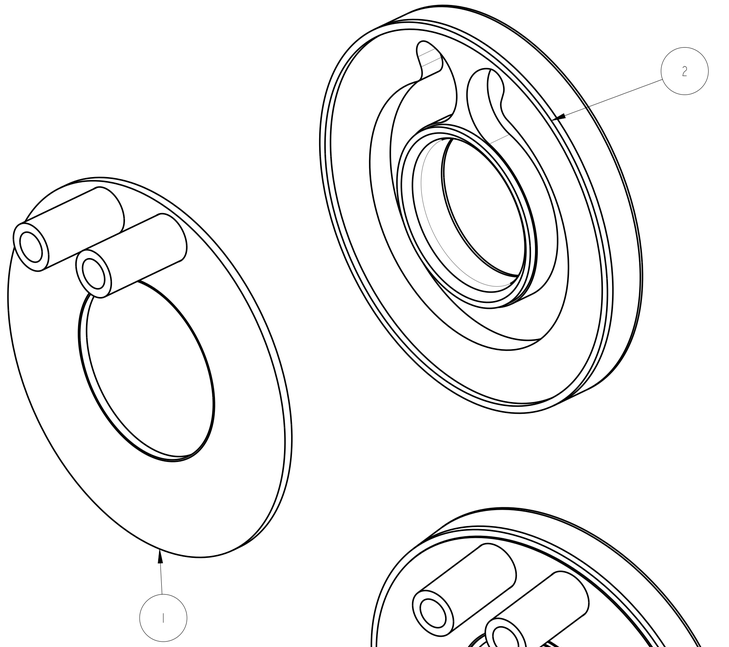
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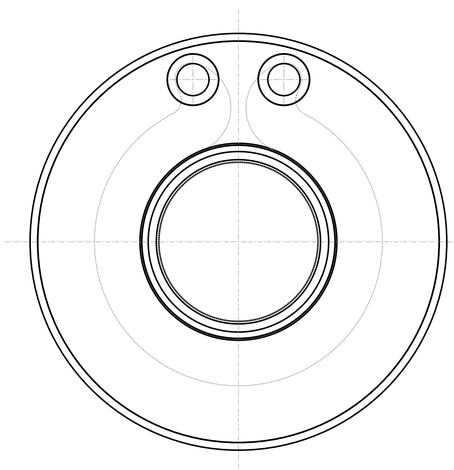
1. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) PRIOR TO WELDING.
2. AFTER CLEANING, ALL COMPONENTS SHALL BE HANDLED ACCORDING TO SECTION 3.10 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) TO AVOID CONTAMINATION OF WELDS.
3. ALL COMPONENTS, FILLER MATERIALS, AND WELDED JOINTS SHALL BE NON-MAGNETIC ACCORDING TO SECTION 3.4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) AFTER WELDING.
4. SUPPLIER SHALL MANUFACTURE A WELD SAMPLE TO VERIFY THAT THE MAGNETIC PERMEABILITY REQUIREMENTS ARE MET. A WELD PROCEDURE WITH PROCESS SETTINGS SHALL BE DOCUMENTED AND USED FOR BOTH THE SAMPLE AND PRODUCTION ASSEMBLIES.
5. ALL VT (VACUUM TIGHT) WELDS MUST PASS A HELIUM LEAK TEST OF 1 X 10^-9 STD CC/SEC HELIUM PERFORMED ACCORDING TO ASTM E498-95, STANDARD TEST METHODS FOR LEAK DETECTION.
6. SUPPLIER SHALL MAINTAIN WELD PROCEDURE AND INSPECTION RECORDS.
7. WELD PROCEDURE AND PERFORMANCE QUALIFICATIONS PER AWS B2.1/2.1M:2014.
8. WELD QUALITY REQUIREMENTS OF AWS D17.1/D17.1M (FUSION WELDING) SPECIFICATION FOR CLASS A WELDS MUST BE MET. WELDS MUST BE VISUALLY INSPECTED.
9. WELD SYMBOLS PER ANSI/AWS A2.4.

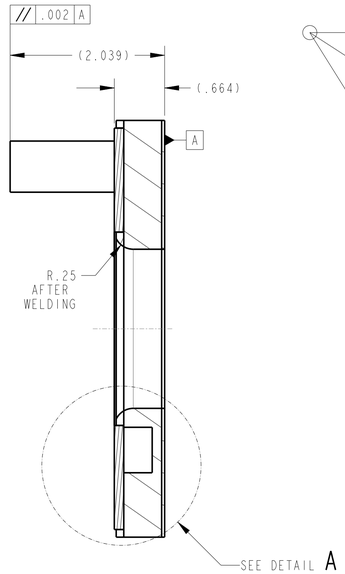
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REVISIONS

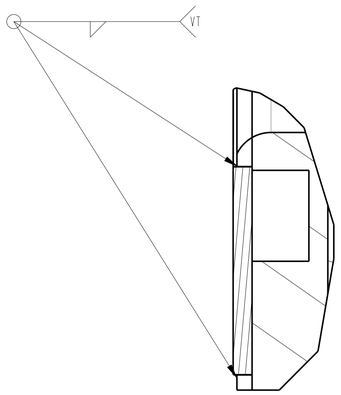
REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023



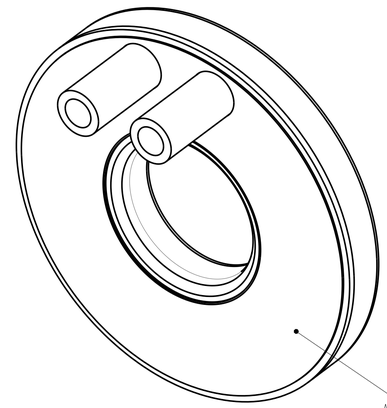




SECTION A - A



DETAIL A
SCALE 2:1



FIND NO.	QTY	PART OR IDENTIFYING NUMBER	DESCRIPTION OR NOMENCLATURE	MATERIAL / SPECIFICATION
2	1	MPEX-04-DES-05-A563	TARGET SHIELD EX-BONDED SHORT, COVER RELIEF	--- ---
1	1	MPEX-04-DES-05-A560	TARGET SHIELD WELDMENT	

PARTS LIST — TOTAL WEIGHT: 3.81 LBS

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	*APPLICABLE*
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A550 — QA REP — DATE

NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 125 RMS MAX
THIRD ANGLE PROJECTION

APPROVALS

		DATE
DESIGNER	L.REFFI	7/2023
DETAILER	L.REFFI	7/2023
CHECKER	D.OTTINGER	7/2023
ENGINEER	T.BOYD	7/2023
CONTROL ACCOUNT MANAGER	A.AARON	7/2023

MPEX GUIDE: MPEX-00-ENG-005

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ORNL OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD SHORT, WELDMENT

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A548	0

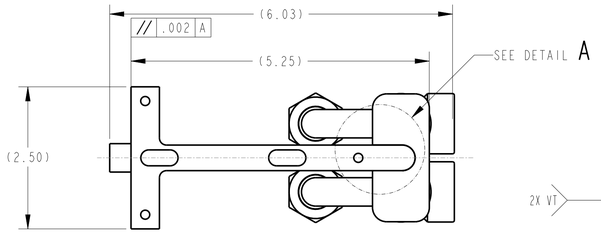
SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A548	0	1 of 1

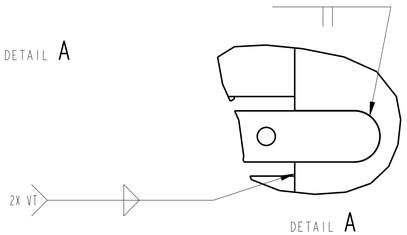
THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A548 REV 1

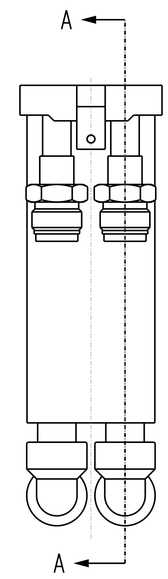
NOTES:

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2. AFTER CLEANING, ALL COMPONENTS SHALL BE HANDLED ACCORDING TO SECTION 3.10 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) TO AVOID CONTAMINATION OF WELDS.
3. ALL COMPONENTS, FILLER MATERIALS, AND WELDED JOINTS SHALL BE NON-MAGNETIC ACCORDING TO SECTION 3.4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) AFTER WELDING.
4. SUPPLIER SHALL MANUFACTURE A WELD SAMPLE TO VERIFY THAT THE MAGNETIC PERMEABILITY REQUIREMENTS ARE MET. A WELD PROCEDURE WITH PROCESS SETTINGS SHALL BE DOCUMENTED AND USED FOR BOTH THE SAMPLE AND PRODUCTION ASSEMBLIES.
5. ALL VT (VACUUM TIGHT) WELDS MUST PASS A HELIUM LEAK TEST OF 1 X 10^-9 STD CC/SEC HELIUM PERFORMED ACCORDING TO ASTM E498-95, STANDARD TEST METHODS FOR LEAK DETECTION.
6. SUPPLIER SHALL MAINTAIN WELD PROCEDURE AND INSPECTION RECORDS.
7. WELD PROCEDURE AND PERFORMANCE QUALIFICATIONS PER AWS B2.1/2.1M:2014.
8. WELD QUALITY REQUIREMENTS OF AWS D17.1/D17.1M (FUSION WELDING) SPECIFICATION FOR CLASS A WELDS MUST BE MET. WELDS MUST BE VISUALLY INSPECTED.
9. WELD SYMBOLS PER ANSI/AWS A2.4.

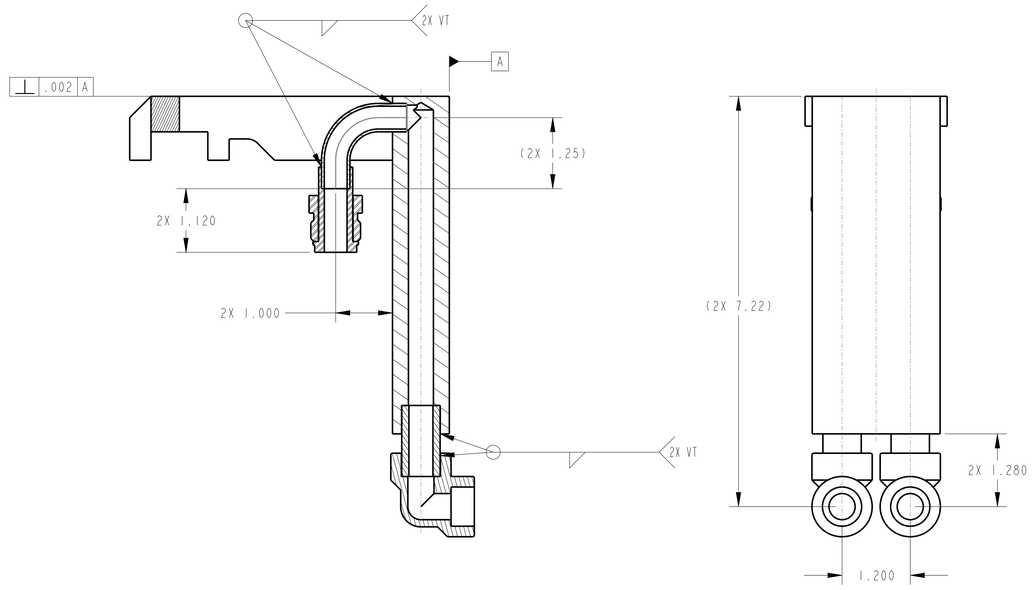




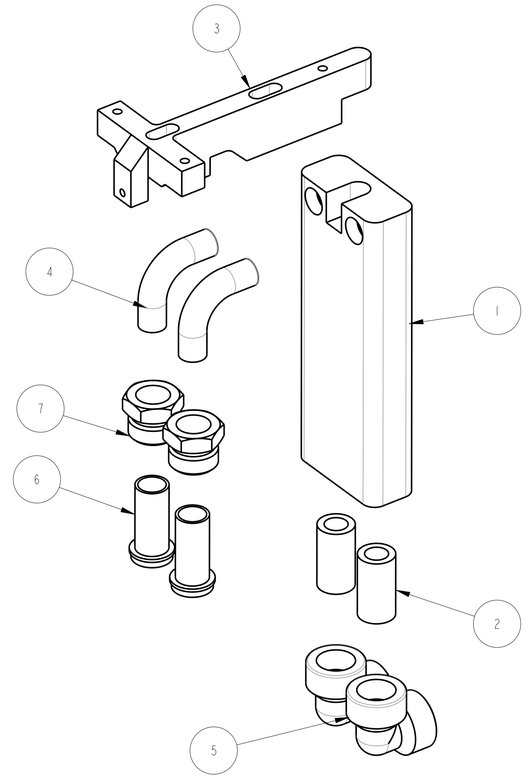
DETAIL A
SCALE 3:2



SCALE 3:4



SECTION A - A



SCALE 3:4

REVISIONS											
REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023

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FIND NO.	QTY	PART OR IDENTIFYING NUMBER	DESCRIPTION OR NOMENCLATURE	MATERIAL / SPECIFICATION
7	2	VMPEX-SWG-SS-8-VCR-4	NUT, 1/2", VCR, MALE, SS316	SS 316 (S31600) ---
6	2	VMPEX-SWG-SS-8-VCR-3	FITTING, SOCKET WELD, 1/2" VCR X 1/2" TUBE, SS316	SS 316 (S31600) ---
5	2	VMPEX-MMC-45515K113	90 DEG ELBOW CONN, 3/8 PIPE, HIGH PRESS, SOCKET CONN	316/316L STAINLESS STEEL
4	2	MPEX-04-DES-05-A558	SHIELD 90 DEG TUBE	316 STAINLESS STEEL ASTM A276
3	1	MPEX-04-DES-05-A557	SHIELD SUPPORT ADJUSTER REVERSE	316 STAINLESS STEEL ASTM A240
2	2	MPEX-04-DES-05-A556	TARGET WELDED TUBE VERTICAL	316 STAINLESS STEEL ASTM A276
1	1	MPEX-04-DES-05-A555	TARGET SHIELD ARM LOD	316 STAINLESS STEEL ASTM A240

PARTS LIST — TOTAL WEIGHT: 4.69 LBS

DWG NO MPEX-04-DES-05-A549 SH 1

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A550 — NEXT USED ASSEMBLIES

QA REP — DATE

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 125 RMS MAX
THIRD ANGLE PROJECTION

APPROVALS

		DATE
DESIGNER	L.REFFI	7/2023
DETAILER	L.REFFI	7/2023
CHECKER	D.OTTINGER	7/2023
ENGINEER	T.BOYD	7/2023
CONTROL ACCOUNT MANAGER	A.AARON	7/2023

MPEX GUIDE: MPEX-00-ENG-005

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OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD SUPPORT REVERSE ASSY

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A549	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:2	MPEX-04-DES-05-A549	0	1 of 1

THIS DRAWING PREPARED ON CREO

NOTES:

WELDING
1. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) PRIOR TO WELDING.

2. AFTER CLEANING, ALL COMPONENTS SHALL BE HANDLED ACCORDING TO SECTION 3.10 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) TO AVOID CONTAMINATION OF WELDS.

3. ALL COMPONENTS, FILLER MATERIALS, AND WELDED JOINTS SHALL BE NON-MAGNETIC ACCORDING TO SECTION 3.4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) AFTER WELDING.

4. SUPPLIER SHALL MANUFACTURE A WELD SAMPLE TO VERIFY THAT THE MAGNETIC PERMEABILITY REQUIREMENTS ARE MET. A WELD PROCEDURE WITH PROCESS SETTINGS SHALL BE DOCUMENTED AND USED FOR BOTH THE SAMPLE AND PRODUCTION ASSEMBLIES.

5. ALL VT (VACUUM TIGHT) WELDS MUST PASS A HELIUM LEAK TEST OF 1 X 10^-9 STD CC/SEC HELIUM PERFORMED ACCORDING TO ASTM E498-95, STANDARD TEST METHODS FOR LEAK DETECTION.

6. SUPPLIER SHALL MAINTAIN WELD PROCEDURE AND INSPECTION RECORDS.

7. WELD PROCEDURE AND PERFORMANCE QUALIFICATIONS PER AWS B2.1/2.1M:2014.

8. WELD QUALITY REQUIREMENTS OF AWS D17.1/D17.1M (FUSION WELDING) SPECIFICATION FOR CLASS A WELDS MUST BE MET. WELDS MUST BE VISUALLY INSPECTED.

9. WELD SYMBOLS PER ANSI/AWS A2.4.

VACUUM
10. CLEAN AND BAKE IN ACCORDANCE WITH GUIDELINES DEFINED IN SECTIONS 3 AND 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).

11. PROTECT KNIFE EDGES OF VACUUM COMPONENTS. INSTALL BLANKS ON OPEN FLANGES ACCORDING TO SECTIONS 3 AND 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).

12. METAL SEALS SHALL BE USED WHEN PERFORMING THE FINAL HELIUM LEAK TEST.

13. HELIUM LEAK TESTING OF ALL FABRICATED PARTS SHALL SHOW A TOTAL LEAK RATE LESS THAN 8 X 10^-10 TORR-L/SECOND USING A MASS SPEC LEAK DETECTOR ACCORDING TO ASTM E498-95, STANDARD TEST METHODS FOR LEAK DETECTION.

14. THE VESSEL OR ASSEMBLY TOTAL OUT-GASSING RATE SHALL BE MEASURED AFTER 10 HOURS OF PUMPING FROM ATMOSPHERE. THE OUT-GASSING RATE MUST NOT EXCEED 8 X 10^-10 TORR/LITER/SEC/CM2.

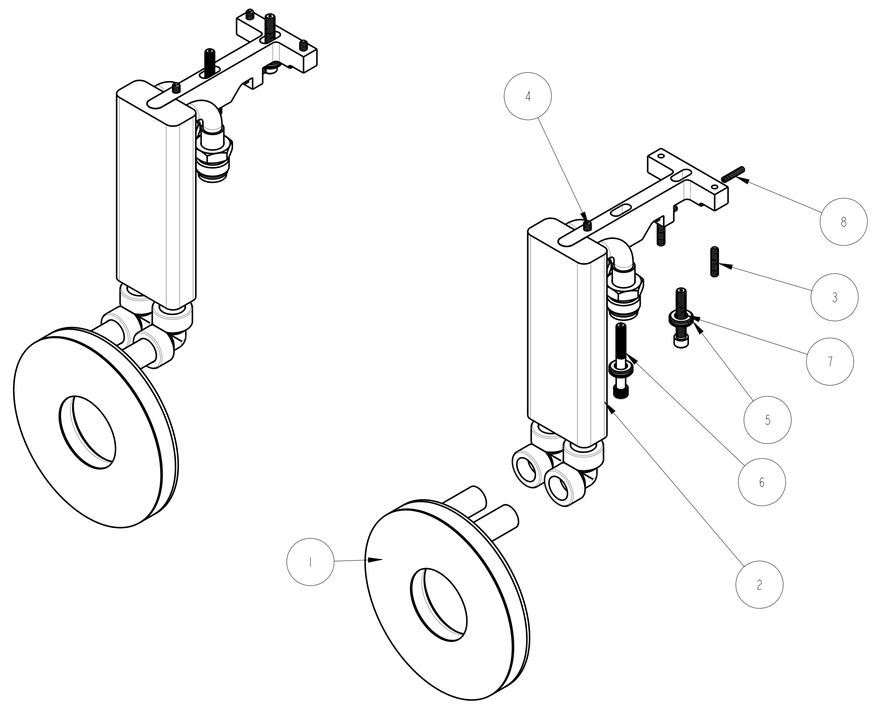
ITEM IDENTIFICATION
15. VACUUM VESSEL SHALL BE INDENTIFIED IN ACCORDANCE WITH SECTION 3.8 OF MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).

PACKAGING NOTES
16. ALL VACUUM VESSELS AND COMPONENTS SHALL BE HANDLED, PACKAGED, AND SHIPPED ACCORDING TO THE GUIDELINES OF SECTION 3.10 AND SECTION 3.11 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002)

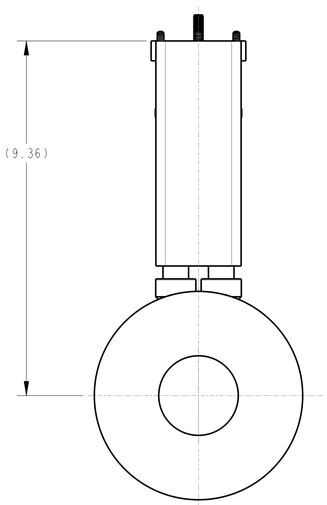
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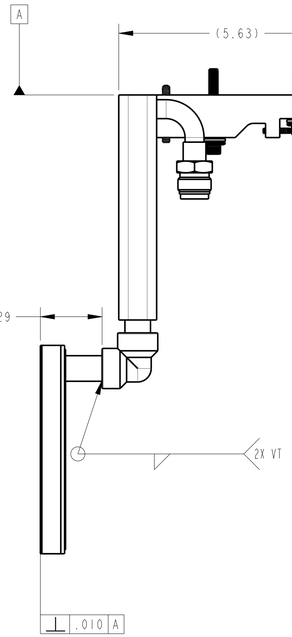
REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023



SCALE 1:2





FIND NO.	QTY	PART OR IDENTIFYING NUMBER	DESCRIPTION OR NOMENCLATURE	MATERIAL / SPECIFICATION
8	2	VMPEX-UCC-T-812-C	SCREW, SET, CUP POINT, SOCKET, 8-32 x 3/4" LG	18-8 STAINLESS STEEL
7	1	VMPEX-UCC-C-2824-C	SCREW, SOCKET HD, VENTED, 1/4-28 x 1 1/2" LG	18-8 STAINLESS STEEL
6	1	VMPEX-UCC-C-2832-C	SCREW, SOCKET HD, VENTED, 1/4-28 x 2" LG	18-8 STAINLESS STEEL
5	2	VMPEX-MMC-91944A430	WASHER, LEVELING, 1/4" SCREW, 0.173"- 0.203" THK	18-8 STAINLESS STEEL
4	1	VMPEX-UCC-T-1024-NC	SCREW, SET, CUP POINT, SOCKET, 10-32 x 1 1/2" lg	18-8 STAINLESS STEEL
3	2	VMPEX-UCC-T-1014-NC	SCREW, SET, CUP POINT, SOCKET, 10-32 x 7/8" lg	18-8 STAINLESS STEEL
2	1	MPEX-04-DES-05-A549	TARGET SHIELD SUPPORT REVERSE ASSY	
1	1	MPEX-04-DES-05-A548	TARGET SHIELD SHORT, WELDMENT	

PARTS LIST — TOTAL WEIGHT 8.60 LBS

DWG NO - MPEX-04-DES-05-A550 SH 1

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	
QA REP	DATE

DRAWING PACKAGE I.D.

NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES
LINEAR: X.X ±.1; X.XX ±.01; X.XXX ±.005
ANGULAR: ±.5°

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 125 RMS MAX
THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023

MPEX OUTDE: MPEX-00-ENG-005

THIS DRAWING IS THE PROPERTY OF
ORNL OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
REVERSE TARGET SHIELD FULL ASSY

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A550	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:2	MPEX-04-DES-05-A550	0	1 of 1

THIS DRAWING PREPARED ON CREO

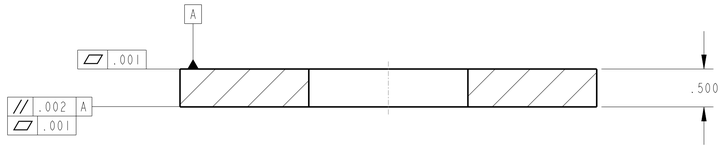
NOTES:

1. ALL PARTS AND COMPONENTS SHALL BE FABRICATED IN ACCORDANCE WITH GOOD VACUUM PRACTICES AND THE GUIDELINES OUTLINED IN THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).
2. USE ONLY WATER SOLUBLE, NON-SULFUROUS BEARING CUTTING OILS FOR MACHINING.
3. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002)
4. SUPPLIER MUST VERIFY THAT ALL MATERIALS AND FABRICATION PROCESS STEPS RESULT IN ALL COMPONENTS (INCLUDING WELD AFFECTED AREAS AND HARDWARE) HAVING A MAGNETIC PERMEABILITY OF <1.03 AT 200 OERSTEDS.

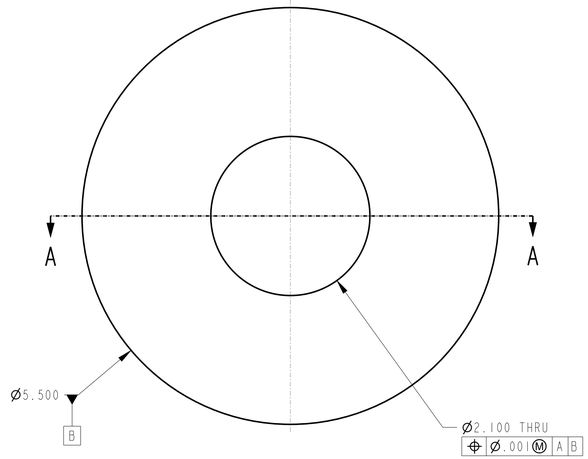
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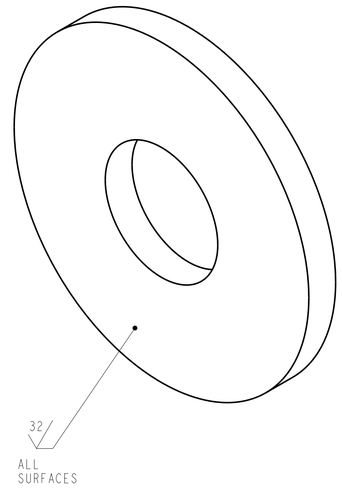
REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023



SECTION A-A





Supplied by ORNL

GLIDCOP	AL-15	3.26 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION		
DOCUMENTS REQUIRED	APPLICABLE	
MATERIAL MILL TEST REPORT		
LEAK TEST REPORT		
CLEANING CERT		
WELD / BRAZE INSPECTION REPORT		
HEAT TREAT REPORT (W/CHART)		
DIMENSIONAL REPORT		
MATERIAL SELLER CERT		
FUNCTIONAL TEST REPORT		
DEVIATION REQUEST	X	
NONCONFORMANCE REPORT	X	
QA REP	DATE	

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A562

NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 125 RMS

THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023

MPEX GUIDE: MPEX-00-ENG-005

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DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD CHANNELS LOD

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A551	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A551	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A551 R 1

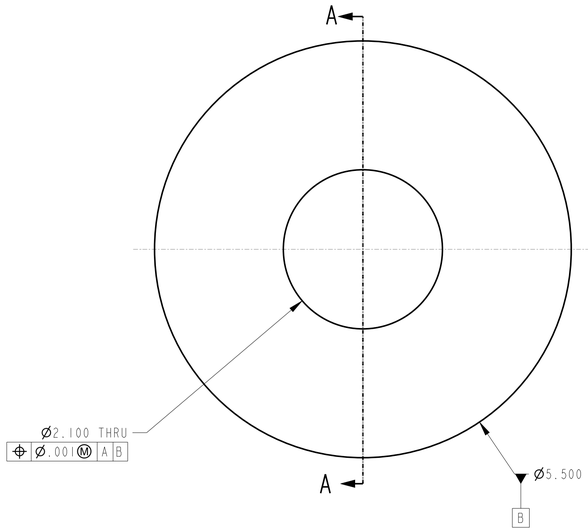
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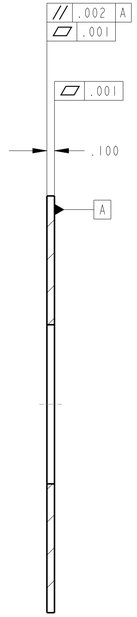
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2. USE ONLY WATER SOLUBLE, NON-SULFUROUS BEARING CUTTING OILS FOR MACHINING.
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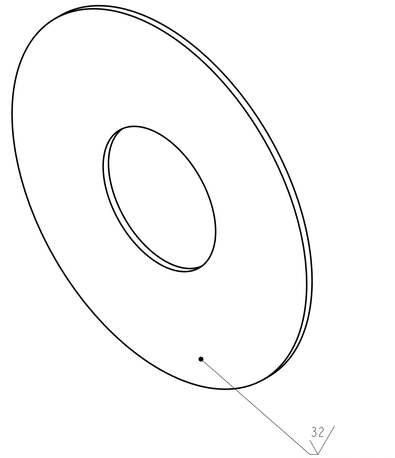
REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023





SECTION A - A



DWG NO MPEX-04-DES-05-A552 R0

316 STAINLESS STEEL	ASTM A276	0.58 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

Supplied by ORNL

DRAWING PACKAGE I.D.
MPEX-04-DES-05-A562
NEXT USED ASSEMBLIES

QUALITY VERIFICATION		
DOCUMENTS REQUIRED	APPLICABLE	
MATERIAL MILL TEST REPORT		
LEAK TEST REPORT		
CLEANING CERT		
WELD / BRAZE INSPECTION REPORT		
HEAT TREAT REPORT (W/CHART)		
DIMENSIONAL REPORT		
MATERIAL SELLER CERT		
FUNCTIONAL TEST REPORT		
DEVIATION REQUEST	☒	
NONCONFORMANCE REPORT	☒	
QA REP	DATE	

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 32 RMS

THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023
MPEX GUIDE	MPEX-00-ENG-005	

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OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD COVER LOD

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A552	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A552	0	1 of 1

THIS DRAWING PREPARED ON CREO

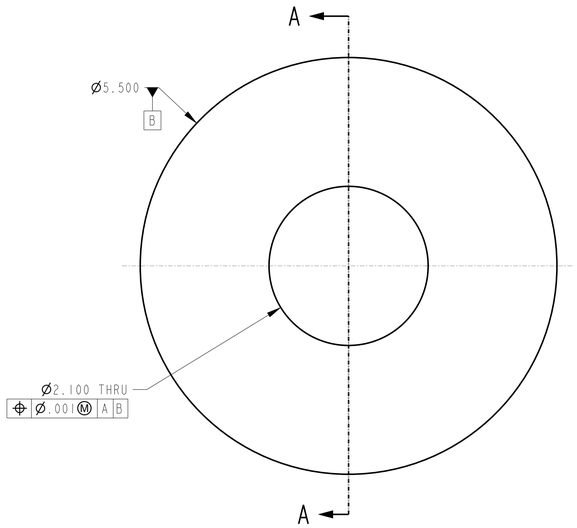
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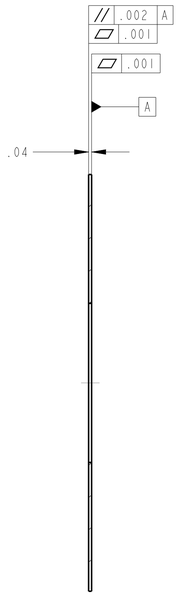
REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023

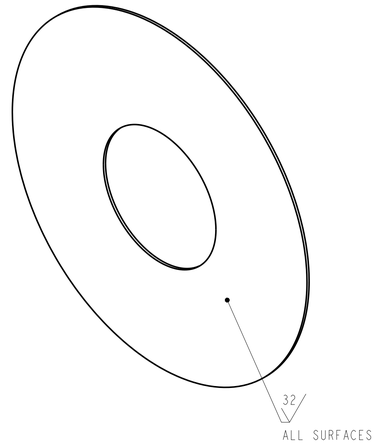
NOTES:

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SECTION A - A



Supplied by ORNL

TUNGSTEN	ASTM B760	0.49 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X
QA REP	DATE

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A562

NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 32 RMS

THIRD ANGLE PROJECTION

APPROVALS

		DATE
DESIGNER	L.REFFI	7/2023
DETAILER	L.REFFI	7/2023
CHECKER	D.OTTINGER	7/2023
ENGINEER	T.BOYD	7/2023
CONTROL ACCOUNT MANAGER	A.AARON	7/2023

MPEX GUIDE: MPEX-00-ENG-005

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OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET EX-BONDED TUNGSTEN LOD

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A553	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A553	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO MPEX-04-DES-05-A553 SH 1

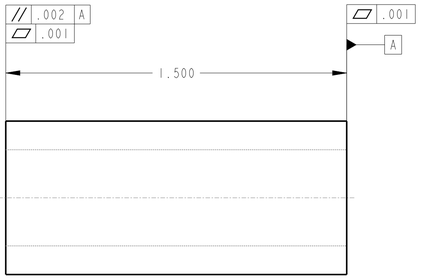
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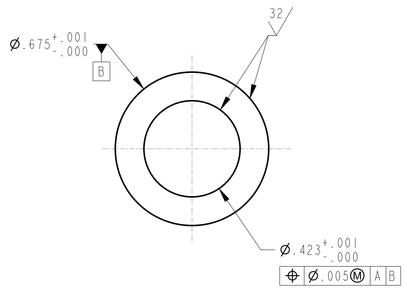
REVISIONS

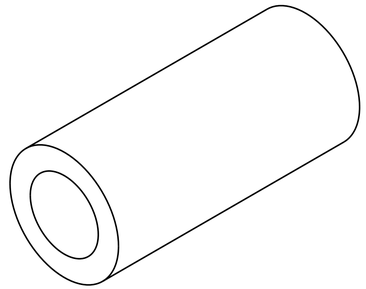
REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023

NOTES:

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316 STAINLESS STEEL	ASTM A276	0.09 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A560
NEXT USED ASSEMBLIES

QA REP | DATE

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 125 RMS
THIRD ANGLE PROJECTION

APPROVALS

		DATE
DESIGNER	L.REFFI	7/2023
DETAILER	L.REFFI	7/2023
CHECKER	D.OTTINGER	7/2023
ENGINEER	T.BOYD	7/2023
CONTROL ACCOUNT MANAGER	A.AARON	7/2023

MPEX GUIDE
MPEX-00-ENG-005

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OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET EX-BONDED TUBE SHORT

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A554	0

SCALE	CAD MODEL	MODEL REV	SHEET
3:1	MPEX-04-DES-05-A554	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO MPEX-04-DES-05-A554 SH 1

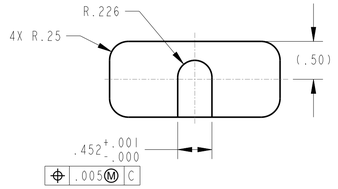
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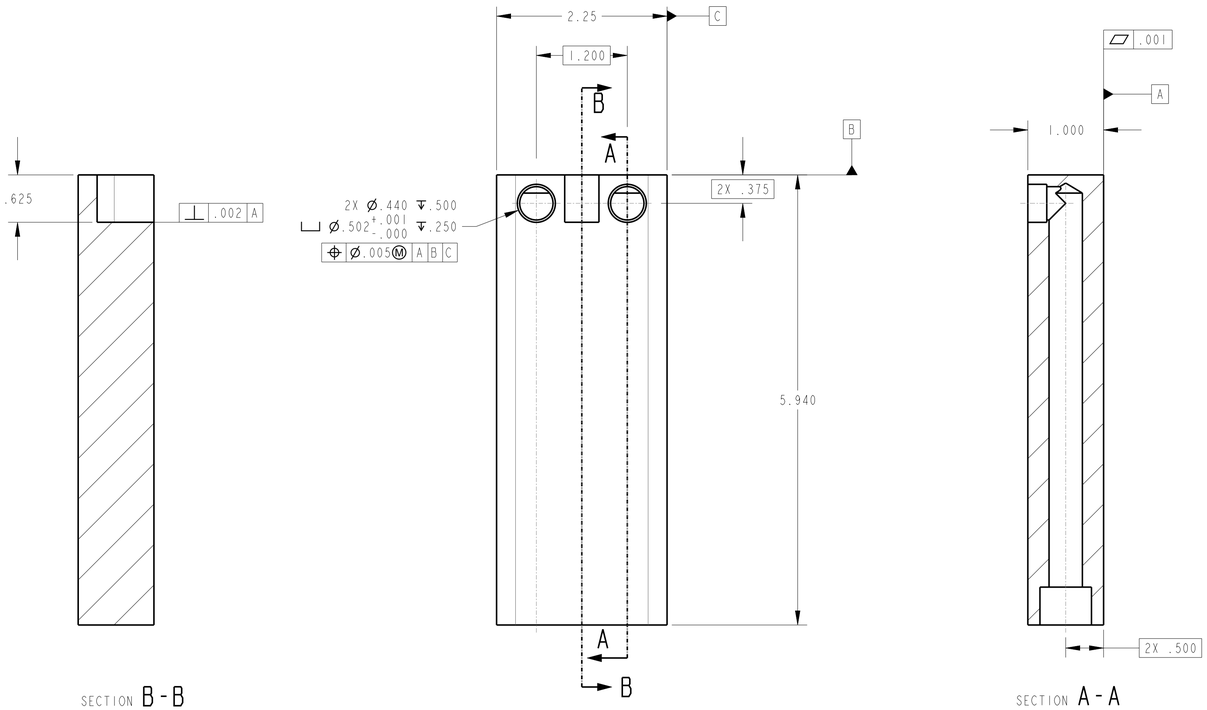
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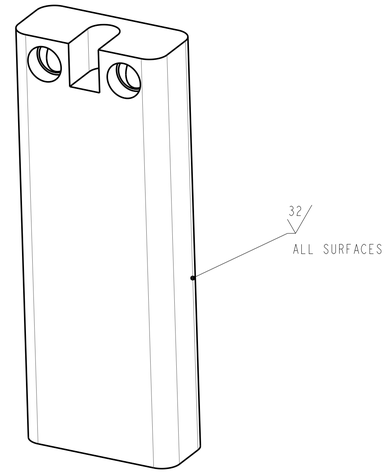
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REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023







316 STAINLESS STEEL	ASTM A240	3.015 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	
NONCONFORMANCE REPORT	

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A549
NEXT USED ASSEMBLIES

QA REP | DATE

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 125 RMS
THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023

MPEX GUIDE: MPEX-00-ENG-005

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OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD ARM LOD

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A555	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A555	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A555 [1]

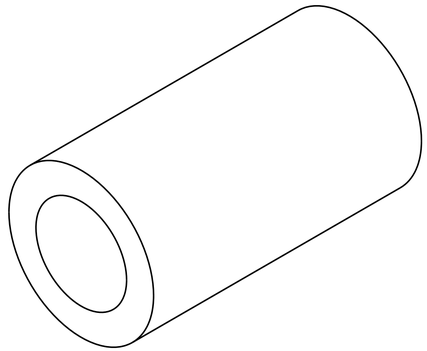
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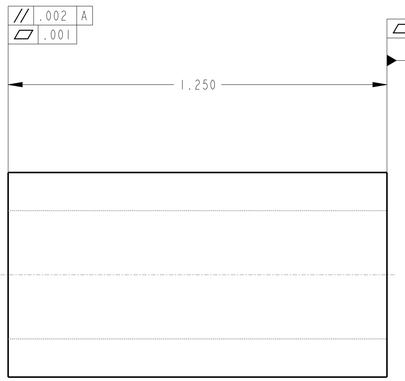
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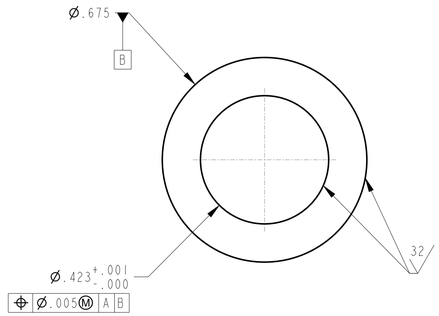
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REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/203







DRAWING PACKAGE I.D.
MPEX-04-DES-05-A549
NEXT USED ASSEMBLIES

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X
QA REP	DATE

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 125 RMS

THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023

MPEX OUTDE: MPEX-00-ENG-005

316 STAINLESS STEEL	ASTM A276	0.08 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

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DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET WELDED TUBE VERTICAL

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A556	0

SCALE	CAD MODEL	MODEL REV	SHEET
4:1	MPEX-04-DES-05-A556	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A556 SH 1

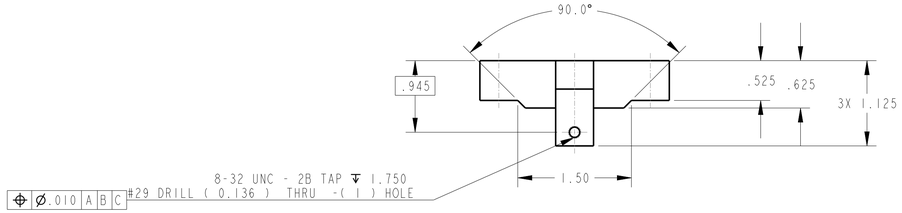
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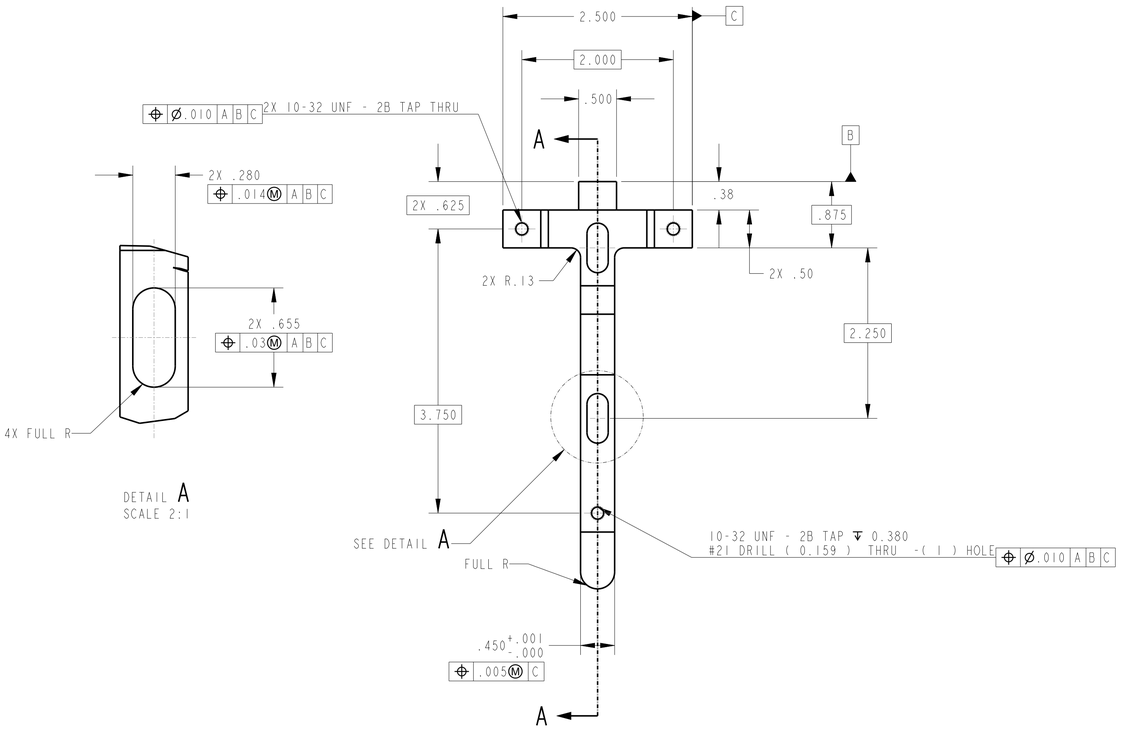
1. ALL PARTS AND COMPONENTS SHALL BE FABRICATED IN ACCORDANCE WITH GOOD VACUUM PRACTICES AND THE GUIDELINES OUTLINED IN THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).
2. USE ONLY WATER SOLUBLE, NON-SULFUROUS BEARING CUTTING OILS FOR MACHINING.
3. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002)
4. SUPPLIER MUST VERIFY THAT ALL MATERIALS AND FABRICATION PROCESS STEPS RESULT IN ALL COMPONENTS (INCLUDING WELD AFFECTED AREAS AND HARDWARE) HAVING A MAGNETIC PERMEABILITY OF <1.03 AT 200 OERSTEDS.

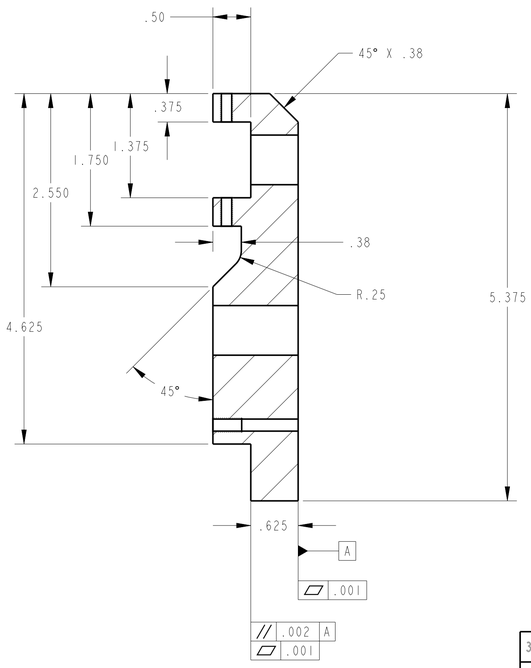
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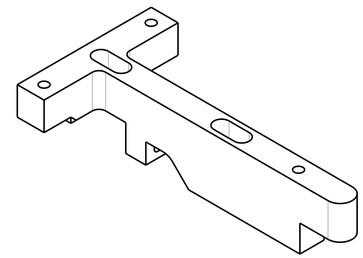
REVISIONS

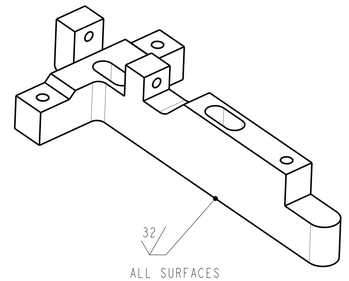
REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/24/2023











316 STAINLESS STEEL	ASTM A240	0.70 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION		
DOCUMENTS REQUIRED	APPLICABLE	
MATERIAL MILL TEST REPORT		
LEAK TEST REPORT		
CLEANING CERT		
WELD / BRAZE INSPECTION REPORT		
HEAT TREAT REPORT (W/CHART)		
DIMENSIONAL REPORT		
MATERIAL SELLER CERT		
FUNCTIONAL TEST REPORT		
DEVIATION REQUEST	☒	
NONCONFORMANCE REPORT	☒	
QA REP	DATE	

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A549

NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 32 RMS

THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/202
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023

MPEX GUIDE: MPEX-00-ENG-005

THIS DRAWING IS THE PROPERTY OF
OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
SHIELD SUPPORT ADJUSTER REVERSE

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A557	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A557	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A557 R: 1

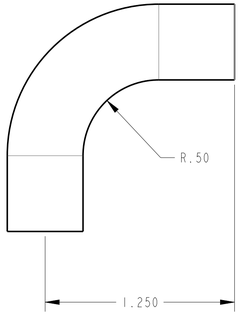
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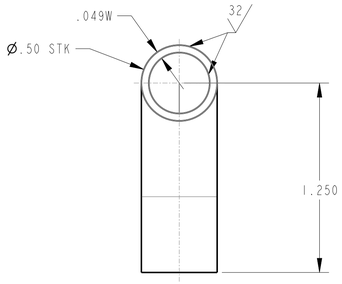
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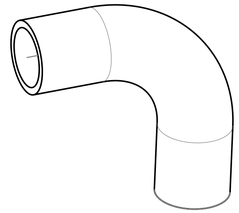
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REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023







316 STAINLESS STEEL	ASTM A276	0.042 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION		
DOCUMENTS REQUIRED	APPLICABLE	
MATERIAL MILL TEST REPORT		
LEAK TEST REPORT		
CLEANING CERT		
WELD / BRAZE INSPECTION REPORT		
HEAT TREAT REPORT (W/CHART)		
DIMENSIONAL REPORT		
MATERIAL SELLER CERT		
FUNCTIONAL TEST REPORT		
DEVIATION REQUEST	⊠	
NONCONFORMANCE REPORT		
QA REP	DATE	

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A549

NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 125 RMS

THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023

MPEX GUIDE: MPEX-00-ENG-005

THIS DRAWING IS THE PROPERTY OF
OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
SHIELD 90 DEG TUBE

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A558	0

SCALE	CAD MODEL	MODEL REV	SHEET
2:1	MPEX-04-DES-05-A558	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A558 R 1

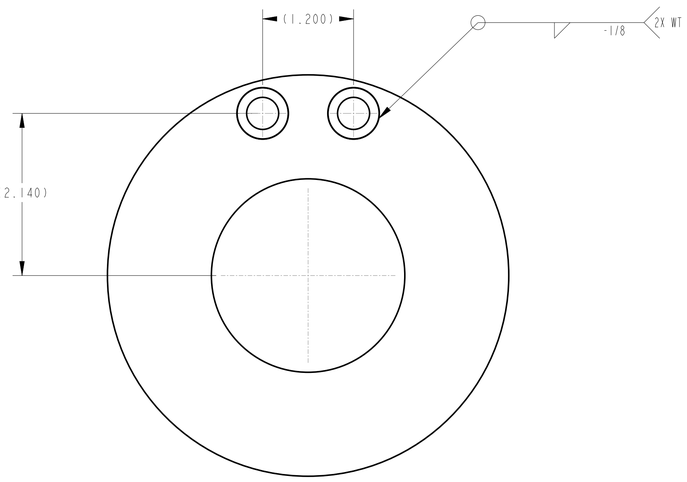
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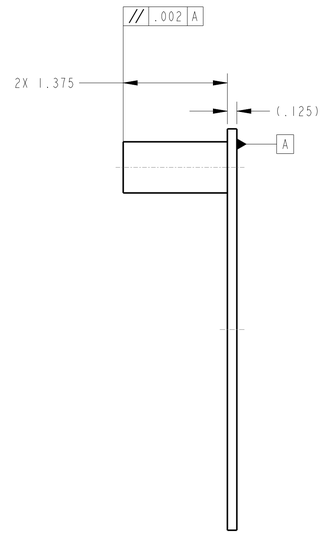
1. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) PRIOR TO WELDING.
2. AFTER CLEANING, ALL COMPONENTS SHALL BE HANDLED ACCORDING TO SECTION 3.10 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) TO AVOID CONTAMINATION OF WELDS.
3. ALL COMPONENTS, FILLER MATERIALS, AND WELDED JOINTS SHALL BE NON-MAGNETIC ACCORDING TO SECTION 3.4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) AFTER WELDING.
4. SUPPLIER SHALL MANUFACTURE A WELD SAMPLE TO VERIFY THAT THE MAGNETIC PERMEABILITY REQUIREMENTS ARE MET. A WELD PROCEDURE WITH PROCESS SETTINGS SHALL BE DOCUMENTED AND USED FOR BOTH THE SAMPLE AND PRODUCTION ASSEMBLIES.
5. ALL VT (VACUUM TIGHT) WELDS MUST PASS A HELIUM LEAK TEST OF 1 X 10^-9 STD CC/SEC HELIUM PERFORMED ACCORDING TO ASTM E498-95, STANDARD TEST METHODS FOR LEAK DETECTION.
6. SUPPLIER SHALL MAINTAIN WELD PROCEDURE AND INSPECTION RECORDS.
7. WELD PROCEDURE AND PERFORMANCE QUALIFICATIONS PER AWS B2.1/2.1M:2014.
8. WELD QUALITY REQUIREMENTS OF AWS D17.1/D17.1M (FUSION WELDING) SPECIFICATION FOR CLASS A WELDS MUST BE MET. WELDS MUST BE VISUALLY INSPECTED.
9. WELD SYMBOLS PER ANSI/AWS A2.4.

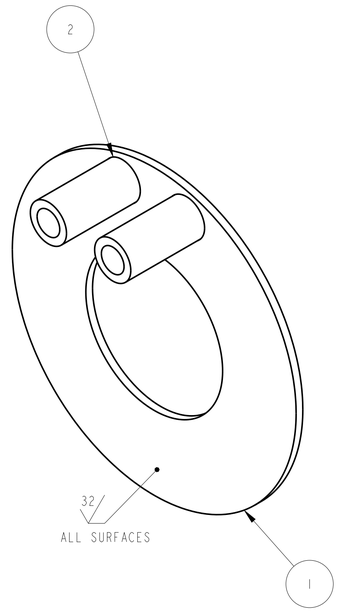
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REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				9/2023







FIND NO.	QTY	PART OR IDENTIFYING NUMBER	DESCRIPTION OR NOMENCLATURE	MATERIAL / SPECIFICATION
2	2	MPEX-04-DES-05-A554	TARGET EX-BONDED TUBE SHORT	316 STAINLESS STEEL ASTM A276
1	1	MPEX-04-DES-05-A561	TARGET SHIELD COVER LOD	316 SS ASTM A276

PARTS LIST — TOTAL WEIGHT: 0.76 LBS

QUALITY VERIFICATION		
DOCUMENTS REQUIRED	APPLICABLE	
MATERIAL MILL TEST REPORT		
LEAK TEST REPORT		
CLEANING CERT		
WELD / BRAZE INSPECTION REPORT		
HEAT TREAT REPORT (W/CHART)		
DIMENSIONAL REPORT		
MATERIAL SELLER CERT		
FUNCTIONAL TEST REPORT		
DEVIATION REQUEST	X	
NONCONFORMANCE REPORT	X	
QA REP	DATE	

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A548
NEXT USED ASSEMBLIES

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING
DEFAULT TOLERANCES
LINEAR: X.X ±.1; X.XX ±.01; X.XXX ±.005
ANGULAR: ±.5°
REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 32 RMS MAX
THIRD ANGLE PROJECTION

APPROVALS

		DATE
DESIGNER	L.REFFI	9/2023
DETAILER	L.REFFI	9/2023
CHECKER	D.OTTINGER	9/2023
ENGINEER	T.BOYD	9/2023
CONTROL ACCOUNT MANAGER	A.AARON	9/2023

MPEX GUIDE: MPEX-00-ENG-005

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ORNL OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD WELDMENT

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A560	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A560	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A560 | 1

NOTES:

1. ALL PARTS AND COMPONENTS SHALL BE FABRICATED IN ACCORDANCE WITH GOOD VACUUM PRACTICES AND THE GUIDELINES OUTLINED IN THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).

2. USE ONLY WATER SOLUBLE, NON-SULFUROUS BEARING CUTTING OILS FOR MACHINING.

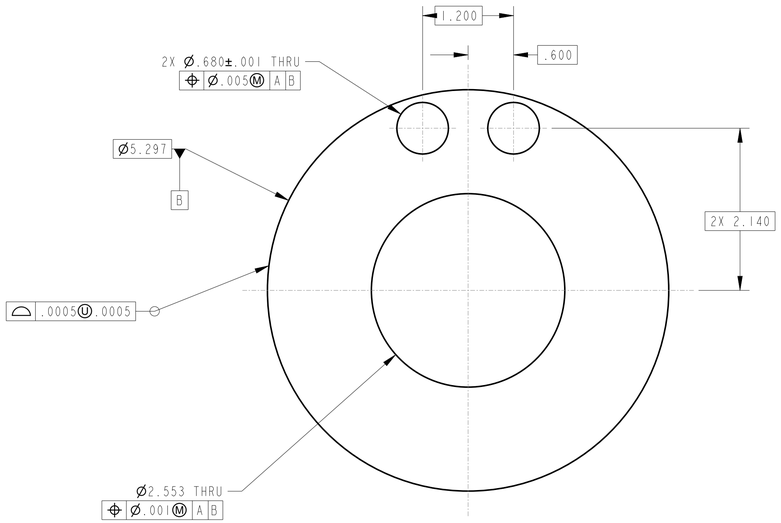
3. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002)

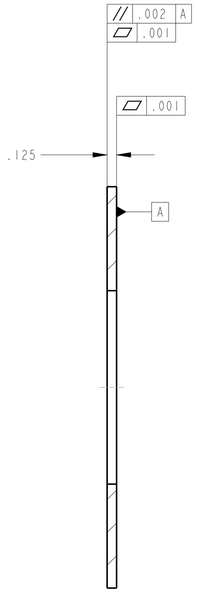
4. SUPPLIER MUST VERIFY THAT ALL MATERIALS AND FABRICATION PROCESS STEPS RESULT IN ALL COMPONENTS (INCLUDING WELD AFFECTED AREAS AND HARDWARE) HAVING A MAGNETIC PERMEABILITY OF <1.03 AT 200 OERSTEDS.

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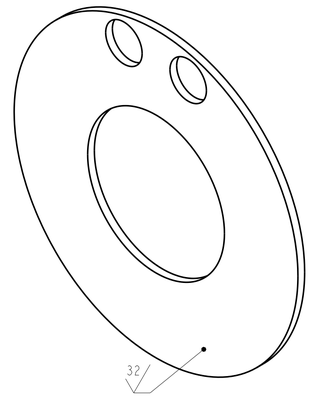
REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				9/2023





SECTION A-A



DWG NO - MPEX-04-DES-05-A561 B

316 SS	ASTM A276	0.58 LBS
MATERIAL	SPECIFICATION	WEIGHT

PART INFORMATION

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	⊠
NONCONFORMANCE REPORT	

DRAWING PACKAGE I.D.

MPEX-04-DES-05-A560

NEXT USED ASSEMBLIES

QA REP | DATE

DIMENSIONS ARE IN INCHES

DRAFTING STANDARD: ASME Y14.1

DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018

DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03

SURFACE ROUGHNESS: 32 RMS

THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 9/2023
DETAILER	L.REFFI	DATE 9/2023
CHECKER	D.OTTINGER	DATE 9/2023
ENGINEER	T.BOYD	DATE 9/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 9/2023

MPEX OUTDE: MPEX-00-ENG-005

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DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHEILD
TARGET SHIELD COVER LOD

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A561	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A561	0	1 of 1

THIS DRAWING PREPARED ON CREO

NOTES:

EXPLOSION BONDING
1. ITEMS 1, 2, AND 3 SHALL BE PERMANENTLY JOINED BY EXPLOSION BONDING.

2. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) PRIOR TO EXPLOSION BONDING.

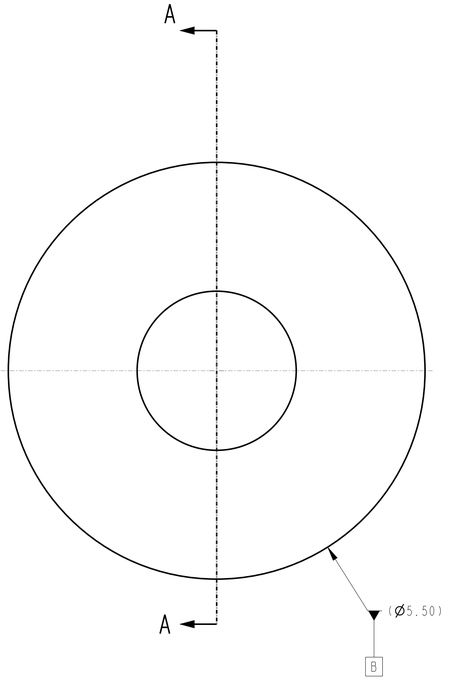
3. AFTER CLEANING, ALL COMPONENTS SHALL BE HANDLED ACCORDING TO SECTION 3.10 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) TO AVOID CONTAMINATION.

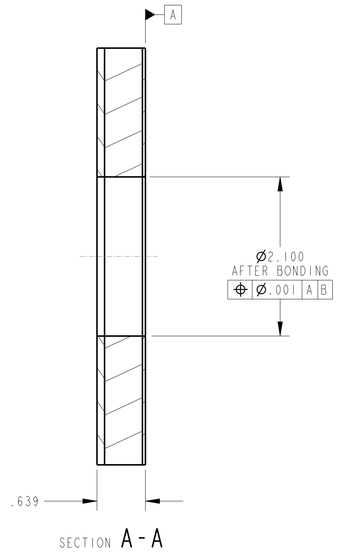
4. ALL COMPONENTS SHALL BE NON-MAGNETIC ACCORDING TO SECTION 3.4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002) AFTER EXPLOSION BONDING.

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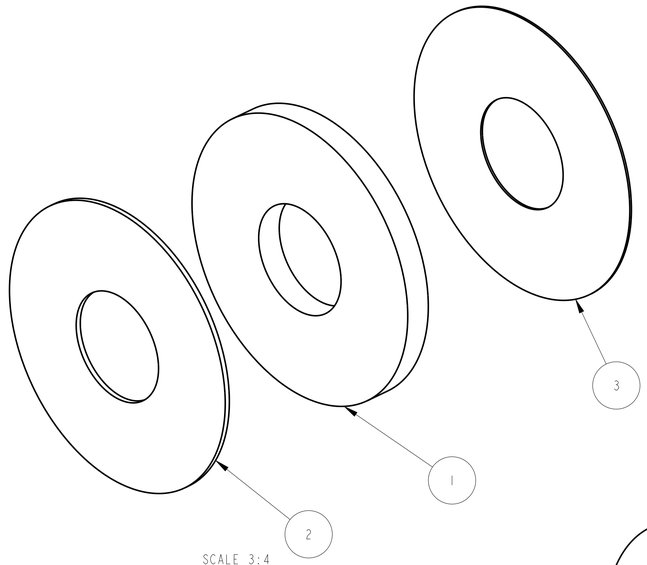
REVISIONS

REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				8/23/2023

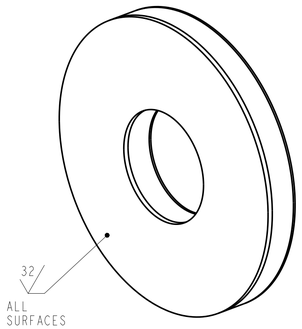




SECTION A - A



SCALE 3:4



SCALE 3:4

FIND NO.	QTY	PART OR IDENTIFYING NUMBER	DESCRIPTION OR NOMENCLATURE	MATERIAL / SPECIFICATION
3	1	MPEX-04-DES-05-A553	TARGET EX-BONDED TUNGSTEN LOD	TUNGSTEN ASTM B760
2	1	MPEX-04-DES-05-A552	TARGET SHIELD COVER LOD	316 SS ASTM A276
1	1	MPEX-04-DES-05-A551	TARGET SHIELD CHANNELS LOD	GLIDCOP AL-15

PARTS LIST — TOTAL WEIGHT: 4.32 LBS

Supplied by ORNL

DRAWING PACKAGE I.D.		
MPEX-04-DES-05-A562	QA REP	DATE
NEXT USED ASSEMBLIES		

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 125 RMS MAX
THIRD ANGLE PROJECTION

APPROVALS		
DESIGNER	L.REFFI	DATE 7/2023
DETAILER	L.REFFI	DATE 7/2023
CHECKER	D.OTTINGER	DATE 7/2023
ENGINEER	T.BOYD	DATE 7/2023
CONTROL ACCOUNT MANAGER	A.AARON	DATE 7/2023
MPEX GUIDE	MPEX-00-ENG-005	

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ORNL OAK RIDGE NATIONAL LABORATORY
DEPARTMENT OF ENERGY UNDER U.S. GOVERNMENT CONTRACT DE-AC05-00OR22725
OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD EX-BONDED SHORT, COOLING CHANNEL

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A562	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A562	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO MPEX-04-DES-05-A562 SH 1

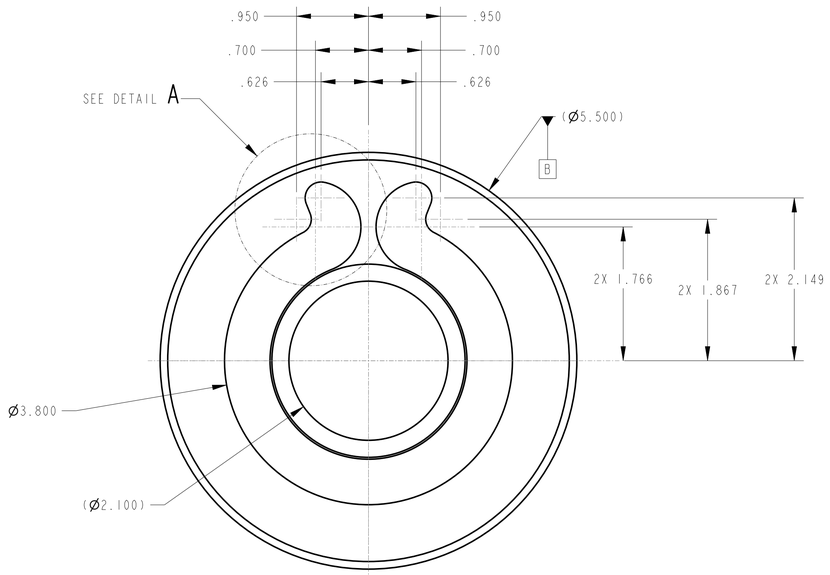
NOTES:

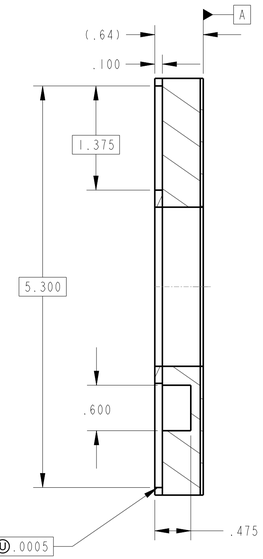
1. ALL PARTS AND COMPONENTS SHALL BE FABRICATED IN ACCORDANCE WITH GOOD VACUUM PRACTICES AND THE GUIDELINES OUTLINED IN THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002).
2. USE ONLY WATER SOLUBLE, NON-SULFUROUS BEARING CUTTING OILS FOR MACHINING.
3. ALL COMPONENTS SHALL BE PRECISION CLEANED ACCORDING TO SECTION 4 OF THE MPEX VACUUM HANDBOOK (MPEX-00-ENG-002)
4. SUPPLIER MUST VERIFY THAT ALL MATERIALS AND FABRICATION PROCESS STEPS RESULT IN ALL COMPONENTS (INCLUDING WELD AFFECTED AREAS AND HARDWARE) HAVING A MAGNETIC PERMEABILITY OF <1.03 AT 200 OERSTEDS.

NO REPRESENTATION OR WARRANTY, EXPRESSED OR IMPLIED, IS MADE AS TO THE ACCURACY, COMPLETENESS OR USEFULNESS OF THE INFORMATION OR STATEMENTS CONTAINED IN THESE DRAWINGS, OR THAT THE DISCLOSURE OF ANY INFORMATION, APPARATUS, METHOD OR PROCESS DISCLOSED IN THESE DRAWINGS MAY NOT INFRINGE PRIVATE RIGHTS OF OTHERS. NO LIABILITY IS ASSUMED WITH RESPECT TO THE USE OF, OR FOR DAMAGES RESULTING FROM THE USE OF, ANY INFORMATION, APPARATUS, METHOD OR PROCESS DISCLOSED IN THESE DRAWINGS. DRAWINGS MADE AVAILABLE FOR INFORMATION TO BIDDER ARE NOT TO BE USED FOR OTHER PURPOSES AND ARE TO BE RETURNED UPON REQUEST OF THE FORWARDING CONTRACTOR.

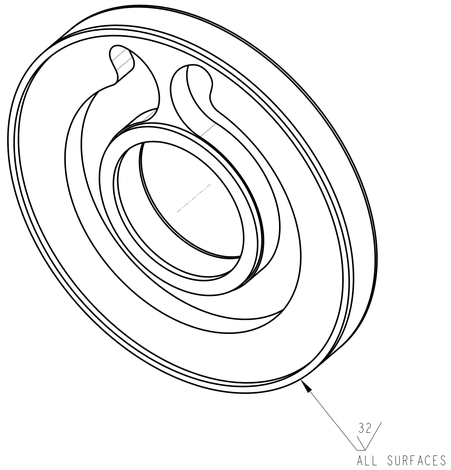
REVISIONS

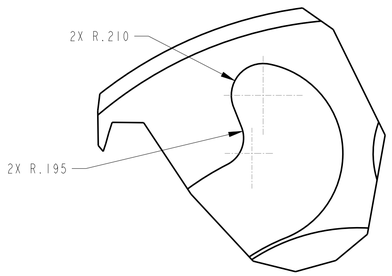
REV	TYPE	DESCRIPTION OF CHANGE	DES	DET	CK	ENG	CAM				DATE
0		ORIGINAL ISSUE	CC	CC	DO	TB	AA				





SECTION A - A





DETAIL A
SCALE 2:1

FIND NO.	QTY	PART OR IDENTIFYING NUMBER	DESCRIPTION OR NOMENCLATURE	MATERIAL / SPECIFICATION
1	1	MPEX-04-DES-05-A562	TARGET SHIELD EX-BONDED SHORT, COOLING CHANNEL	

PARTS LIST — TOTAL WEIGHT: 3.07 LBS

DRAWING PACKAGE I.D.		
MPEX-04-DES-05-A548	QA REP	DATE
NEXT USED ASSEMBLIES		

QUALITY VERIFICATION	
DOCUMENTS REQUIRED	APPLICABLE
MATERIAL MILL TEST REPORT	
LEAK TEST REPORT	
CLEANING CERT	
WELD / BRAZE INSPECTION REPORT	
HEAT TREAT REPORT (W/CHART)	
DIMENSIONAL REPORT	
MATERIAL SELLER CERT	
FUNCTIONAL TEST REPORT	
DEVIATION REQUEST	X
NONCONFORMANCE REPORT	X

DIMENSIONS ARE IN INCHES
DRAFTING STANDARD: ASME Y14.1
DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5, 2018
DO NOT SCALE DRAWING

DEFAULT TOLERANCES

LINEAR	ANGULAR
X.X ±.1	±.5°
X.XX ±.01	
X.XXX ±.005	

REMOVE ALL BURRS AND BREAK SHARP EDGES: .03
SURFACE ROUGHNESS: 32 RMS MAX
THIRD ANGLE PROJECTION

APPROVALS

		DATE
DESIGNER	L.REFFI	9/2023
DETAILER	L.REFFI	9/2023
CHECKER	D.OTTINGER	9/2023
ENGINEER	T.BOYD	9/2023
CONTROL ACCOUNT MANAGER	A.AARON	9/2023

MPEX GUIDE: MPEX-00-ENG-005

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OAK RIDGE, TENNESSEE

MATERIAL PLASMA EXPOSURE EXPERIMENT

MPEX
REVERSE TARGET SHIELD
TARGET SHIELD EX-BONDED SHORT, COVER RELIEF

SIZE	DRAWING NUMBER	REV
D	MPEX-04-DES-05-A563	0

SCALE	CAD MODEL	MODEL REV	SHEET
1:1	MPEX-04-DES-05-A563	0	1 of 1

THIS DRAWING PREPARED ON CREO

DWG NO: MPEX-04-DES-05-A563 [SM 1]