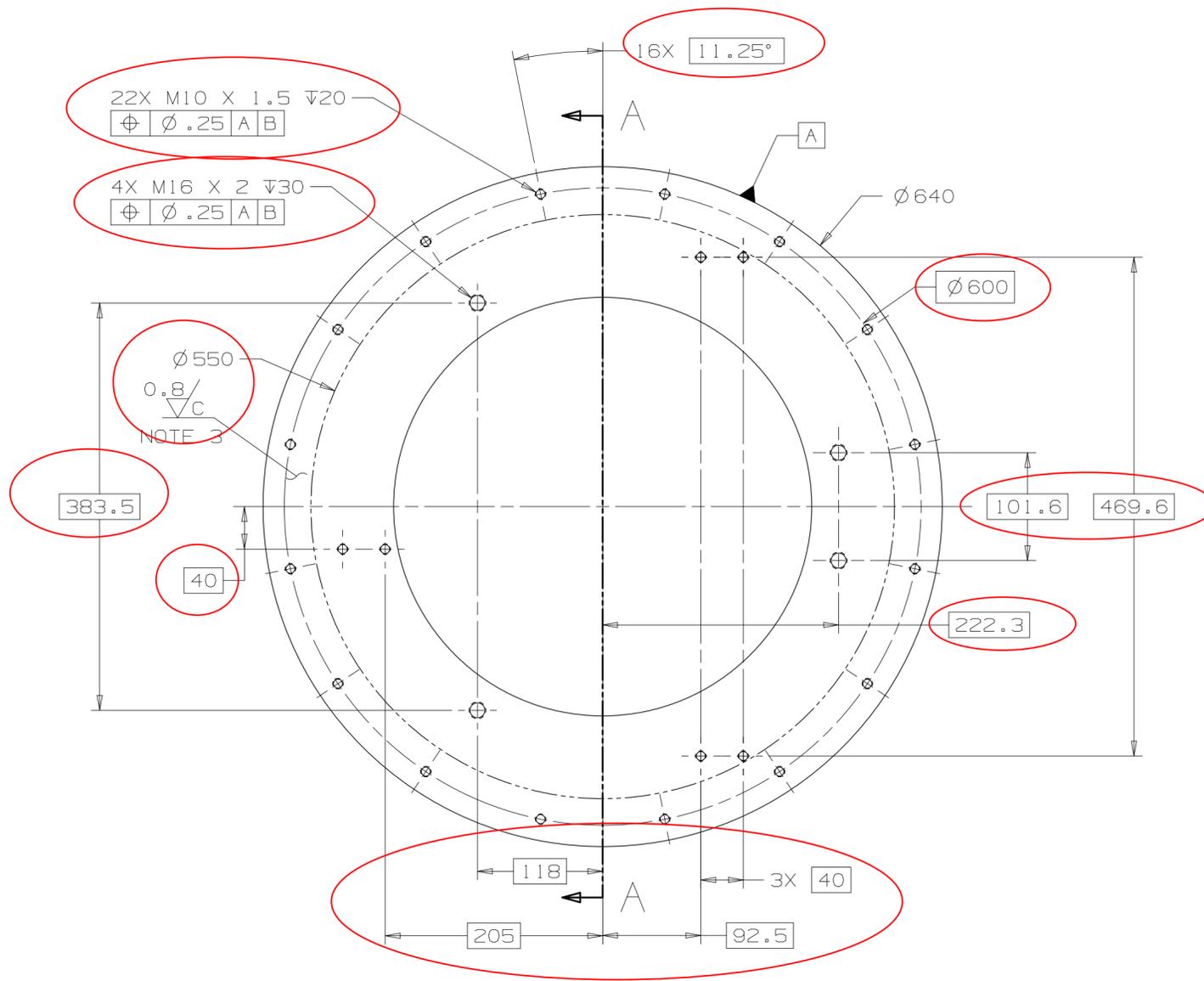
USED ON
 F10026610

MATERIAL
 316L STAINLESS STEEL, UNS S31603

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

| | | | | | |
|--------------|------------|---|-----------------|----------|--|
| | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| | | NAME SUPPORT RH | | | |
| SCALE 1:1 | SIZE A2 | DRAWING NUMBER F10017456 | SHEET 1 OF 1 | REV A | |

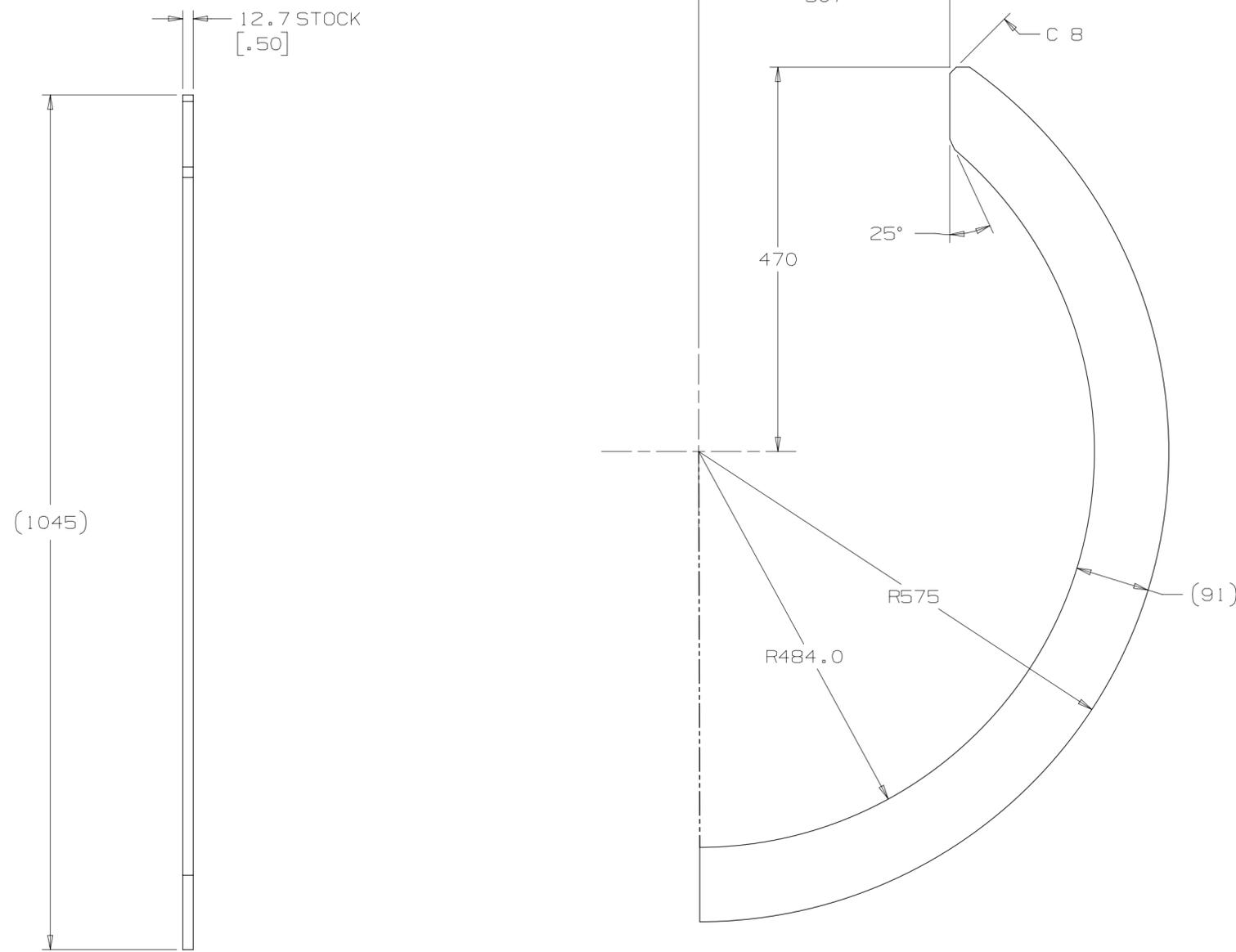
| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-------------------|
| - | F10018068---RCD | | DRAWN APPROVED |



- 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.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICK WITH NO RADIAL SCORING.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | DATE | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
|--|------|-------|------|-----|---|-------------|---|--|---|--|--|--|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | G. LANGLOIS | 07-Jul-2014 | NAME: PORT MIDDLE SCALE: 0.25:1 AS SHOWN SIZE: A2 DRAWING NUMBER: F10018068 SHEET: 1 OF 1 REV: - | | | | | |
| 2 | 0.3 | 0.12 | N/A | 1° | M. KRAMP | 30-Dec-2014 | | | | | | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | Y. ORLOV | 02-Jan-2015 | | | | | | |
| USED ON: F10026610 | | | | | MATERIAL: 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | GROUP: Technical Division - Design and Drafting CAGE CODE: QUES6 | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | | SIGNATURES | |
|-----|---------------------------|-------------|----------|-------------|--|
| A | F10018071-A-RCD | 26-Feb-2015 | DRAWN | G. LANGLOIS | |
| | | 26-Feb-2015 | APPROVED | Y. ORLOV | |



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. DIMENSIONS IN [.XX] ARE IN INCHES.

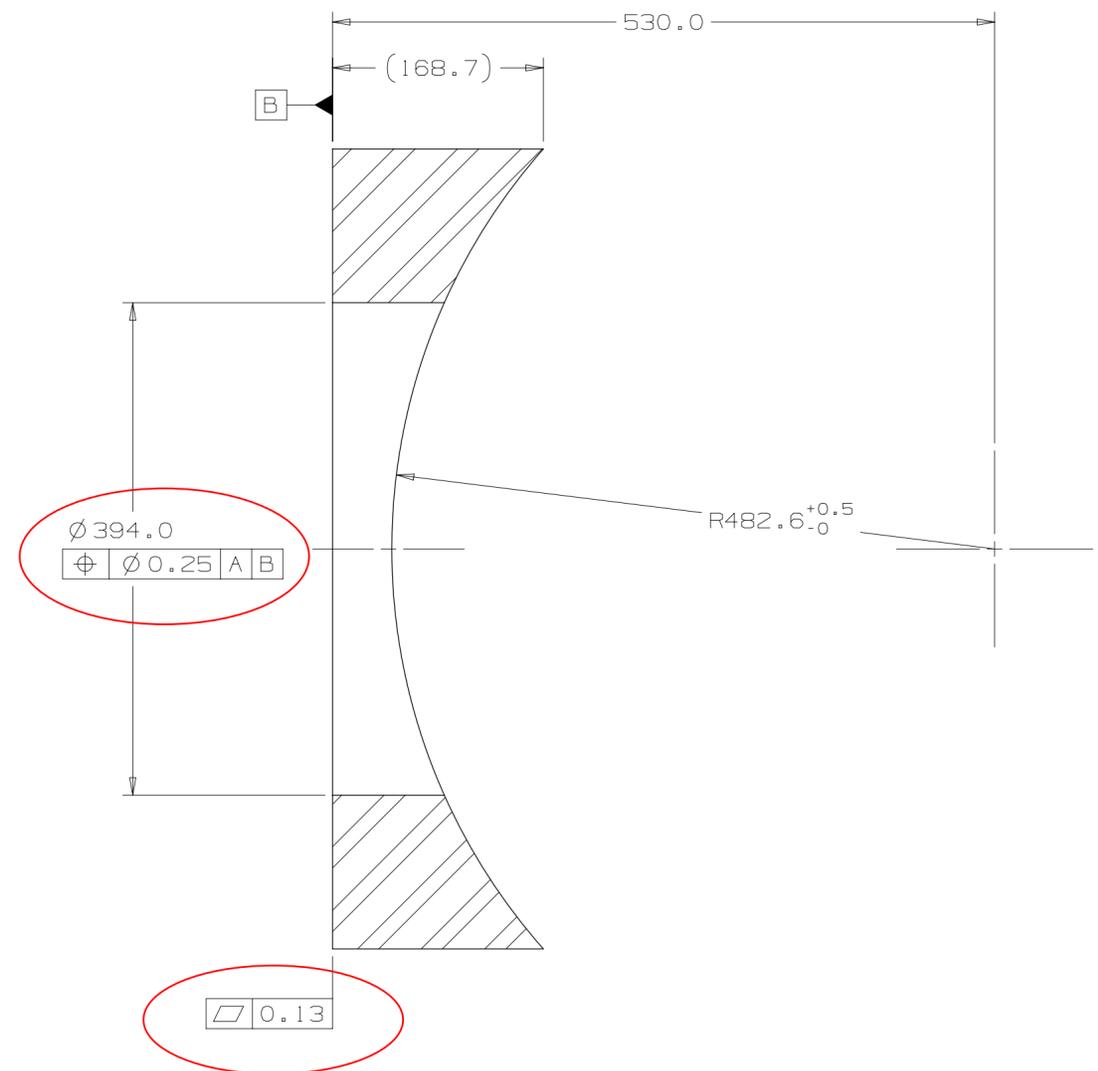
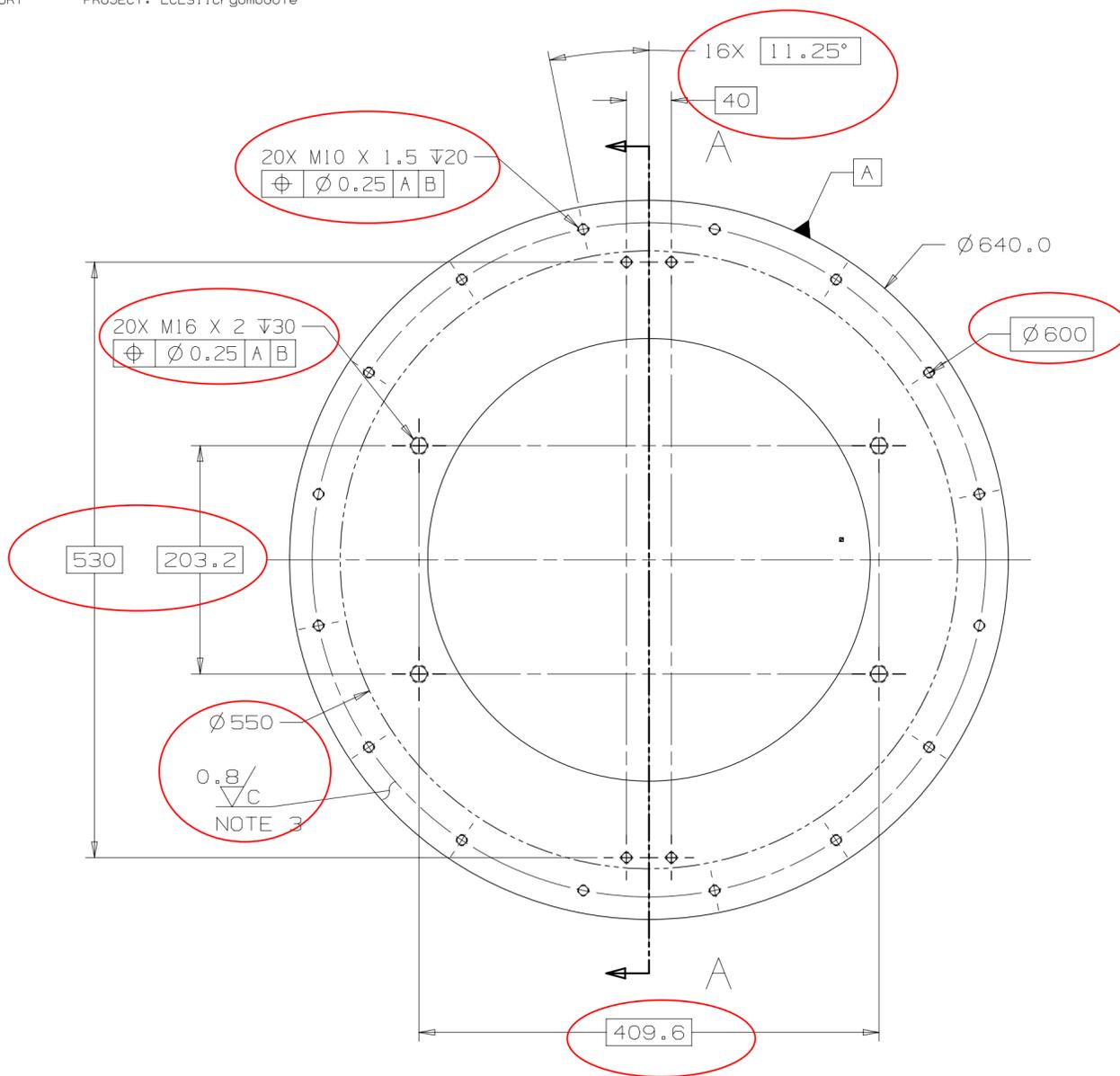
| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | |
| | | | | | GROUP: Technical Division - Design and Drafting CAGE CODE: OUSR6 | | | |



FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

| | | | | | | | | | |
|-------|------|----------------|--|--------|-----------------|--|--|--|--|
| NAME | | | | | RING STIFFENING | | | | |
| SCALE | SIZE | DRAWING NUMBER | | SHEET | REV | | | | |
| 1:5 | A2 | F10018071 | | 1 OF 1 | A | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-------------------|
| - | F10018083---RCD | | DRAWN APPROVED |

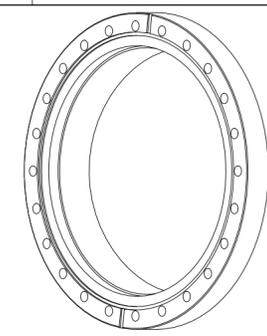
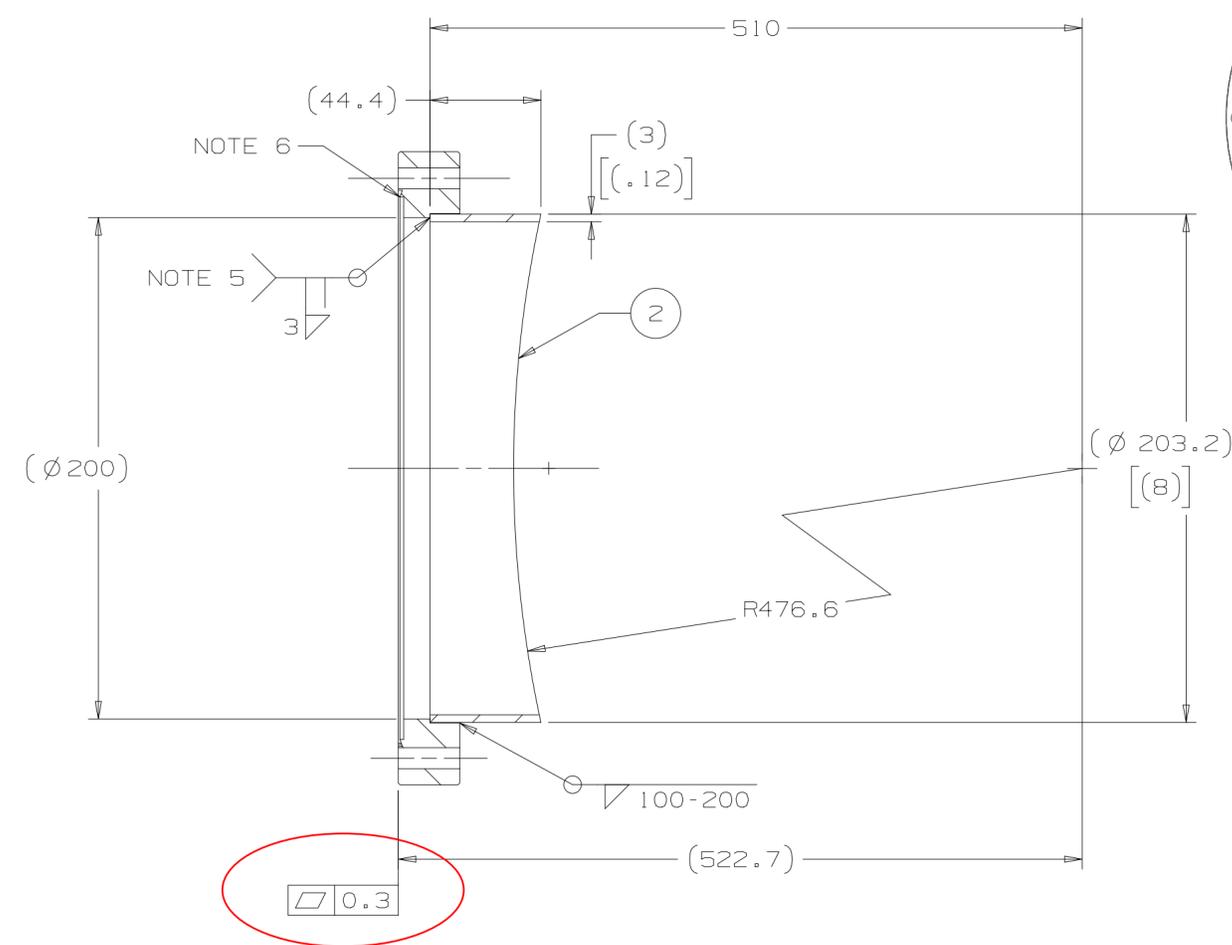
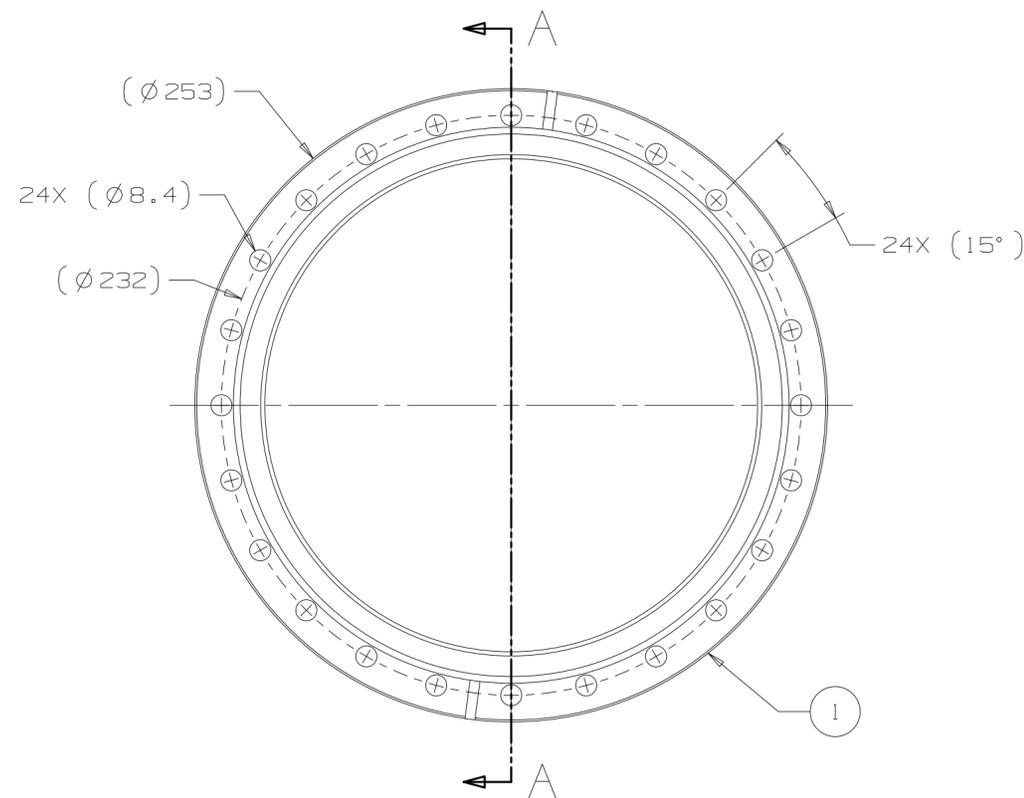


SECTION A-A

- 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.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICK WITH NO RADIAL SCORING.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 07-Jul-2014 | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
|--|------|-------|------|-----|--|-------------|------|-------------|---|------------|-----------------------------|-----------------|----------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 30-Dec-2014 | | | | | |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | | | | | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | | NAME PORT END | | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | | | SCALE 1:1 | SIZE A2 | DRAWING NUMBER F10018083 | SHEET 1 OF 1 | REV - |
| GROUP: Technical Division - Design and Drafting | | | | | CAGE CODE: OUSR6 | | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|----------------------------|--|
| B | F10020935-B-RCD | 01-Dec-2015 08-Sep-2015 | DRAWN: B.DAMPHOUSSE APPROVED: Y.ORLOV |



SECTION A-A

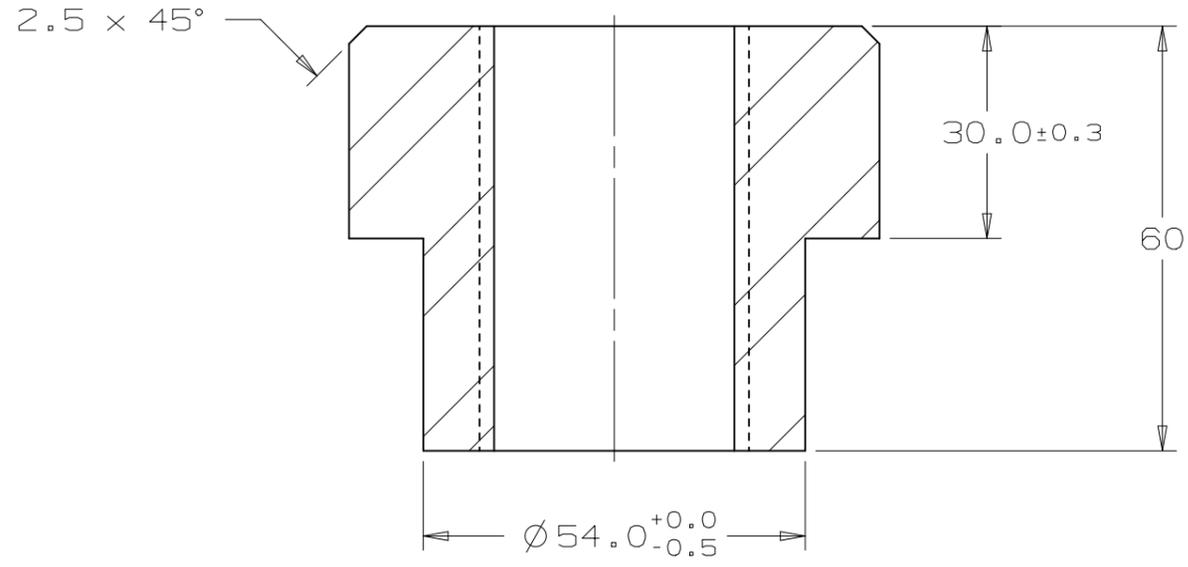
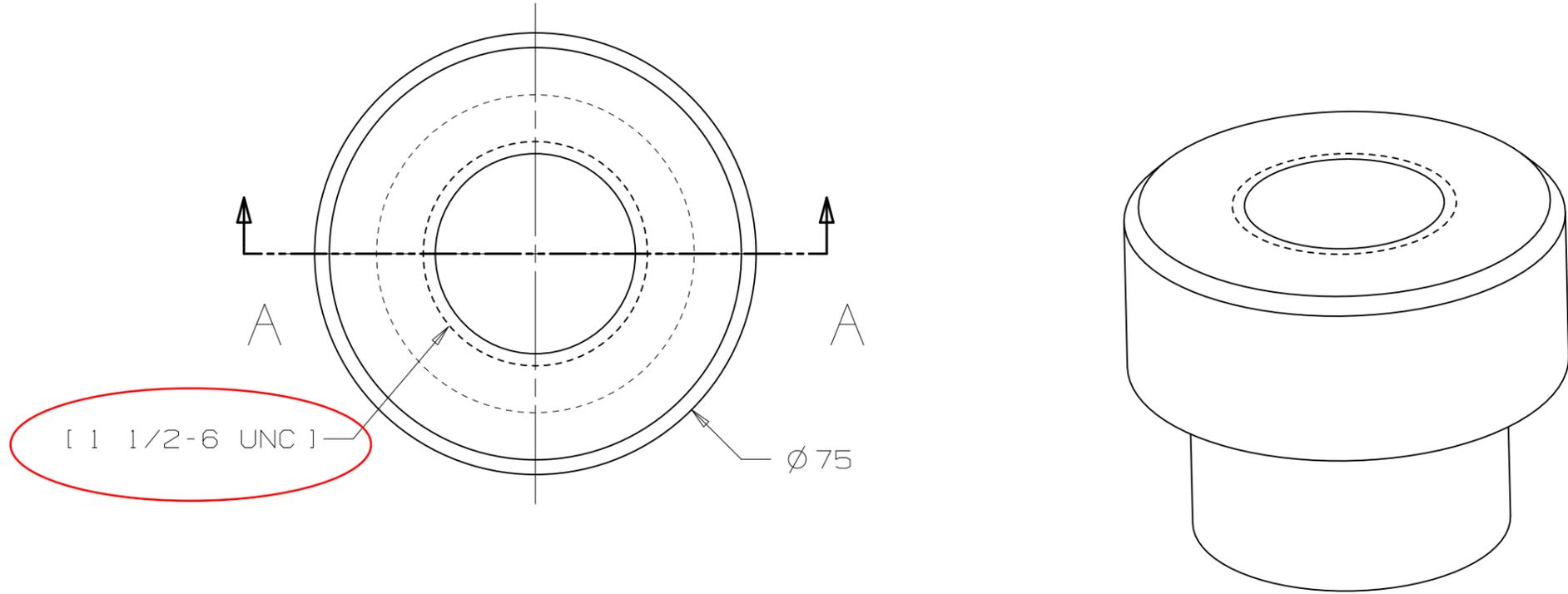
- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - ALL DIMENSIONS ARE IN MILLIMETERS:
DIMENSIONS IN [.XX] ARE IN INCHES.
 - ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
 - ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
 - ALL WELDS TO BE VACUUM LEAK TIGHT.
LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10^{-9} ATM. CC/SEC.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.



| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | DATE | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | |
|---|------|-------|------|-----|---|-------------|------------------------|---|---|-----|--|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | G. LANGLOIS | 09-Jul-2014 | NAME: WELDMENT CL PORT | | | | |
| 2 | 0.3 | 0.12 | N/A | 1* | M. KRAMP | 30-Dec-2014 | | | | | |
| BROKE 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 | | | | | Y. ORLOV | 02-Jan-2015 | | | | | |
| | | | | | USED ON | | SCALE | | | REV | |
| | | | | | F10026610 | | A2 | B | | | |
| MATERIAL | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: Q05R6 | | DRAWING NUMBER: F10020935 | | |
| SEE PARTS LIST | | | | | SHEET | | REV | | 1 OF 1 B | | |

DESCRIPTION: BUSHING HOIST RING
 CATEGORY: BUSHING PROJECT: LCLS11Cryomodule

| REV | REVISION CONTROL DOCUMENT | DATES | | SIGNATURES | |
|-----|---------------------------|-------------|----------|-------------|--|
| A | F10023623-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS | |
| | | 25-Feb-2015 | APPROVED | ORLOV | |



SECTION A-A

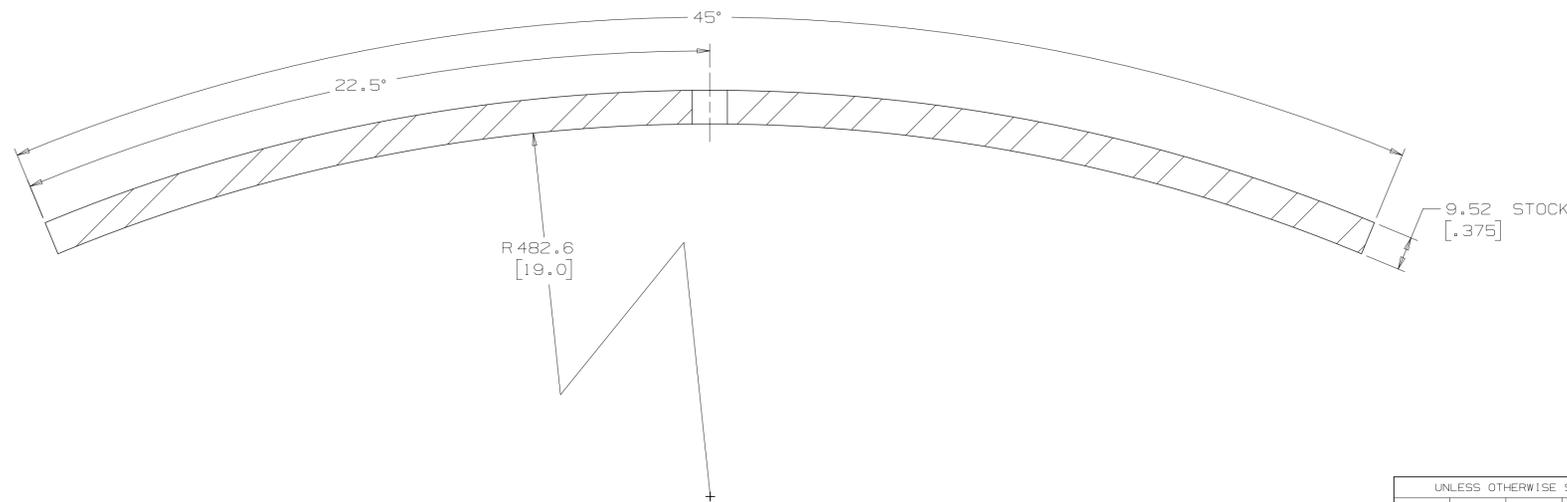
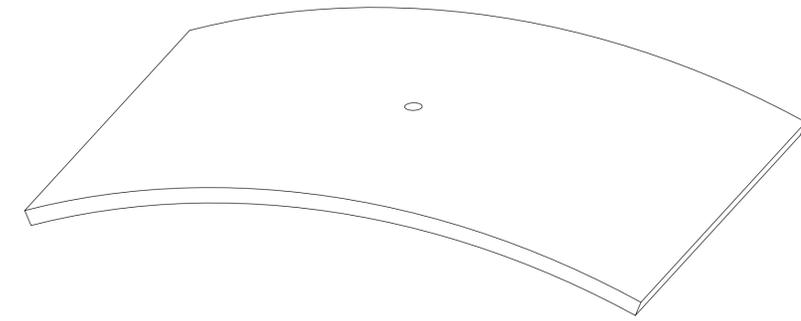
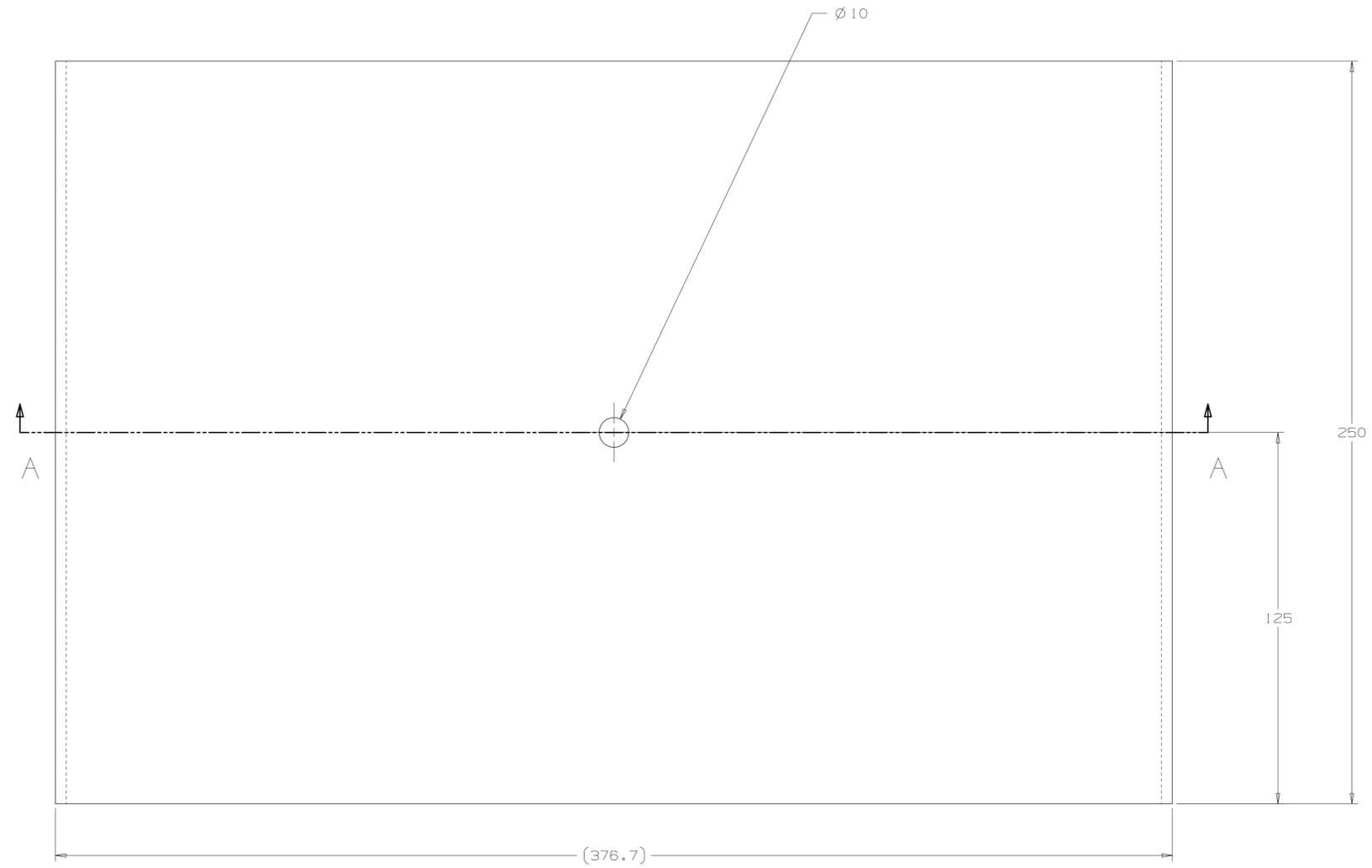
NOTES (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS.
- TRAILING ZERO INDICATES TOLERANCE.
- DIMENSIONS WITH (X.XX) ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 17-Jun-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON | | | |
| | | | | | F10023631 | | | |
| | | | | | MATERIAL | | | |
| | | | | | 316L STAINLESS STEEL, UNS S31603 | | | |
| | | | | | GROUP: Technical Division - Design and Drafting CAGE CODE: 0U5R6 | | | |

| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
|---|------|----------------|--------|-----|
| NAME | | | | |
| BUSHING HOIST RING | | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:1 | A3 | F10023623 | 1 OF 1 | A |

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|-------|----------|------------|
| - | F10023625---RCD | -- | --- | -- |
| | | | APPROVED | -- |



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.
- DIMENSIONS IN [.XX] ARE IN INCHES.

SECTION A-A

| UNLESS OTHERWISE SPECIFIED | | | | |
|--|------|-------|------|-----|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* |
| 2 | 0.3 | 0.12 | N/A | 1* |
| BREAK ALL SHARP EDGES .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 | 17-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10023631 | | |
| MATERIAL | 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | |
| GROUP: | Technical Division - Design and Drafting | | |
| CAGE CODE: | QUS96 | | |

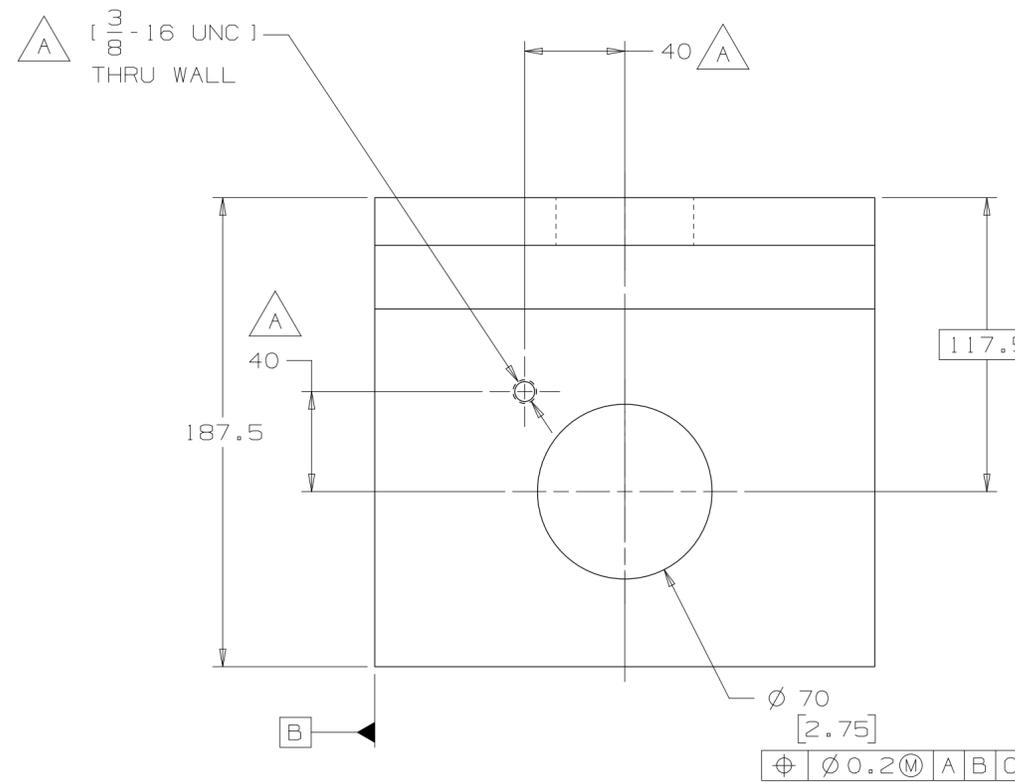
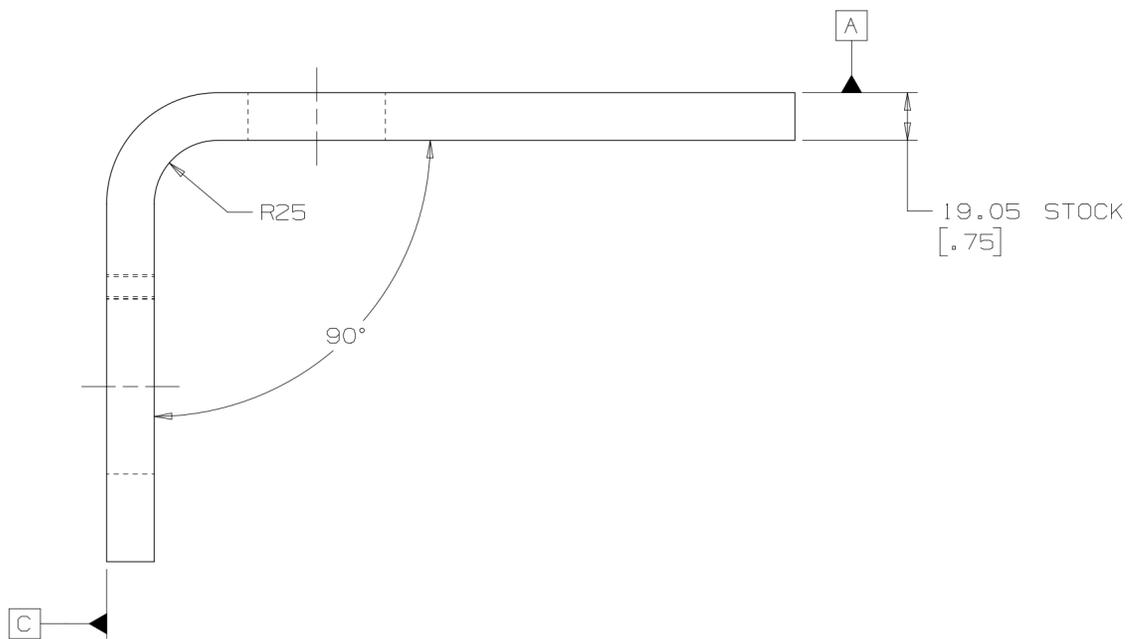
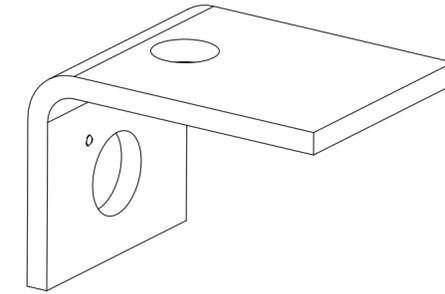
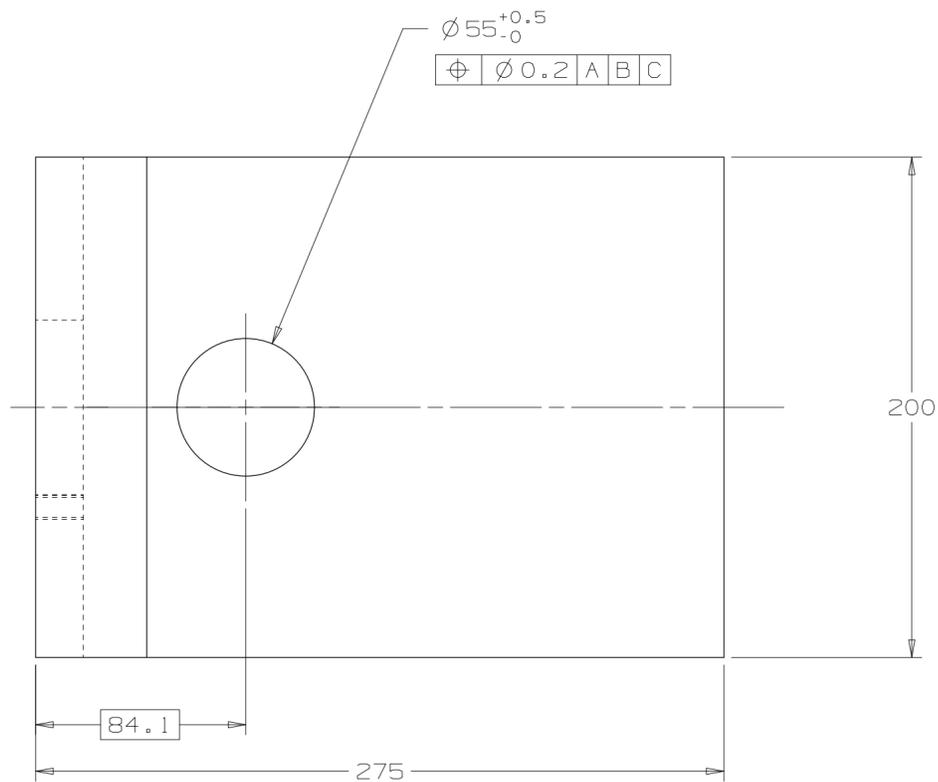


FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

PICKUP PAD

| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
|-------|------|----------------|--------|-----|
| 1:1 | A1 | F10023625 | 1 OF 1 | - |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-----------------------|
| A | F10023628-A-RCD | - | DRAWN - APPROVED - |



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.
- DIMENSIONS IN (.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 .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 | 17-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

USED ON
 F10023631

MATERIAL
 316L STAINLESS STEEL, ANNEALED, UNS S31603

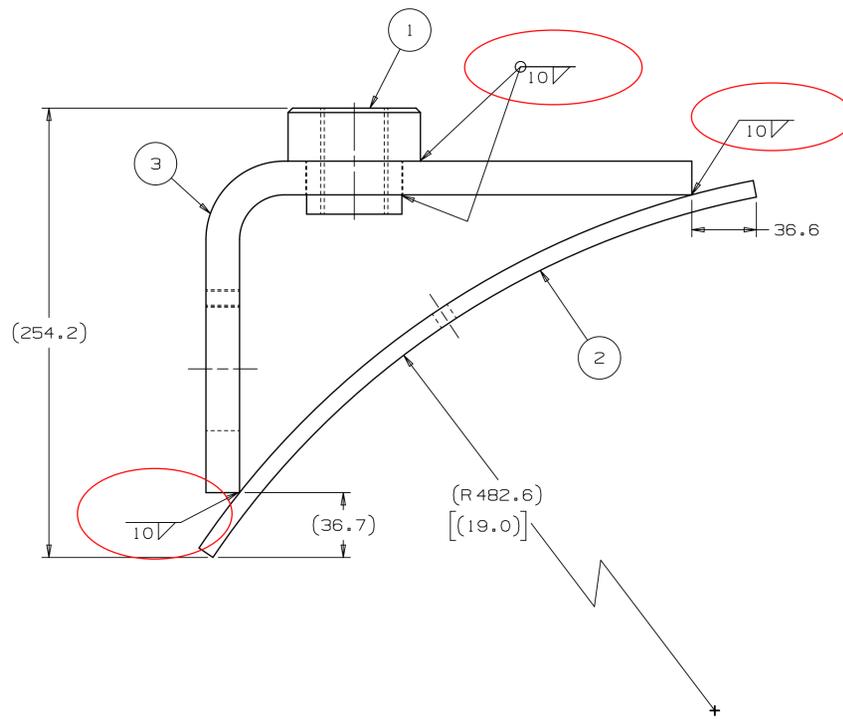
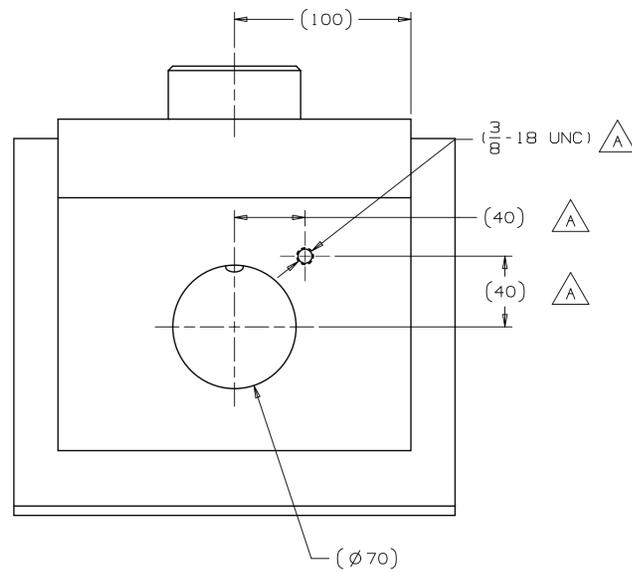
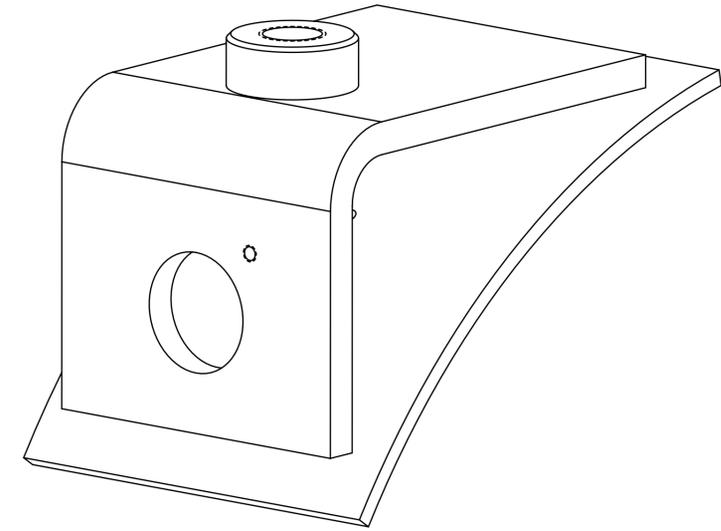
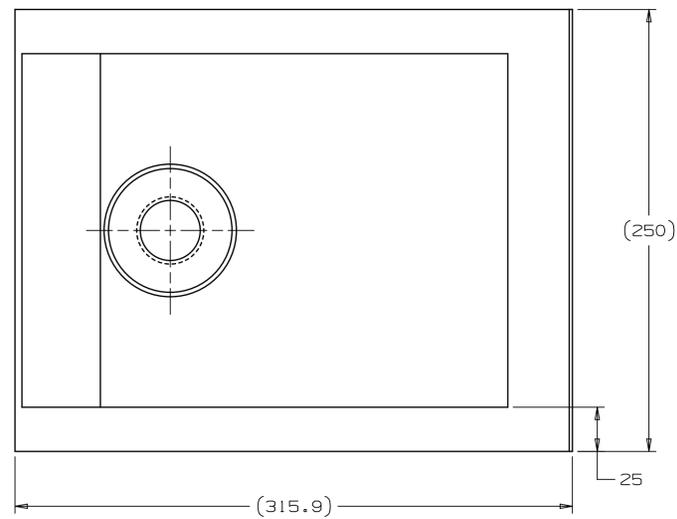
GROUP: Technical Division - Design and Drafting CAGE CODE: QUSR6

| | | | |
|---|------------|-----------------------------|-----------------|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| NAME PICKUP BRACKET | | | |
| SCALE 1:2 | SIZE A2 | DRAWING NUMBER F10023628 | SHEET 1 OF 1 |
| REV A | | REV A | |

12 11 10 9 8 7 6 5 4 3 2 1

DESCRIPTION: PICKUP WELDMENT
 CATEGORY: WELDMENT PROJECT: LCLS11Cr-yomodule

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|----------------------------|----------------------|------------|
| A | F10023631-A-RCD | 18-Nov-2015 18-Nov-2015 | M. KRAMP Y. ORLOV | |



- NOTES (UNLESS OTHERWISE SPECIFIED):
1. WELDMENT MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 2. ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
 3. STEEL WELDS SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF ANSI/AWS D14.1 STRUCTURAL WELDING CODE.

| UNLESS OTHERWISE SPECIFIED | | | | |
|----------------------------|------|-------|------|-----|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* |
| 2 | 0.3 | 0.12 | N/A | 1* |

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

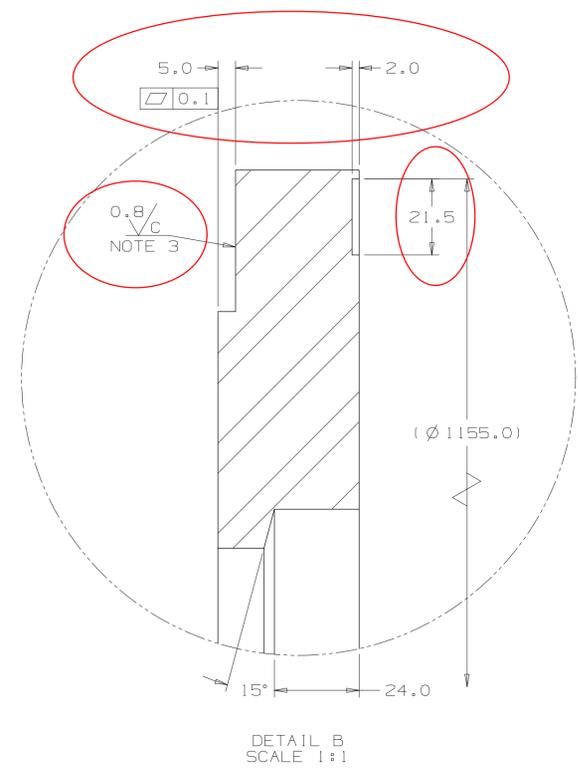
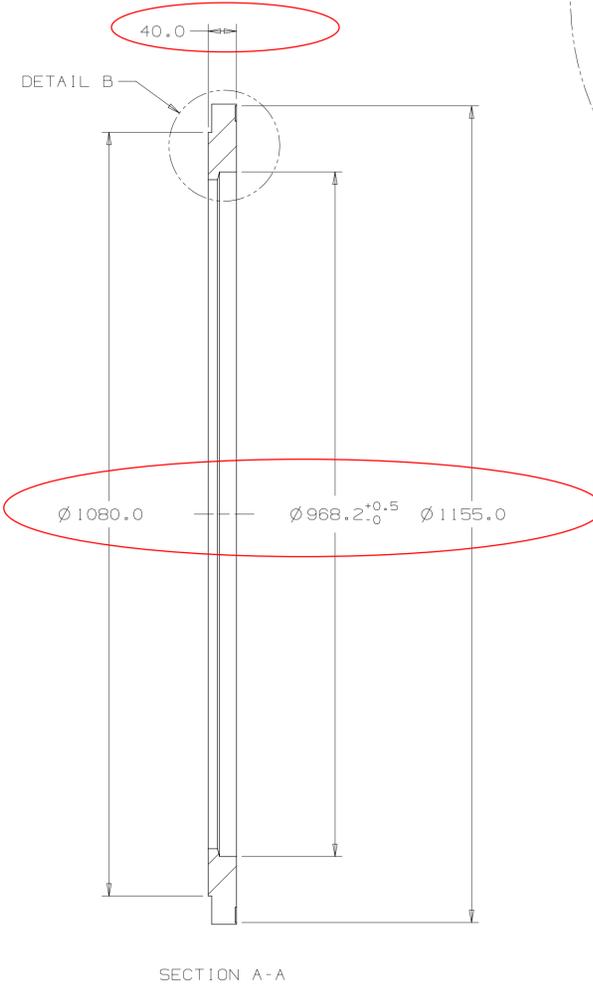
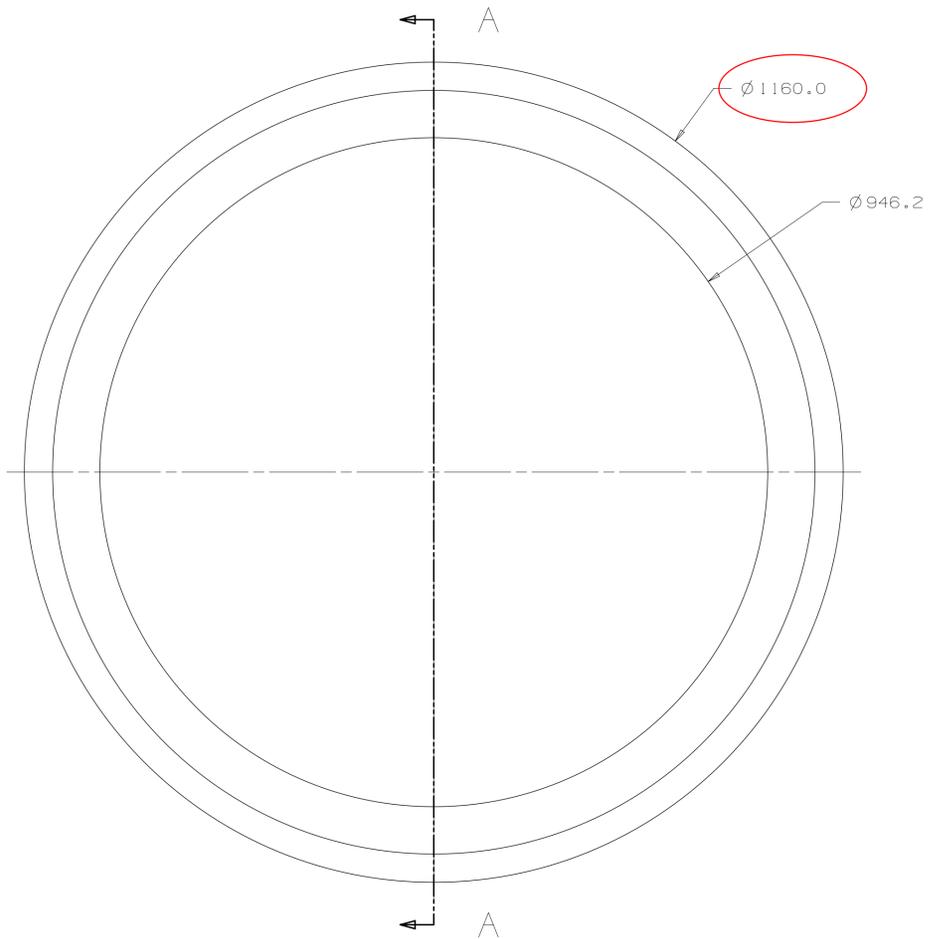
| | | | |
|--|----------------|------|-------------|
| DRAWN | G. LANGLOIS | DATE | 17-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10026610 | | |
| MATERIAL | SEE PARTS LIST | | |
| GROUP: Technical Division - Design and Drafting CASE CODE: QUS96 | | | |

| ITEM | PART# | DESCRIPTION | QTY |
|------|-----------|--------------------|-----|
| 3 | F10023628 | PICKUP BRACKET | 1 |
| 2 | F10023625 | PICKUP PAD | 1 |
| 1 | F10023623 | BUSHING HOIST RING | 1 |

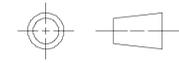
| PARTS LIST | | | | |
|--|------|----------------|--------|-----|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
| NAME: PICKUP WLDMT | | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:2 | A1 | F10023631 | 1 of 1 | A |

12 11 10 9 8 7 6 5 4 3 2 1

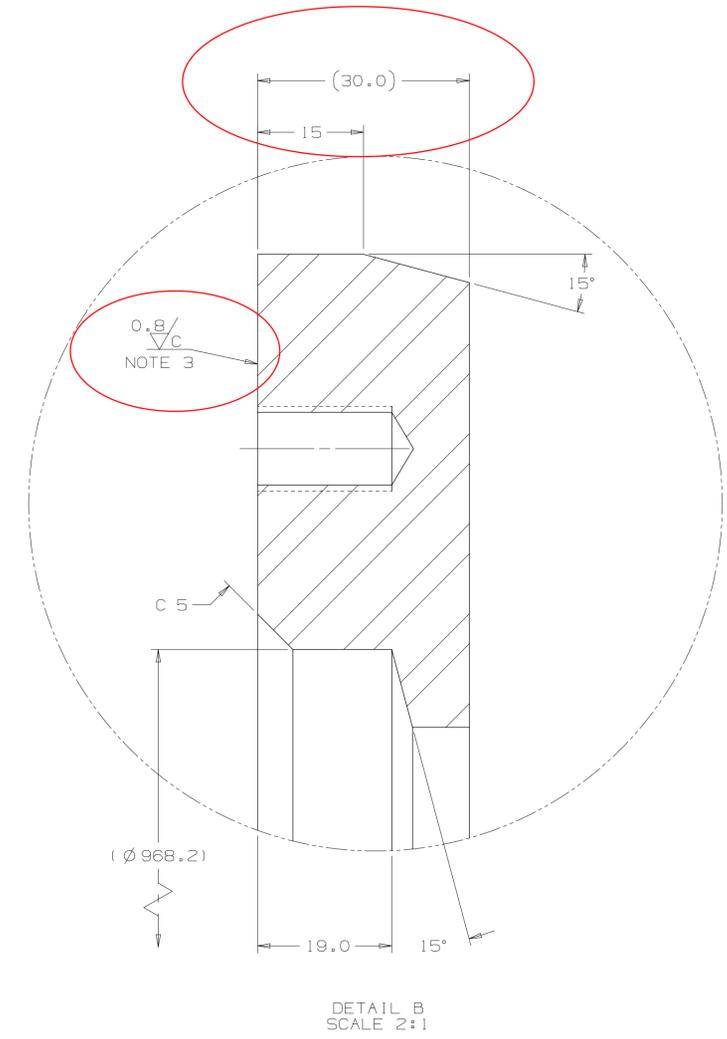
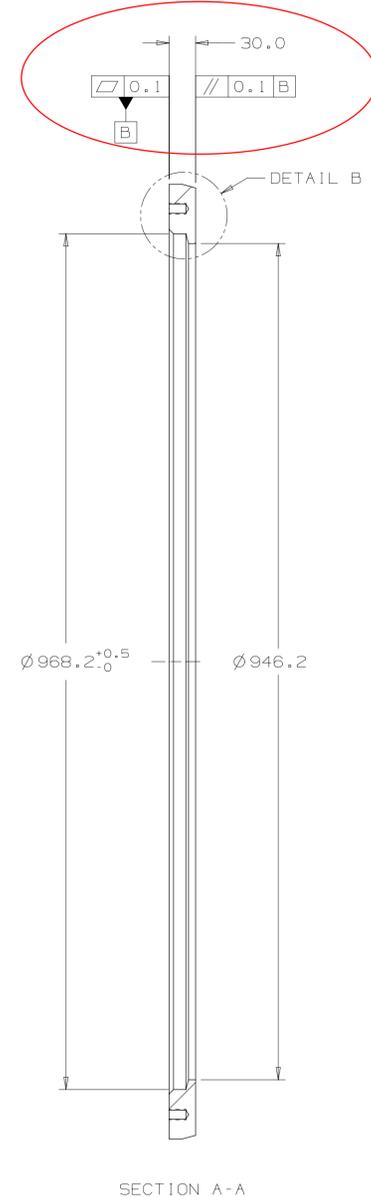
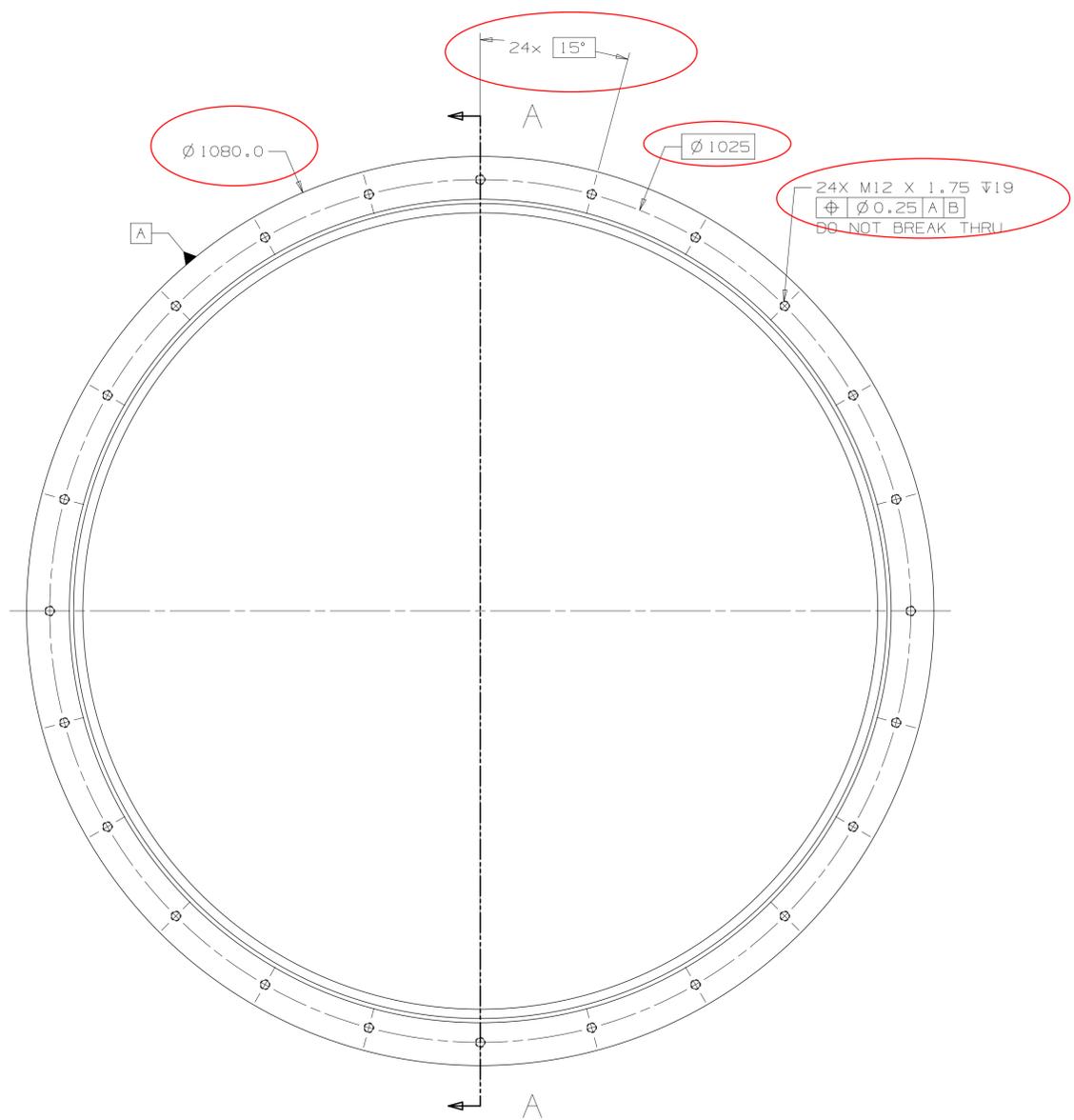
| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|-------|----------|------------|
| - | F10023636---RCD | - | - | - |
| - | | - | APPROVED | - |



- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 17-Jun-2014 |  FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
|--|------|-------|------|-----|--|-------------|---------------------------|-------------|---|-----------------------------|-----------------|----------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M. KRAMP | DATE | 30-Dec-2014 | | | | |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | | | | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | NAME FLANGE - FIXED DS | | | | | |
|  | | | | | MATERIAL 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | SCALE 1:5 AS SHOWN | | SIZE A1 | DRAWING NUMBER F10023636 | SHEET 1 OF 1 | REV - |
| GROUP: Technical Division - Design and Drafting CASE CODE: QUS96 | | | | | | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|-------|----------|------------|
| - | F10023641---RCD | - | - | - |
| - | | - | 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.
- SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.

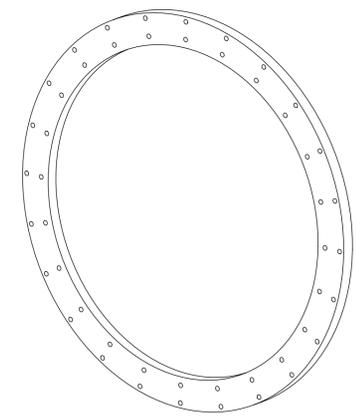
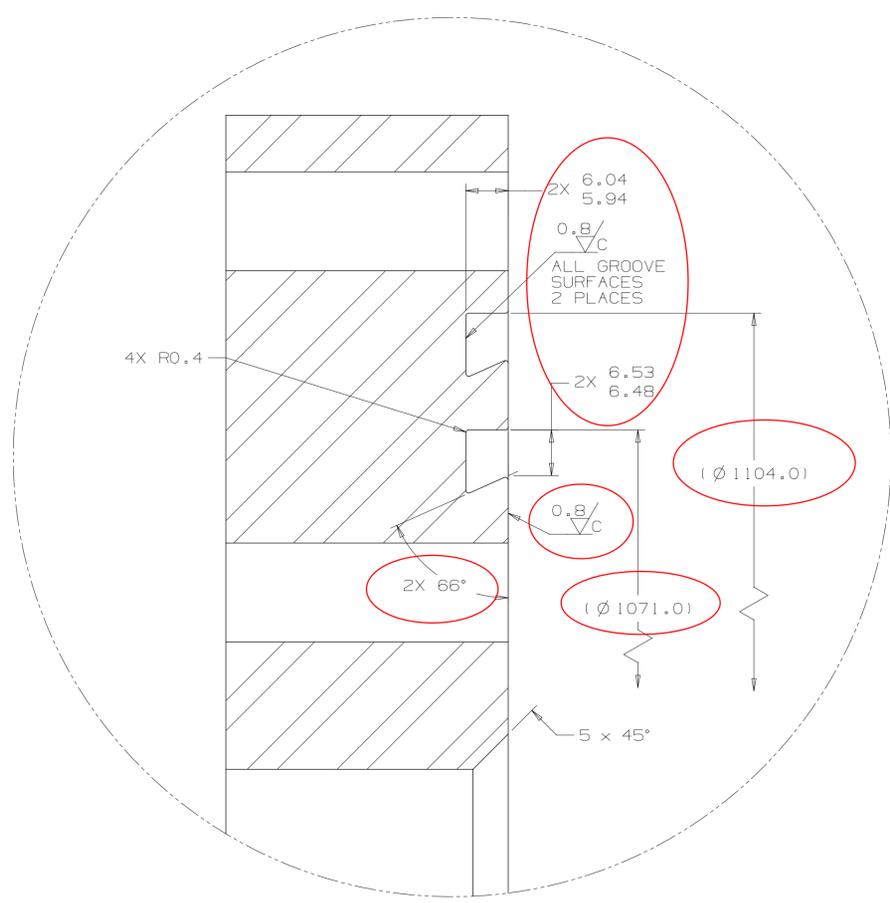
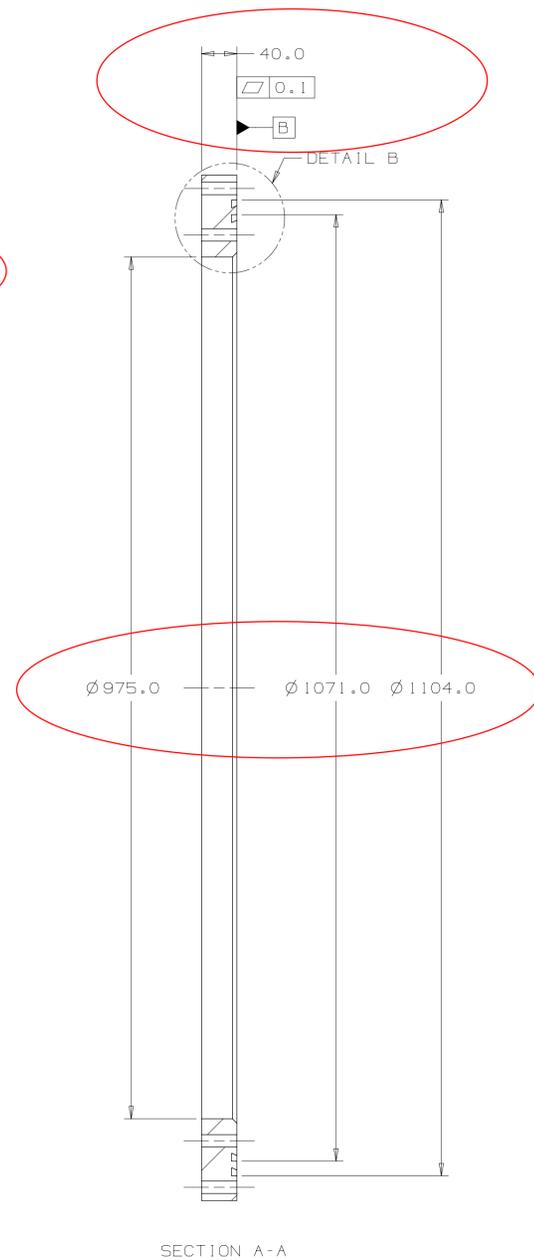
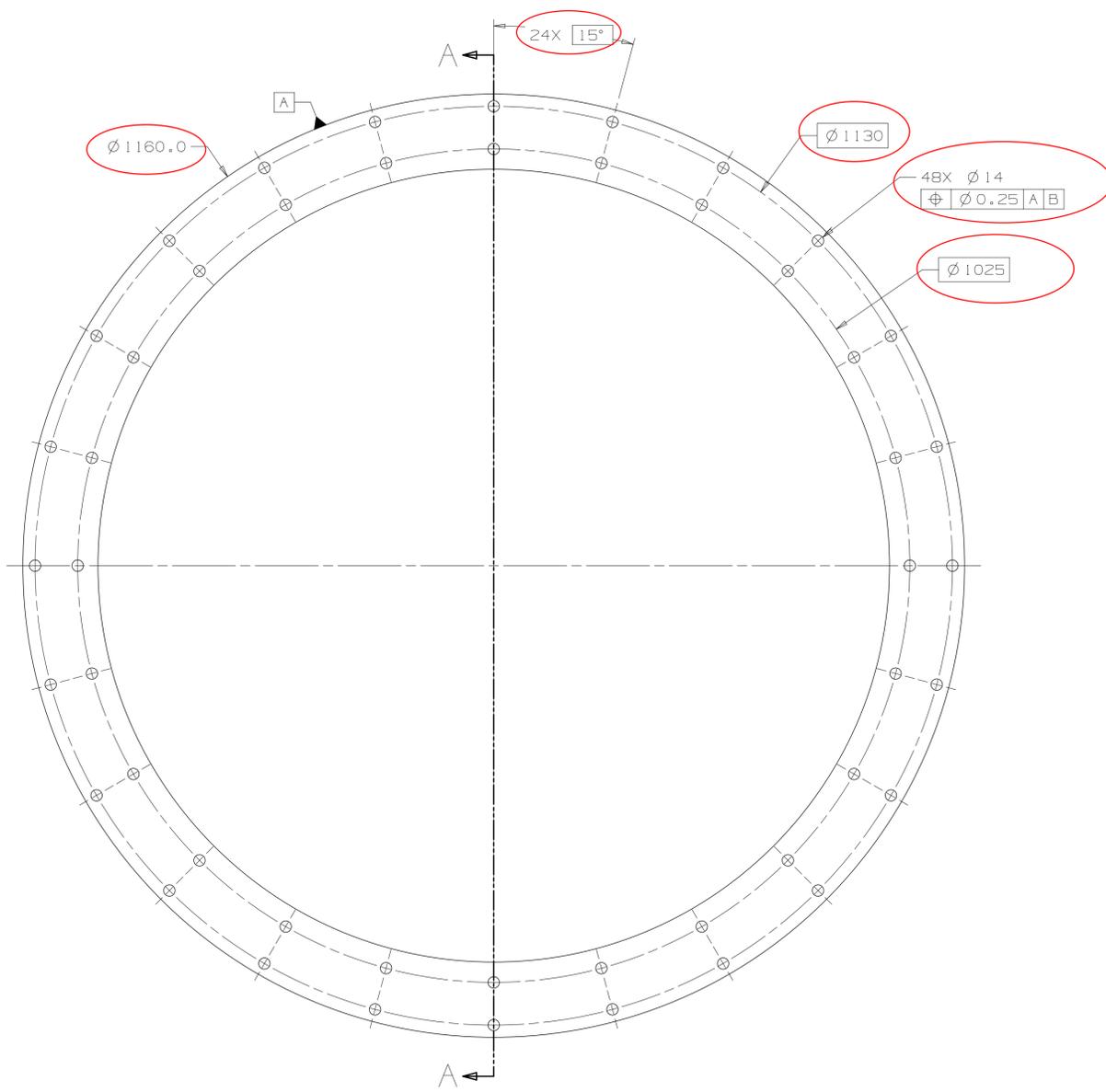
| UNLESS OTHERWISE SPECIFIED | | | | |
|----------------------------|------|-------|------|-----|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* |
| 2 | 0.3 | 0.12 | N/A | 1* |

BREAK ALL SHARP EDGES .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-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10026610 | | |
| MATERIAL | 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | |
| GROUP: | Technical Division - Design and Drafting | | |
| CAGE CODE: | QUS96 | | |

| | | | | |
|---|------|-------------------|--------|-----|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | NAME | | |
| | | FLANGE - FIXED US | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:4 AS SHOWN | A1 | F10023641 | 1 OF 1 | - |

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|-------|----------|------------|
| - | F10023643---RCD | - | APPROVED | - |



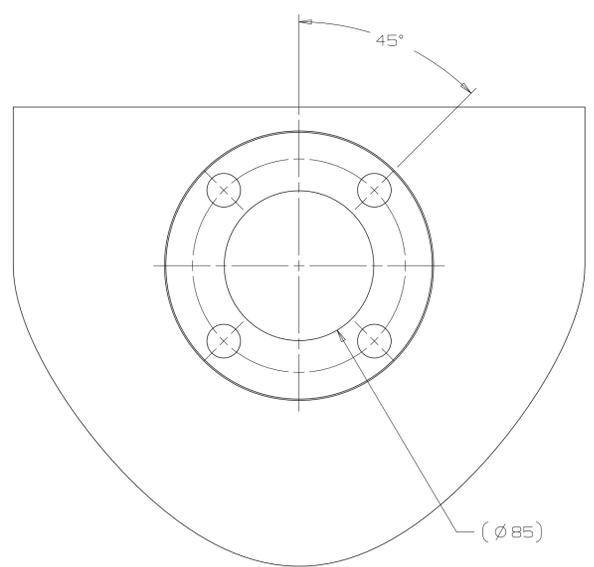
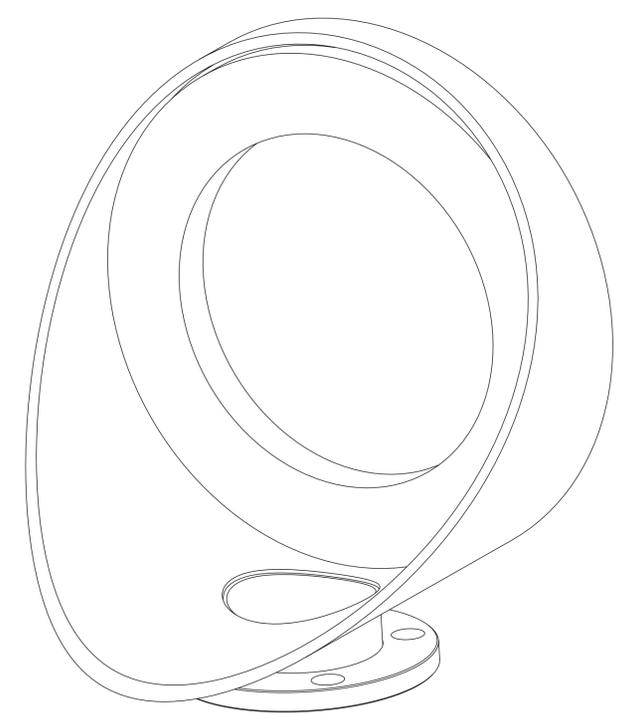
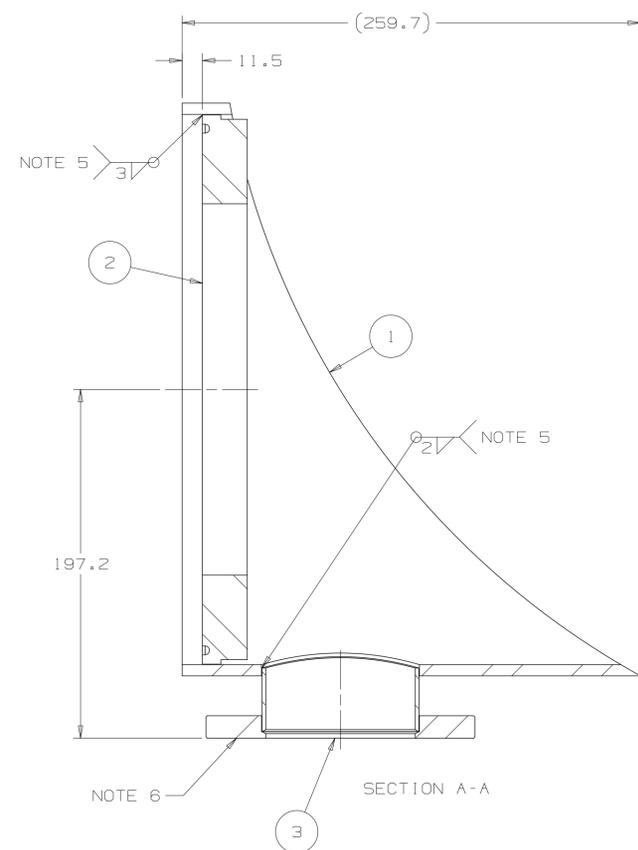
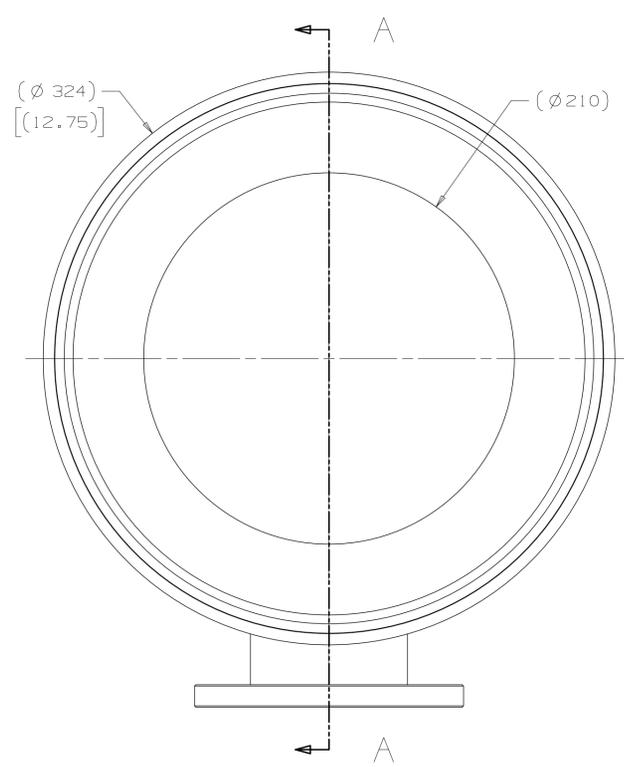
- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 18-Jun-2014 |
|--|-----------|------------|-----------|-----------|---|--|------|-------------|
| $\pm X$ | $\pm X.X$ | $\pm X.XX$ | $\pm X/X$ | $\pm X^*$ | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1" | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON | F10026610 | | |
| | | | | | MATERIAL | 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | |
| | | | | | GROUP: Technical Division - Design and Drafting | CAGE CODE: QJ596 | | |


FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

NAME: FLANGE - SLIDING
 SCALE: 1:4 AS SHOWN
 SIZE: A1
 DRAWING NUMBER: F10023643
 SHEET: 1 OF 1
 REV: -

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|-------------|----------|--------------|
| A | F10023650-A-RCD | 01-Dec-2015 | APPROVED | B.DAMPHOUSSE |



NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- ALL DIMENSIONS ARE IN MILLIMETERS; DIMENSIONS IN () ARE IN INCHES.
- ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
- ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
- ALL WELDS TO BE VACUUM LEAK TIGHT. LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10⁻⁹ ATM. CC/SEC.
- SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.

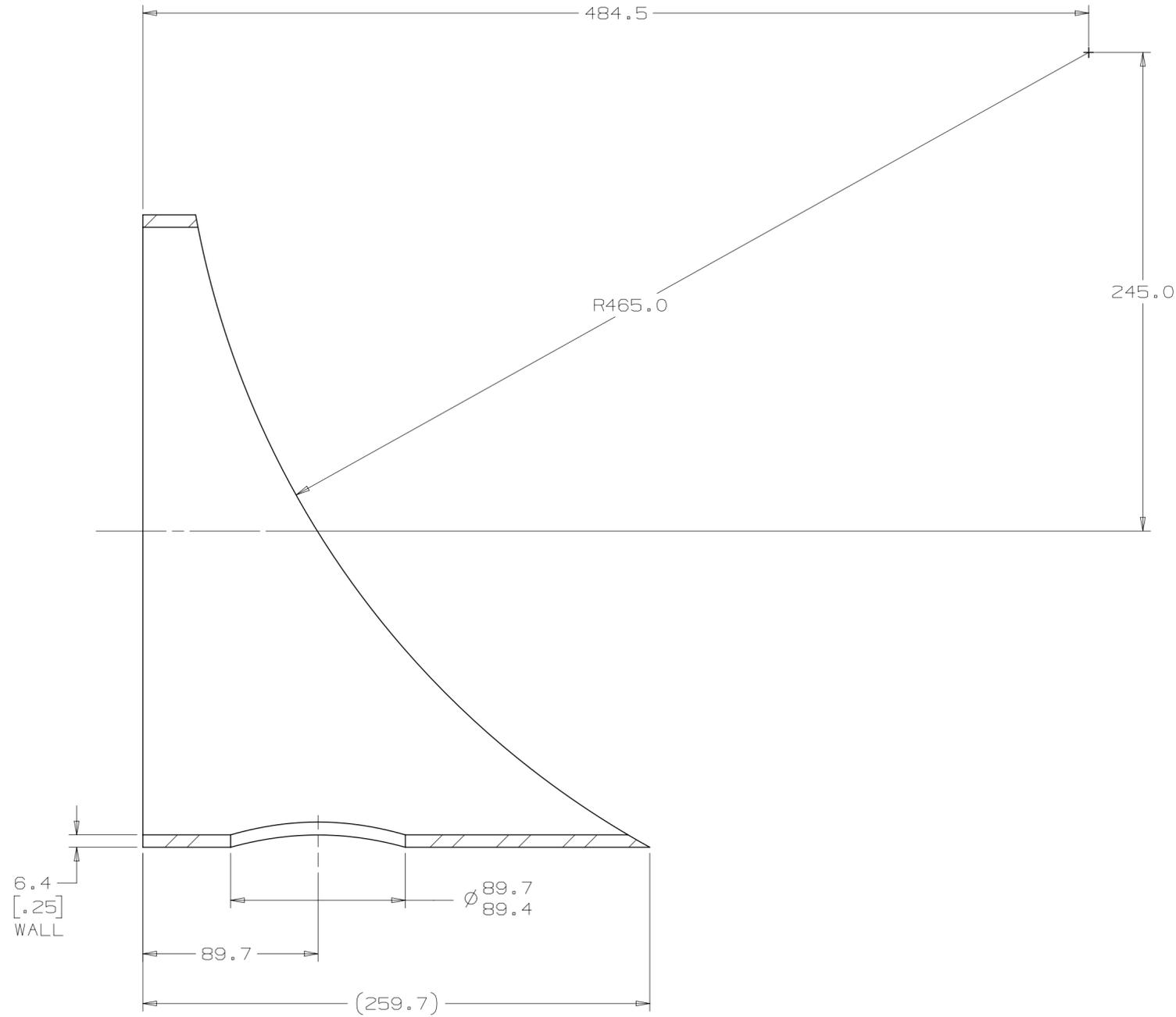
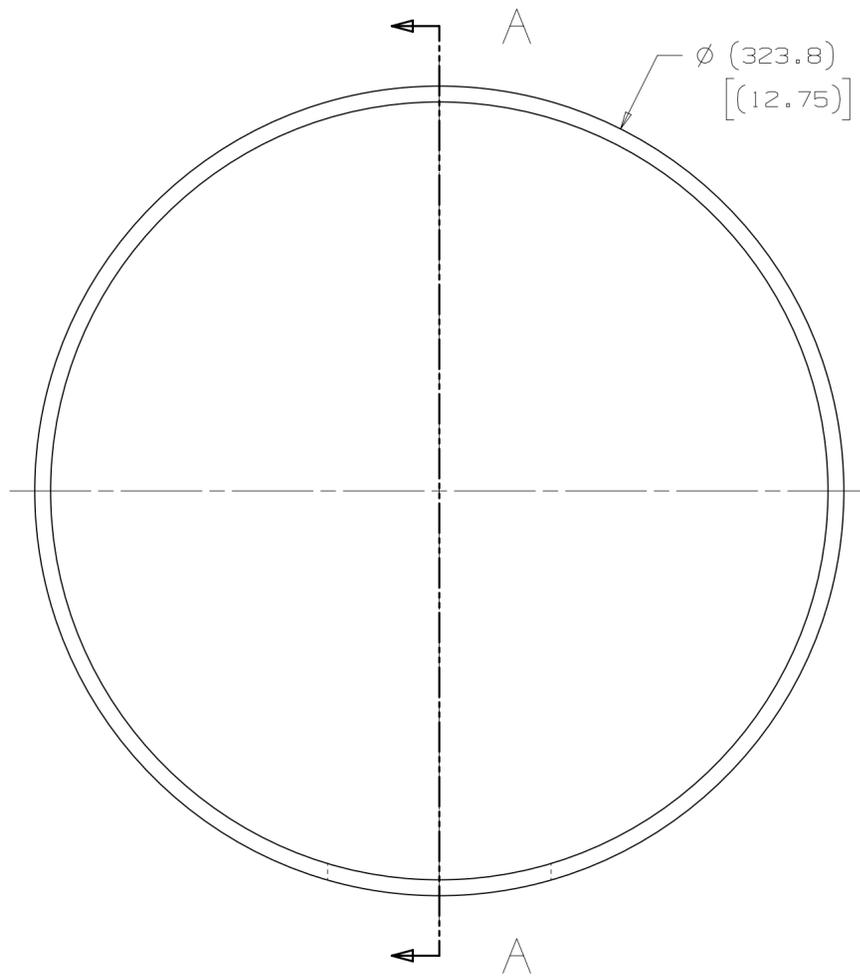
| ITEM | PART# | DESCRIPTION | QTY |
|------|-----------|-------------------------------|-----|
| 3 | F10023655 | WELDMENT INSTRUMENTATION PORT | 1 |
| 2 | F10023653 | MC PORT FLANGE | 1 |
| 1 | F10023651 | MC PORT PIPE | 1 |

PARTS LIST

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G.LANGLAIS | DATE | 19-Jun-2014 |
|--|------|-------|------|-----|---|------------|------------------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON | | F10026610 | |
| | | | | | MATERIAL | | SEE PARTS LIST | |
| | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: QUS96 | |

| | | | |
|---|------------|-----------------------------|-----------------|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| NAME WELDMENT MC PORT | | | |
| SCALE 1:2 | SIZE A1 | DRAWING NUMBER F10023650 | SHEET 1 OF 1 |
| | | REV A | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-----------------------|
| - | F10023651---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.
- DIMENSIONS IN (.XX) ARE IN INCHES.
- TRAILING ZEROS INDICATE TOLERANCE.

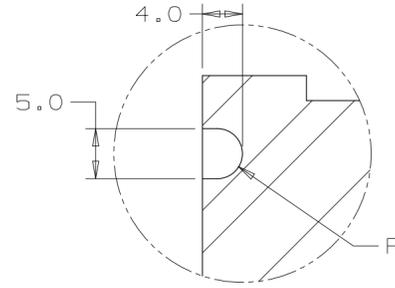
| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 18-Jun-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| 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 F10023650 | | | |
| | | | | | MATERIAL 304L STAINLESS STEEL, UNS S30400 | | | |
| GROUP: Technical Division - Design and Drafting | | | | | CAGE CODE: OUES6 | | | |



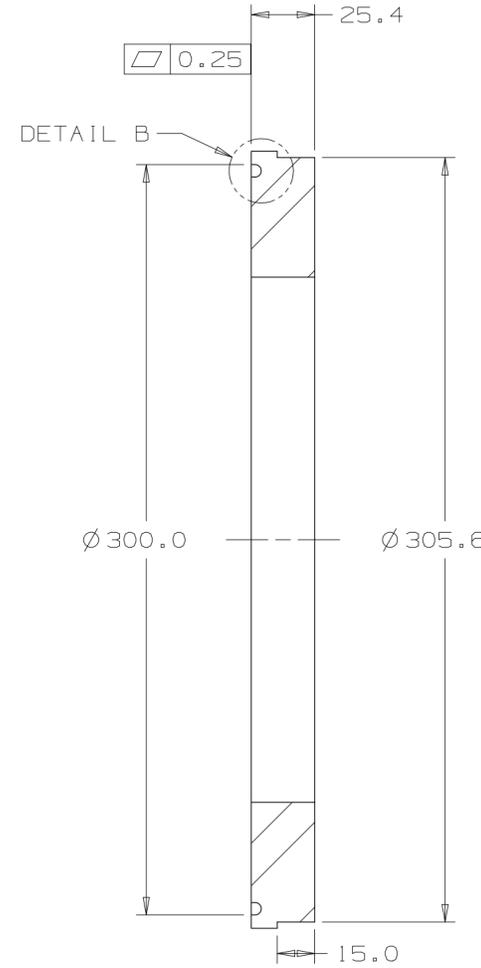
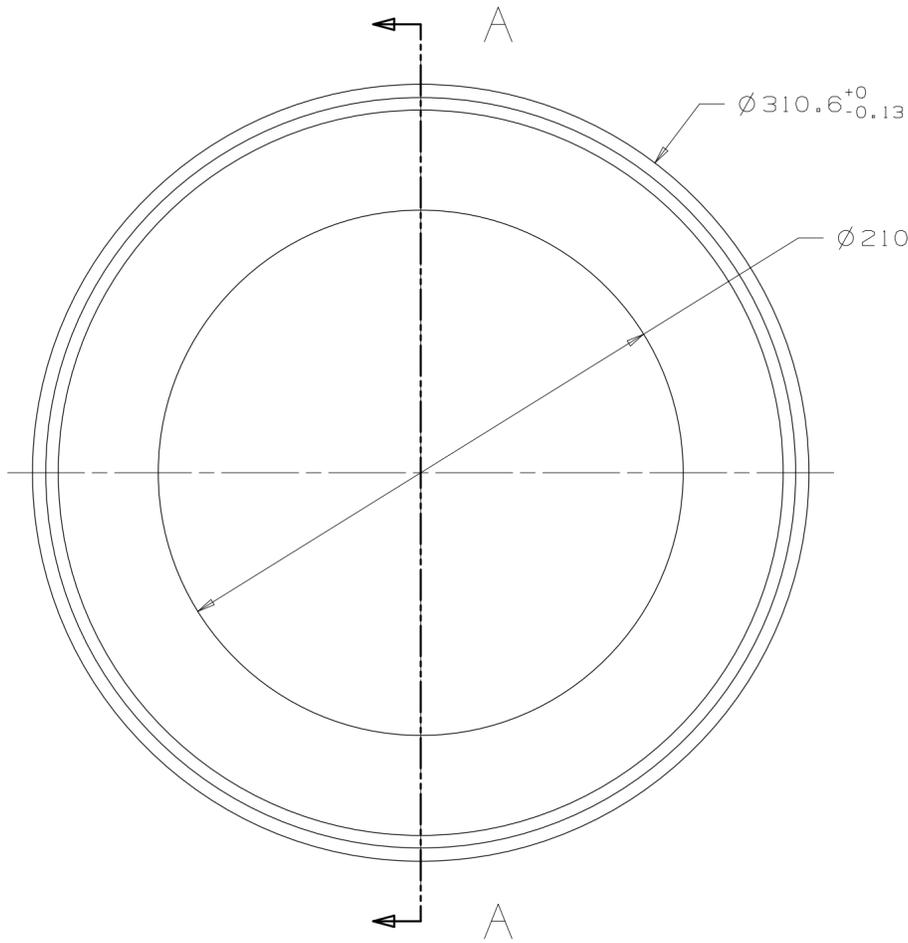
FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

| | | | | | | | |
|-------|------|----------------|--------|--------------|--|--|--|
| NAME | | | | MC PORT PIPE | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV | | | |
| 1:2 | A2 | F10023651 | 1 OF 1 | - | | | |

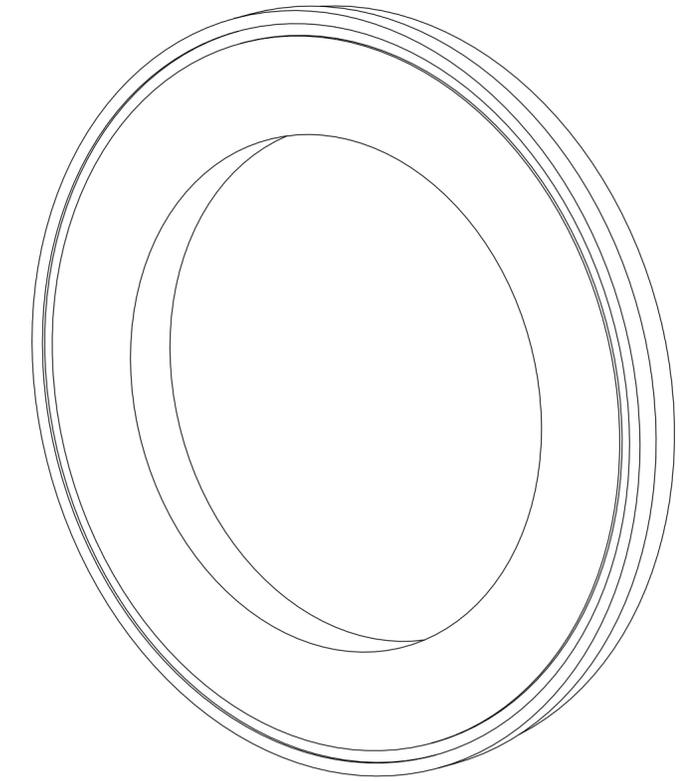
| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|-------------|
| A | F10023653-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV |



DETAIL B
SCALE 2:1



SECTION A-A

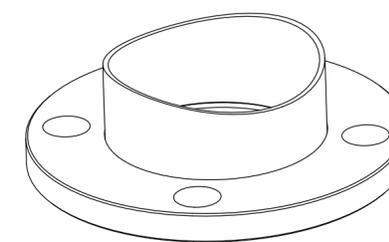
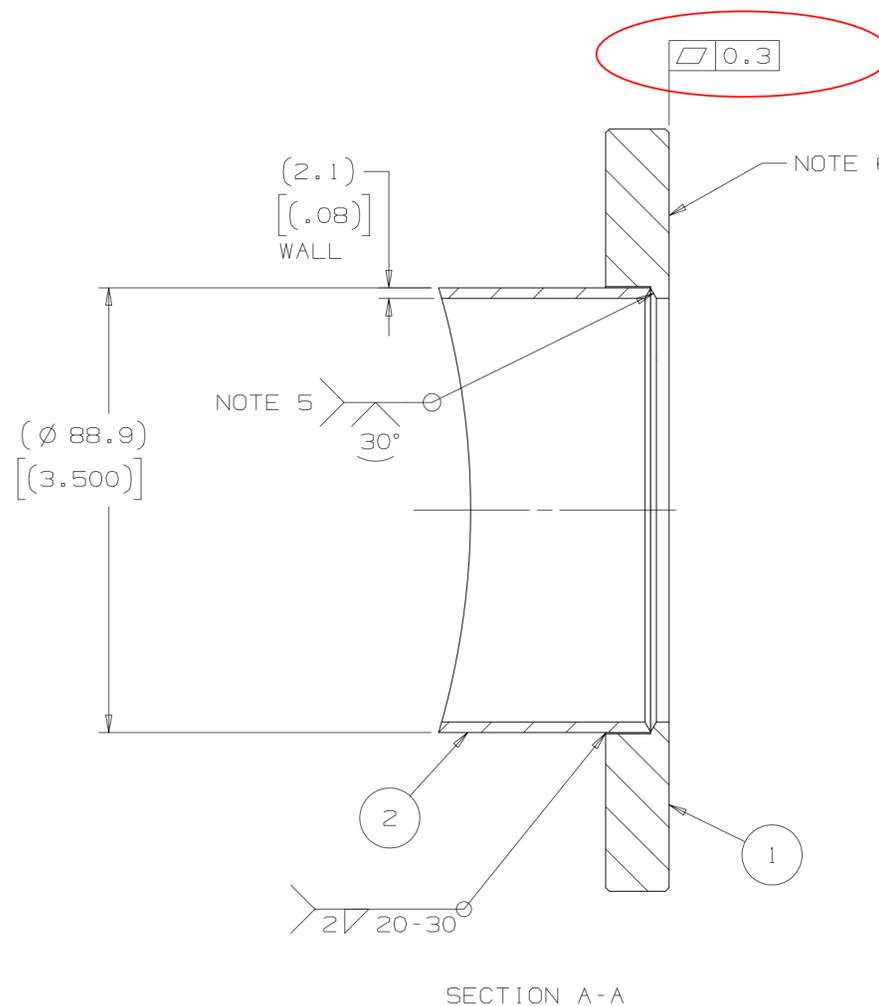
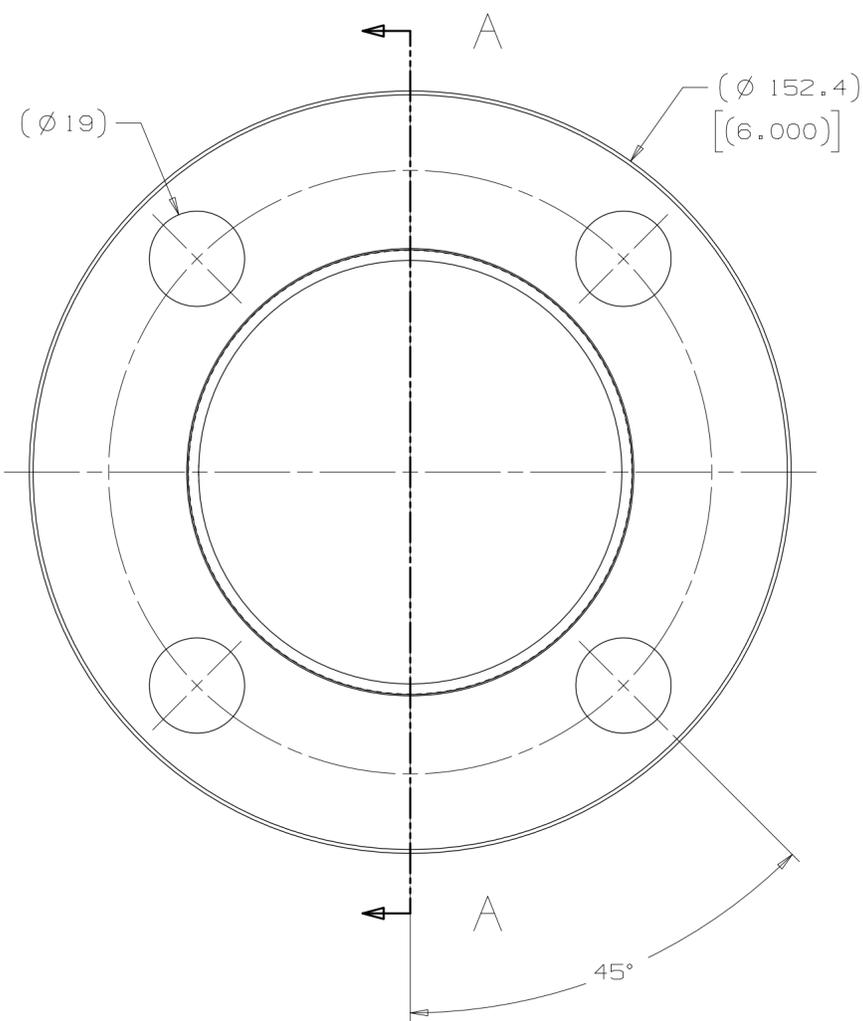


NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- DIMENSIONS IN (.XX) ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | DATE | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
|--|------|-------|------|-----|---|-------------|---|--|---|--|--|--|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | G. LANGLOIS | 18-Jun-2014 | NAME MC PORT FLANGE SCALE 1:1 SIZE A2 DRAWING NUMBER F10023653 SHEET 1 OF 1 REV A | | | | | |
| 2 | 0.3 | 0.12 | N/A | 1° | M. KRAMP | 30-Dec-2014 | | | | | | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | Y. ORLOV | 02-Jan-2015 | | | | | | |
| USED ON F10023650 MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | | | GROUP: Technical Division - Design and Drafting CAGE CODE: QUES6 | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|--------------|
| A | F10023655-A-RCD | 01-Dec-2015 | DRAWN | B.DAMPHOUSSE |
| | | | APPROVED | - |



NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- ALL DIMENSIONS ARE IN MILLIMETERS:
DIMENSIONS IN [.XX] ARE IN INCHES.
- ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
- ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
- ALL WELDS TO BE VACUUM LEAK TIGHT.
LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10^{-9} ATM. CC/SEC.
- SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.



| ITEM | PART# | DESCRIPTION | QTY |
|------|-----------|------------------------|-----|
| 2 | F10023659 | INSTRUMENTATION TUBE | 1 |
| 1 | F10023656 | INSTRUMENTATION FLANGE | 1 |

PARTS LIST

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

BREAK ALL SHARP EDGES .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 | 19-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

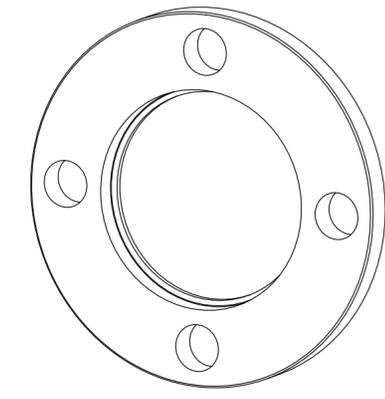
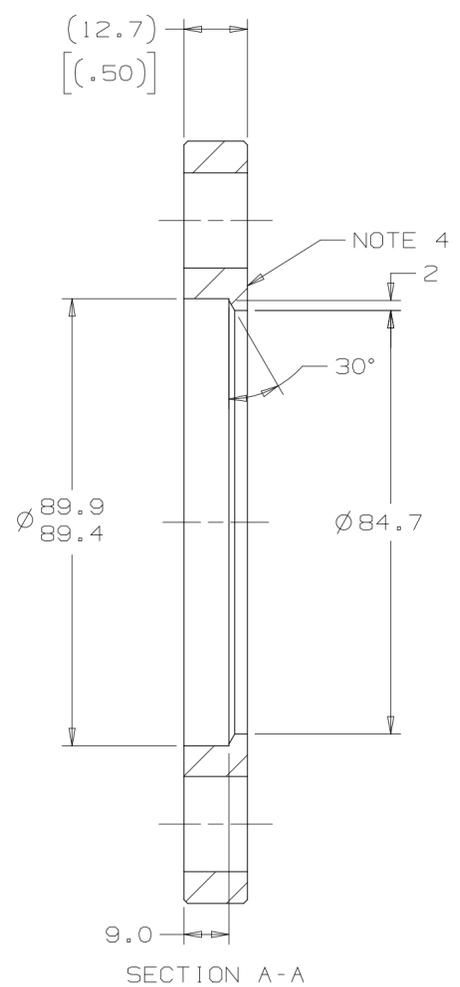
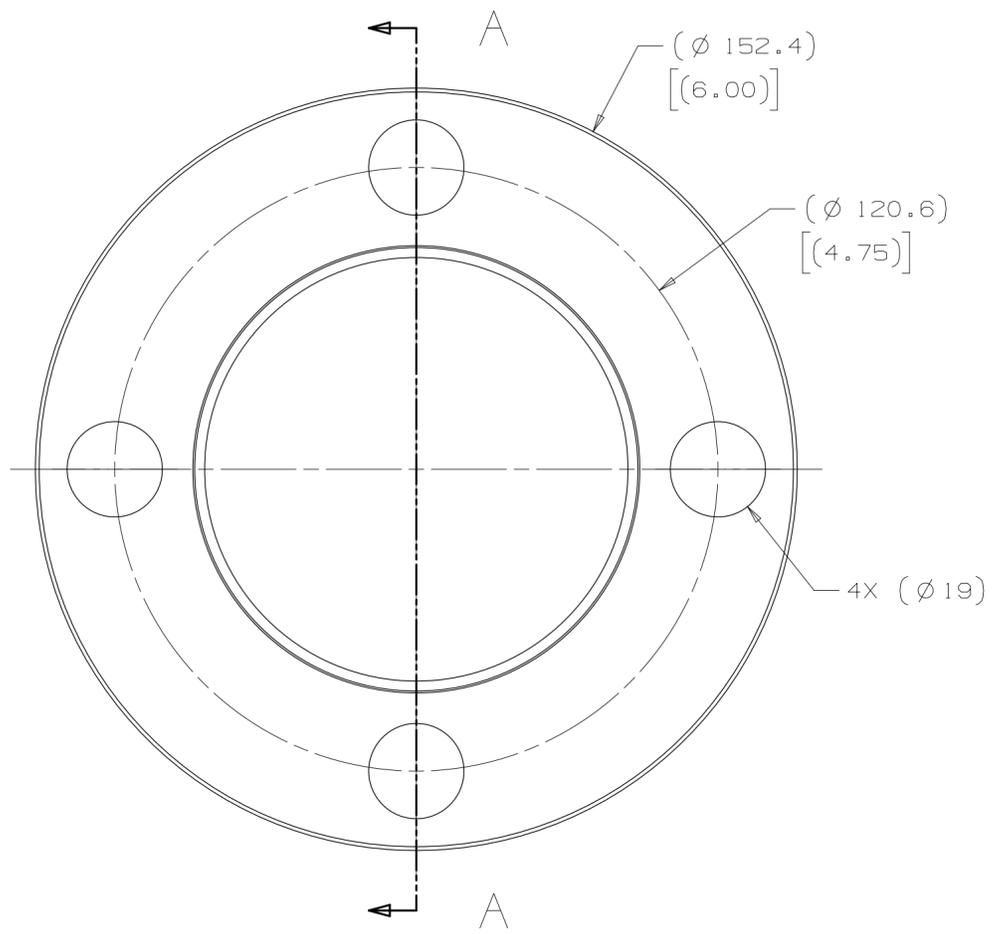
USED ON
 F10023650

MATERIAL
 SEE PARTS LIST

GROUP: Technical Division - Design and Drafting | CAGE CODE: QUSR6

| | | | | |
|---|------|----------------|--------|-----|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
| NAME WELDMENT INSTRUMENTATION PORT | | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:1 | A2 | F10023655 | 1 OF 1 | A |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|---------------------------|
| - | F10023656---RCD | - | DRAWN - - APPROVED - - |



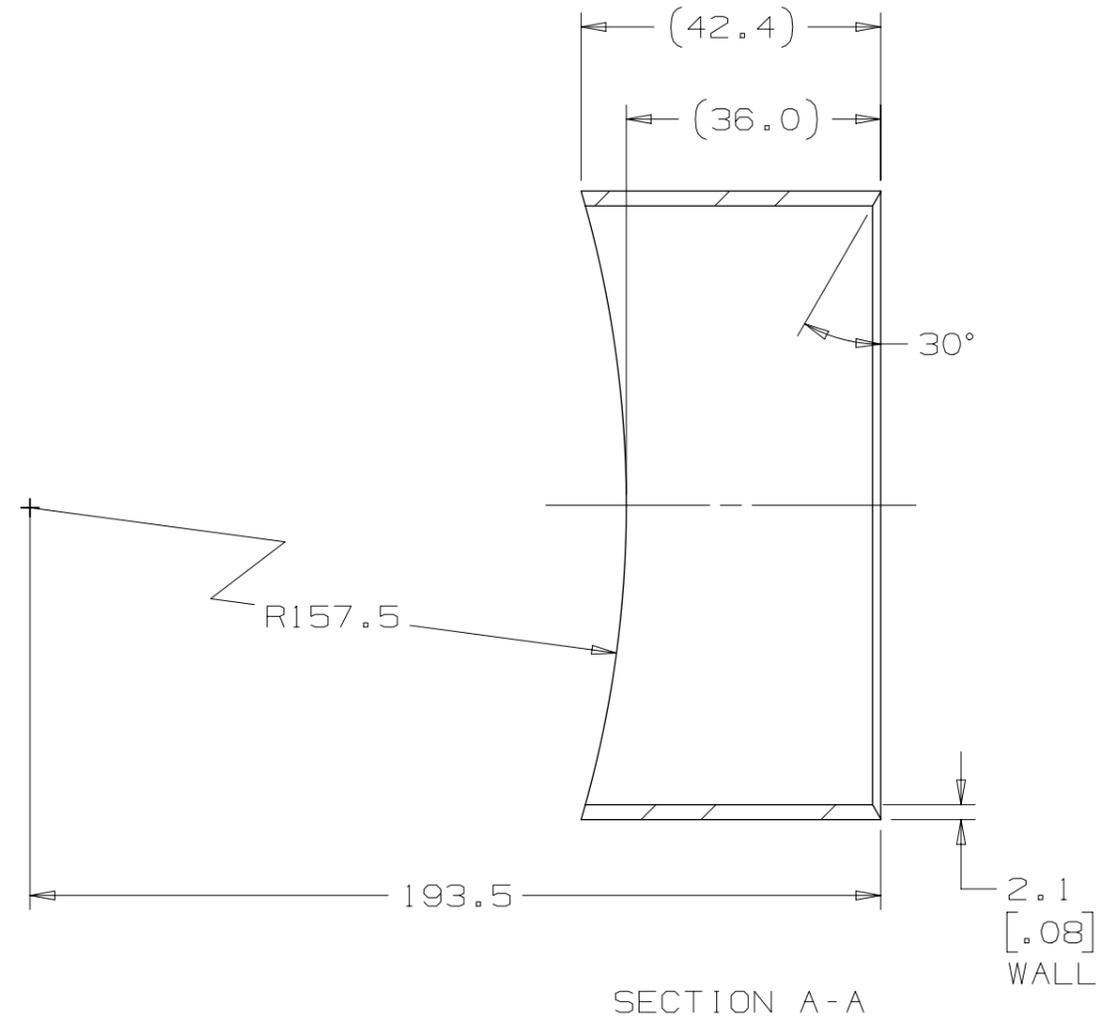
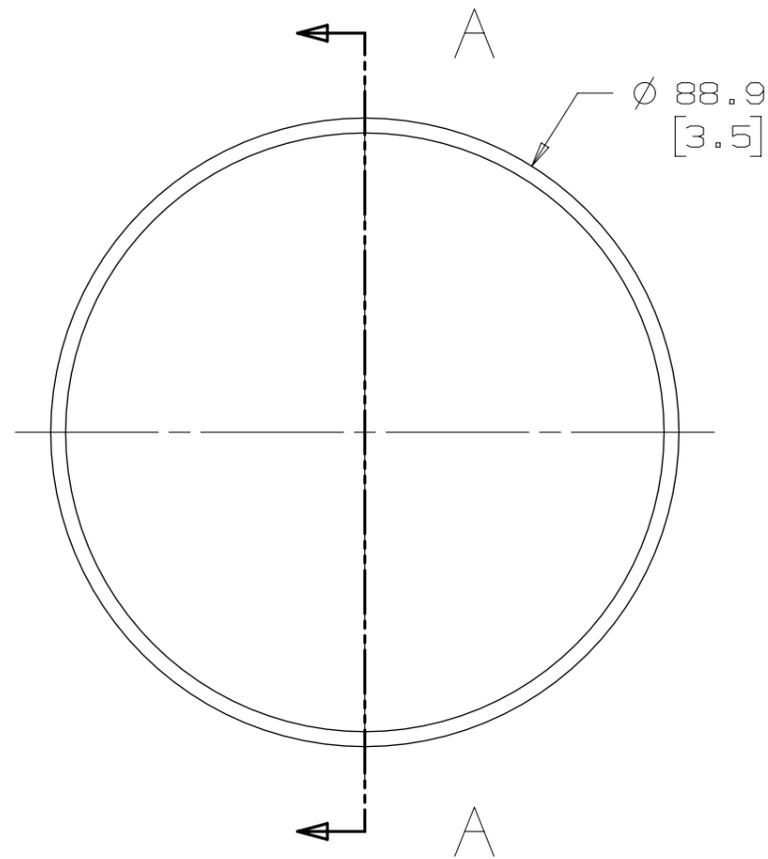
- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 - DIMENSIONS APPLY AFTER ALL FINISHING.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.
 - DIMENSIONS IN [.XX] ARE IN INCHES.

| ITEM | PART # | DESCRIPTION | QTY |
|------|-----------|--|-----|
| 1 | FC0038871 | FLANGE, ASA, FLAT, NON-ROTATABLE, 6" OD 0, 304SS | 1 |

| | | | | | | | | | | | | | | | |
|--|------|-------|------|-----|---|----------|------------------|------|-------------|--|----------------|----|---|--------|----------------|
| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | G. LANGLAIS | | DATE | | 19-Jun-2014 | | FERMION NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY NAME INSTRUMENTATION FLANGE | | |
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M. KRAMP | | DATE | 30-Dec-2014 | | SCALE | | | | 1:1 |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | | DATE | 02-Jan-2015 | | SIZE | A2 | | | DRAWING NUMBER |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON | | F10023655 | | MATERIAL | | SEE PARTS LIST | | SHEET | 1 OF 1 | |
| | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: 0U5R6 | | | | | | REV | - | |

DESCRIPTION: INSTRUMENTATION TUBE
 CATEGORY: TUBE PROJECT: LCLS11Cryomodule

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------|------------|-----|
| - | F10023659---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.
- DIMENSIONS IN [.XX] ARE IN INCHES.

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

BREAK ALL SHARP EDGES .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 | 19-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10023655 | | |
| MATERIAL | 304L STAINLESS STEEL, UNS S30400 | | |
| GROUP: | Technical Division - Design and Drafting | | |
| CAGE CODE: | OU5R6 | | |

FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

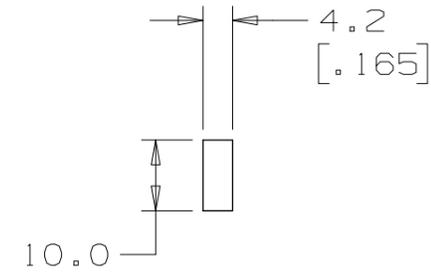
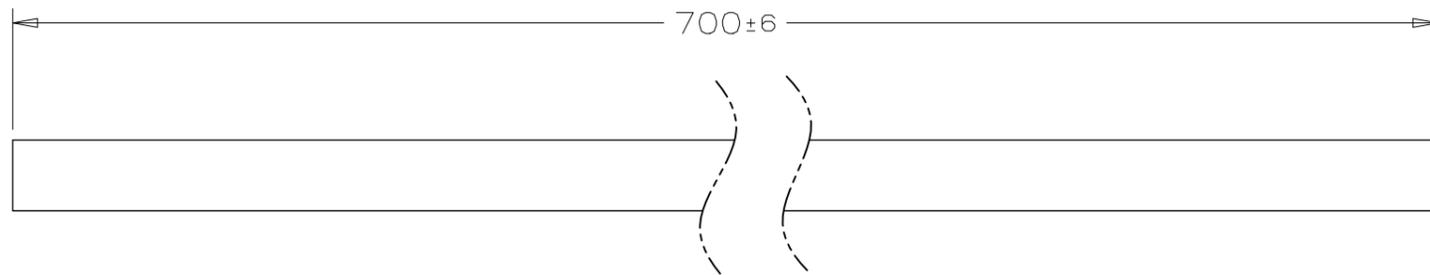
NAME

INSTRUMENTATION TUBE

| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
|-------|------|----------------|--------|-----|
| 1:1 | A3 | F10023659 | 1 OF 1 | - |

DESCRIPTION: RAIL
 CATEGORY: BAR PROJECT: LCLS11Cryomodule

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|--------------|
| B | F10023661-B-RCD | 01-Dec-2015 | DRAWN | B.DAMPHOUSSE |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV |

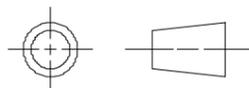


NOTES (UNLESS OTHERWISE SPECIFIED):

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

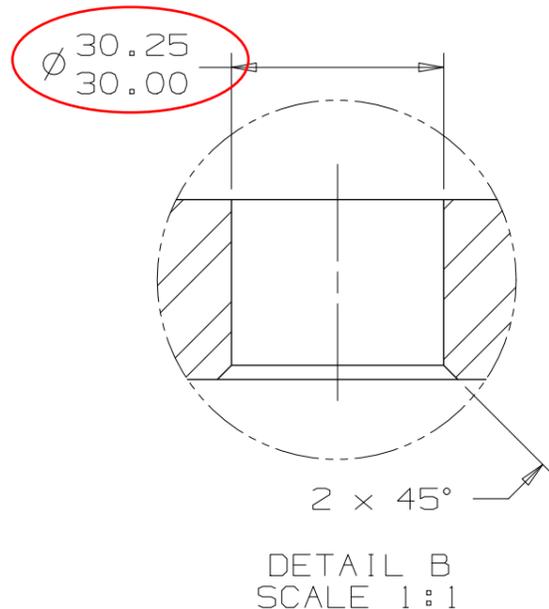
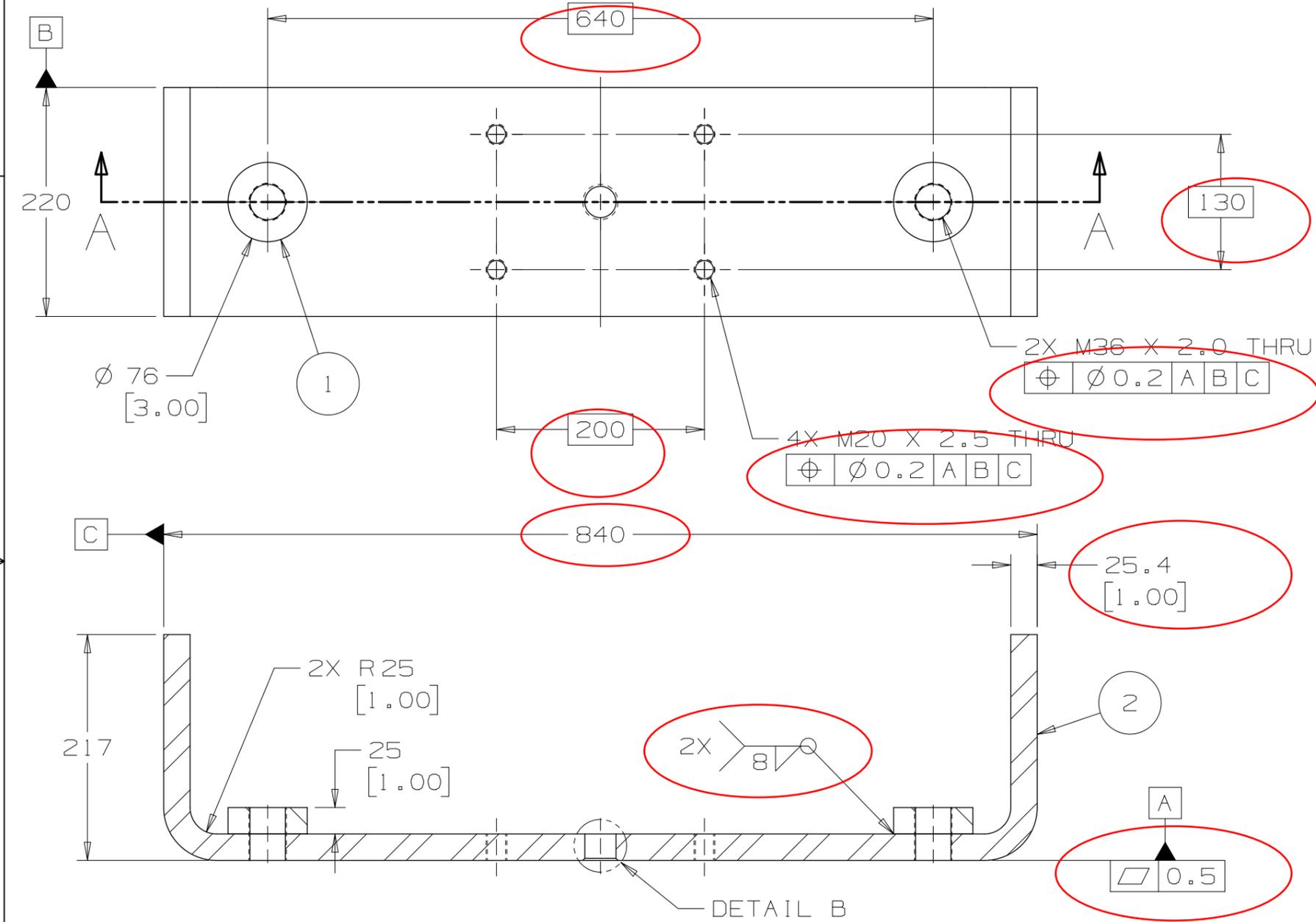


| | | | |
|---|----------------------------------|------------------|-------------|
| DRAWN | G. LANGLOIS | DATE | 19-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10026610 | | |
| MATERIAL | 316L STAINLESS STEEL, UNS S31603 | | |
| GROUP: Technical Division - Design and Drafting | | CAGE CODE: 0U5R6 | |

| | | | | |
|---|------|----------------|--------|-----|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
| NAME | | | | |
| RAIL | | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:1 | A3 | F10023661 | 1 OF 1 | B |

DESCRIPTION: WELDMENT SUPPORT PLATE
 CATEGORY: PLATE PROJECT: LCLS11Cryomodule

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|--------------|
| B | F10023717-B-RCD | 02-Dec-2015 | DRAWN | B.DAMPHOUSSE |
| | | | APPROVED | - |



SECTION A-A

- NOTES (UNLESS OTHERWISE SPECIFIED):
1. WELDMENT MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 2. WELDMENT TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
 3. DIMENSIONS IN [.XX] IS IN INCHES.
 4. FINAL MACHINING AFTER WELDING IS COMPLETE.

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

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

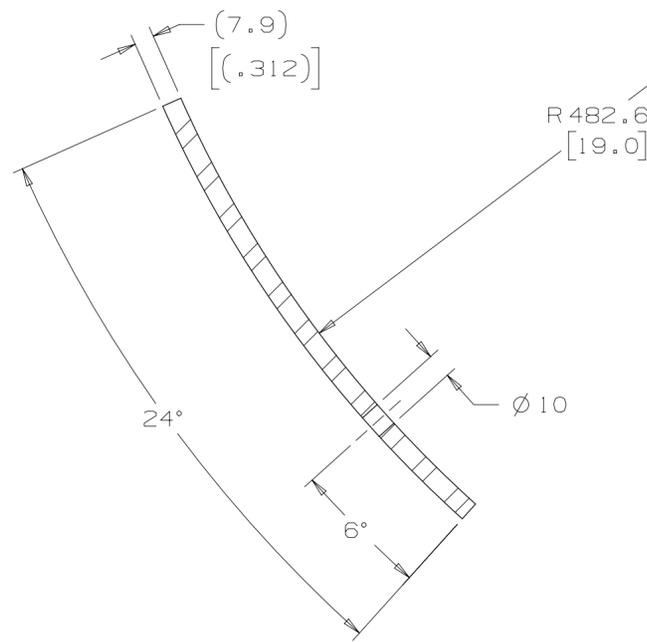
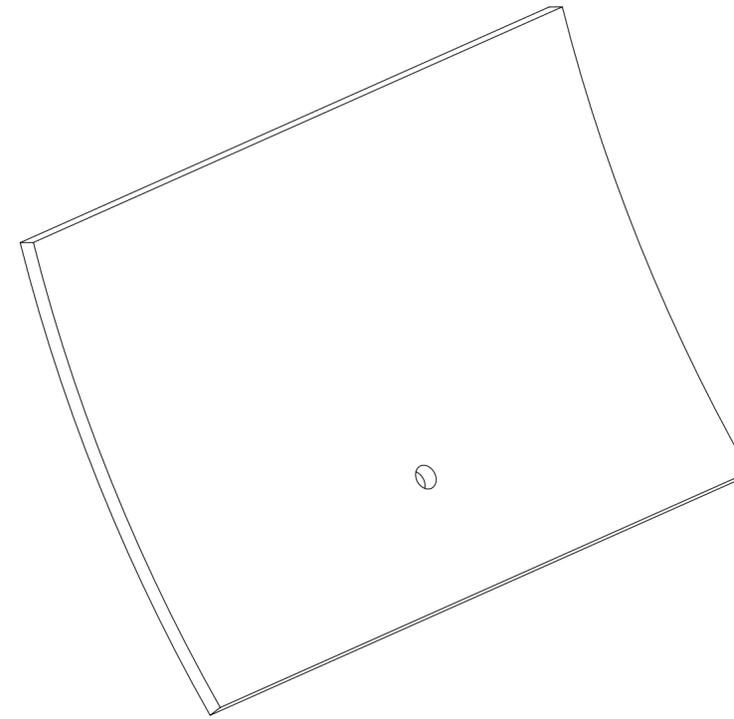
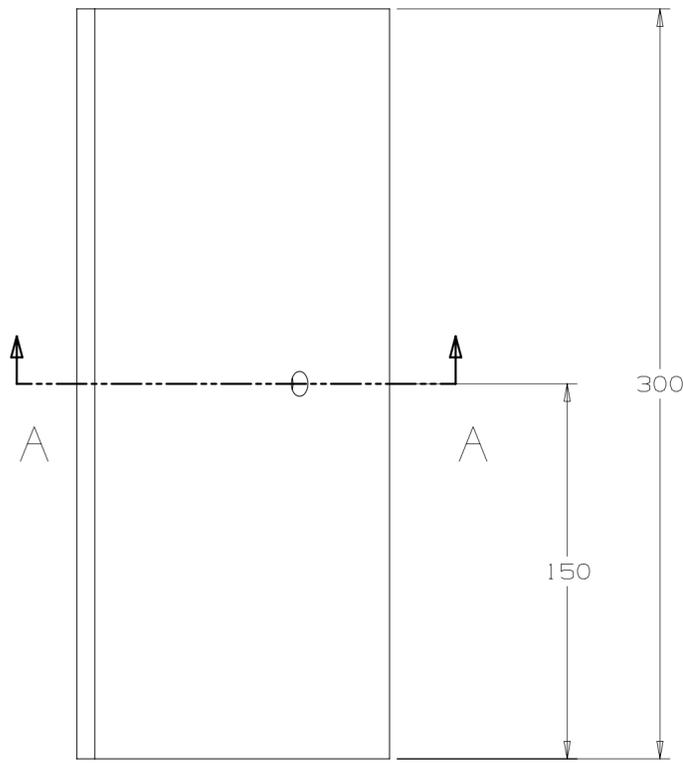
| | | | |
|--|----------------------------------|------|-------------|
| DRAWN | G. LANGLOIS | DATE | 24-Jun-2014 |
| CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10026610 | | |
| MATERIAL | 316L STAINLESS STEEL, UNS S31603 | | |
| GROUP: Technical Division - Design and Drafting CAGE CODE: 0U5R6 | | | |

| ITEM | PART# | DESCRIPTION | QTY |
|------|-----------|-----------------------|-----|
| 2 | FC0046258 | U SUPPORT PLATE | 1 |
| 1 | FC0046257 | THREADED SUPPORT BOSS | 2 |

PARTS LIST

| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
|---|------|----------------|--------|-----|
| NAME | | | | |
| WELDMENT SUPPORT PLATE | | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:5 AS SHOWN | A3 | F10023717 | 1 OF 1 | B |

| REV | REVISION CONTROL DOCUMENT | DATES | | SIGNATURES | |
|-----|---------------------------|-------------|----------|-------------|--|
| A | F10023723-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS | |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV | |



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.
- DIMENSIONS IN [.XX] ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 24-Jun-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | |
| GROUP: Technical Division - Design and Drafting | | | | | CAGE CODE: OUSR6 | | | |



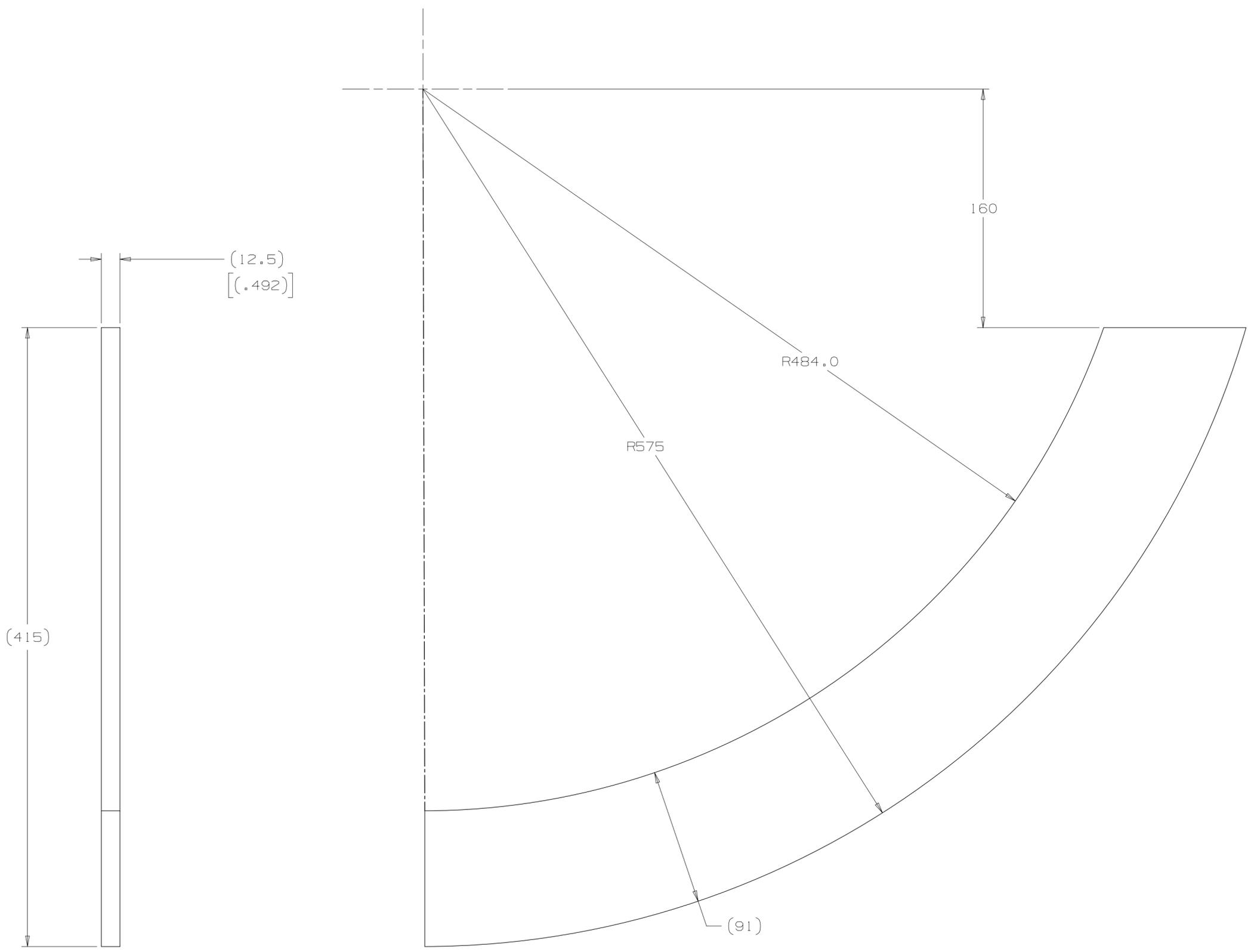
FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

NAME

PLATE REINFORCEMENT

| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
|-------|------|----------------|--------|-----|
| 1:2 | A2 | F10023723 | 1 OF 1 | A |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-------------------|
| - | F10023948---RCD | | DRAWN APPROVED |



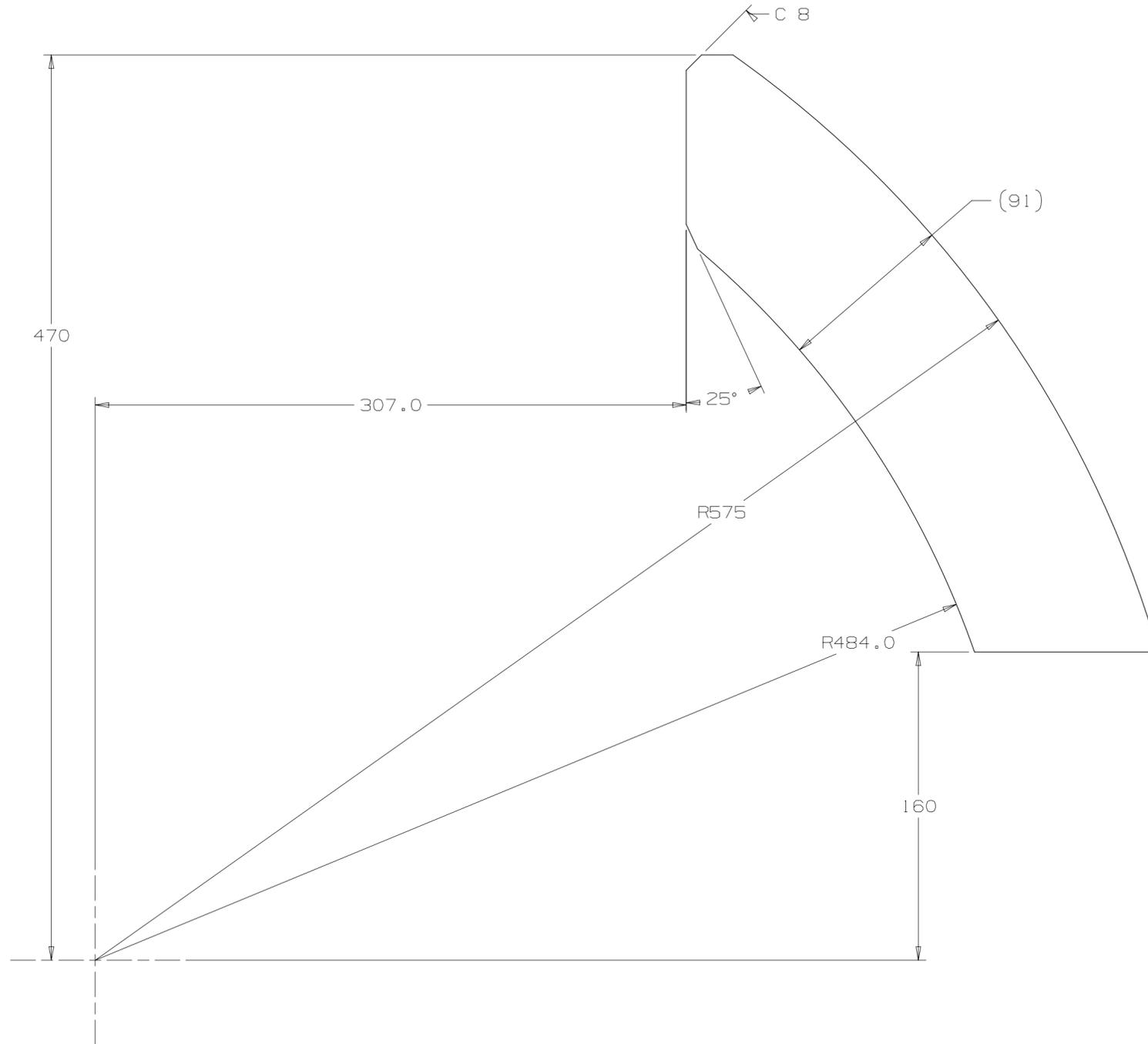
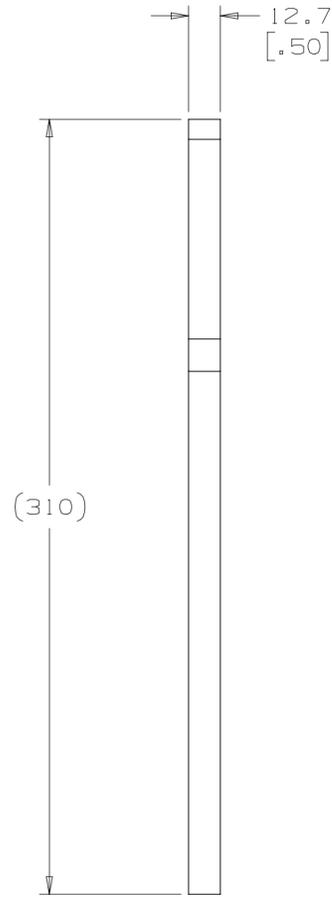
NOTES (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS.
- DIMENSIONS IN (.XX) ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | |
| GROUP: Technical Division - Design and Drafting | | | | | CAGE CODE: OUSR6 | | | |

| | | | | | | | |
|-----------------|------|----------------|--|---|-----|--|--|
| | | | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| NAME | | | | | | | |
| RING STIFFENING | | | | | | | |
| SCALE | SIZE | DRAWING NUMBER | | SHEET | REV | | |
| 1:2 | A2 | F10023948 | | 1 OF 1 | - | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-------------------|
| - | F10023949---RCD | | DRAWN APPROVED |



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.
- DIMENSIONS IN (.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 .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 | 02-Jul-2014 |
| CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

USED ON
 F10026610

MATERIAL
 316L STAINLESS STEEL, ANNEALED, UNS S31603

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



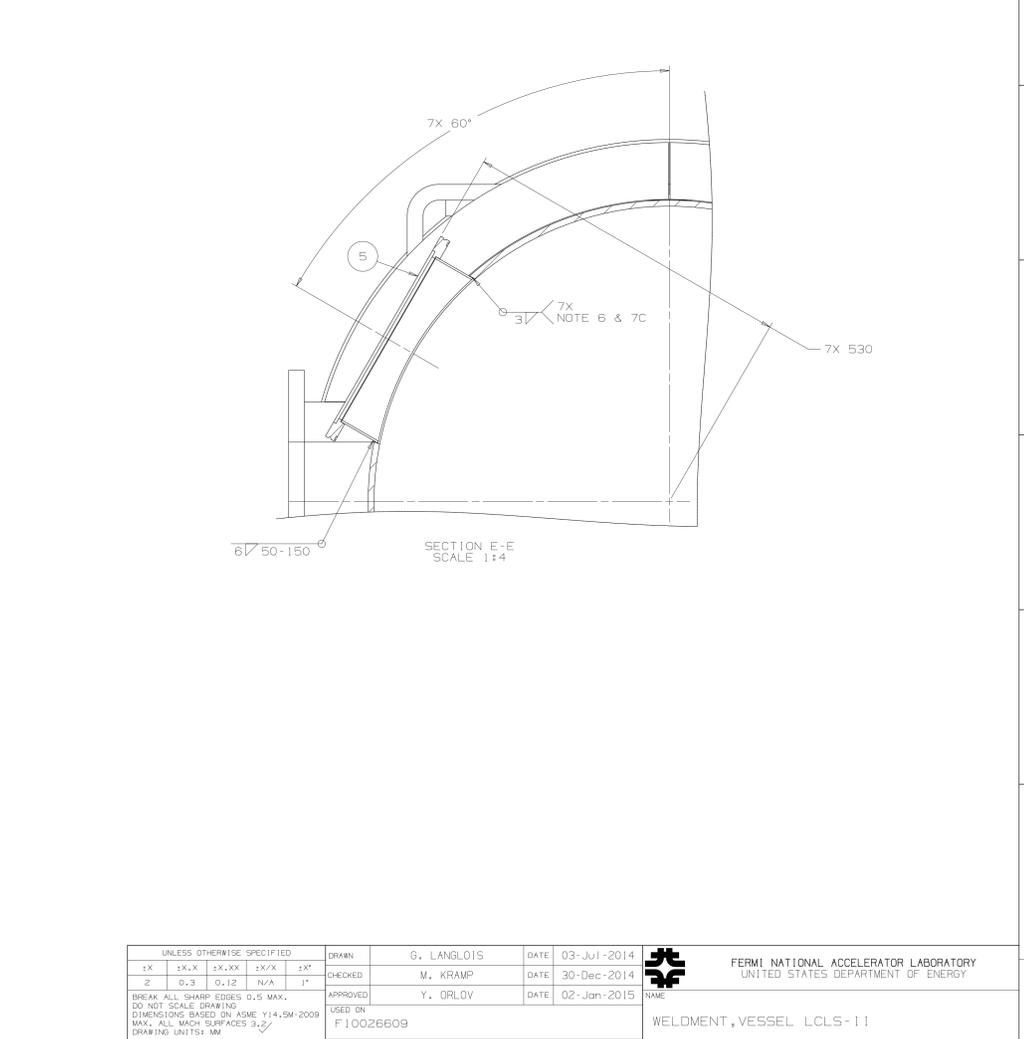
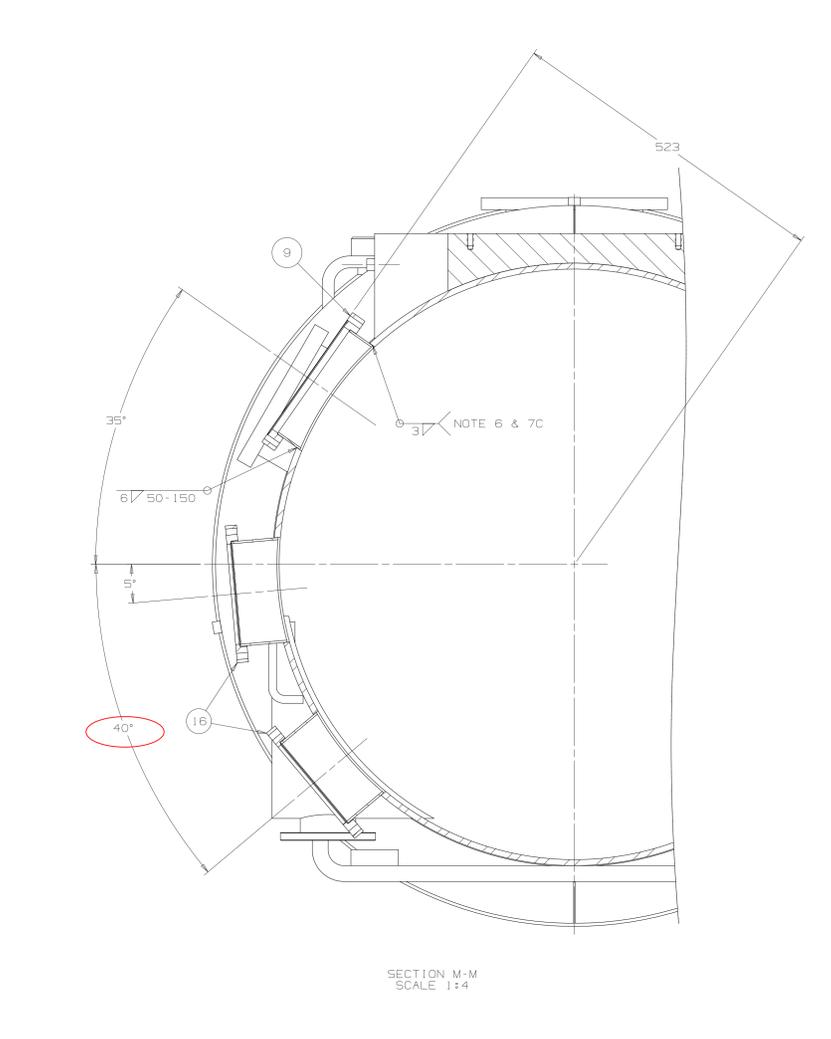
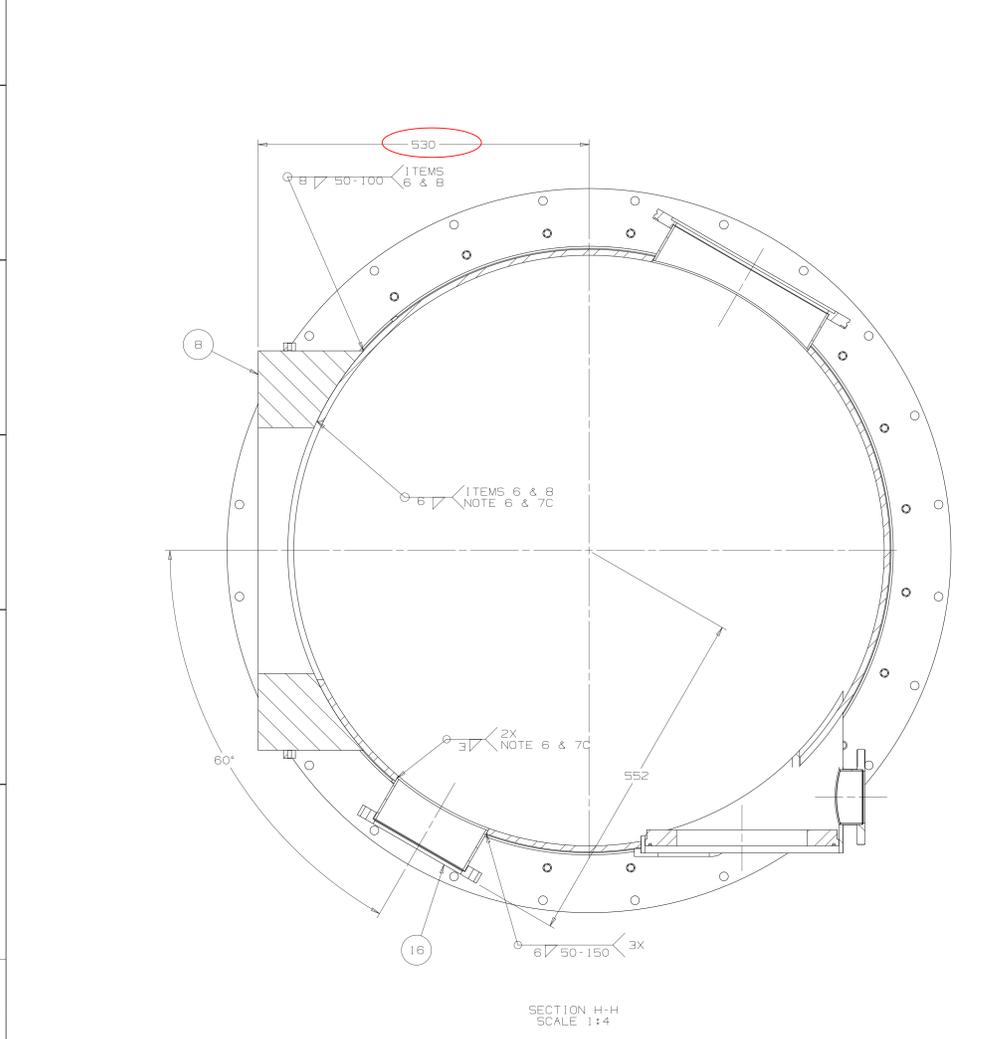
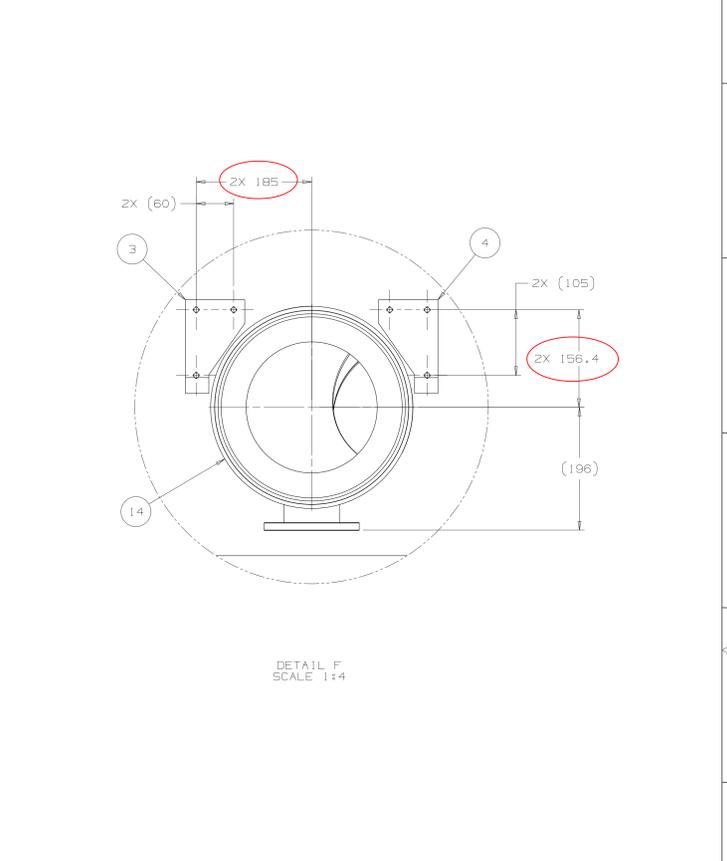
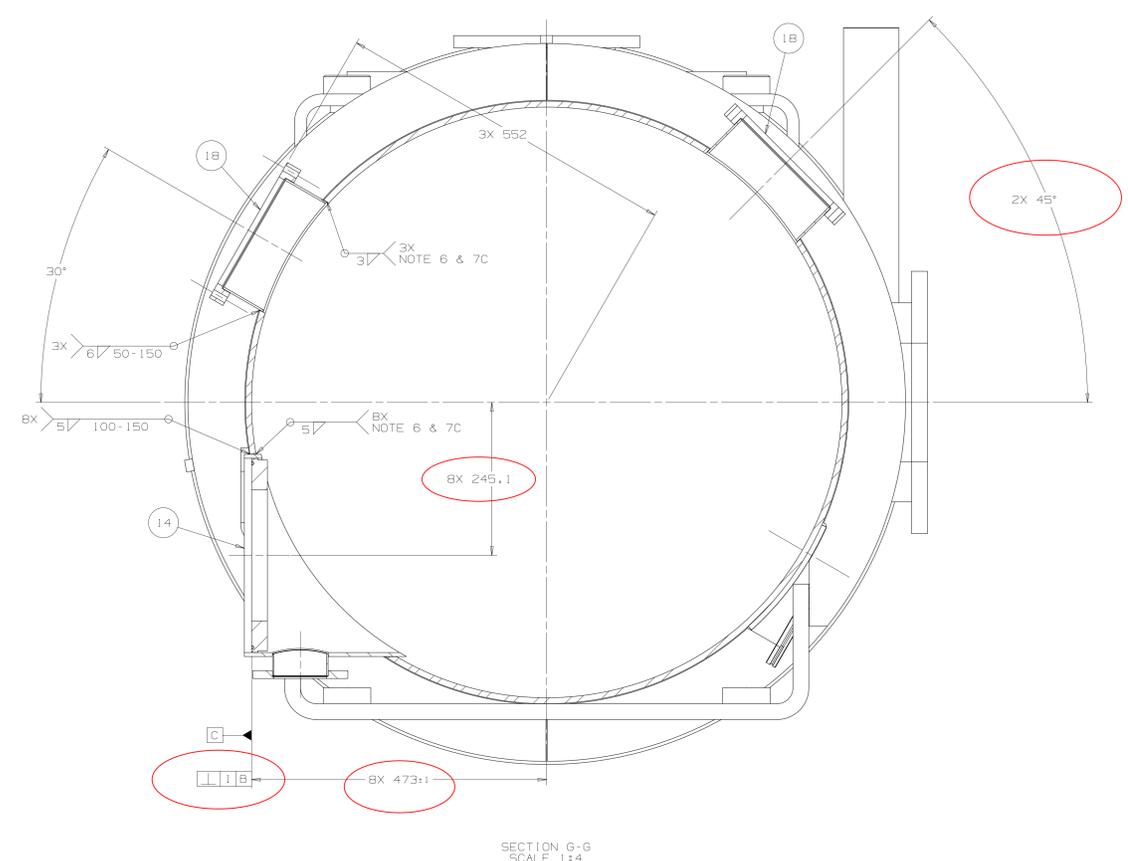
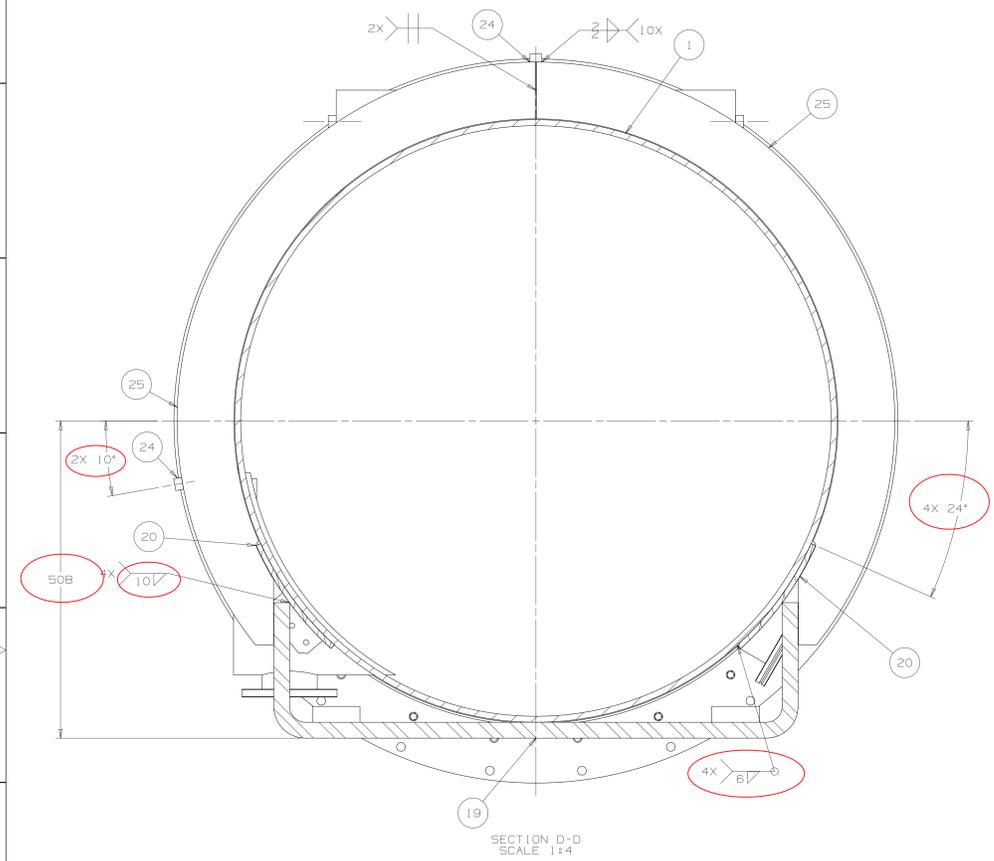
FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

NAME
 RING STIFFENING

| | | | | |
|--------------|------------|-----------------------------|-----------------|----------|
| SCALE 1:2 | SIZE A2 | DRAWING NUMBER F10023949 | SHEET 1 OF 1 | REV - |
|--------------|------------|-----------------------------|-----------------|----------|

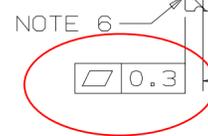
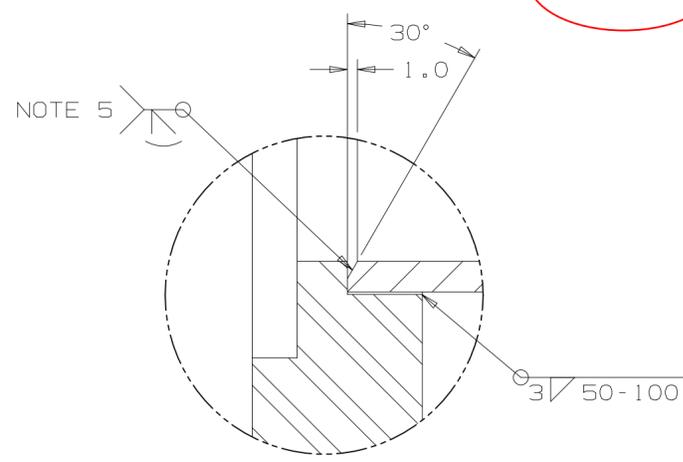
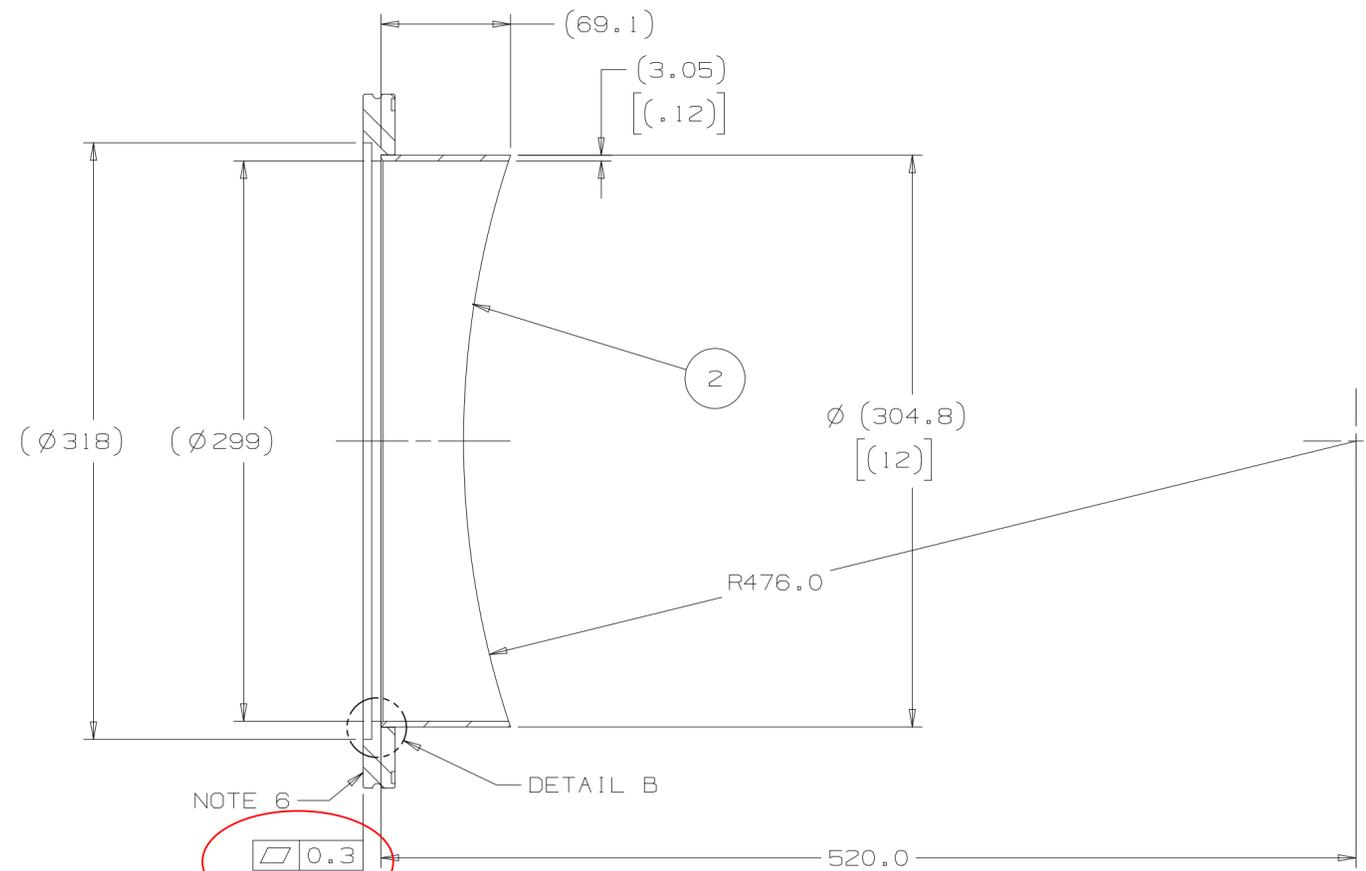
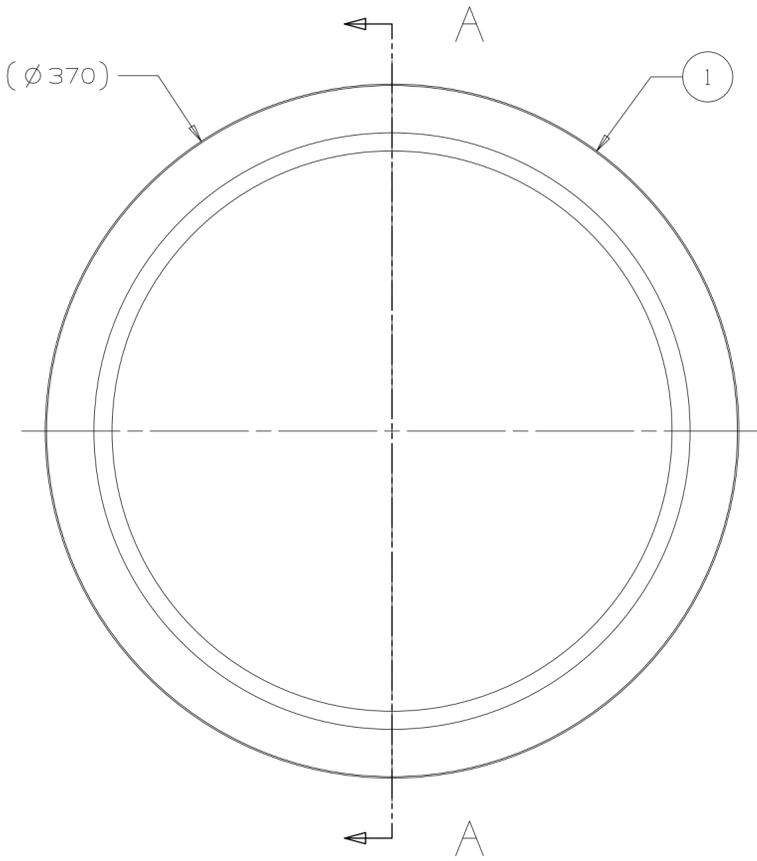


| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|----------------------------|---------------------------------------|
| C | F10026610-C-RCD | 10-Nov-2015 11-Nov-2015 | DRWN: G. LANGLOIS APPROV: Y. ORLOV |



| UNLESS OTHERWISE SPECIFIED | | | | | DRWN | G. LANGLOIS | DATE | 03-Jul-2014 | FERMILAB FERMION NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | | |
|---|------|-------|------|-----|----------------------|-------------|------|-------------|---|-----------|-------|--------|-----|---|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 30-Dec-2014 | | | | | | |
| Z | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | | | | | | |
| 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 F10026609 | | | | NAME WELDMENT, VESSEL LCLS-11 | | | | | |
| MATERIAL SEE PARTS LIST | | | | | SCALE | 1:1 | SIZE | A0 | DRAWING NUMBER | F10026610 | SHEET | 2 of 2 | REV | C |
| GROUP: Technical Division - Design and Drafting CASE CODE: 0596 | | | | | | | | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------------|----------------------------------|
| A | F10026614-A-RCD | 02-Dec-2015 | DRAWN: B.DAMPHOUSSE APPROVED: |



- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - ALL DIMENSIONS ARE IN MILLIMETERS:
DIMENSIONS IN [.XX] ARE IN INCHES.
 - ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
 - ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
 - ALL WELDS TO BE VACUUM LEAK TIGHT.
LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10⁻⁹ ATM. CC/SEC.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.

| ITEM | PART # | DESCRIPTION | QTY |
|------|-----------|--|-----|
| 2 | FC0046576 | PIPE TUNER MOTOR PORT - 12" OD .120" WALL 304 OR 304L SS | 1 |
| 1 | FC0035221 | FLANGE, ISO, 12" ID, 304 SS | 1 |

| 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 | 02-Jul-2014 |
| CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 03-Jan-2015 |

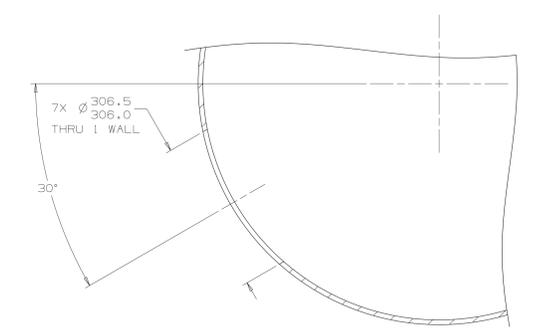
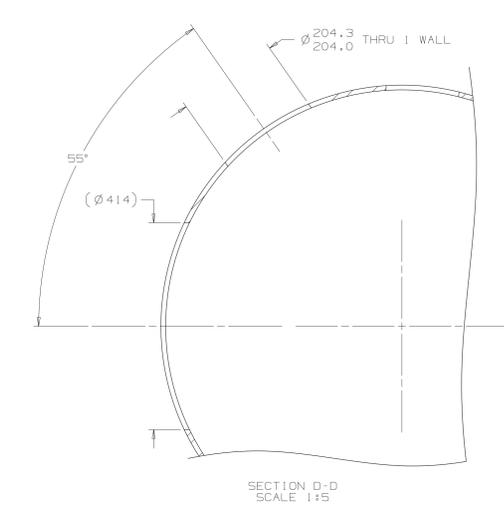
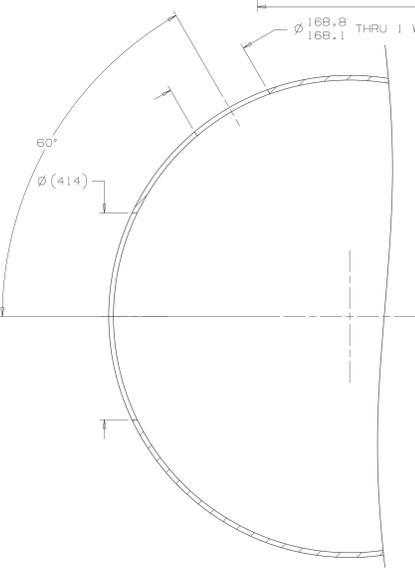
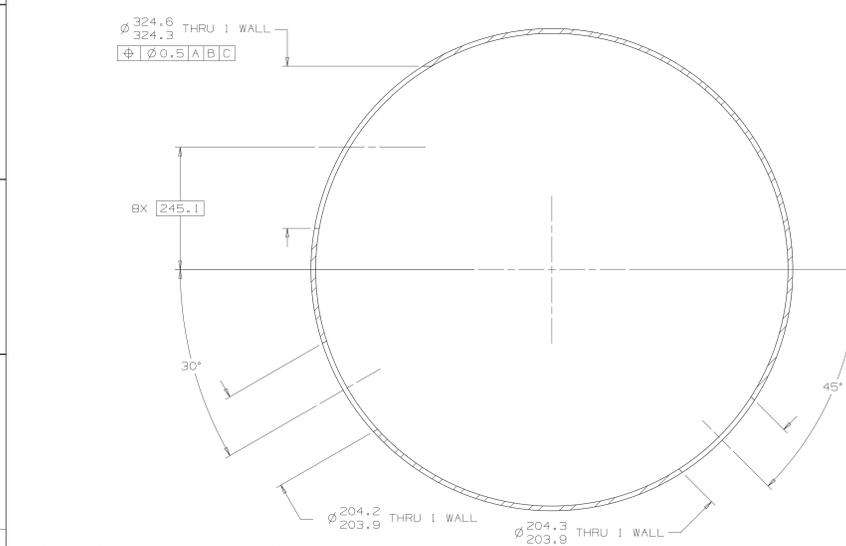
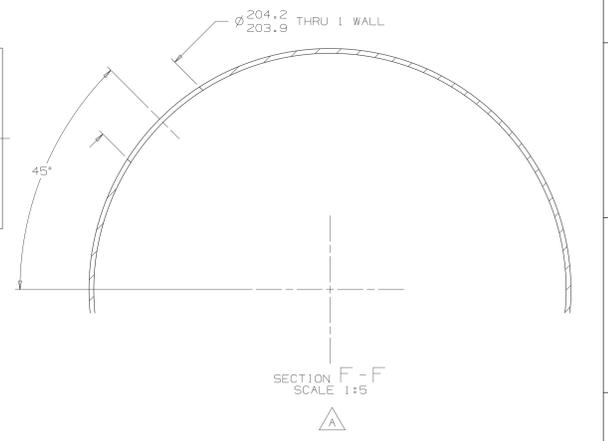
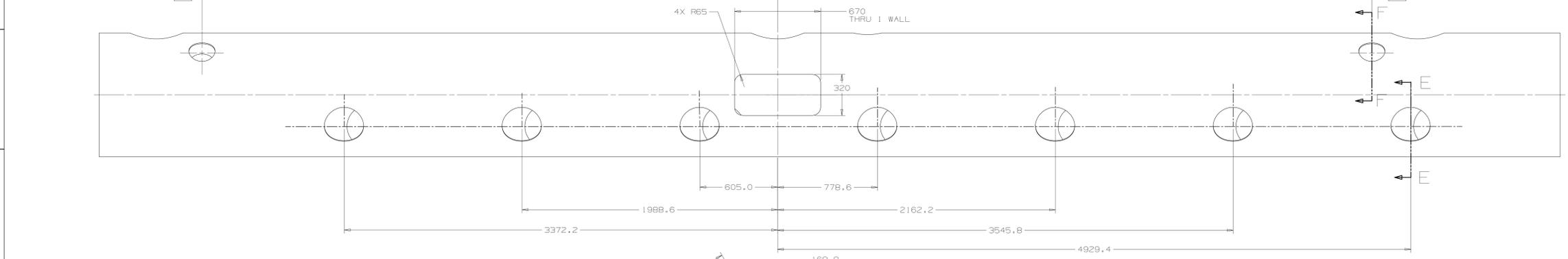
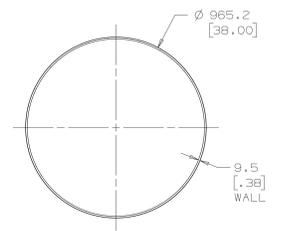
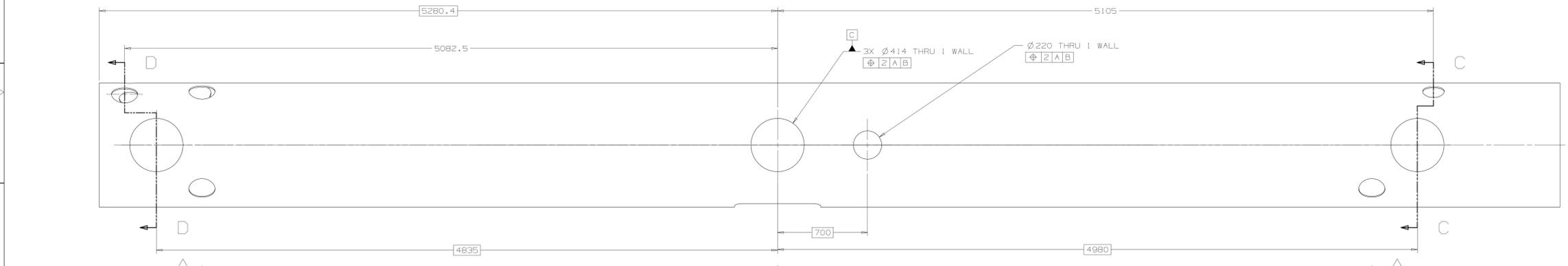
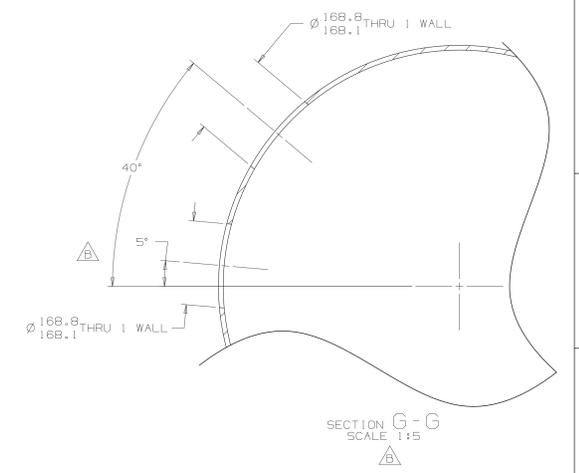
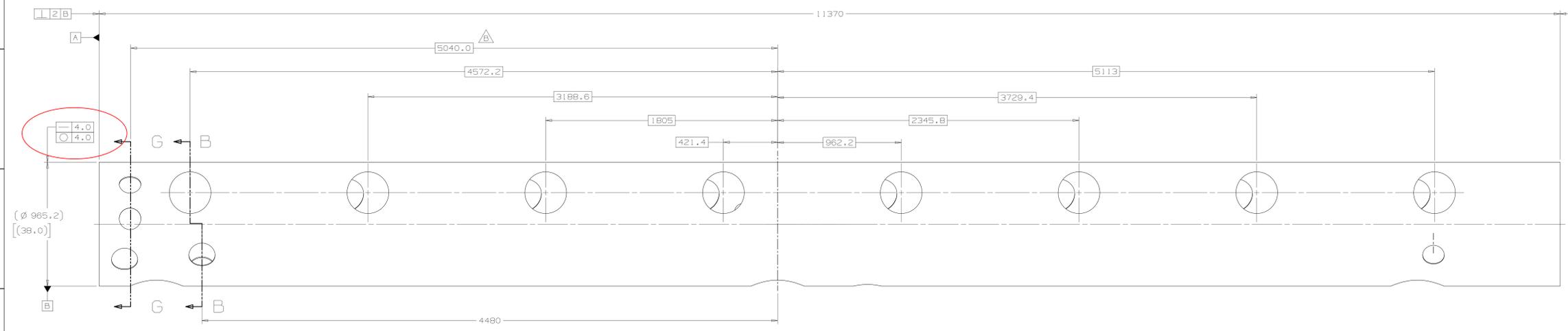
USED ON
 F10026610

MATERIAL
 SEE PARTS LIST

GROUP: Technical Division - Design and Drafting | CAGE CODE: 045R6

| | | | |
|---|------------|-----------------------------|-----------------|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| NAME WELDMENT TUNER MOTOR PORT | | | |
| SCALE 3:8 AS SHOWN | SIZE A2 | DRAWING NUMBER F10026614 | SHEET 1 OF 1 |
| | | REV A | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|----------------------------|-------------------------------------|
| B | F10026616-B-RCD | 10-Feb-2015 10-Feb-2015 | DRWN: G. LANGLOIS APPV: Y. ORLOV |

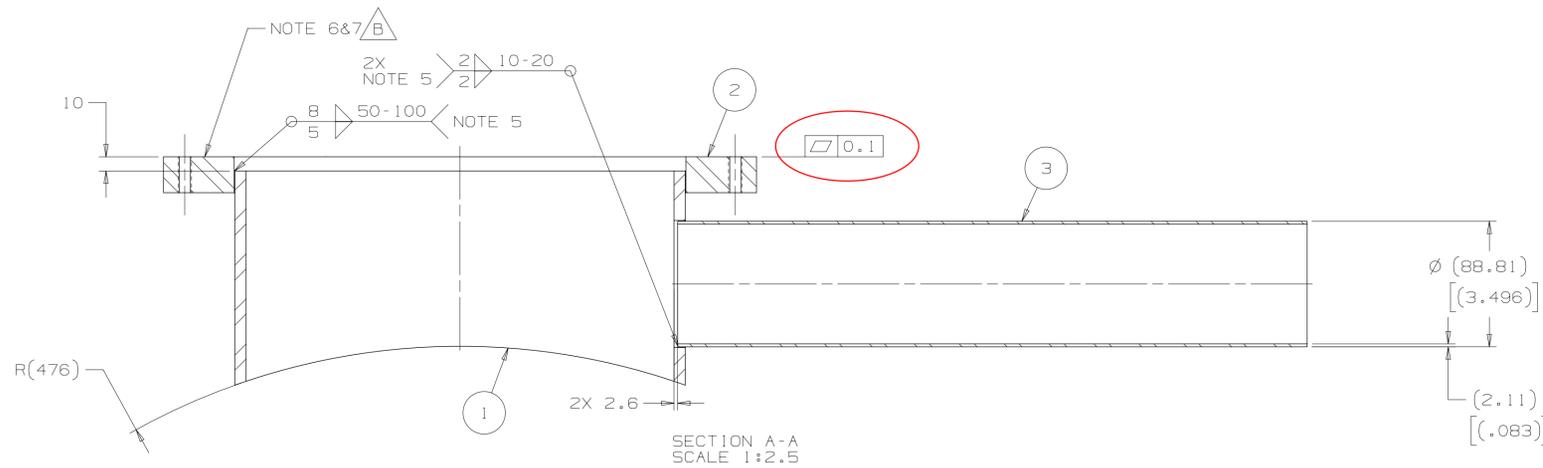
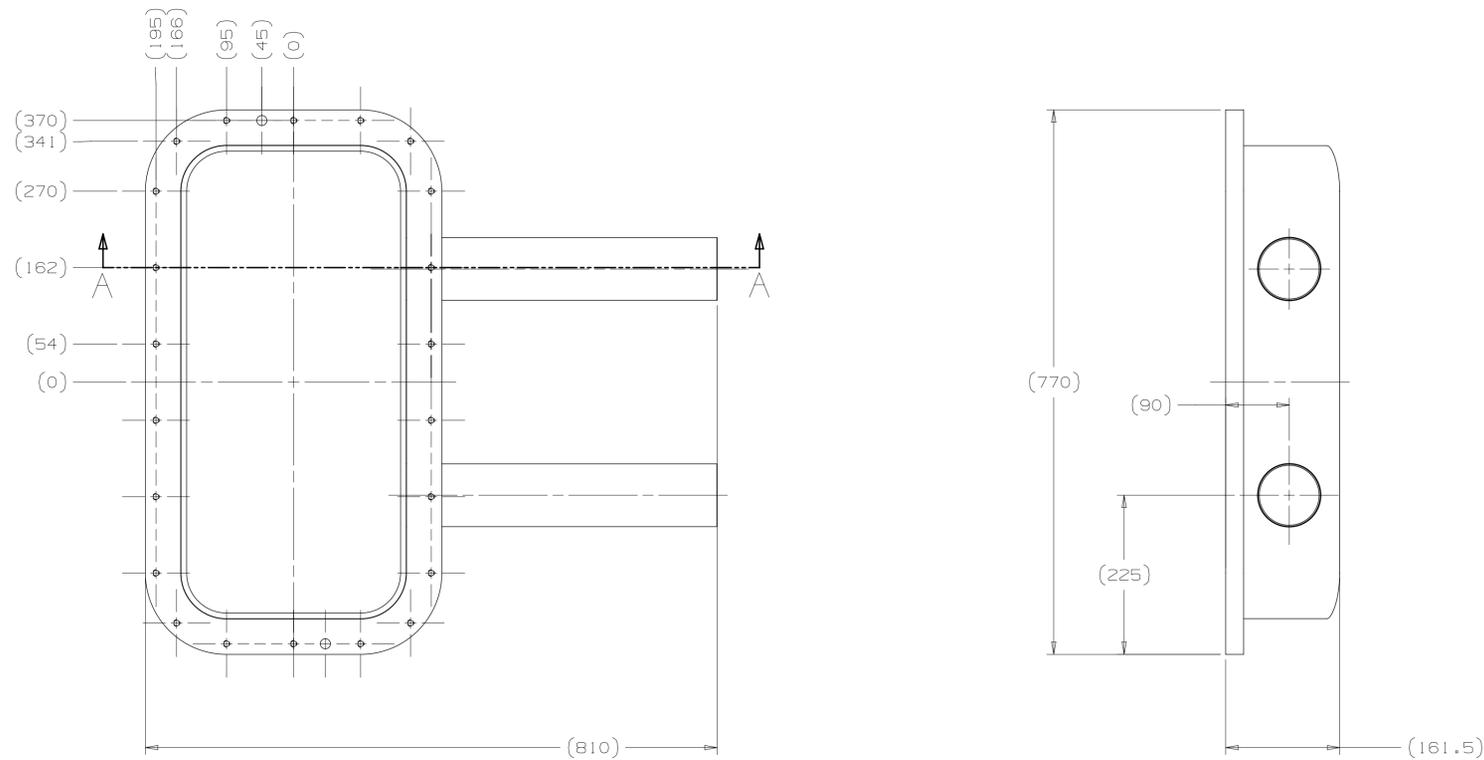


NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- DIMENSIONS IN (.XX) ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRWN | G. LANGLOIS | 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 | 30-Dec-2014 | NAME | | | | |
| Z | 0.3 | 0.12 | N/A | 1" | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | TUBE VACUUM VESSEL-1.3GHz | | | | |
| DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-2009 MAX. ALL MACH SURFACES 3.2 | | | | | USED ON | | F10026610 | | SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| DRAWING UNITS: MM | | | | | MATERIAL | | A516 STEEL, GRADE 60, UNS K02700 | | 0.075:1 | A0 | F10026616 | 1 of 1 | B |
| | | | | | GROUP: Technical Division - Design and Drafting CASE CODE: OUSRB | | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|----------------------------|----------|---------------------------|
| B | F10026618-B-RCD | 02-Dec-2015 04-Dec-2015 | Y. ORLOV | B. DAMPHOUSSE Y. ORLOV |



- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - ALL DIMENSIONS ARE IN MILLIMETERS; DIMENSIONS IN (.XX) ARE IN INCHES.
 - ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
 - ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
 - ALL WELDS TO BE VACUUM LEAK TIGHT. LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10⁻⁹ ATM. CC/SEC.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.
 - SURFACE CAN BE MACHINED, AFTER WELDING. (VENDOR OPTION)

| ITEM | PART # | DESCRIPTION | QTY |
|------|-----------|---------------------------------|-----|
| 3 | F10010054 | PIPE, CONTROL VALVE, SNOOT FEED | 2 |
| 2 | F10026622 | FLANGE BODY SIDE PORT | 1 |
| 1 | F10026623 | BODY SIDE PORT | 1 |

PARTS LIST

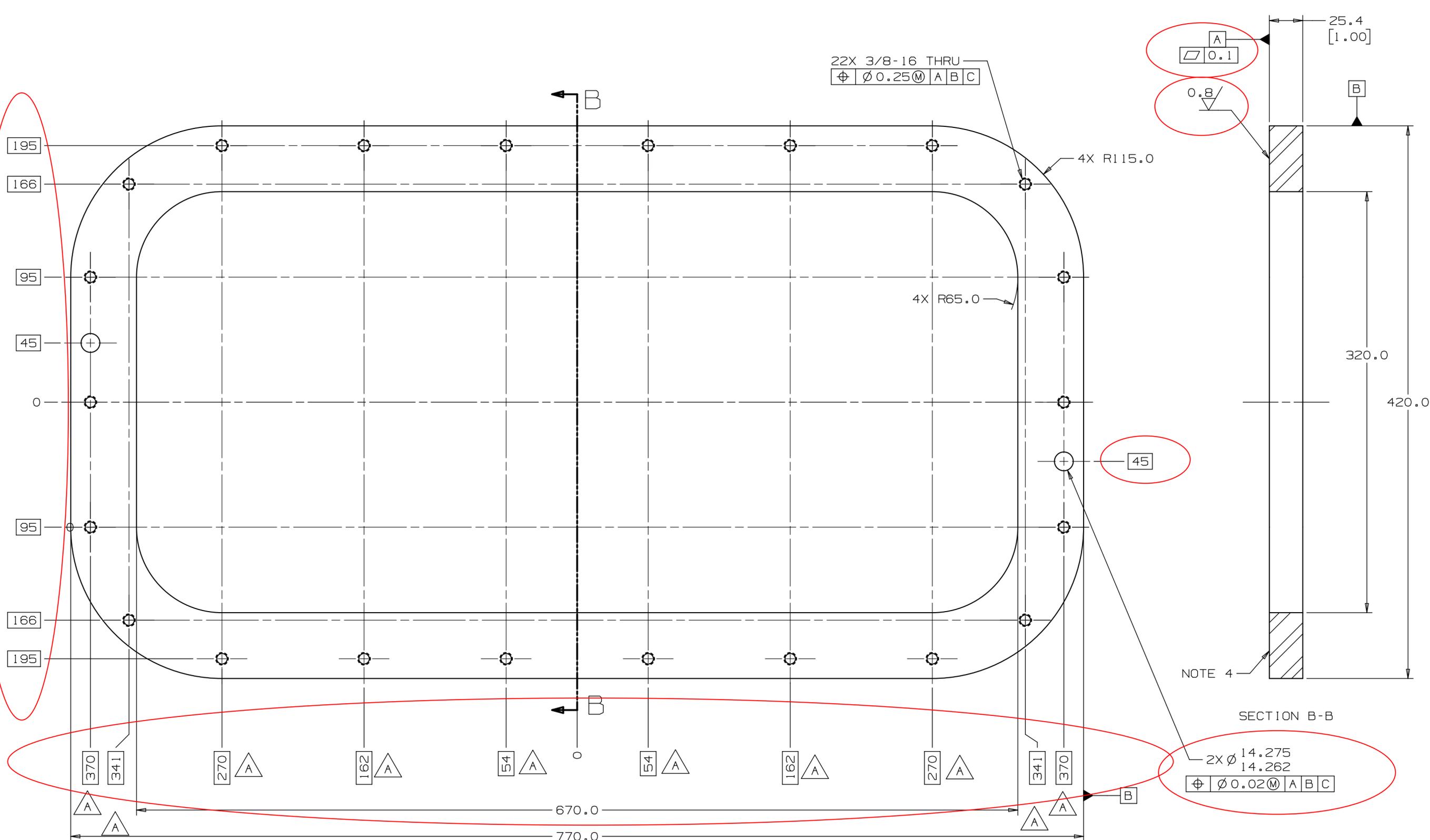
| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 |
|--|------|-------|------|-----|-------------------|-------------|------|-------------|
| ±X | +X.X | +X.XX | +X/X | +X* | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | |
| MATERIAL | | | | | SEE PARTS LIST | | | |
| GROUP: Technical Division - Design and Drafting | | | | | CAGE CODE: QJ596 | | | |

NAME: FERMION NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY

WELDMENT SIDE PORT

| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
|-------|------|----------------|--------|-----|
| 1:2 | A1 | F10026618 | 1 OF 1 | B |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|----------------------------|--|
| A | F10026622-A-RCD | 05-Nov-2015 06-Nov-2015 | DRAWN G. LANGLOIS APPROVED Y. ORLOV |

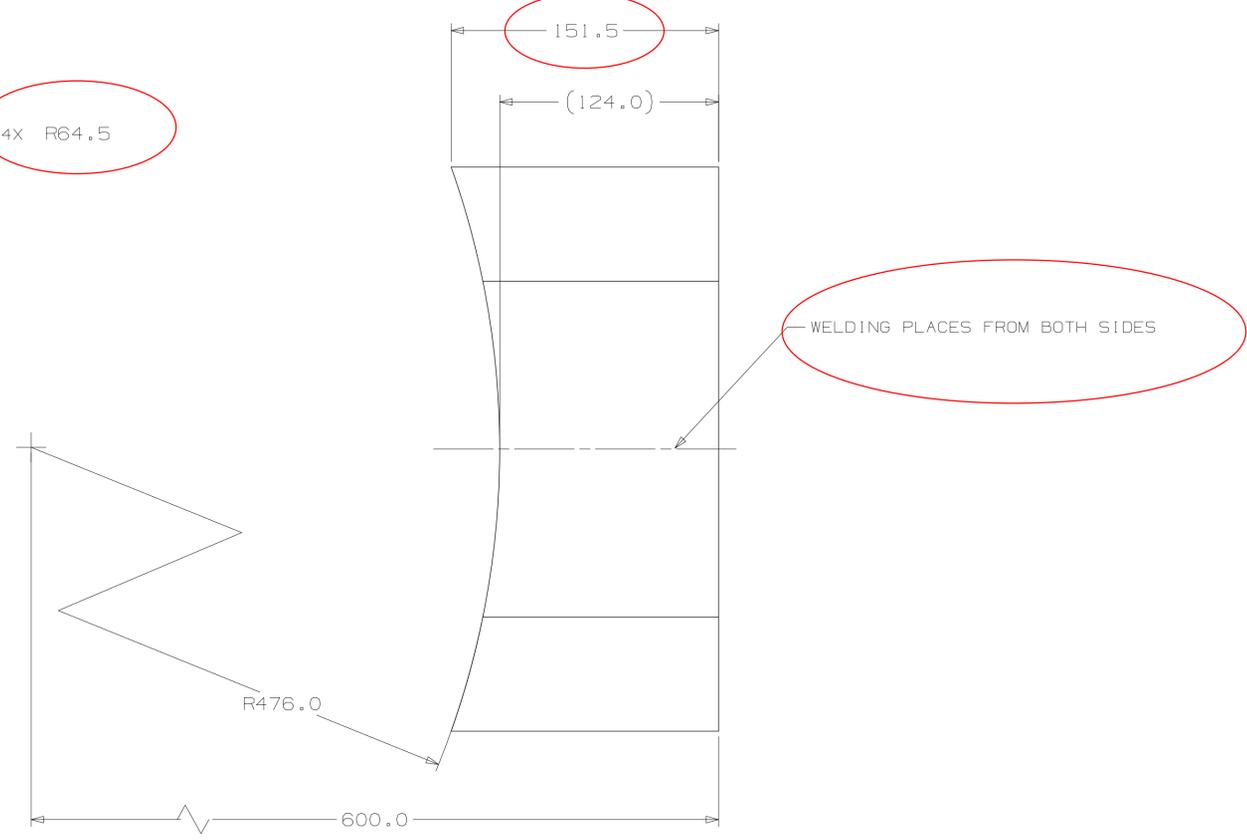
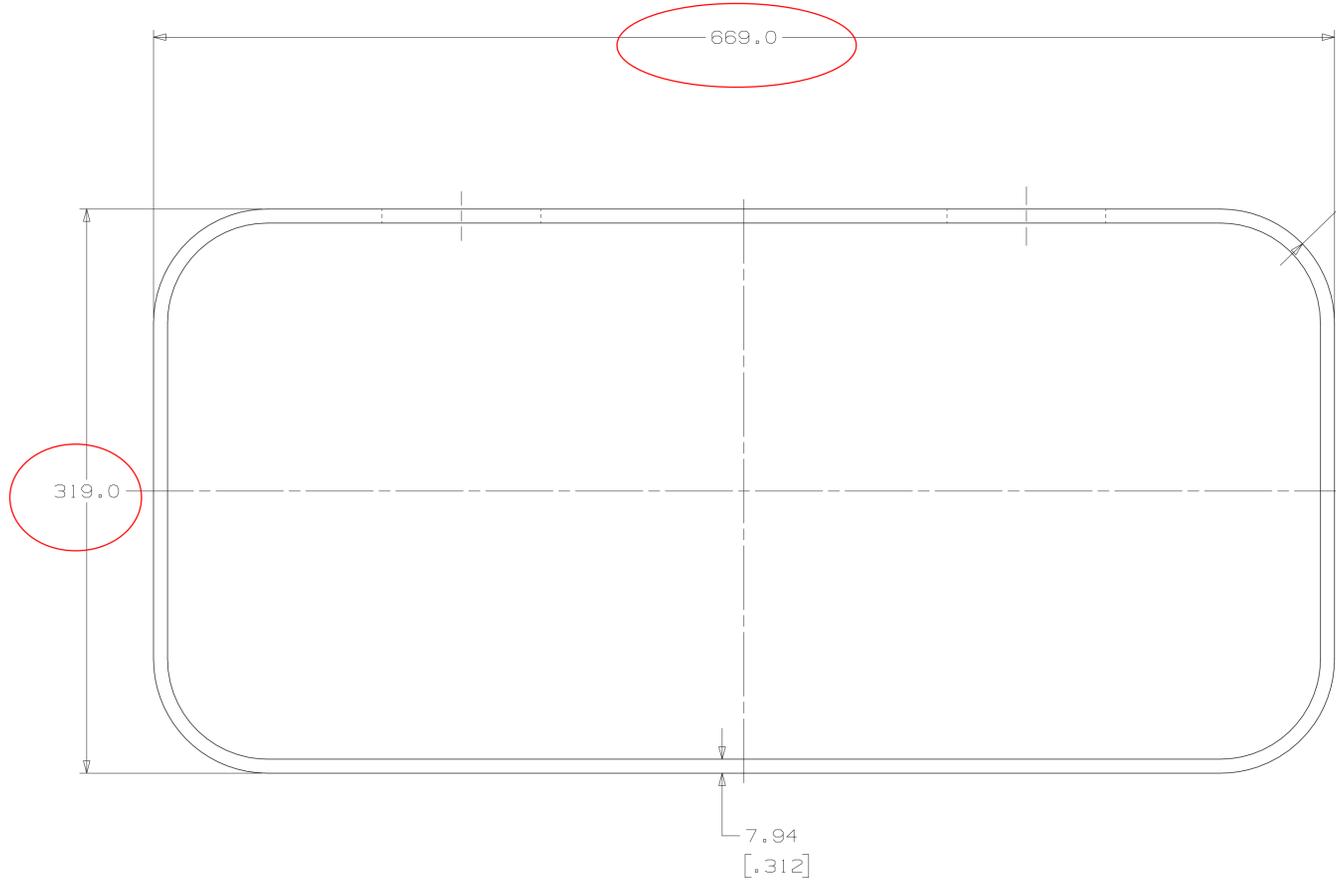
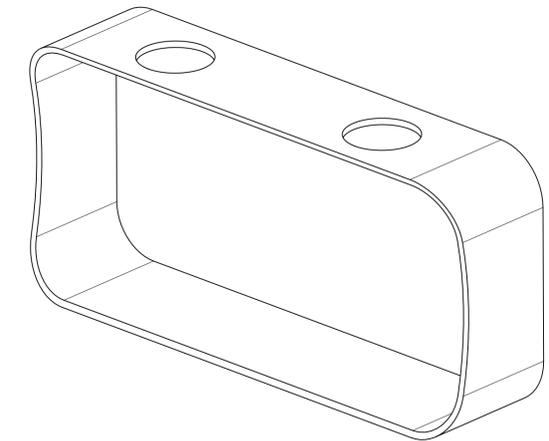
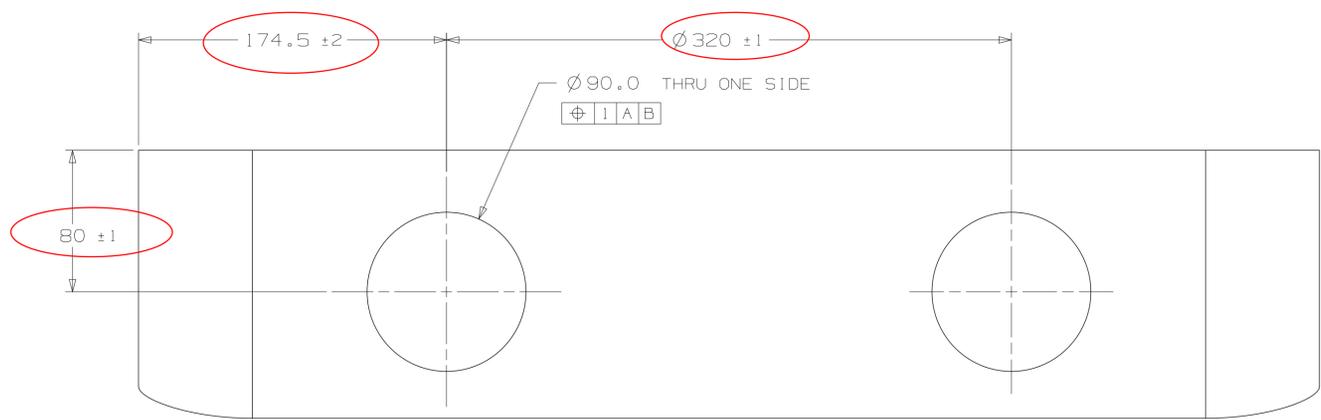


NOTES (UNLESS OTHERWISE SPECIFIED)

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS.
- DIMENSIONS IN (.XX) IS IN INCHES.
- SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
|--|------|-------|------|-----|---|-------------|-------------------------------|-------------|--|-----------------------------|-----------------|----------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M. KRAMP | DATE | 30-Dec-2014 | | | | |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | | | | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026618 | | NAME FLANGE BODY SIDE PORT | | | | | |
| | | | | | MATERIAL: 316L STAINLESS STEEL, UNS S31603 | | SCALE 1:2 | | SIZE A2 | DRAWING NUMBER F10026622 | SHEET 1 OF 1 | REV A |
| | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: OUSR6 | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------------|----------------------------------|
| A | F10026623-A-RCD | 02-Dec-2015 | DRAWN: B.DAMPHOUSSE APPROVED: |

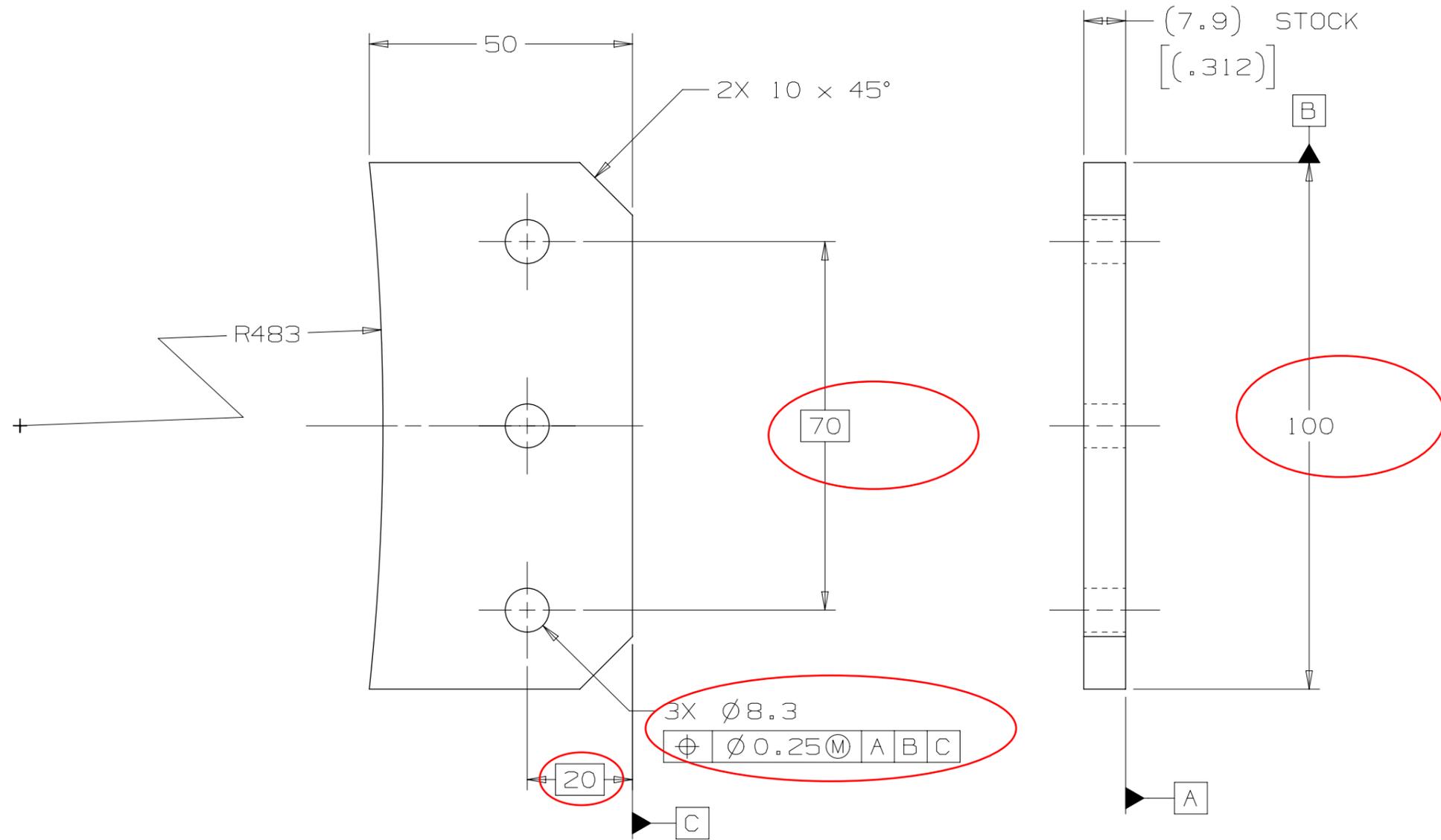


- NOTES (UNLESS OTHERWISE SPECIFIED)
- PART SHALL BE WELDED WITH FULL PENETRATION AND SHALL BE LEAK TIGHT.
 - PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
 - PART TO BE FREE OF ALL SHARP EDGES, CORNERS AND BURRS.
 - DIMENSIONS WITH (.XX) ARE IN INCHES
 - ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | 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 | 30-Dec-2014 | NAME BODY SIDE PORT | | | | |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | | | | | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026618 | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | SCALE 1:2 | SIZE A1 | DRAWING NUMBER F10026623 | SHEET 1 OF 1 | REV A |
| | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: QUSR6 | | | | | | |

DESCRIPTION: PLATE SUPPORT
 CATEGORY: PLATE PROJECT: LCLS11Cryomodule

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|-------------|
| A | F10027597-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV |

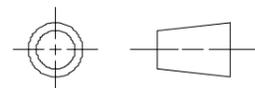


NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- DIMENSIONS IN (.XX) ARE IN INCHES.

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

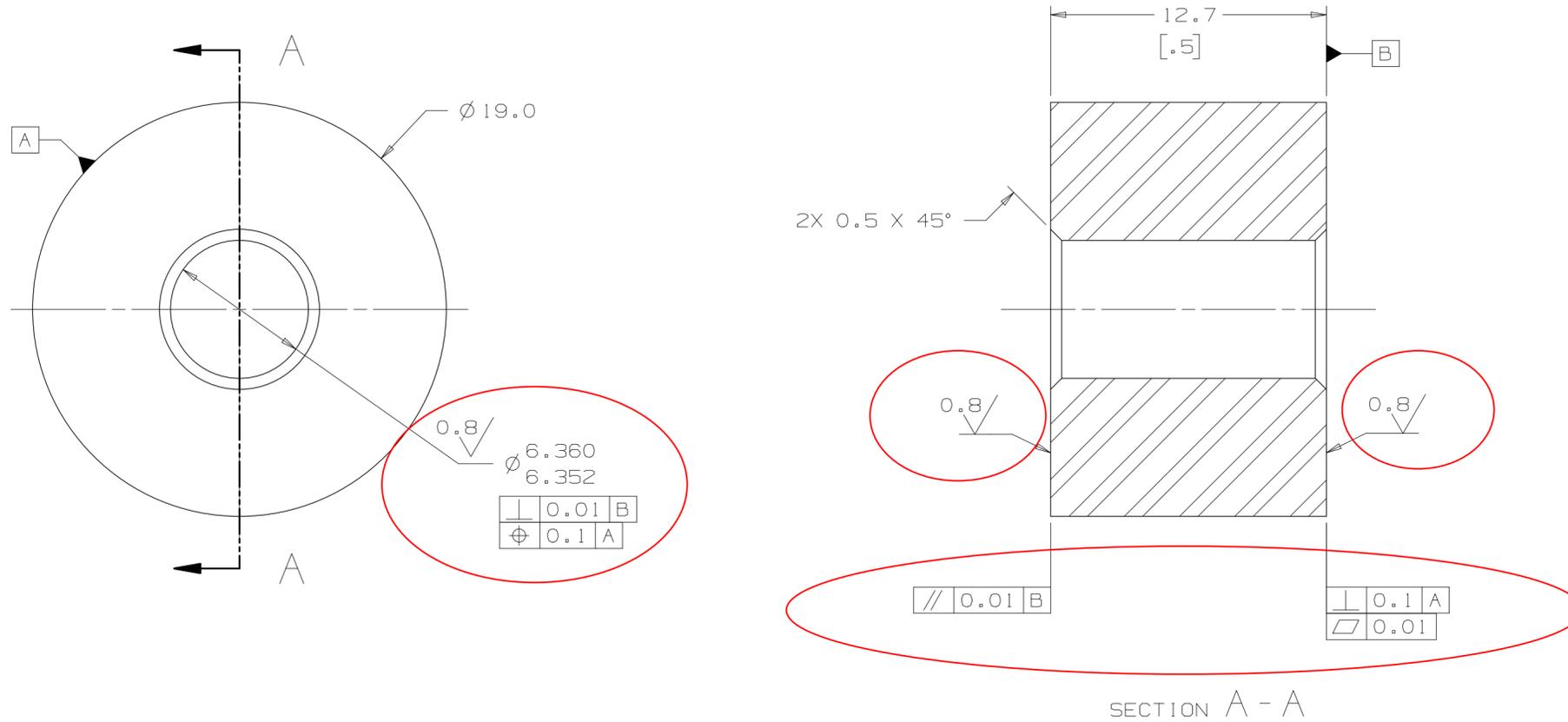
BREAK ALL SHARP EDGES 0.5 MAX.
 DO NOT SCALE DRAWING
 DIMENSIONS BASED ON ASME Y14.5M-1994
 MAX. ALL MACH SURFACES 3.2
 DRAWING UNITS: MM



| | | | |
|--|----------------------------------|------|-------------|
| DRAWN | G. LANGLOIS | DATE | 03-Nov-2014 |
| CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10026610 | | |
| MATERIAL | 316L STAINLESS STEEL, UNS S31603 | | |
| GROUP: Technical Division - Design and Drafting CAGE CODE: OUSR6 | | | |

| | | | | |
|---------------|---|-----------------------------|-----------------|----------|
| | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| | NAME | | | |
| PLATE SUPPORT | | | | |
| SCALE 1:1 | SIZE A3 | DRAWING NUMBER F10027597 | SHEET 1 OF 1 | REV A |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|-------------|
| A | F10030268-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV |

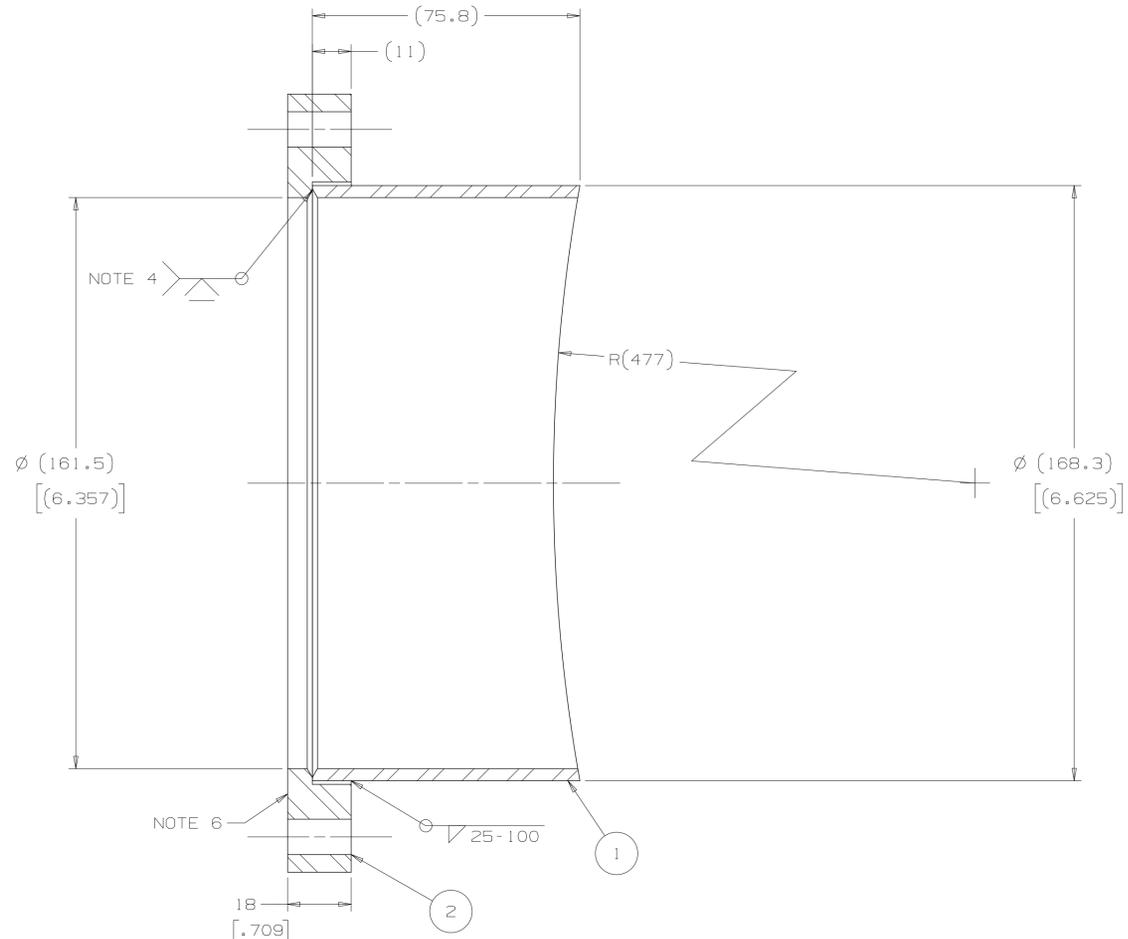
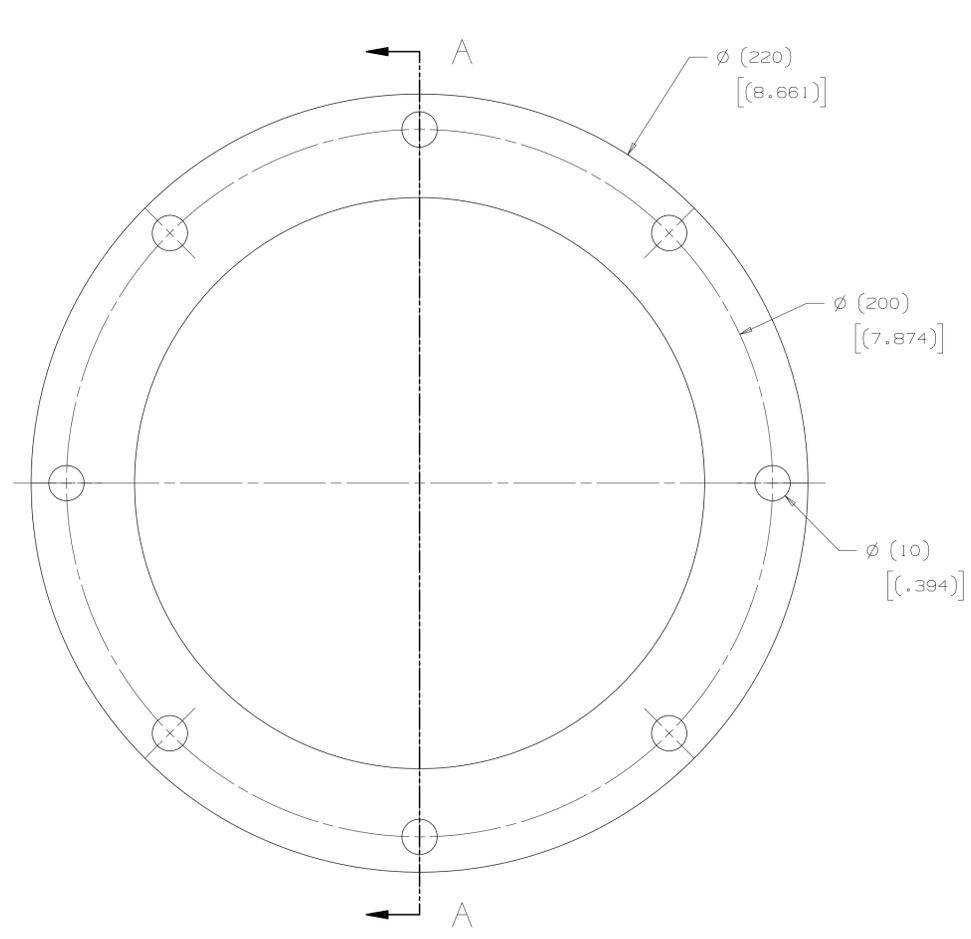


NOTES (UNNNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- DIMENSIONS IN [.XX] ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | DATE | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | | | |
|--|------|-------|------|-----|---|-------------|----------------------------------|------|---|--|--|----|----------------|-----------|-------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | G. LANGLOIS | 03-Nov-2014 | | | NAME SOCKET BALL TOOLING | | | | | | |
| 2 | 0.3 | 0.12 | N/A | 1* | M. KRAMP | 31-Dec-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 | | | | | APPROVED | Y. ORLOV | 02-Jan-2015 | | SCALE 5:1 | | | | | | |
| | | | | | USED ON | F10026610 | | SIZE | | | | A2 | DRAWING NUMBER | F10030268 | SHEET |
| | | | | | MATERIAL | | 316L STAINLESS STEEL, UNS S31603 | | | | | | | | |
| | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: QUES6 | | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | DRAWN | SIGNATURES |
|-----|---------------------------|-------------|----------|--------------|
| A | F10030283-A-RCD | 02-Dec-2015 | APPROVED | B.DAMPHOUSSE |



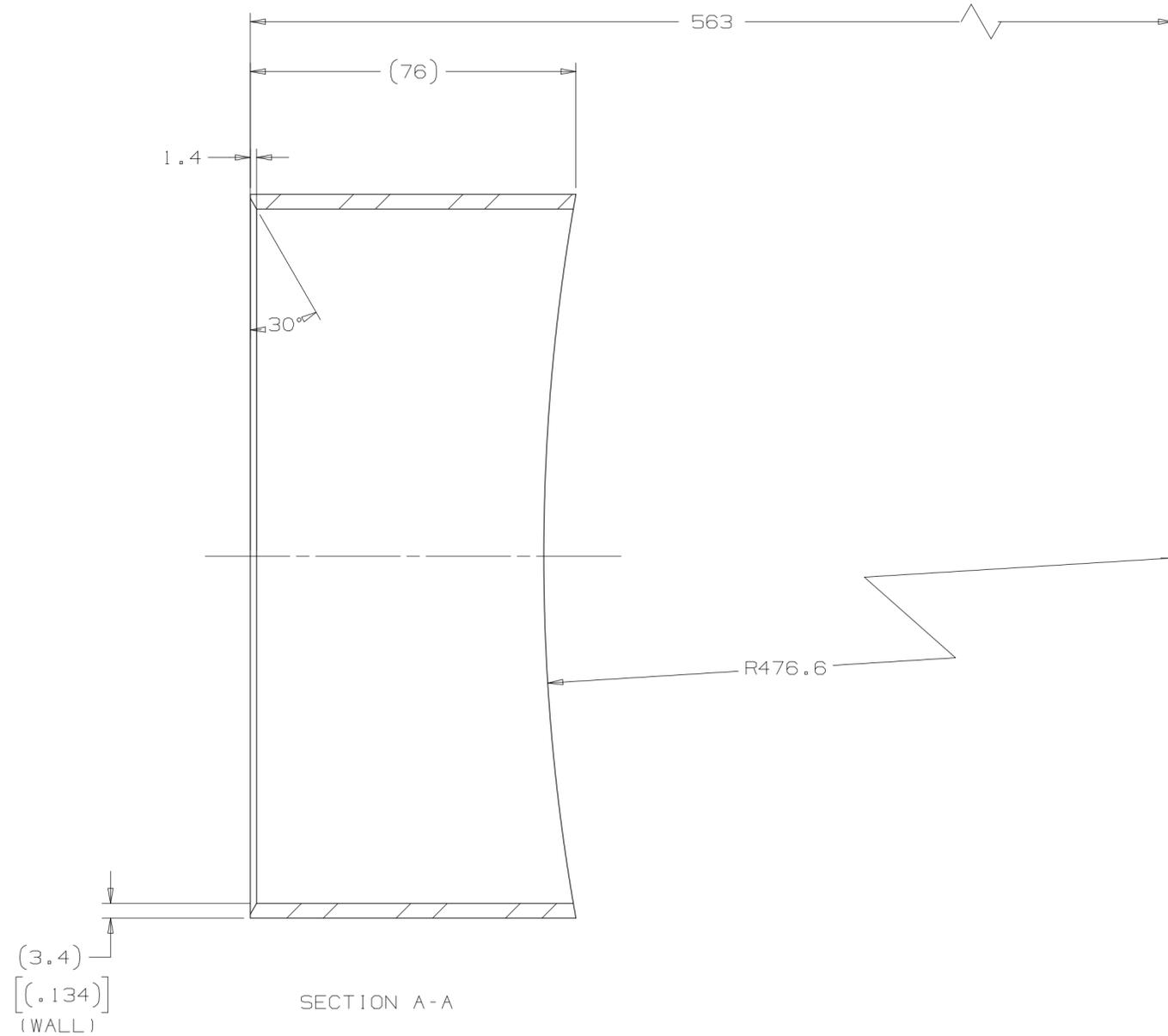
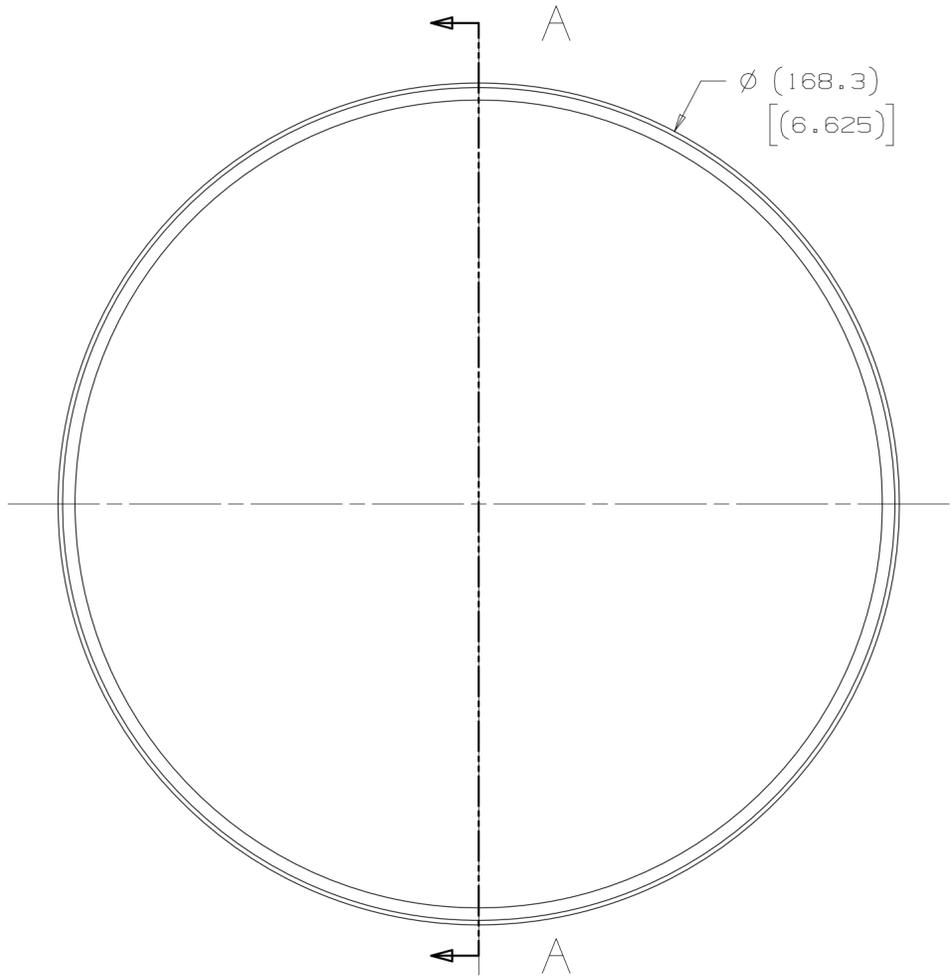
SECTION A - A

- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - ALL DIMENSIONS ARE IN MILLIMETERS; DIMENSIONS IN (.XX) ARE IN INCHES.
 - ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
 - ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
 - ALL WELDS TO BE VACUUM LEAK TIGHT. LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10⁻⁹ ATM. CC/SEC.
 - SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.

| ITEM | PART# | DESCRIPTION | QTY |
|------|-----------|------------------------|-----|
| 2 | F10030285 | FLANGE INSTRUMENTATION | 1 |
| 1 | F10030284 | TUBE NOZZLE | 1 |

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 20-Jun-2014 | FERMIL NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | |
|--|------|-------|------|-----|---|----------------|------------------|-------------|--|---------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M. KRAMP | DATE | 30-Dec-2014 | | |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y. ORLOV | DATE | 02-Jan-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 | F10026610 | | NAME | | WELDMENT PORT |
| | | | | | MATERIAL | SEE PARTS LIST | | SCALE | 1:1 | |
| | | | | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: QUS96 | SIZE | A1 | |
| | | | | | | | DRAWING NUMBER | F10030283 | SHEET | 1 OF 1 |
| | | | | | | | REV | A | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|---------------------------|
| - | F10030284---RCD | - | DRAWN - - APPROVED - - |



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.
- PIPE 6" SCHEDULE 10, 304 SS.
- DIMENSIONS IN [.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 .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 | 19-Jun-2014 |
| CHECKED | M KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

USED ON
 F10030283

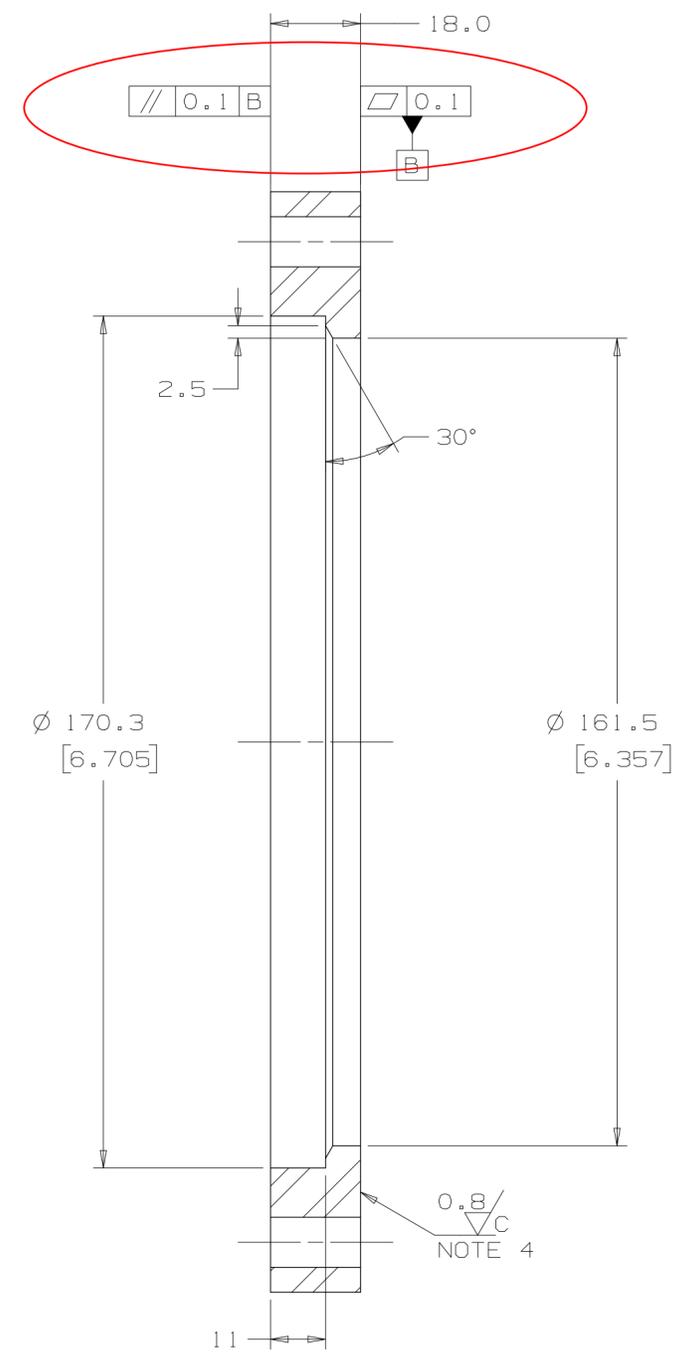
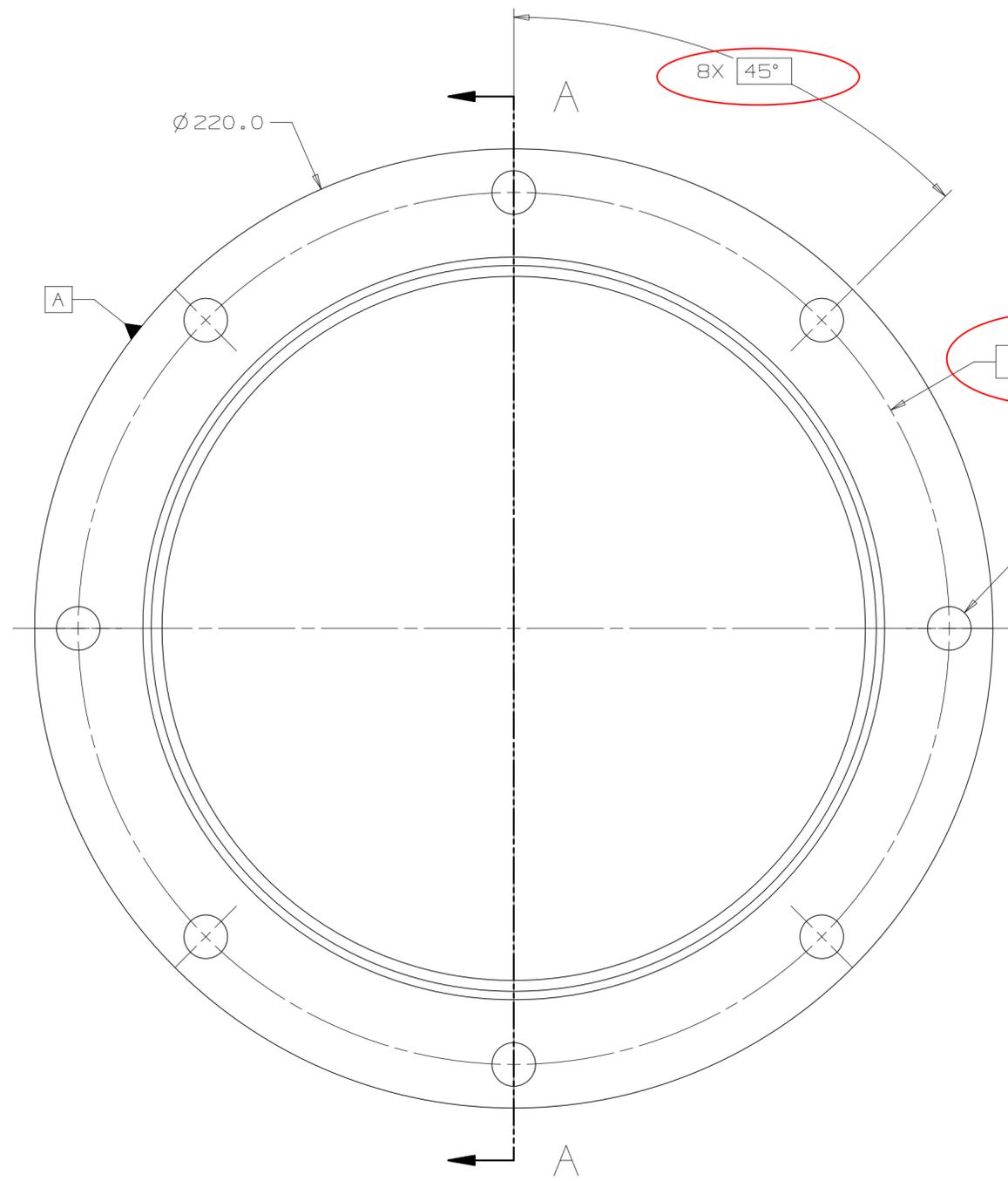
MATERIAL
 NOTE 3

GROUP: Technical Division - Design and Drafting CAGE CODE: QUSR6

| | | | | |
|---|------------|-----------------------------|-----------------|----------|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
| NAME TUBE NOZZLE | | | | |
| SCALE 1:1 | SIZE A2 | DRAWING NUMBER F10030284 | SHEET 1 OF 1 | REV - |



| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|-------------|
| A | F10030285-A-RCD | 25-Feb-2015 | DRAWN | G. LANGLOIS |
| | | 25-Feb-2015 | APPROVED | Y. ORLOV |

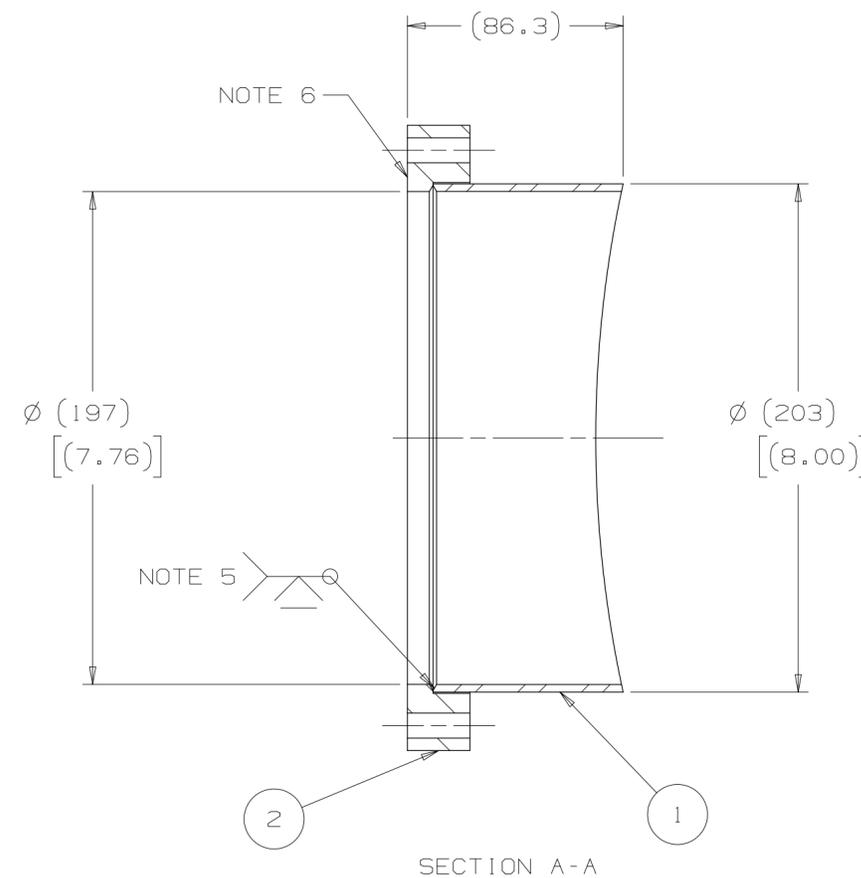
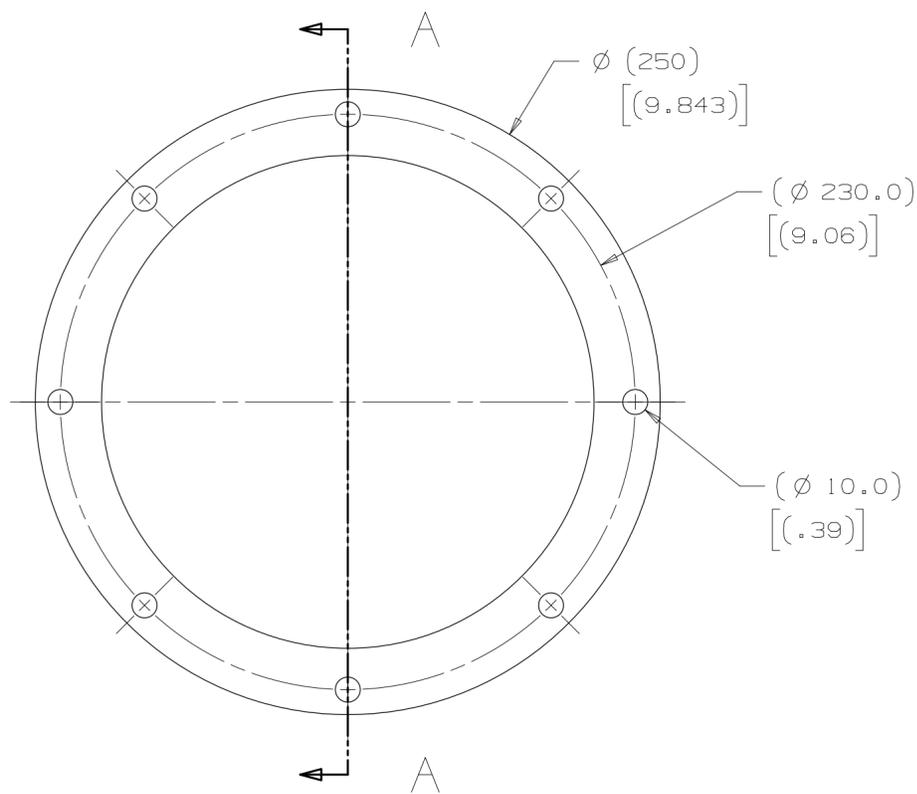


NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- DIMENSIONS APPLY AFTER ALL FINISHING.
- SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.
- DIMENSIONS IN [.XX] ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | DATE | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | |
|--|------|-------|------|-----|--|-------------|---|--|---|--|--|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | G. LANGLOIS | 31-Oct-2014 | NAME FLANGE INSTRUMENTATION SCALE 1:1 SIZE A2 DRAWING NUMBER F10030285 SHEET 1 OF 1 REV A | | | | |
| 2 | 0.3 | 0.12 | N/A | 1° | M. KRAMP | 30-Dec-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 | | | | | Y. ORLOV | 02-Jan-2015 | | | | | |
| USED ON F10030283 | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | | | | |
| GROUP: Technical Division - Design and Drafting CAGE CODE: QUSR6 | | | | | | | | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------------|------------|--------------|
| A | F10030297-A-RCD | 02-Dec-2015 | DRAWN | B.DAMPHOUSSE |
| | | | APPROVED | - |



NOTES (UNLESS OTHERWISE SPECIFIED):

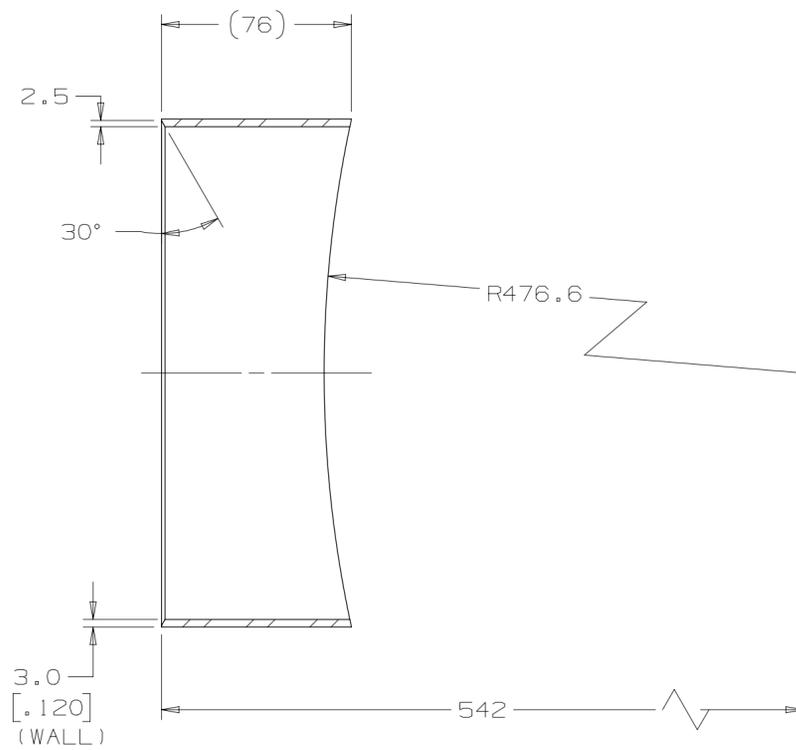
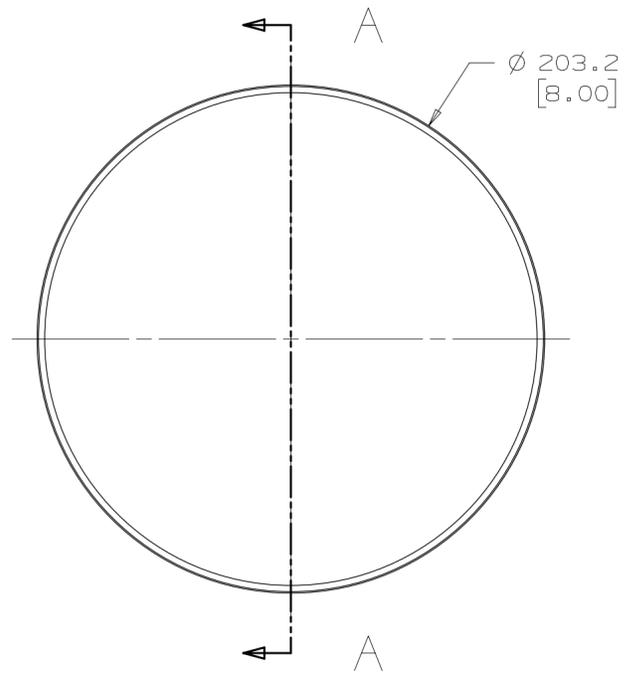
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- ALL DIMENSIONS ARE IN MILLIMETERS:
DIMENSIONS IN (.XX) ARE IN INCHES.
- ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
- ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1 
- ALL WELDS TO BE VACUUM LEAK TIGHT.
LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10^{-9} ATM. CC/SEC.
- SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.

| ITEM | PART # | DESCRIPTION | QTY |
|------|-----------|------------------------|-----|
| 2 | F10030301 | FLANGE INSTRUMENTATION | 1 |
| 1 | F10030299 | PIPE NOZZLE PORT | 1 |

PARTS LIST

| | | | | | | | |
|--|------|---|----------|------------------|-------------|---|---------------|
| UNLESS OTHERWISE SPECIFIED | | DRAWN | | DATE | | FERMION NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | |
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | G. LANGLOIS | 24-Jun-2014 | WELDMENT PORT |
| 2 | 0.3 | 0.12 | N/A | 1* | M. KRAMP | 31-Dec-2014 | |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 | NAME | |
|  | | USED ON | | F10026610 | | SCALE | |
| | | MATERIAL | | SEE PARTS LIST | | SIZE | |
| | | GROUP: Technical Division - Design and Drafting | | CAGE CODE: QUSR6 | | DRAWING NUMBER | |
| | | | | | | A2 | |
| | | | | | | F10030297 | |
| | | | | | | SHEET | |
| | | | | | | 1 OF 1 | |
| | | | | | | REV | |
| | | | | | | A | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------|------------|---|
| - | F10030299---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.
- DIMENSION IN [.XX] ARE IN INCHES.

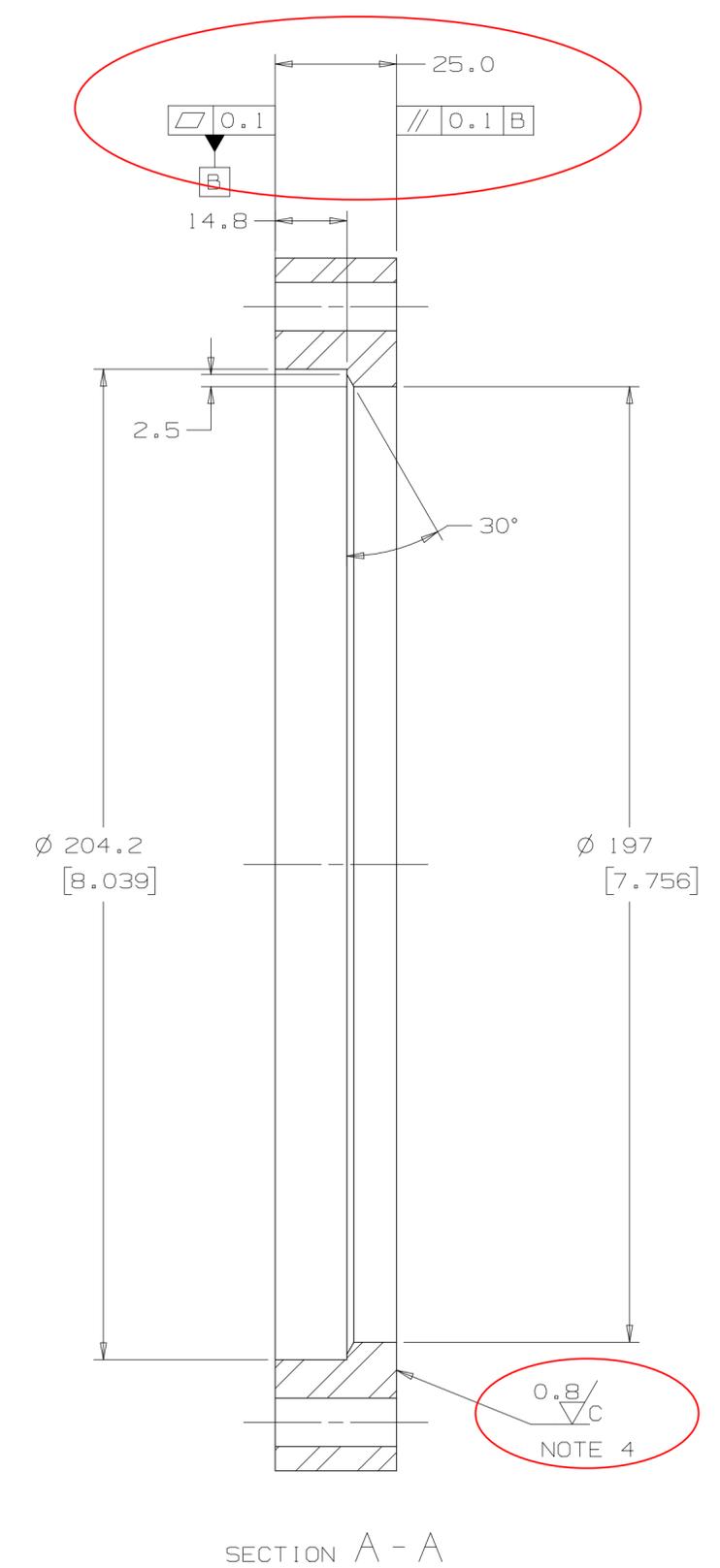
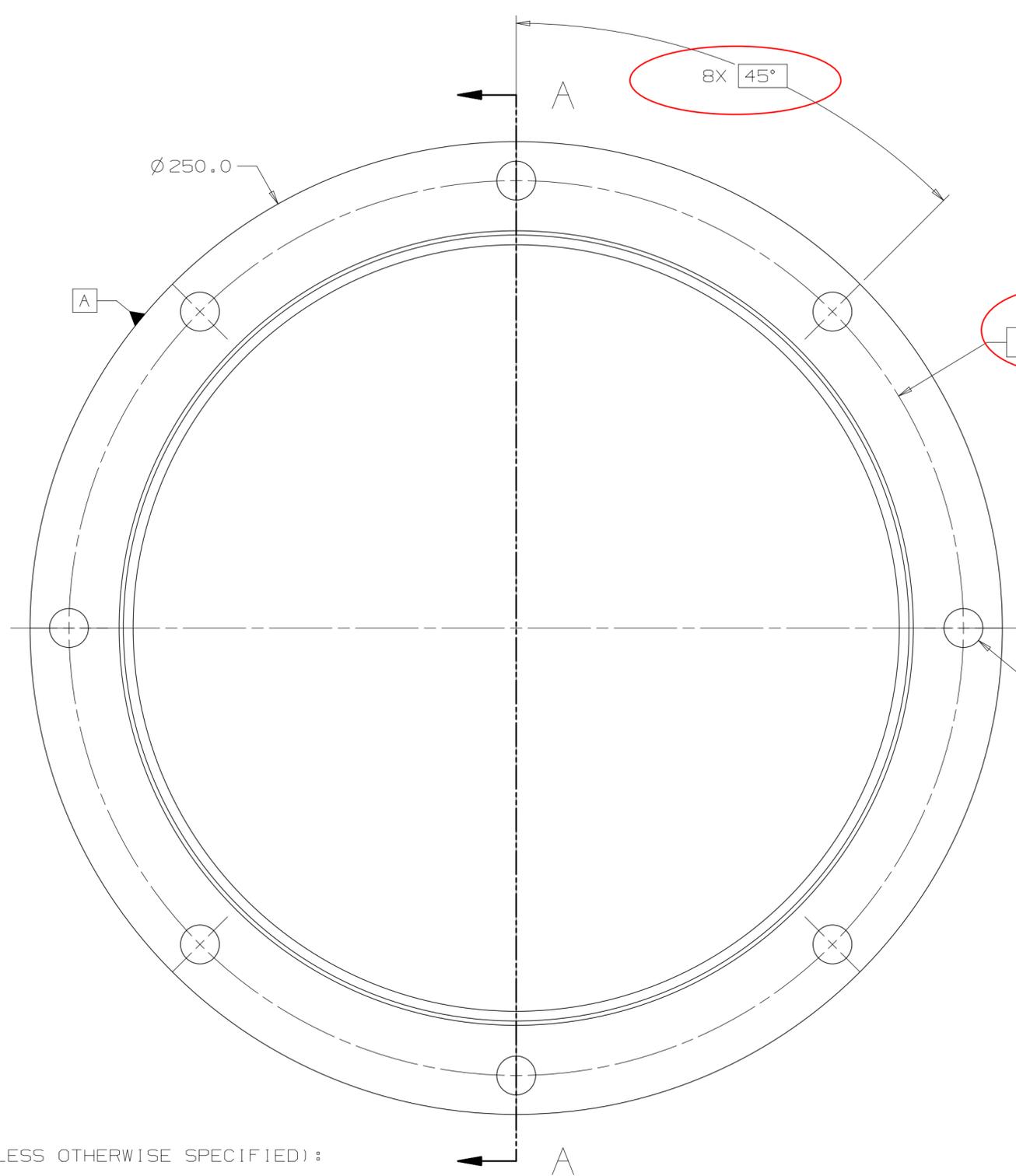
| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 24-Jun-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10030297 | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, ANNEALED, UNS S31603 | | | |
| | | | | | GROUP: Technical Division - Design and Drafting CAGE CODE: OUSR6 | | | |



FERMI NATIONAL ACCELERATOR LABORATORY
 UNITED STATES DEPARTMENT OF ENERGY

| | | | | | | | | | |
|-------|------|----------------|--|--------|------------------|--|--|--|--|
| NAME | | | | | PIPE NOZZLE PORT | | | | |
| SCALE | SIZE | DRAWING NUMBER | | SHEET | REV | | | | |
| 1:2 | A2 | F10030299 | | 1 OF 1 | - | | | | |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|----------------------------|--|
| A | F10030301-A-RCD | 25-Feb-2015 25-Feb-2015 | DRAWN: G. LANGLOIS APPROVED: Y. ORLOV |

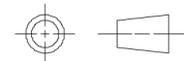


NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- DIMENSIONS APPLY AFTER ALL FINISHING.
- SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.
- DIMENSIONS IN [.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 0.5 MAX.
 DO NOT SCALE DRAWING
 DIMENSIONS BASED ON ASME Y14.5-2009
 MAX. ALL MACH SURFACES 3.2
 DRAWING UNITS: MM

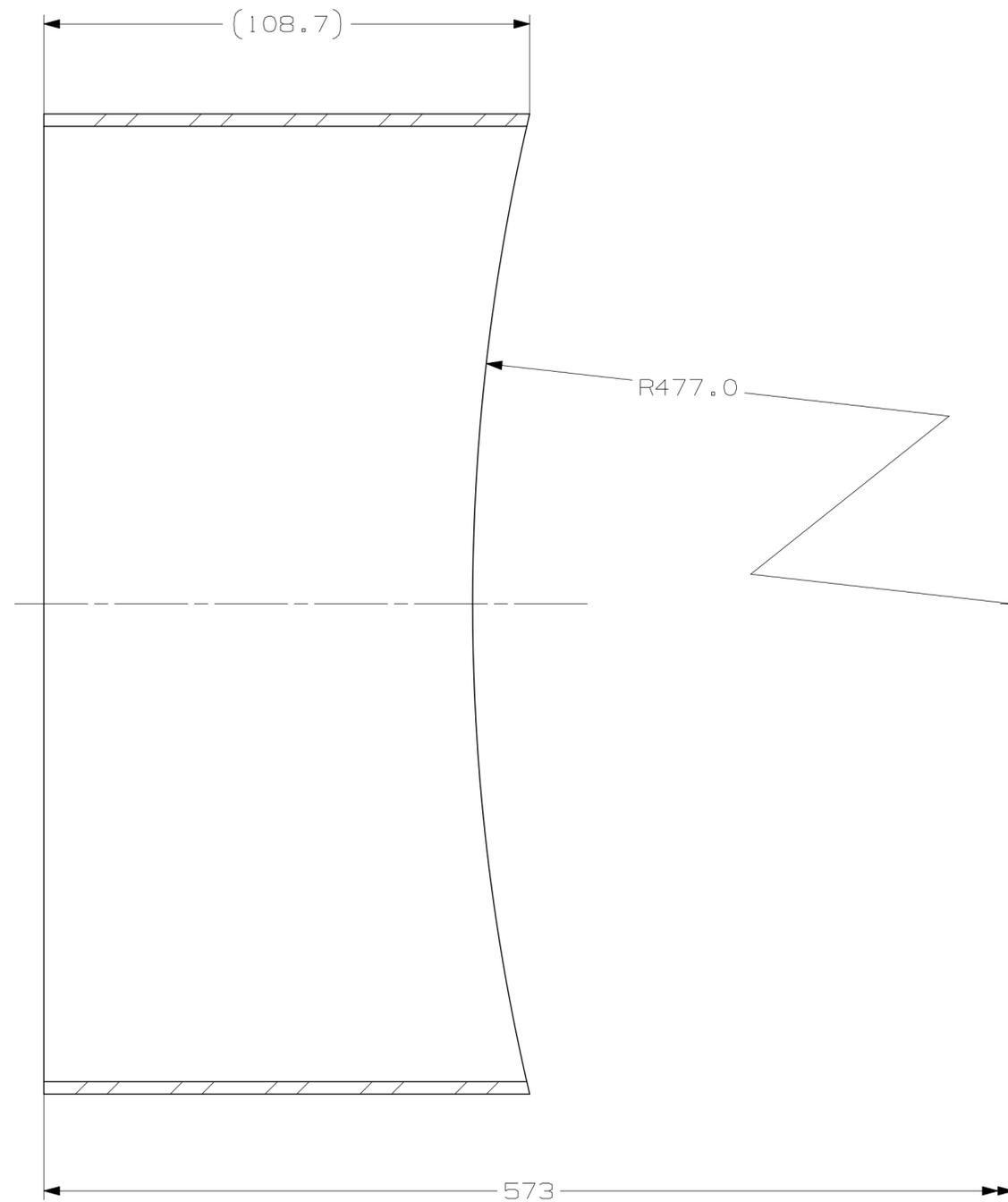
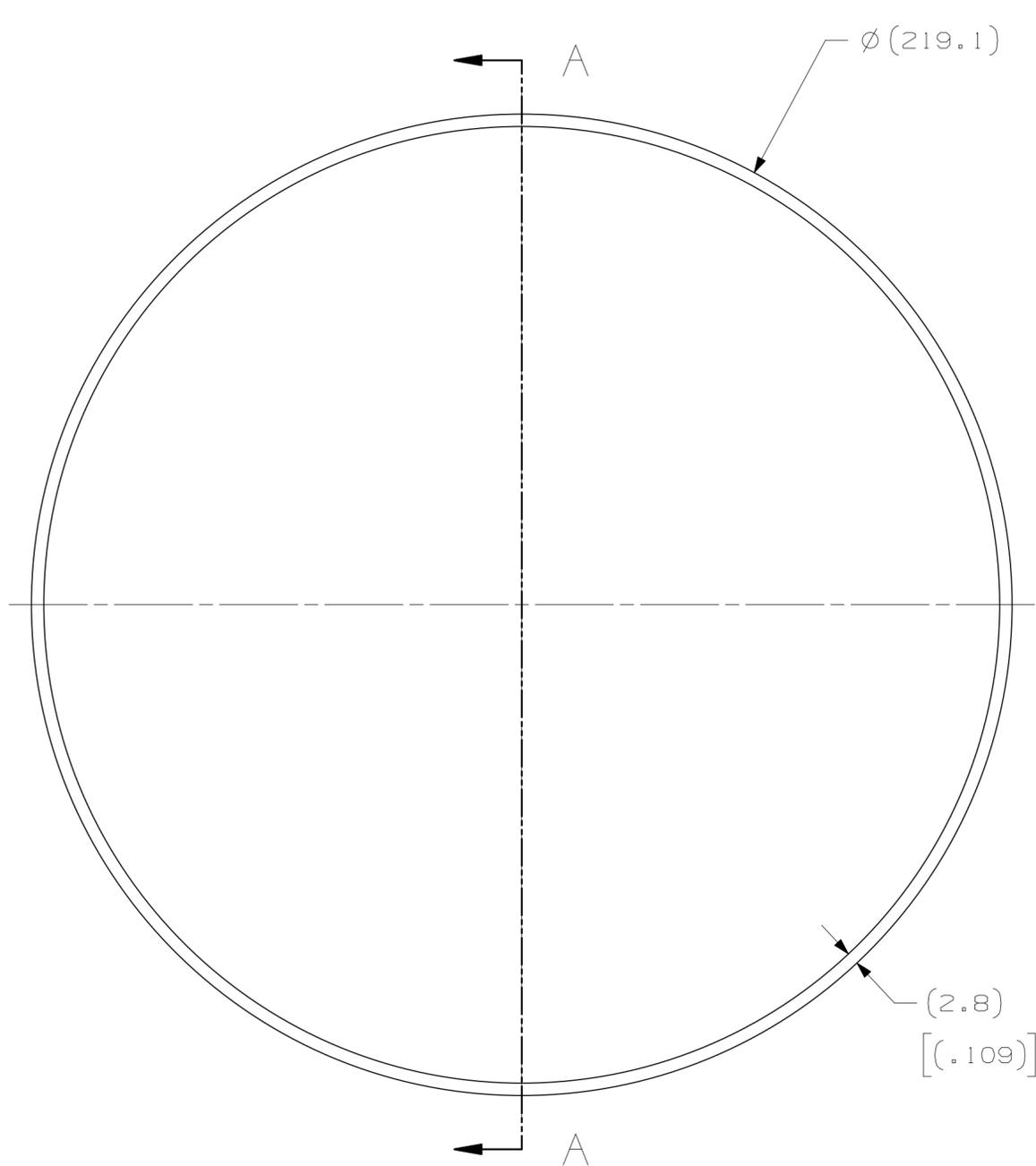


| | | | |
|----------|-------------|------|-------------|
| DRAWN | G. LANGLOIS | DATE | 31-Oct-2014 |
| CHECKED | M. KRAMP | DATE | 31-Dec-2014 |
| APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |

| | |
|---|----------------------------------|
| USED ON | F10030297 |
| MATERIAL | 316L STAINLESS STEEL, UNS S31603 |
| GROUP: Technical Division - Design and Drafting | CAGE CODE: QUSR6 |

| | | | |
|---|------|----------------|--------|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| NAME FLANGE INSTRUMENTATION | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET |
| 1:1 | A2 | F10030301 | 1 OF 1 |
| REV | A | | |

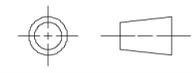
| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|-------------------|
| - | F10030613---RCD | | DRAWN APPROVED |



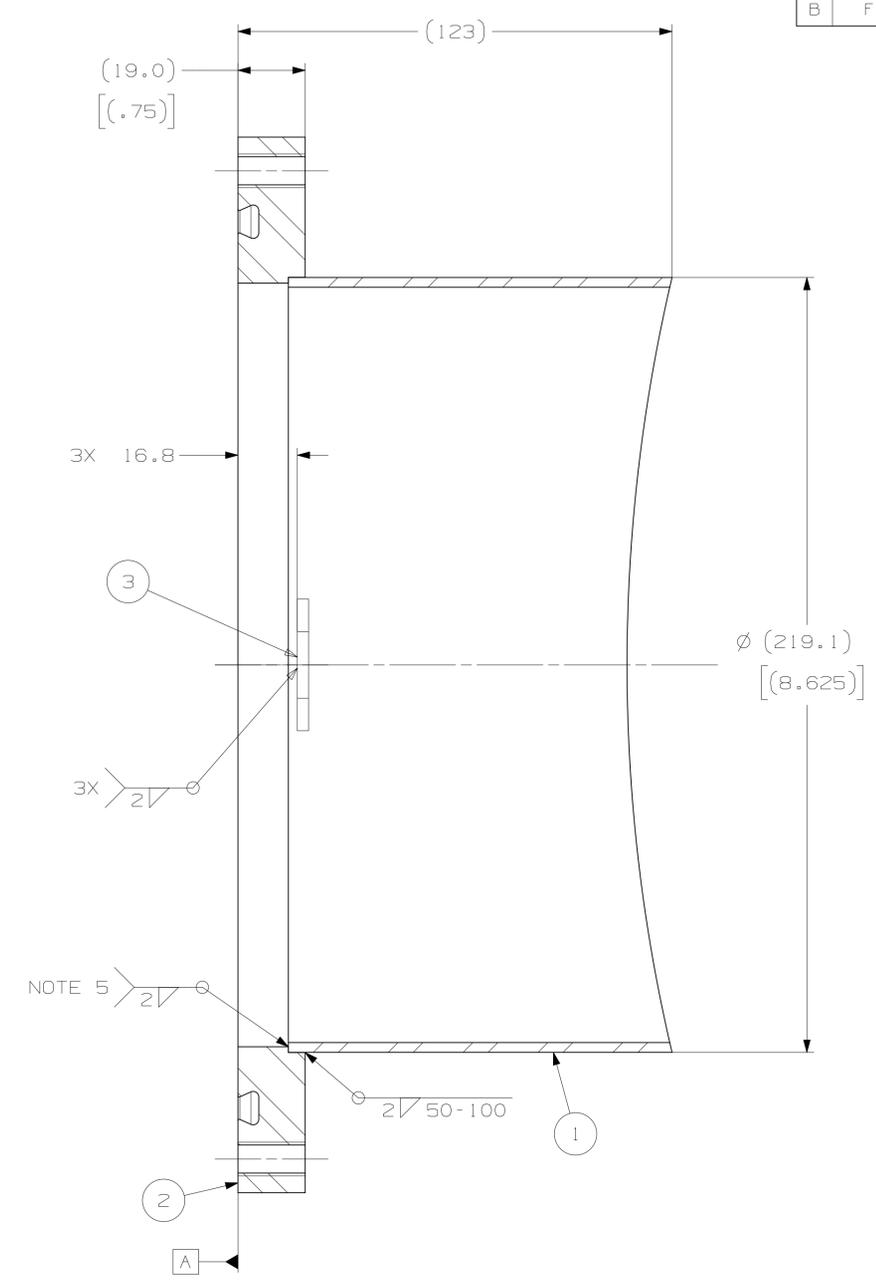
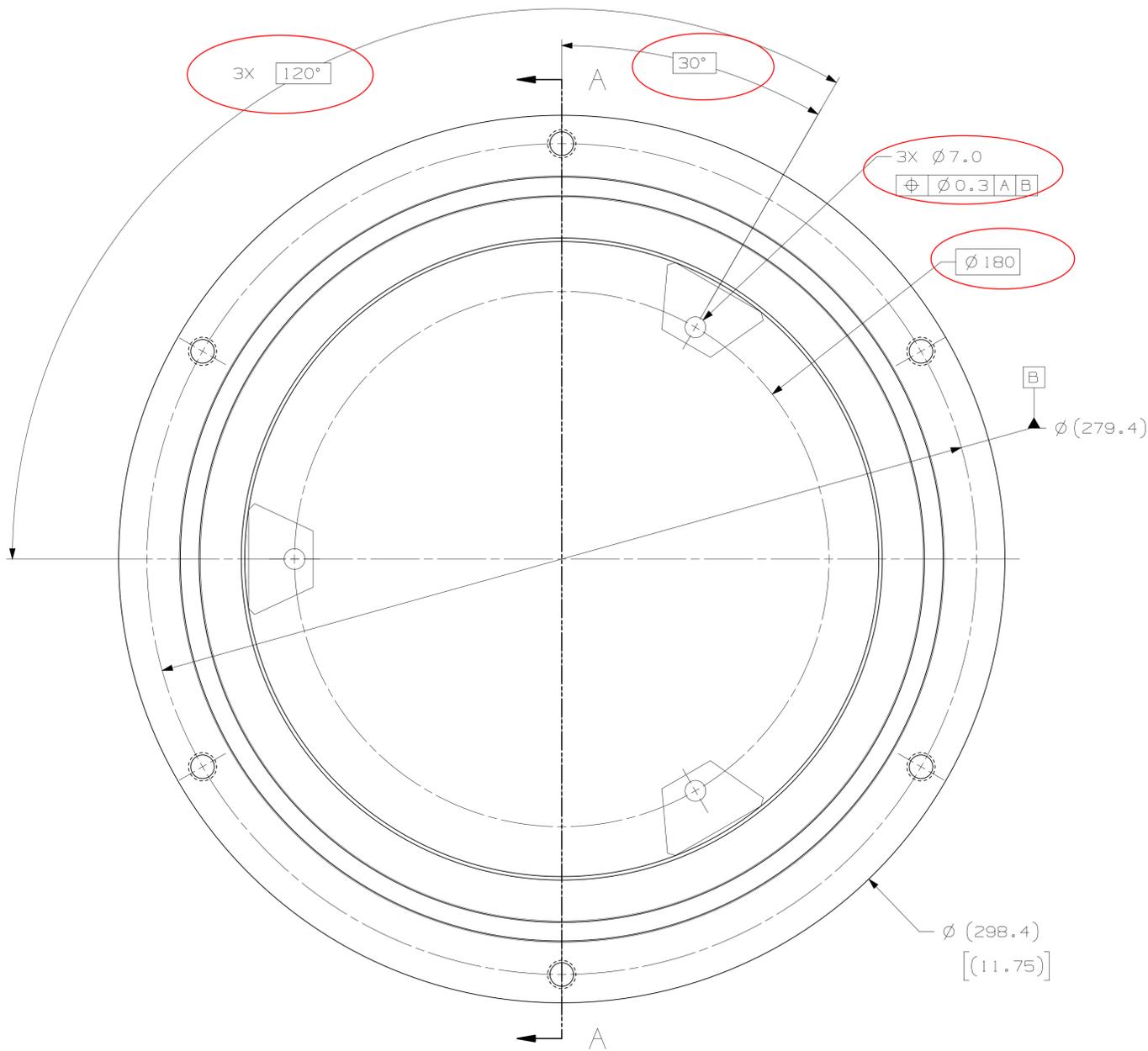
SECTION A - A

- NOTES (UNLESS OTHERWISE SPECIFIED):
- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
 - ALL DIMENSIONS ARE IN MILLIMETERS:
DIMENSIONS IN [.XX] ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | | DATE | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | |
|--|------|-------|------|-----|---|-------------|-------------|------------------|---|-----------------------------|--|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | B.DAMPHOUSSE | 07-Nov-2014 | | | NAME PIPE, RELIEF PORT WLDMT | | |
| 2 | 0.3 | 0.12 | N/A | 1* | M.KRAMP | 31-Dec-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 | | | | | APPROVED | Y.ORLOV | 02-Jan-2015 | SCALE 1:1 | | | |
| | | | | | USED ON F10030619 | | | SIZE A2 | | DRAWING NUMBER F10030613 | |
| | | | | | GROUP: Technical Division - Design and Drafting | | | CAGE CODE: QUSR6 | | | |



| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|----------------------------|---|
| B | F10030619-B-RCD | 02-Dec-2015 25-Feb-2015 | DRAWN: B.DAMPHOUSSE APPROVED: Y. ORLOV |



SECTION A - A

NOTES (UNLESS OTHERWISE SPECIFIED):

1. WELDMENT MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
2. ALL DIMENSIONS ARE IN MILLIMETERS: DIMENSIONS IN [.XX] ARE IN INCHES.
3. ALL FILLET WELDS TO BE SMOOTH FOR COSMETIC APPEARANCE.
4. ALL WELDS AND MANUFACTURING TOLERANCES MUST BE IN ACCORDANCE WITH RELATED PRESSURE VESSEL CODES OF ASME VIII, DIV.1
5. ALL WELDS TO BE VACUUM LEAK TIGHT. LEAK TEST: NO LEAK SHALL BE DETECTABLE ON THE MOST SENSITIVE SCALE OF A HELIUM LEAK DETECTOR WITH A MINIMUM SENSITIVITY OF 10⁻⁹ ATM. CC/SEC.
6. SEALING SURFACES MUST BE FREE OF SCRATCHES WITH NO RADIAL SCORING.

| ITEM | PART # | DESCRIPTION | QTY |
|------|-----------|----------------------------|-----|
| 3 | F10035728 | PLATE SUPPORT | 3 |
| 2 | F10030811 | FLANGE | 1 |
| 1 | F10030613 | PIPE, 8" NPS SCH 5S 304 SS | 1 |

PARTS LIST

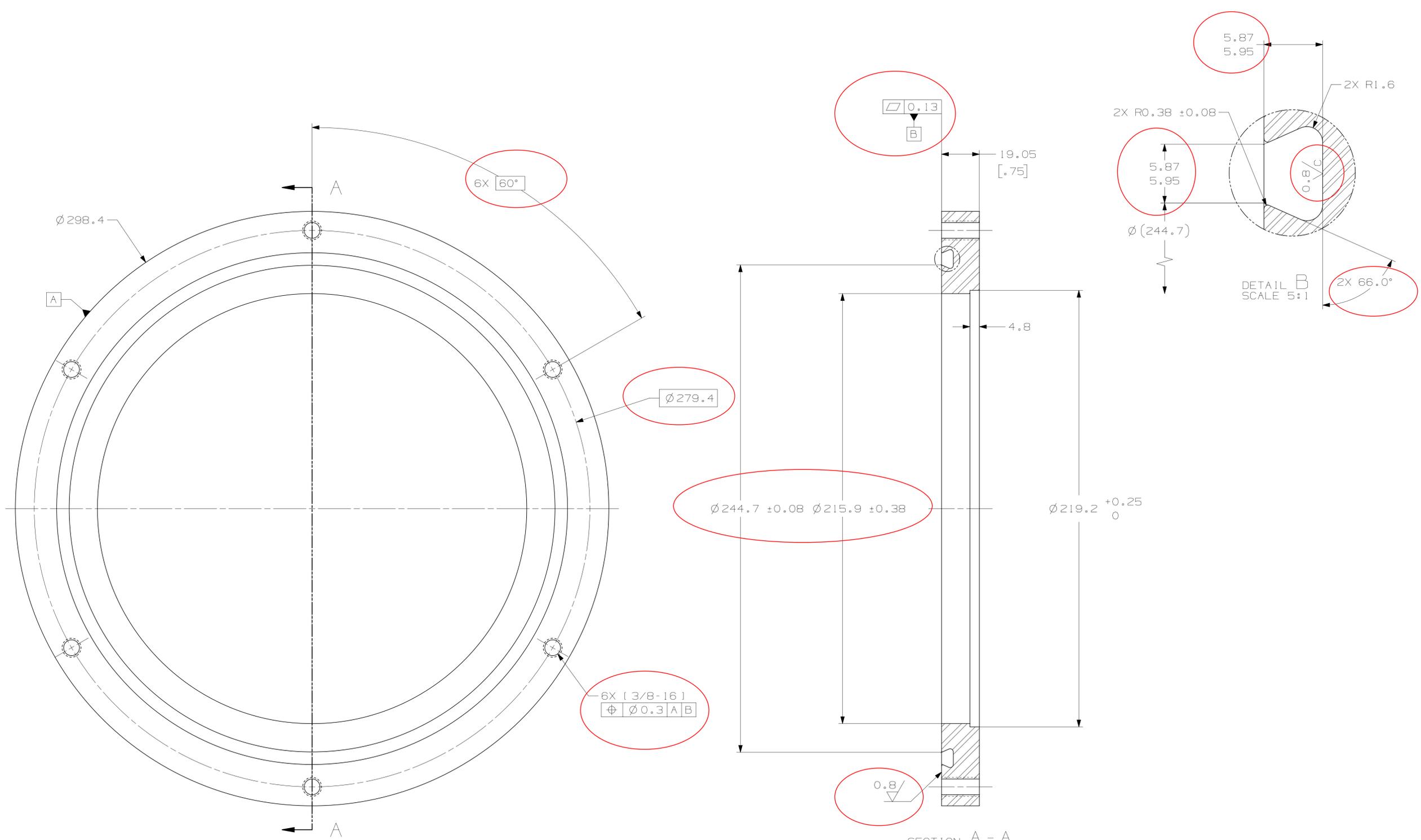
| UNLESS OTHERWISE SPECIFIED | | | | |
|----------------------------|------|-------|------|-----|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* |
| 2 | 0.3 | 0.12 | N/A | 1* |

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 | 07-Nov-2014 |
| CHECKED | M.KRAMP | DATE | 30-Dec-2014 |
| APPROVED | Y.ORLOV | DATE | 02-Jan-2015 |
| USED ON | F10026610 | | |
| MATERIAL | SEE PARTS LIST | | |
| GROUP: Technical Division - Design and Drafting CAGE CODE: QUSR6 | | | |

| | | | | |
|---|------|----------------|--------|-----|
| FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
| NAME WELDMENT, RELIEF VALVE PORT | | | | |
| SCALE | SIZE | DRAWING NUMBER | SHEET | REV |
| 1:1 | A1 | F10030619 | 1 of 1 | B |

| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES |
|-----|---------------------------|-------|------------|
| - | F10030811---RCD | | |



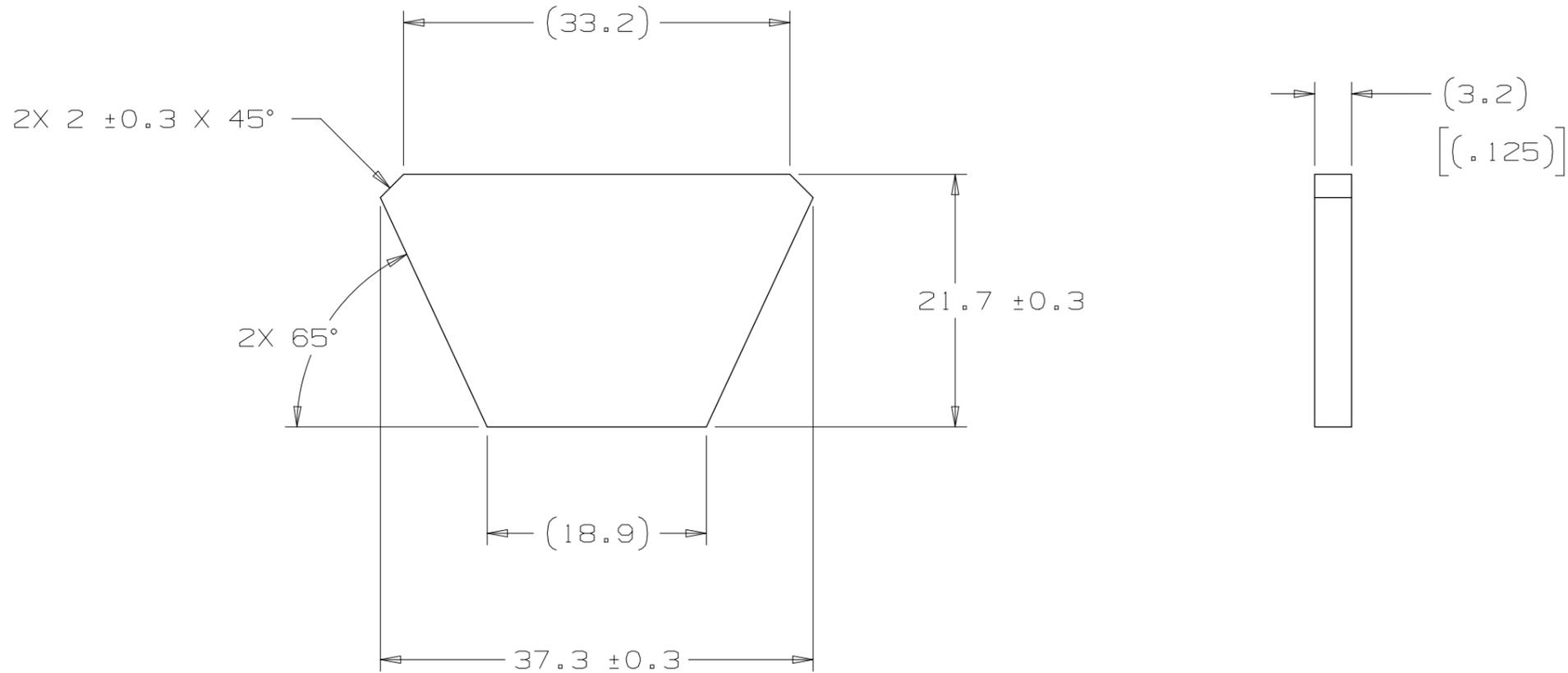
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL & CHIPS.
- PART TO BE FREE OF ALL SHARP EDGES, CORNERS, AND BURRS.
- SEALING SURFACES MUST BE FREE OF SCRATCHES AND NICKS WITH NO RADIAL SCORING.
- DIMENSIONS WITH (X.XX) ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | B.DAMPHOUSSE | DATE | 07-Nov-2014 |
|--|------|-------|------|-----|--|--------------|---|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X* | CHECKED | M.KRAMP | DATE | 31-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1* | APPROVED | Y.ORLOV | DATE | 02-Jan-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 F10030619 MATERIAL 304 STAINLESS STEEL, UNS S30400 | | NAME FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | |
| GROUP: Technical Division - Design and Drafting CASE CODE: QUS96 | | | | | SCALE 1:1 | | SIZE A1 | |
| | | | | | DRAWING NUMBER F10030811 | | SHEET 1 OF 1 | |
| | | | | | REV - | | | |

DESCRIPTION: PLATE SUPPORT
 CATEGORY: PLATE PROJECT: LCLS11Cryomodule

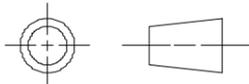
| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------|------------|--|
| - | F10035728---RCD | | DRAWN | |
| | | | APPROVED | |



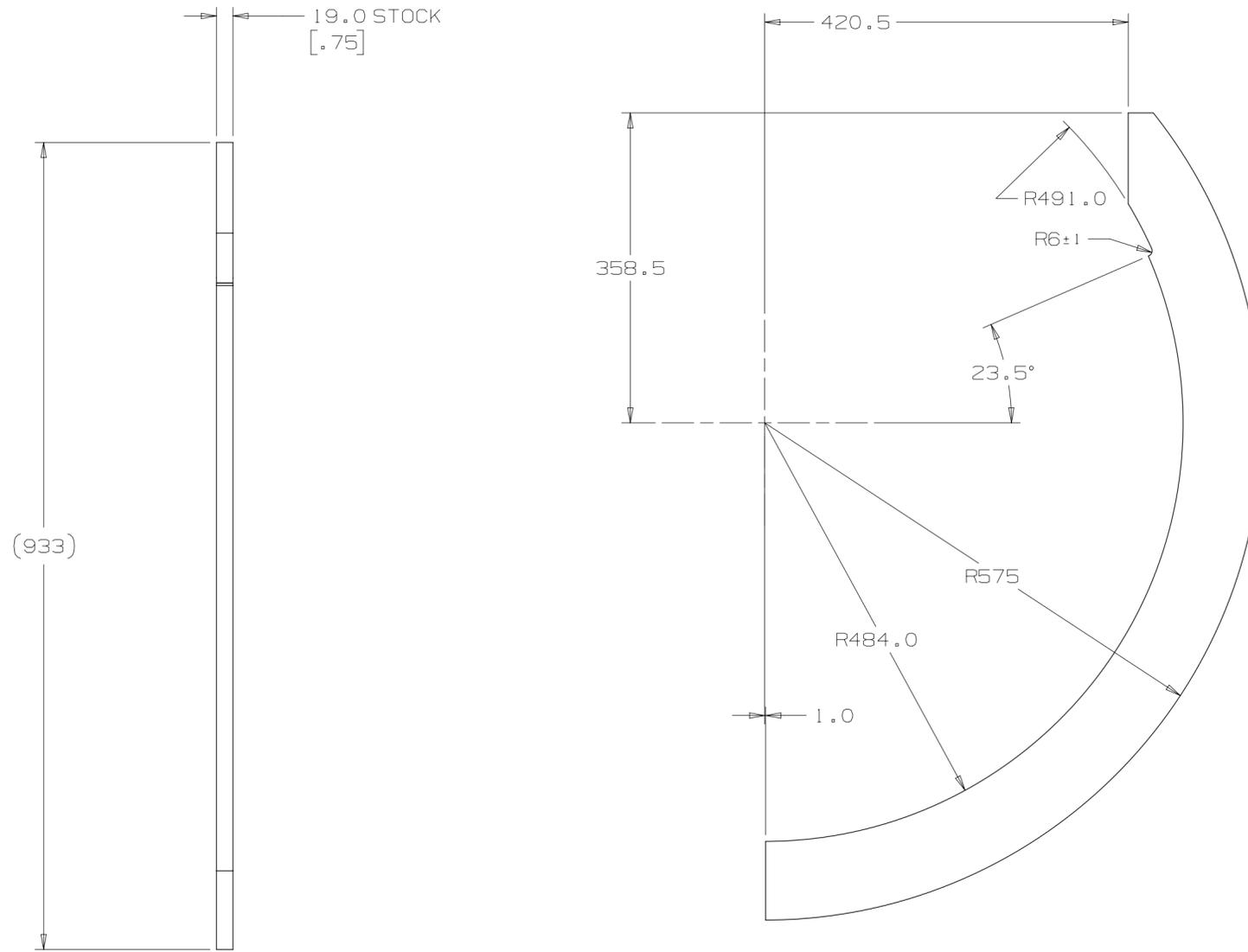
NOTES (UNLESS OTHERWISE SPECIFIED):

- PART MUST BE FREE OF DIRT, GREASE, OIL AND CHIPS.
- DIMENSIONS WITH [.XXX] ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | B.DAMPHOUSSE | DATE | 29-Dec-2014 | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | | |
|--|------|-------|------|-----|---|--------------|------|-------------|---|--|-----------------------------|--|-----------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M.KRAMP | DATE | 30-Dec-2014 | NAME PLATE SUPPORT | | | | |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y.ORLOV | DATE | 02-Jan-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 F10030619 | | | | SCALE 1:1 | | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | | SIZE A3 | | DRAWING NUMBER F10035728 | | SHEET 1 OF 1 |
| | | | | | GROUP: Technical Division - Design and Drafting | | | | CAGE CODE: 0U5R6 | | | | |



| REV | REVISION CONTROL DOCUMENT | DATES | SIGNATURES | |
|-----|---------------------------|-------|------------|--|
| - | F10036062---RCD | | DRAWN | |
| | | | APPROVED | |



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. DIMENSIONS IN [.XX] ARE IN INCHES.

| UNLESS OTHERWISE SPECIFIED | | | | | DRAWN | G. LANGLOIS | DATE | 02-Jul-2014 |
|--|------|-------|------|-----|--|-------------|------|-------------|
| ±X | ±X.X | ±X.XX | ±X/X | ±X° | CHECKED | M. KRAMP | DATE | 30-Dec-2014 |
| 2 | 0.3 | 0.12 | N/A | 1° | APPROVED | Y. ORLOV | DATE | 02-Jan-2015 |
| BREAK ALL SHARP EDGES .5 MAX. DO NOT SCALE DRAWING DIMENSIONS BASED ON ASME Y14.5M-1994 MAX. ALL MACH SURFACES 3.2 DRAWING UNITS: MM | | | | | USED ON F10026610 | | | |
| | | | | | MATERIAL 316L STAINLESS STEEL, UNS S31603 | | | |
| | | | | | GROUP: Technical Division - Design and Drafting CAGE CODE: OUSR6 | | | |

| | | | | | | | |
|-----------------------------|------|----------------|--|---|-----|--|--|
| | | | | FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY | | | |
| NAME RING STIFFENING END | | | | | | | |
| SCALE | SIZE | DRAWING NUMBER | | SHEET | REV | | |
| 1:5 | A2 | F10036062 | | 1 OF 1 | - | | |