Author: **James T. Goulding**
Department: **Mechanical Engineering**
Date: **8/18/00**
Rev. A: 02/19/02

Program - Project - Job: SNS-FE Project
MEBT Mechanical Systems

Title: **SNS-FE MEBT Beam Current Monitor Mechanical Design**

1. Scope

This engineering note describes the mechanical design for the Beam Current Monitor (Toroid). It includes a drawing list of mechanical components and assemblies, design overview, outside vendor component information, and rendered pictures.

2. Drawings

2.1. 25B131_2_A BCM 1 Threaded Conflat Flange
2.2. 25B137_4_B BCM 1 Electrical Cover
2.3. 25B138_4_A BCM 1 Isolater Pipe with Conflat Flanges
2.4. 25B139_4_A Beam Current Monitor 1
2.5. 25B191_2_A Rubber Spacer
2.6. 25B192_2_B BCM 2 Threaded O-Ring Flange
2.7. 25B193_4_A BCM 2 Magnetic Shield
2.8. 25B194_4_B BCM 2 Electrical Cover
2.9. 25B195_4_A Beam Current Monitor 2
2.10. 25B196_4_A BCM 2 Isolater Pipe with O-Ring Flanges
2.11. 25B197_4_A BCM 1 Magnetic Shield

Copies of all drawings are included in the Appendix - active links are shown in blue.

3. Design Overview

Two beam current monitors (toroids) are used in the MEBT. Toroid 1 is positioned between quadrupole magnets 2 and 3 on raft 1 and toroid 2 is positioned between quadrupole magnets 11 and 12 on raft 3.

The toroid design is made up of four main components: fast current transformer (FCT), electrical isolater, electrical cover and magnetic shield. The FCT is the beam diagnostic device. The Isolater and electric cover make up the electrical short around the FCT. The magnetic shield protects the FCT from the magnetic fields of the adjacent quadrupole magnets.

Preliminary measurements of quadrupole magnet fields were performed to show that the shields are needed and effective. See technical note number FE-EE-015 "Magnetic Shielding Tests for the MEBT Current Transformers," for test details and results. Further tests where run with the shield and the FCT to measure droop rate in the FCT, in the presence of a fully excited quadrupole magnet, with and without the shielding. This test confirmed that the designed shielding is adequate.

4. Reference

4.1. Electrical Isolator, Vacuum (Specification), Ceramaseal 1996 Product Guide
4.2. 2 ¾ in. OD Flanges (Specification), MDC Vacuum Products Corporation

5. Fabrication and Assembly Issues

The fabrication and assembly are very straightforward. The electric cover is made from welded copper sheet. The isolator and flange assemblies are connected using a vacuum seal internal weld. Rubber strips are use to hold the FCT in place relative to the isolator. When the toroid is assembled into the beam line, the break between the magnetic shield needs to be oriented 45 off of vertical. This is where the adjacent quadrupole magnet's magnetic flux is at 0 gauss. Take care to protect the conflat flange knife edge or o-ring face during assembly, storage and installation.

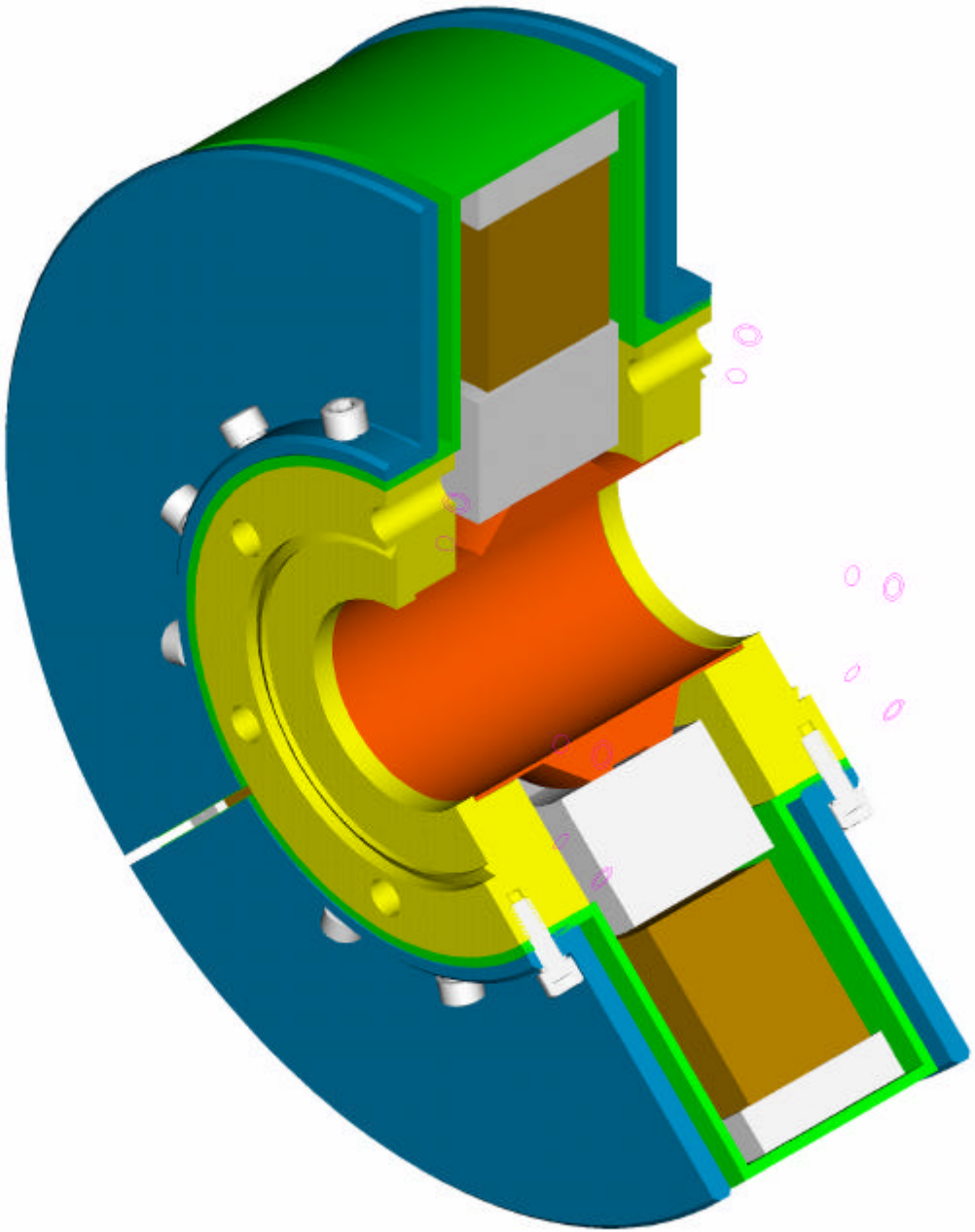
6. SNS-FE Personnel

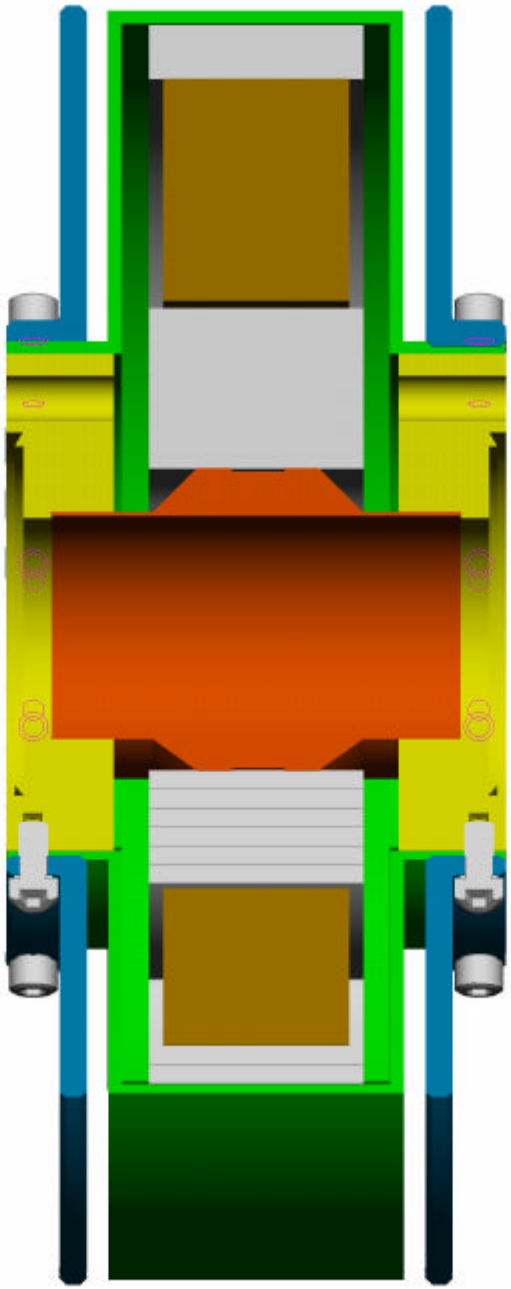
Daryl Oshatz, MEBT Lead Mechanical Engineer
James T. Goulding, Mechanical Engineer
Larry Doolittle, Electrical Engineer

7. Appendices

Appendix A: Rendered Pictures of 3-D CAD model
Appendix B: Component and Assembly Drawings

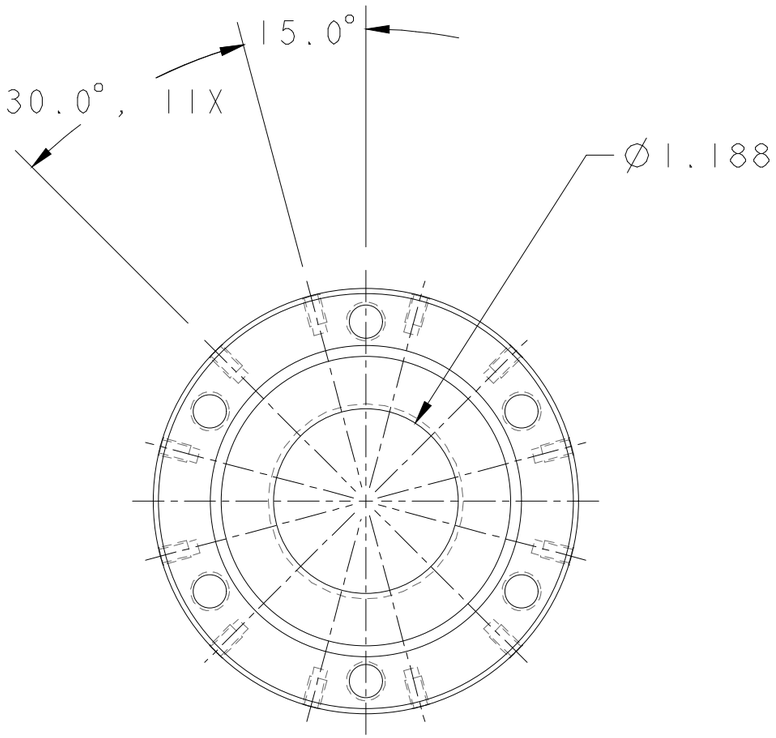
Appendix A

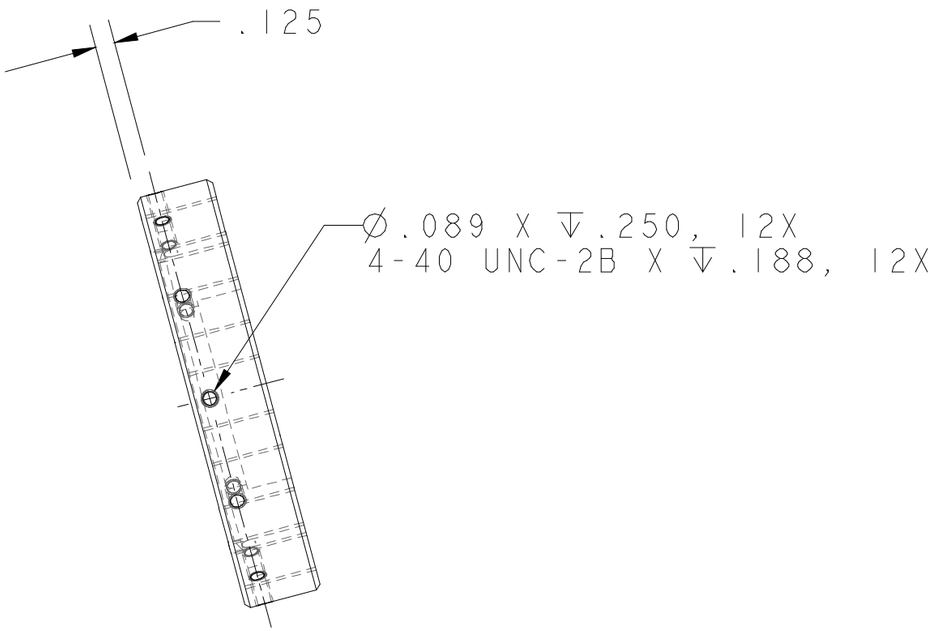


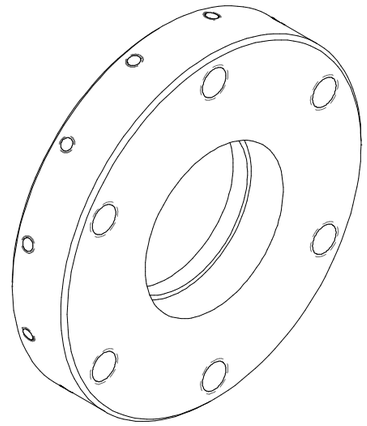


Appendix B

DWG. NO.	SIZE	REV.	SH.
25B1312	A	1	







-	2.75'' SS CONFLAT FLANGE	-
DESCRIPTION	MATERIAL	MAT. LOCATION

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

PROJECTION:

TOLERANCES		
	X.X ± 0.1	FRAC. ± 1/64
	X.XX ± 0.01	Angles ± 0.5°
	X.XXX ± 0.005	FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS

		SER NO.	-
ACCT NO. -	NO. REQD -	DATE ISSD	-
DEL TO -		DATE REQD	-
SURFACE TREATMT	UH VAC CLEANING		
IDENT METHOD	TAG		
PROJECT NUMBER	na		
PROJECT NAME	-		
DWG BY	TREVOR GOULDING	DATE	22-Mar-00
CHK BY	DARYL OSHATZ	DATE	-
APR BY	DARYL OSHATZ	DATE	-

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SNS

SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCMI THREADED CONFLAT FLANGE

MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 1/1	DO NOT SCALE PRINTS
	PART	-	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	-	FE3313	25B1312	A

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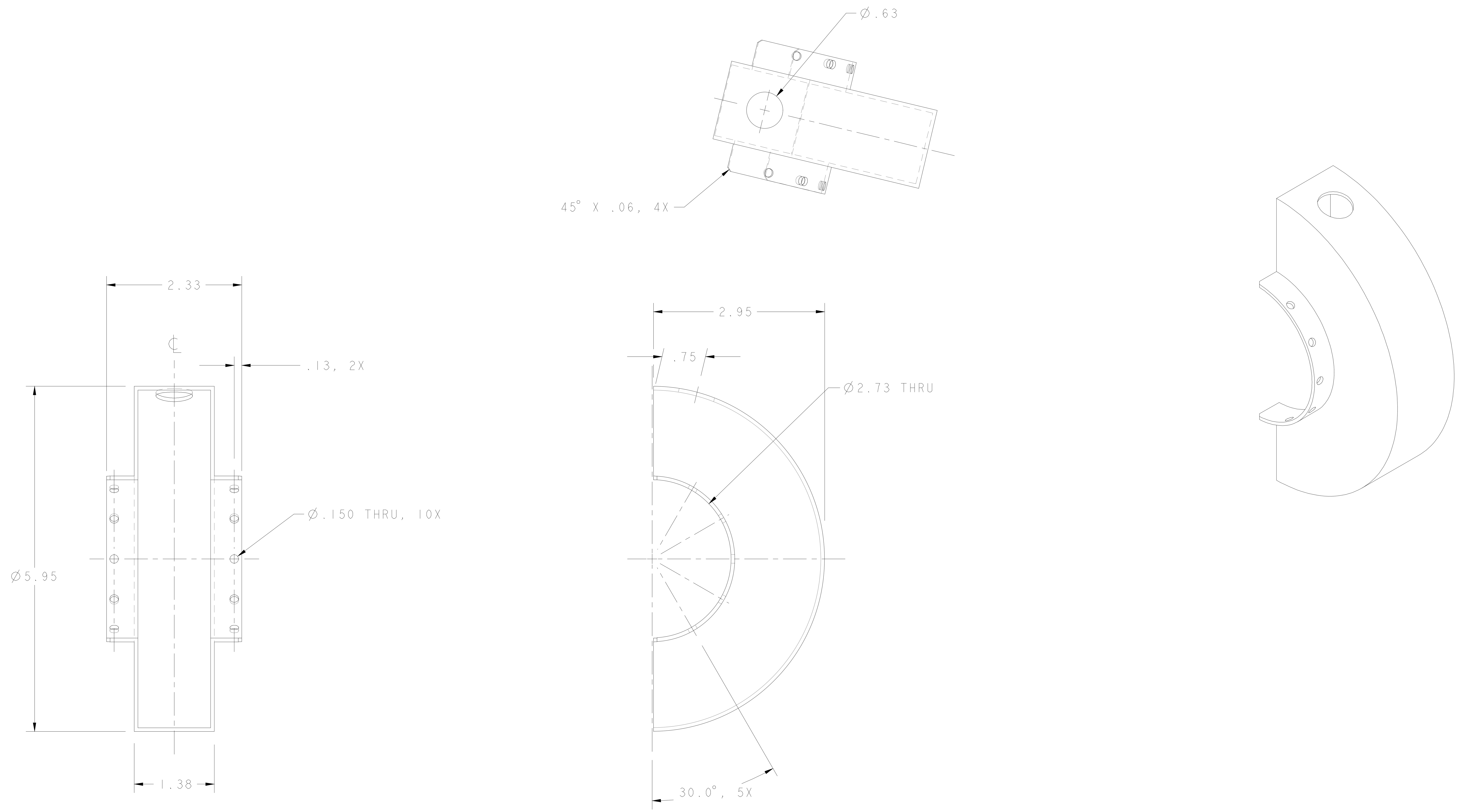
Dwg. File: 25B131 Model File: 25B131

DWG. NO. 25B1374 SIZE B REV. 1 SH.



-	16 GAGE COPPER	-
DESCRIPTION	MATERIAL	MAT. LOCATION

REV	DWG	CHK	ZONE	DATE	CHANGES
B			C6	8/17/00	INCREASE HOLE DIAMETER
B			D4	8/17/00	INCREASE HOLE DIAMETER

UNLESS OTHERWISE SPECIFIED
PROJECTION:

TOLERANCES		
	X.X ± 0.1	FRAC. ± 1/64
	X.XX ± 0.01	Angles ± 0.5°
	X.XXX ± 0.005	FINISH 125

DO NOT SCALE PRINT
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS
SER NO. -
ACCT NO. - NO. REQD -
DATE ISSD -
DEL TO -
DATE REQD -
SURFACE TREATMT -
IDENT METHOD TAG
PROJECT NUMBER na
PROJECT NAME -
DWG BY TREVOR GOULDING DATE 22-Mar-00
CHK BY DARYL OSHATZ DATE -
APR BY DARYL OSHATZ DATE -

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UNIVERSITY OF CALIFORNIA - BERKELEY

SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM 1 ELECTRICAL COVER

MICROFILMED: | DWG. TYPE PART | SHOWN ON - | SCALE: 1/1 | DO NOT SCALE PRINTS
SHEET 1 OF 1
PATENT CLEAR: | DESIGN ACCT. NO. - | CATEGORY CODE FE3313 | DWG. NO. 25B1374 | SIZE | REV. B

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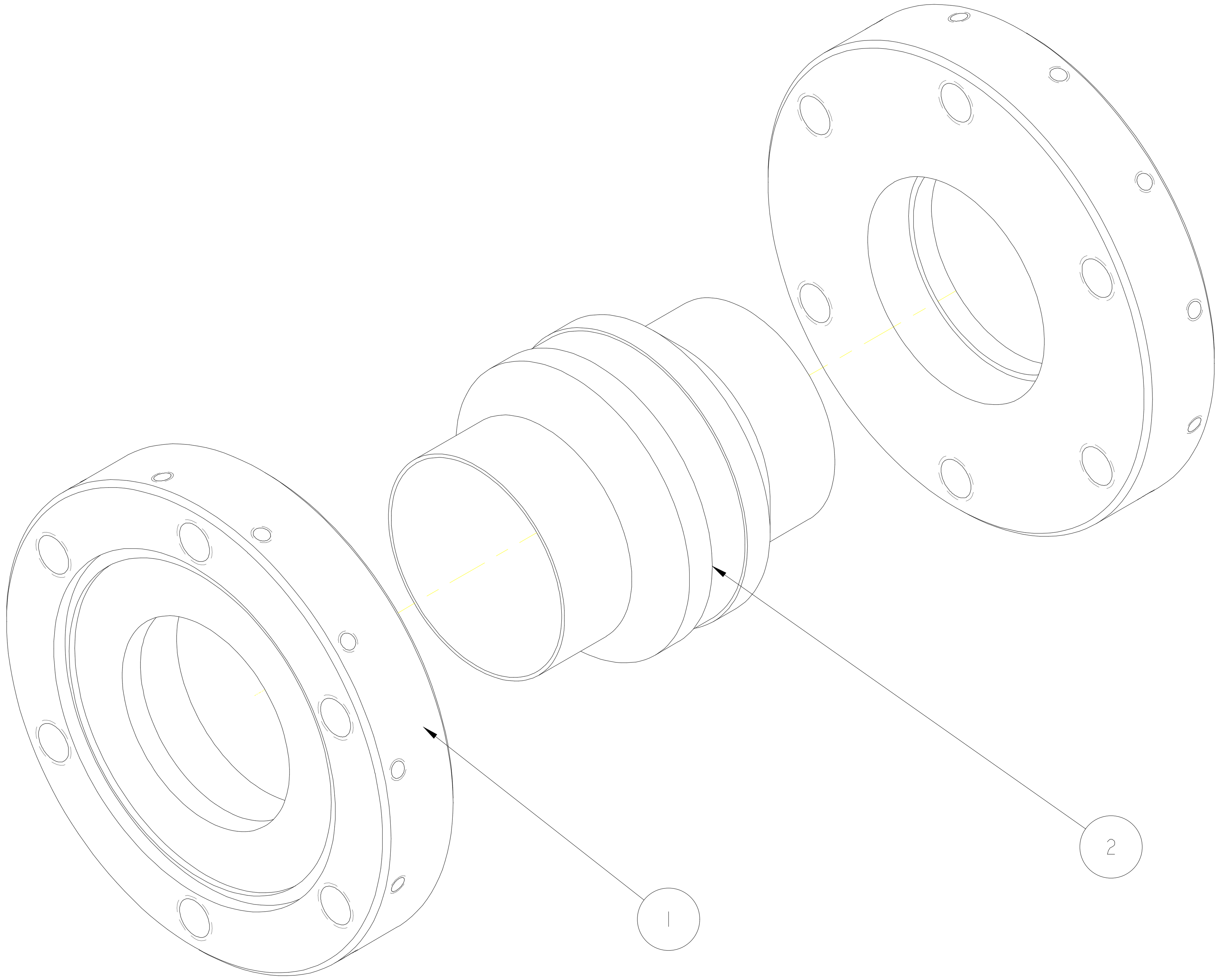
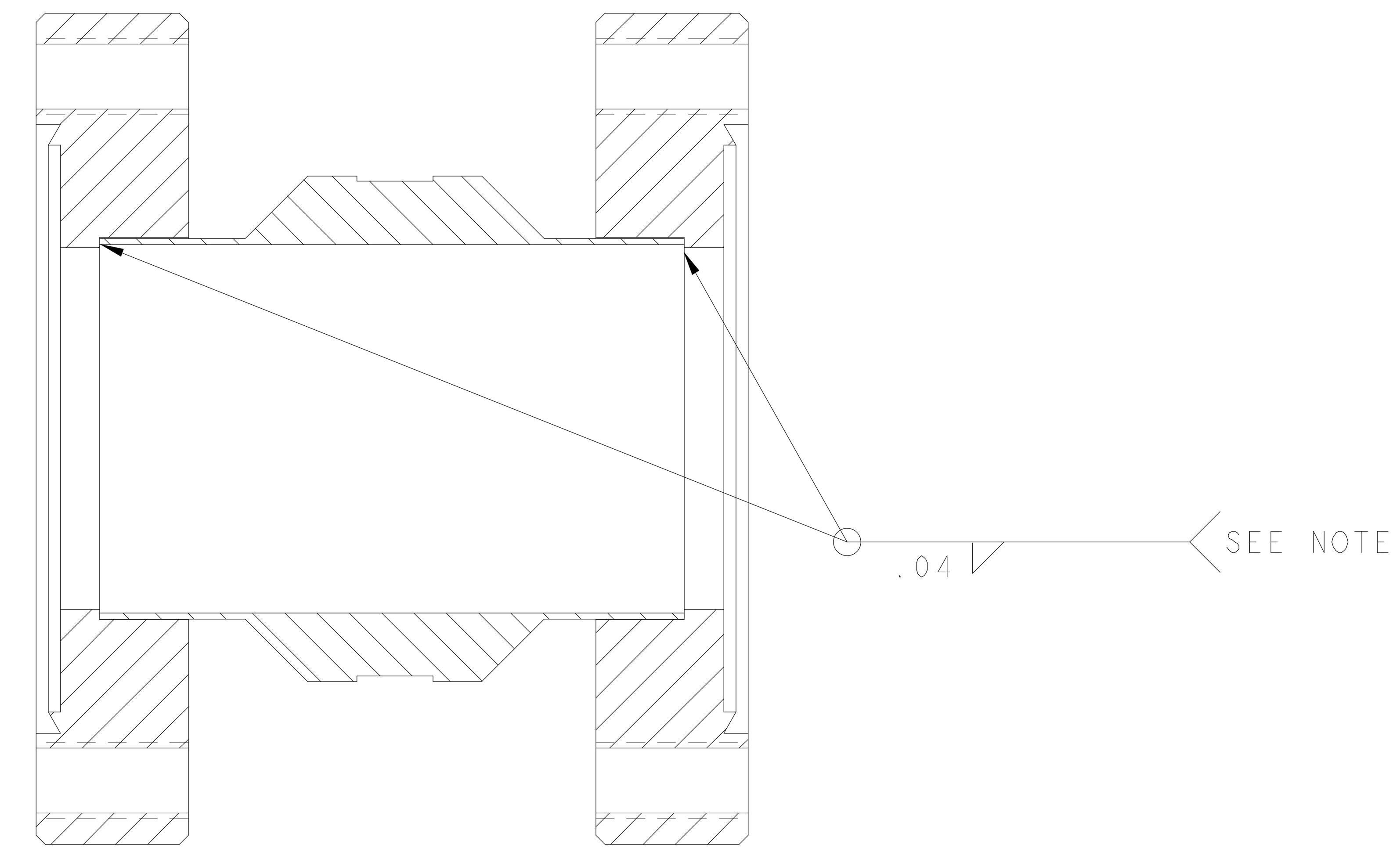
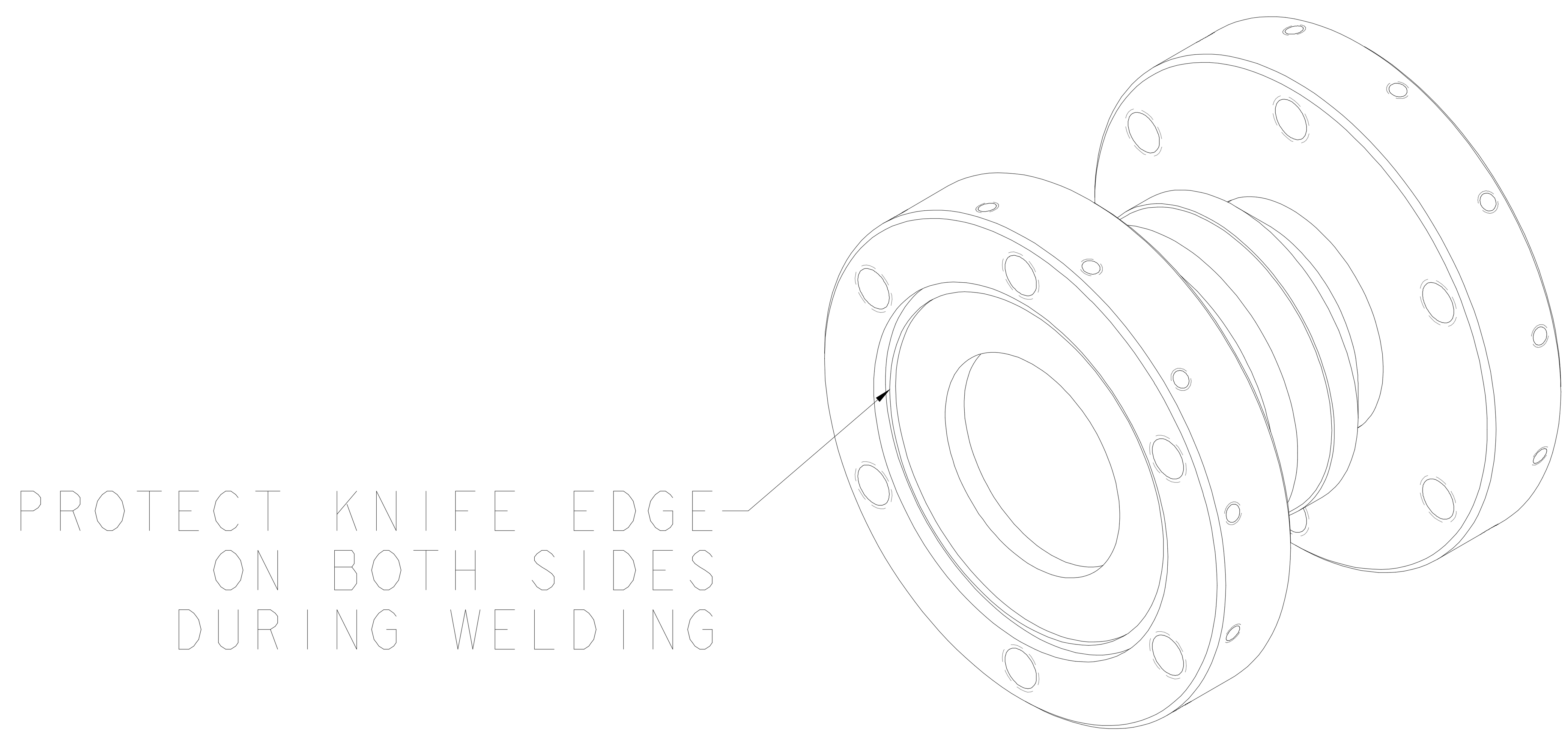
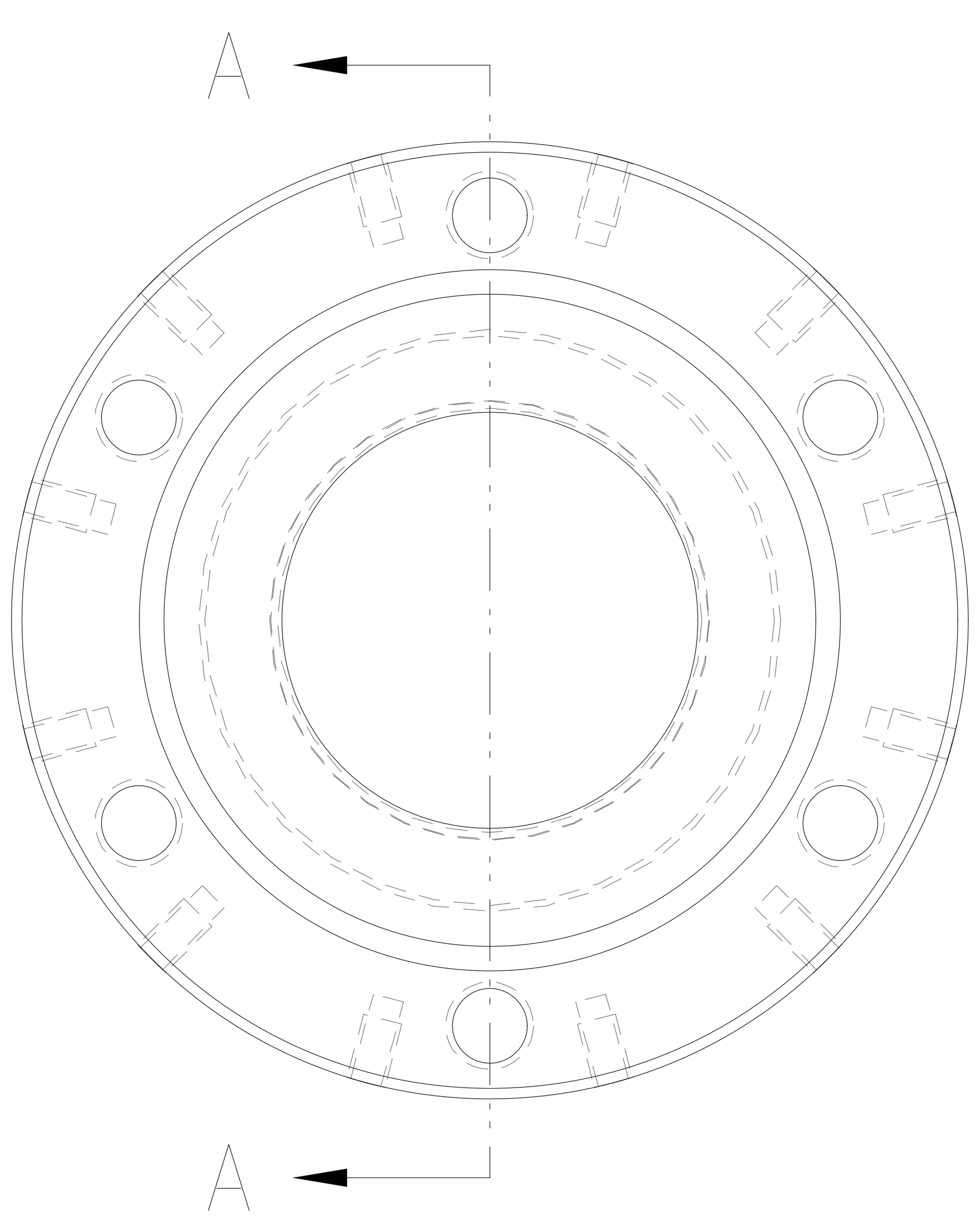
Dwg. File: 25B137 Model File: 25B137

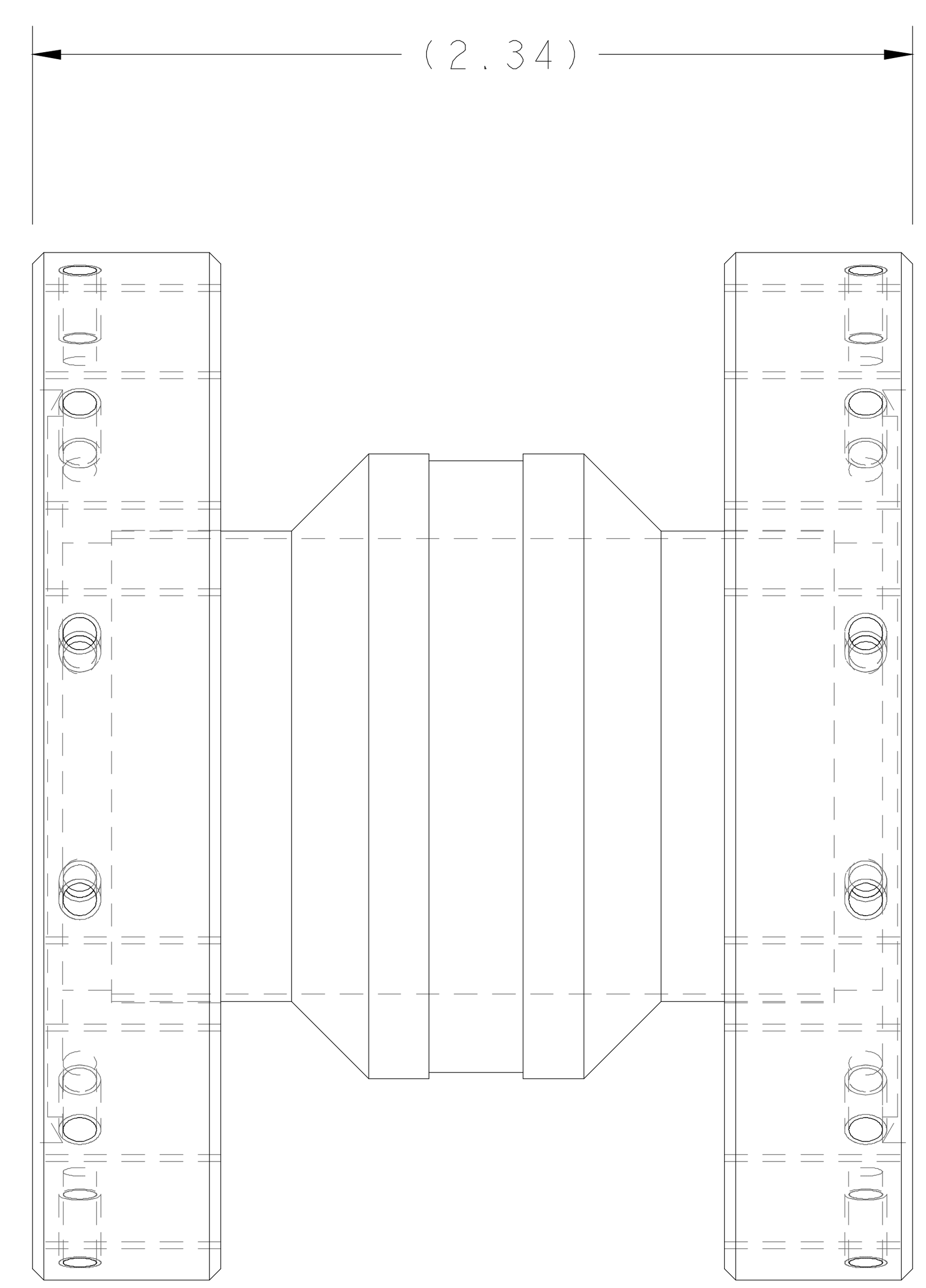




SECTION A-A







NOTES
1. FINISHED PART TO BE VACUUM TIGHT. LEAK RATE NOT TO EXCEED 1×10^{-8} torr - l/sec He.
2. BAG AFTER WELDING TO MAINTAIN HIGH VACUUM CLEANLINESS

ITEM	PART NO	REQD	DESCRIPTION	MATERIAL
2	CERAMASEAL 9999-03-W	1	ELECTRIC ISOLATOR VACUUM PIPE	KOVAR & ALUMINA OXIDE
1	25B131	2	BCM1 THREADED CONFLAT FLANGE	2.75'' SS CONFLAT FLANGE

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
PROJECTION:

TOLERANCES	
X.X ± 0.1	FRAC. ± 1/64
X.XX ± 0.03	Angles ± 1.0°
X.XXX ± 0.010	FINISH 125

DO NOT SCALE PRINT
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS
SER NO. -
ACCT NO. - NO. REQD - DATE ISSD -
DEL TO - DATE REQD -
SURFACE TREATMT ULTRA HIGH VACUUM CLEANING
IDENT METHOD TAG
PROJECT NUMBER na
PROJECT NAME SPALLATION NEUTRON SOURCE
DWG BY TREVOR GOULDING DATE 22-Mar-00
CHK BY DARYL OSHATZ DATE
APR BY DARYL OSHATZ DATE -

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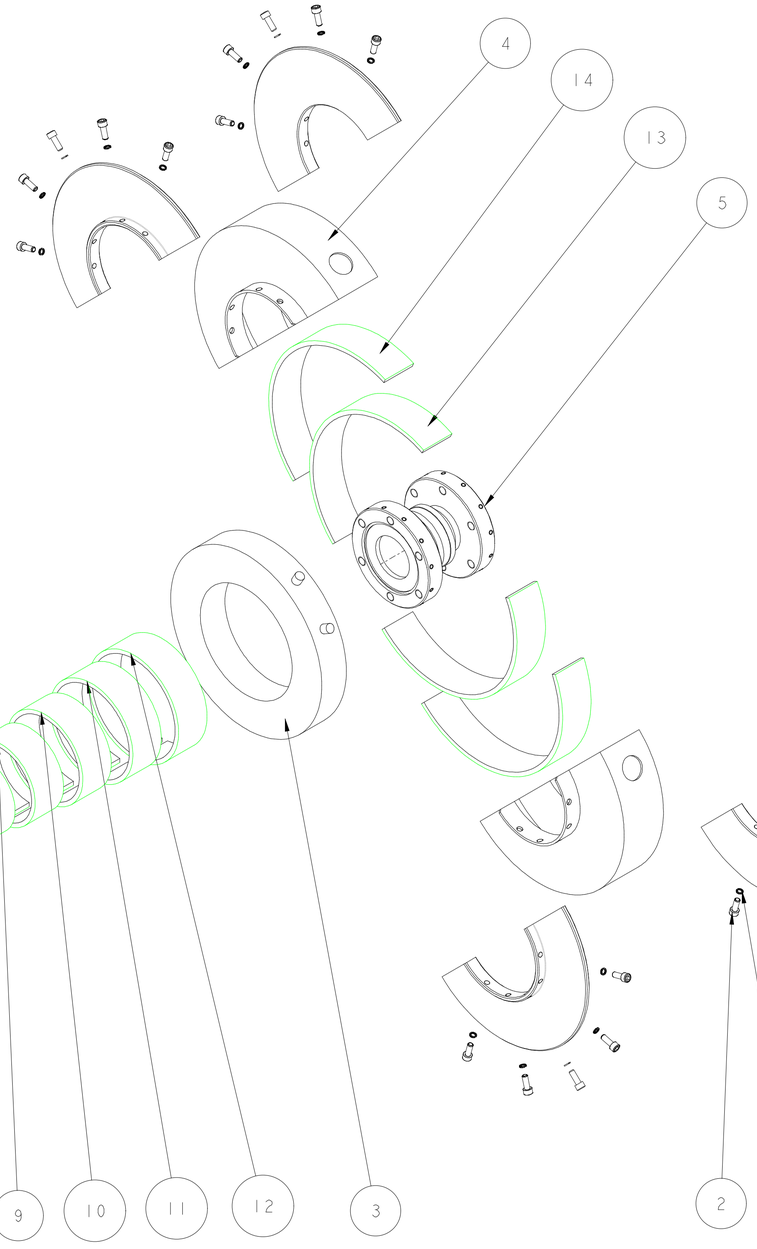
UNIVERSITY OF CALIFORNIA - BERKELEY

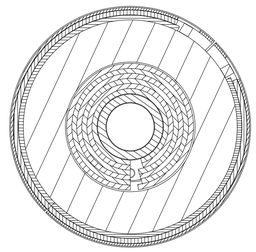
SNS
SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM 1 ISOLATOR PIPE WITH CONFLAT FLANGES

MICROFILMED: | DWG. TYPE ASSEM | SHOWN ON - | SCALE: 2/1 | DO NOT SCALE PRINTS
SHEET 1 OF 1
PATENT CLEAR: | DESIGN ACCT. NO. - | CATEGORY CODE FE3313 | DWG. NO. 25B1384 | SIZE | REV. A

Rev. 1/29/2000 J. R. Osborn
Dwg. File: 25B138 Model File: 25B138

DWG. NO. 25B1384 SIZE REV. A SH. 1





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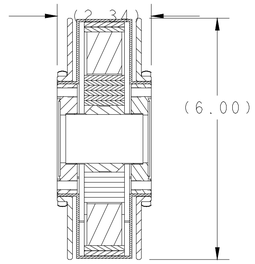
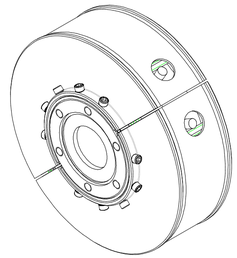
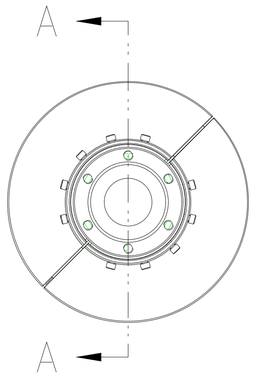
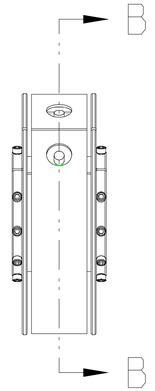


SECTION A - A







ITEM	PART NO	REQD	DESCRIPTION	MATERIAL
15	nnXnnn	1	THIRD LINE TITLE	-
14	25B191-8	2	RUBBER SPACER 7.75"	1/8" NEOPRENE
13	25B191-7	2	RUBBER SPACER 7.50"	1/8" NEOPRENE
12	25B191-6	1	RUBBER SPACER 9.00"	1/8" NEOPRENE
11	25B191-5	1	RUBBER SPACER 8.13"	1/8" NEOPRENE
10	25B191-4	1	RUBBER SPACER 7.38"	1/8" NEOPRENE
9	25B191-3	1	RUBBER SPACER 6.63"	1/8" NEOPRENE
8	25B191-2	1	RUBBER SPACER 5.75"	1/8" NEOPRENE
7	25B191-1	1	RUBBER SPACER 5.00"	1/8" NEOPRENE
6	25B197	4	BCM 1 MAGNETIC SHIELD	ASTM A36 OR EQUIV
5	25B138	1	BCM 1 ISOLATOR PIPE WITH CONFLAT FLANGES	-
4	25B137	2	BCM 1 ELECTRICAL COVER	16 GAGE COPPER
3	-	1	FAST CURRENT TRANSFORMER	-
2	-	20	4-40 X 1/2 HEX SOCKET CAP SCREW	-
1	-	20	#4 SPLIT LOCK WASHER	-

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

PROJECTION:

TOLERANCES

X.X ± 0.1	FRAC. ± 1/64
X.XX ± 0.03	Angles ± 1.0°
X.XXX ± 0.010	FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS

ACCT NO. -	NO. REQD -	SER NO.	-
DEL TO -		DATE ISSD	-
SURFACE TREATMT -		DATE REQD	-
IDENT METHOD TAG			
PROJECT NUMBER na			
PROJECT NAME -			
DWG BY TREVOR GOULDING		DATE 22-Mar-00	
CHK BY DARYL OSHATZ		DATE -	
APR BY DARYL OSHATZ		DATE -	

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UNIVERSITY OF CALIFORNIA - BERKELEY

SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BEAM CURRENT MONITOR 1

MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 1/2	DO NOT SCALE PRINTS
	ASSEM	-	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	-	FE3313	25B1394	A

Dwg. File: 25B1394 Model File: 25B138

DWG. NO. 25B1912 | SIZE A | REV. | SH. 1

PART NO.	TITLE3	LENGTH
25B191-1	RUBBER SPACER 5.00"	5.000
25B191-2	RUBBER SPACER 5.75"	5.750
25B191-3	RUBBER SPACER 6.63"	6.630
25B191-4	RUBBER SPACER 7.38"	7.380
25B191-5	RUBBER SPACER 8.13"	8.130
25B191-6	RUBBER SPACER 9.00"	9.000
25B191-7	RUBBER SPACER 7.50"	7.500
25B191-8	RUBBER SPACER 7.75"	7.750

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

PROJECTION:

TOLERANCES: X.X ± 0.1 | FRAC. ± 1/64 | X.XX ± 0.01 | Angles ± 0.5° | X.XXX ± 0.005 | FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

COMMERCIAL GRADE, SHORE A: 70	1/8" NEOPRENE	-
DESCRIPTION	MATERIAL	MAT. LOCATION

SHOP ORDERS

SER NO.	-		
ACCT NO.	-	NO. REQD -	DATE ISSD -
DEL TO	-		DATE REQD -
SURFACE TREATMT	-		
IDENT METHOD	TAG		
PROJECT NUMBER	-		
PROJECT NAME	SPALLATION NEUTRON SOURCE		
DWG BY	TREVOR GOULDING		DATE 27-Mar-00
CHK BY	DARYL OSHATZ		DATE -
APR BY	DARYL OSHATZ		DATE -

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UNIVERSITY OF CALIFORNIA - BERKELEY

SNS FES MEBT
MECHANICAL SUBSYSTEMS
RUBBER SPACER

MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 1/1	DO NOT SCALE PRINTS
	PART	-	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	-	FE3313	25B1912	A

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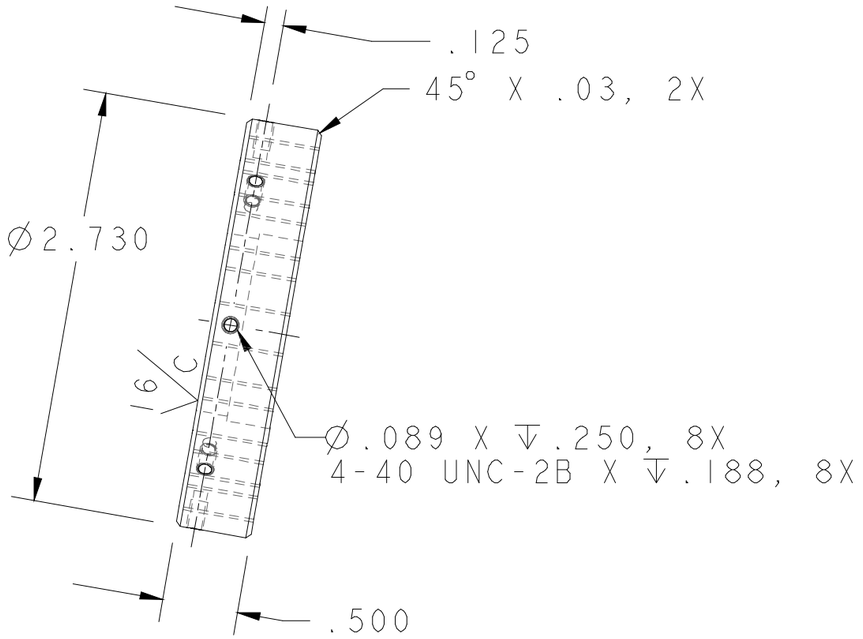
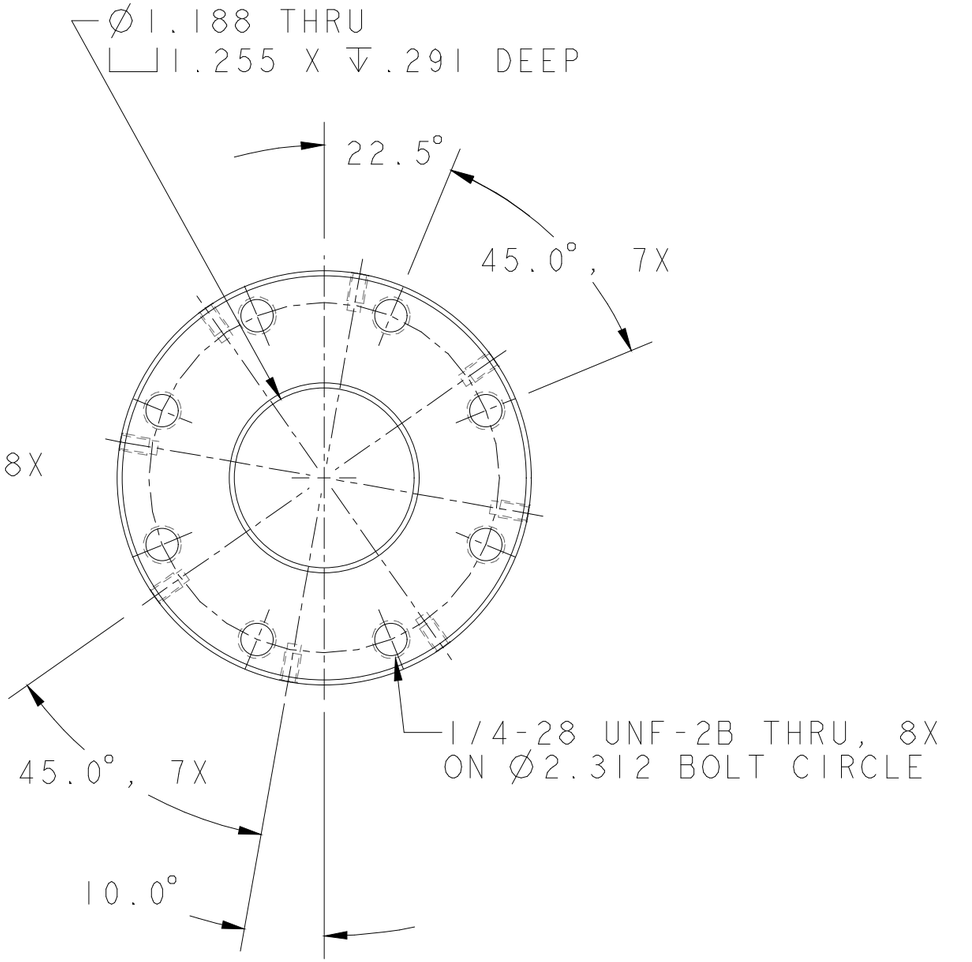
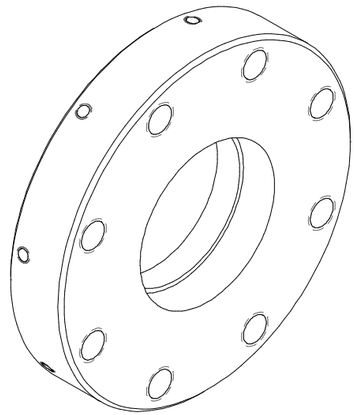
Dwg. File: 25B191 Model File: 25B191

DWG. NO.	SIZE	REV.	SH.
25B1922	B	1	







-	316 STAINLESS STEEL	-
DESCRIPTION	MATERIAL	MAT. LOCATION

REV	DWG	CHK	ZONE	DATE	CHANGES
B				8/17/00	CORRECTED VIEW PROJECTION

UNLESS OTHERWISE SPECIFIED

PROJECTION:

TOLERANCES		
	X.X ± 0.1	FRAC. ± 1/64
	X.XX ± 0.01	Angles ± 0.5°
	X.XXX ± 0.005	FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS

ACCT NO. -	NO. REQD -	SER NO. -	
DEL TO -		DATE ISSD -	DATE REQD -
SURFACE TREATMT	ELECTROPOLISH		
IDENT METHOD	TAG		
PROJECT NUMBER	na		
PROJECT NAME	-		
DWG BY	TREVOR	DATE	27-Mar-00
CHK BY	DARYL OSHATZ	DATE	-
APR BY	DARYL OSHATZ	DATE	-

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UNIVERSITY OF CALIFORNIA - BERKELEY

SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM 2 THREADED O-RING FLANGE

MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 1/1	DO NOT SCALE PRINTS
	PART	-	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	-	FE3313	25B1922	B

Dwg. File: 25B192 Model File: 25B192

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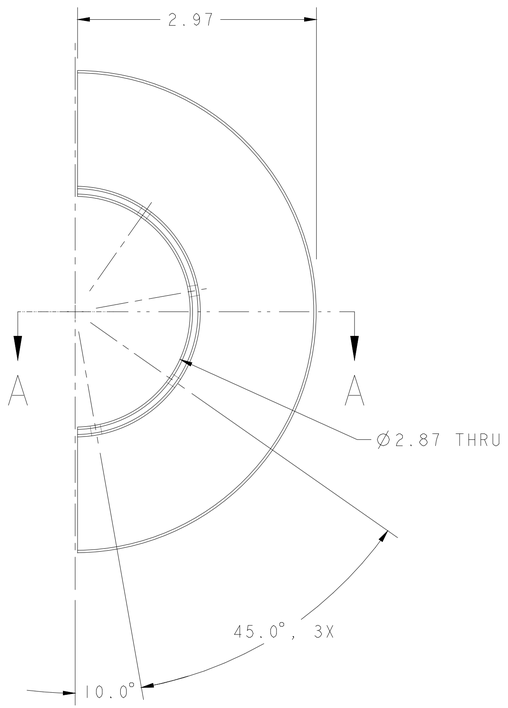

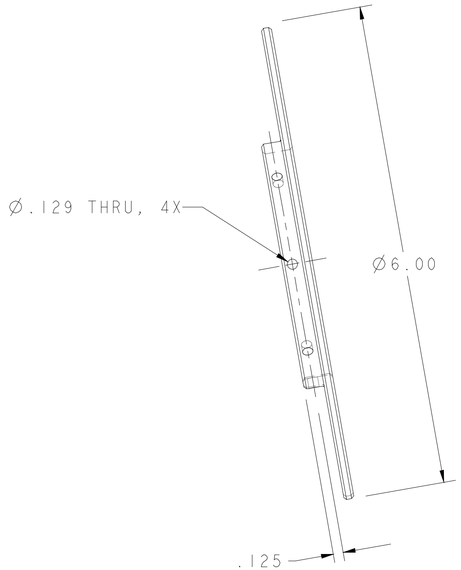

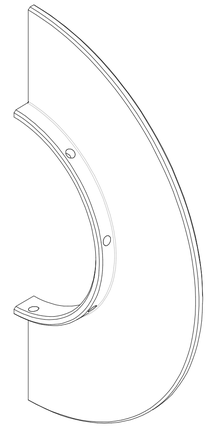

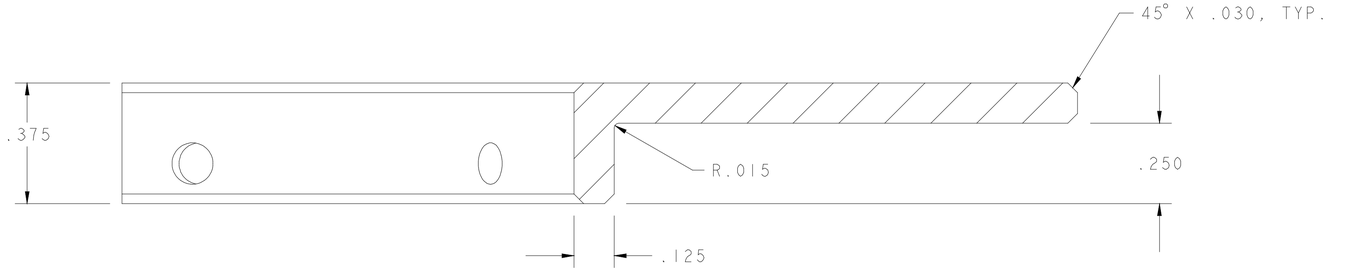

SECTION A - A
SCALE 4/1

NOTES

1. FINISH SPECIFICATIONS:
   PAINT: SERIES 89
   TYPE: TIGER DRYLAC (POWDER COAT) RAL 5015
   TEXTURE: SMOOTH
   MAXIMUM THICKNESS NOT TO EXCESS 0.001"

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
PROJECTION:
TOLERANCES: X.X ± 0.1 | FRAC. ± 1/64 | X.XX ± 0.01 | Angles ± 0.5° | X.XXX ± 0.005 | FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS

ACCT NO. -	NO. REQD -	SER NO. -	
DEL TO -		DATE ISSD -	
SURFACE TREATMT SEE NOTES		DATE REQD -	
IDENT METHOD TAG			
PROJECT NUMBER na			
PROJECT NAME -			
DWG BY TREVOR GOULDING	DATE 27-Mar-00		
CHK BY DARYL OSHATZ	DATE -		
APP'D BY DARYL OSHATZ	DATE -		

DESCRIPTION	MATERIAL	MAT. LOCATION
-	ASTM A36 OR EQUIV	-

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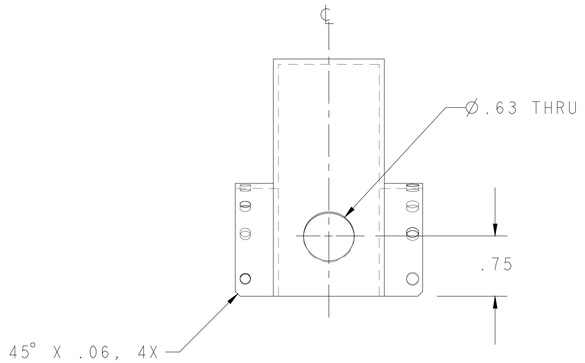
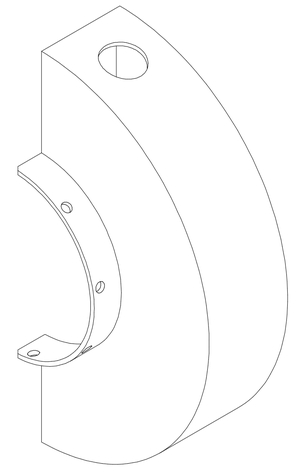
BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA - BERKELEY

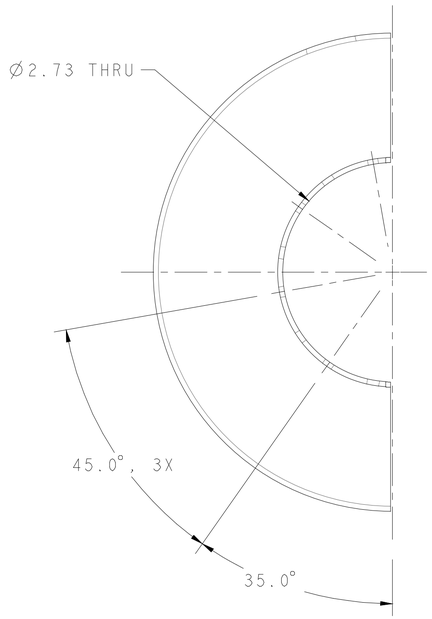
SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM2 MAGNETIC SHIELD

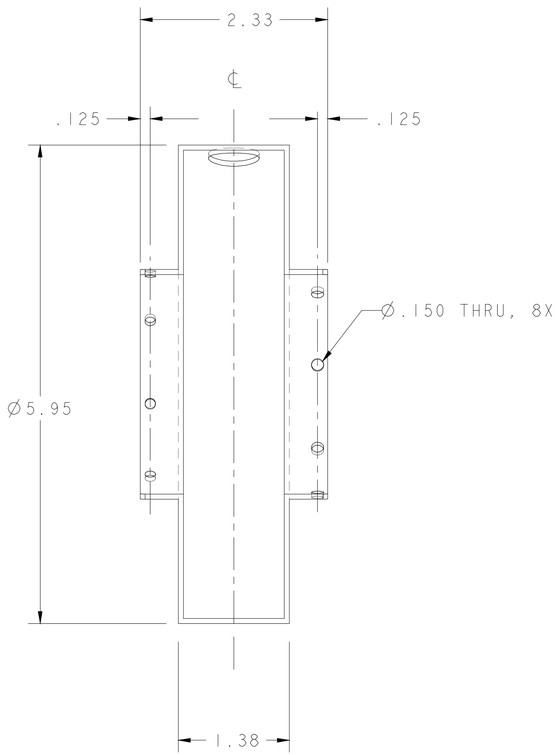
MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 1/1	DO NOT SCALE PRINTS
	PART	-	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	-	FE3313	25B1934	A

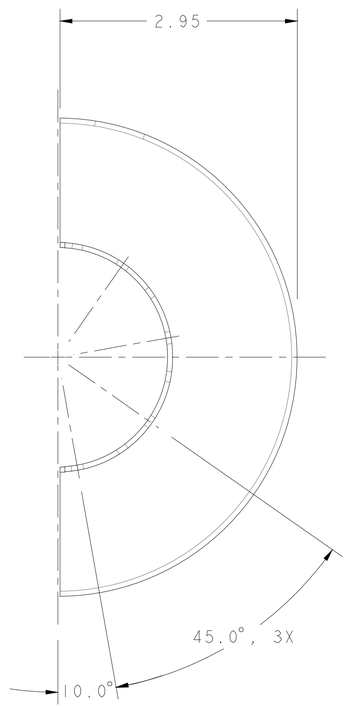
Dwg. File: 25B1P1.Model File: 25B193











REV	DWG	CHK	ZONE	DATE	CHANGES
B			D5	8/17/00	INCREASE HOLE DIAMETER
B			B5	8/17/00	INCREASE HOLE DIAMETER

UNLESS OTHERWISE SPECIFIED

PROJECTION:

TOLERANCES

X.X ± 0.1	FRAC. ± 1/64
X.XX ± 0.01	Angles ± 0.5°
X.XXX ± 0.005	FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

-	16 GAGE COPPER	-
DESCRIPTION	MATERIAL	MAT. LOCATION

SHOP ORDERS

ACCT NO. -
NO. REQD -
SER NO. -
DATE ISSD -
DEL TO -
DATE REQD -
SURFACE TREATMT -
IDENT METHOD TAG
PROJECT NUMBER na
PROJECT NAME -
DWG BY TREVOR GOULDING DATE 27-Mar-00
CHK BY DARYL OSHATZ DATE -
APR BY DARYL OSHATZ DATE -

ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA - BERKELEY

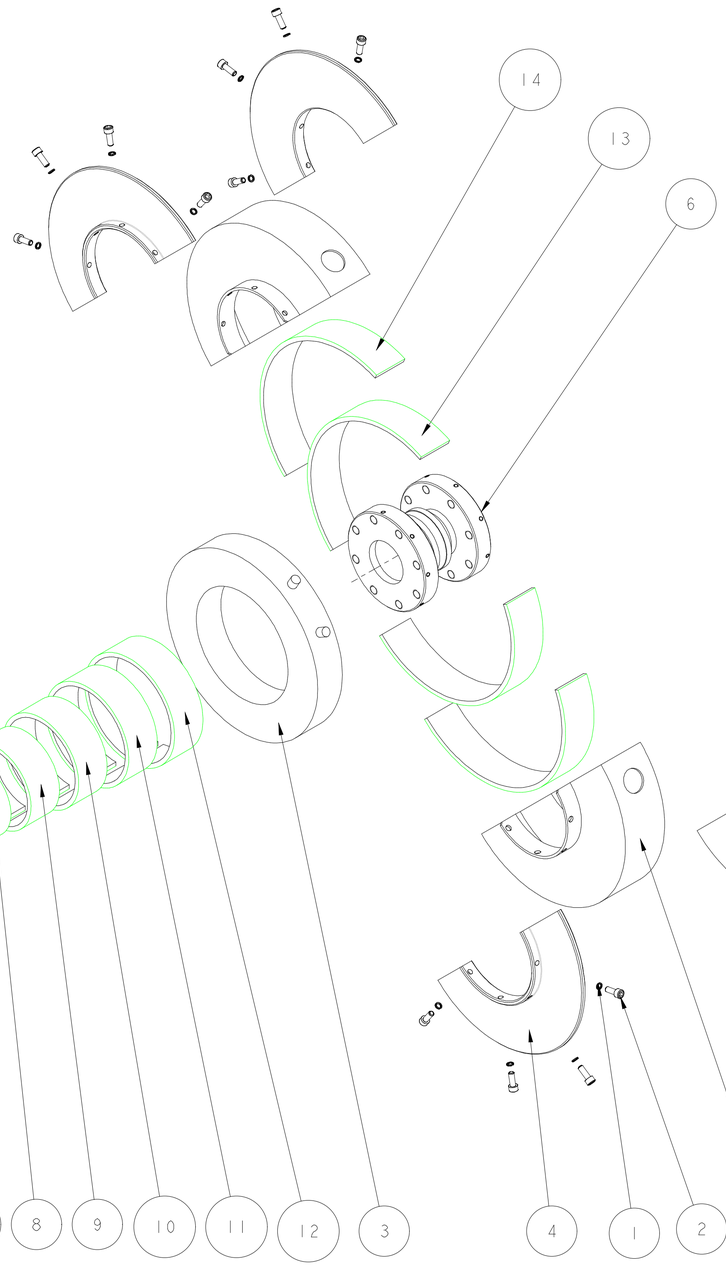
SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM2 ELECTRICAL COVER

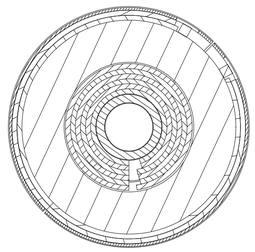
MICROFILMED:
PATENT CLEAR:

DWG. TYPE	SHOWN ON	SCALE: 1/1	DO NOT SCALE PRINTS
PART	-	SHEET 1 OF 1	

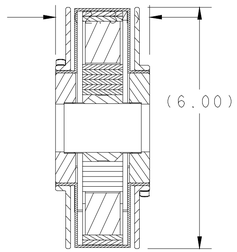
DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE	REV.
-	FE3313	25B1944	B	B

Dwg. File: 25B1944_Model File: 25B1944

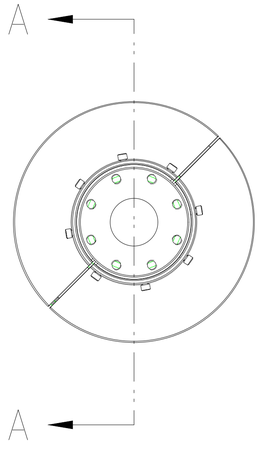


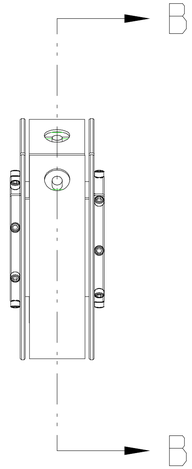


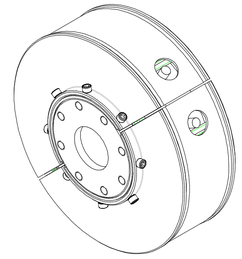
SECTION B - B



SECTION A - A







ITEM	PART NO	REQD	DESCRIPTION	MATERIAL
14	25B191-8	2	RUBBER SPACER 7.75"	1/8" NEOPRENE
13	25B191-7	2	RUBBER SPACER 7.50"	1/8" NEOPRENE
12	25B191-6	1	RUBBER SPACER 9.00"	1/8" NEOPRENE
11	25B191-5	1	RUBBER SPACER 8.13"	1/8" NEOPRENE
10	25B191-4	1	RUBBER SPACER 7.38"	1/8" NEOPRENE
9	25B191-3	1	RUBBER SPACER 6.63"	1/8" NEOPRENE
8	25B191-2	1	RUBBER SPACER 5.75"	1/8" NEOPRENE
7	25B191-1	1	RUBBER SPACER 5.00"	1/8" NEOPRENE
6	25B196	1	BCM 2 ISOLATOR PIPE WITH O-RING FLANGES	-
5	25B194	2	BCM2 ELECTRICAL COVER	16 GAGE COPPER
4	25B193	4	BCM2 MAGNETIC SHIELD	ASTM A36 OR EQUIV
3	-	1	FAST CURRENT TRANSFORMER	-
2	-	16	4-40 X 1/2 HEX SOCKET CAP SCREW	-
1	-	16	#4 SPLIT LOCK WASHER	-

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED

PROJECTION:

TOLERANCES:

X.X ± 0.1	FRAC. ± 1/64
X.XX ± 0.03	Angles ± 1.0°
X.XXX ± 0.010	FINISH 125

DO NOT SCALE PRINT

THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS

ACCT NO. -	NO. REQD -	SER NO. -	
DEL TO -		DATE ISSD -	
		DATE REQD -	
SURFACE TREATMT -			
IDENT METHOD TAG			
PROJECT NUMBER na			
PROJECT NAME SPALLATION NEUTRON SOURCE			
DWG BY TREVOR GOULDING		DATE 24-Mar-00	
CHK BY DARYL OSHATZ		DATE -	
APR BY DARYL OSHATZ		DATE -	

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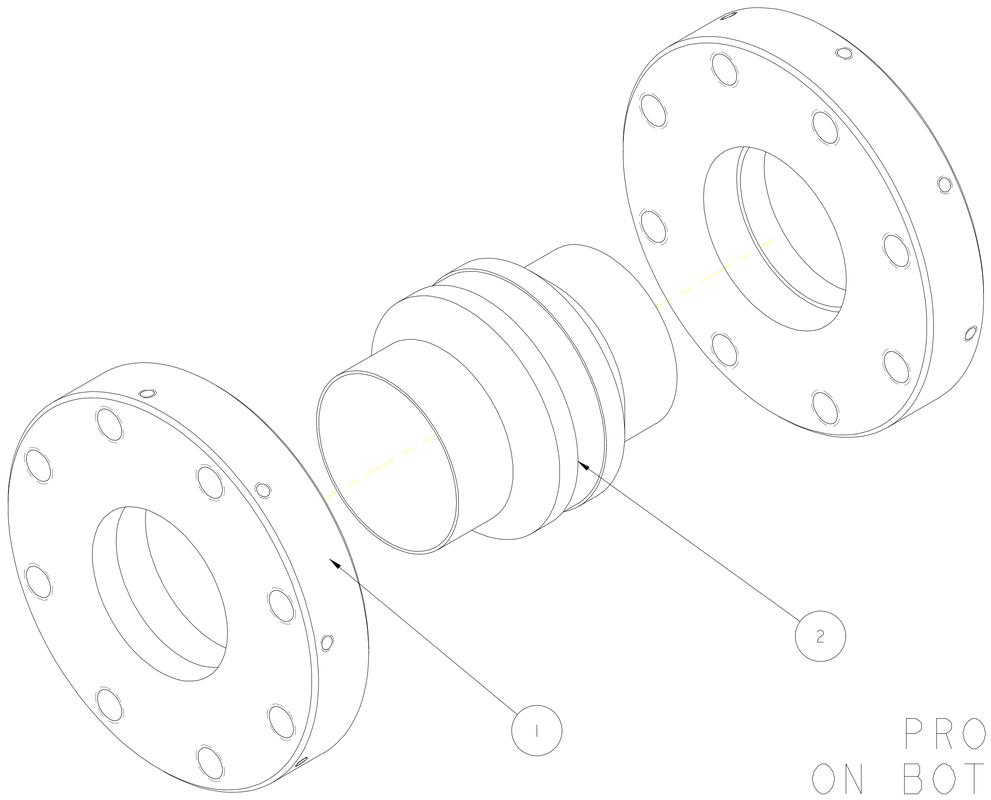
UNIVERSITY OF CALIFORNIA - BERKELEY

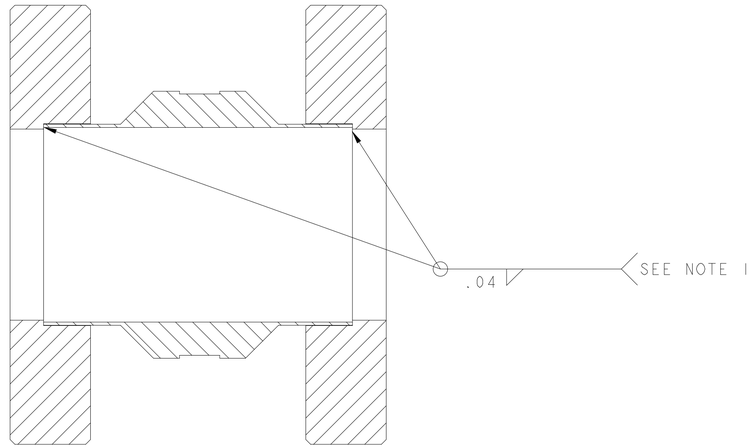
SNS

SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BEAM CURRENT MONITOR 2

MICROFILMED:	DWG. TYPE	SHOWN ON	SCALE: 1/2	DO NOT SCALE PRINTS
	ASSEM	-	SHEET 1 OF 1	
PATENT CLEAR:	DESIGN ACCT. NO.	CATEGORY CODE	DWG. NO.	SIZE / REV.
	-	FE3313	25B1954	A

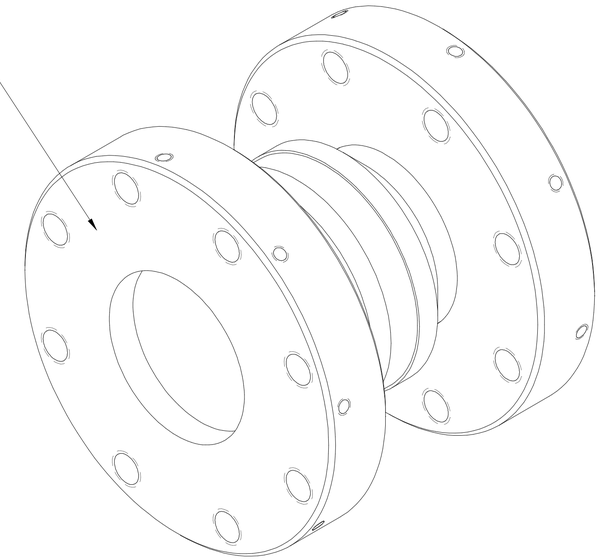
Dwg. File: 25B1954 Model File: 25B195

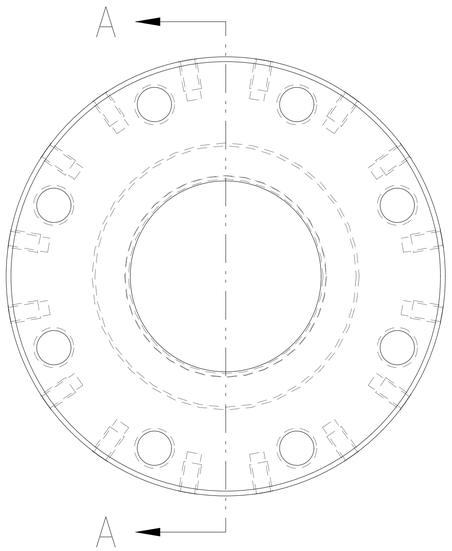


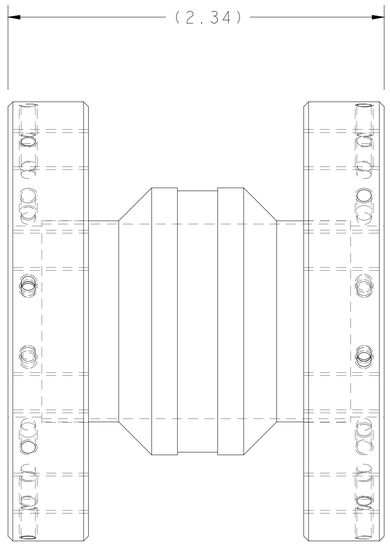


SECTION A - A

PROTECT O-RING SEAL SURFACE
ON BOTH FLANGES DURING WELDING







NOTES
1. FINISHED PART TO BE VACUUM TIGHT. LEAK RATE NOT TO EXCEED 1 x 10^{-8} torr - l/sec He.
2. BAG AFTER WELDING TO MAINTAIN HIGH VACUUM CLEANLINESS

ITEM	PART NO	REQD	DESCRIPTION	MATERIAL
2	CERAMASEAL 9999-03-W	1	ELECTRIC ISOLATOR VACUUM PIPE	KOVAR & ALUMINA OXIDE
1	25B192	2	BCM 2 THREADED O-RING FLANGE	316 STAINLESS STEEL

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
PROJECTION:
TOLERANCES: X.X ± 0.1 | FRAC. ± 1/64 | X.XX ± 0.03 | Angles ± 1.0° | X.XXX ± 0.010 | FINISH 125
DO NOT SCALE PRINT
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

SHOP ORDERS
ACCT NO. - | NO. REQD. - | SER NO. -
DEL TO - | DATE ISSD - | DATE REQD -
SURFACE TREATMT ULTRA HIGH VACUUM CLEANING
IDENT METHOD TAG
PROJECT NUMBER na
PROJECT NAME SPALLATION NEUTRON SOURCE
DWG BY TREVOR GOULDING | DATE 22-Mar-00
CHK BY DARYL OSHATZ | DATE -
APR BY DARYL OSHATZ | DATE -

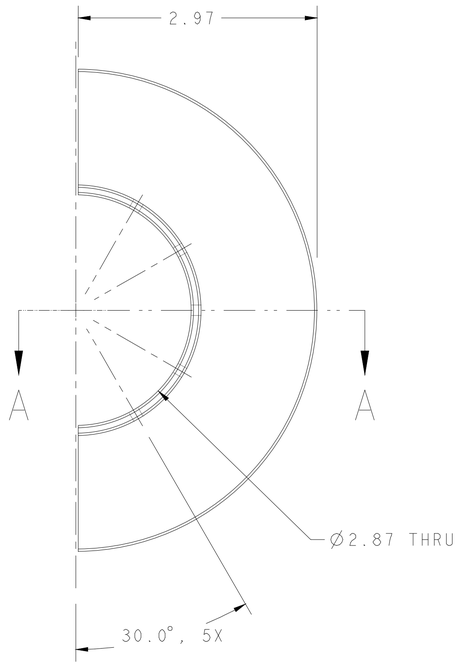
ERNEST ORLANDO LAWRENCE BERKELEY NATIONAL LABORATORY
UNIVERSITY OF CALIFORNIA - BERKELEY

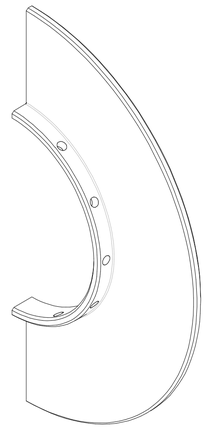
SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM 2 ISOLATOR PIPE WITH O-RING FLANGES

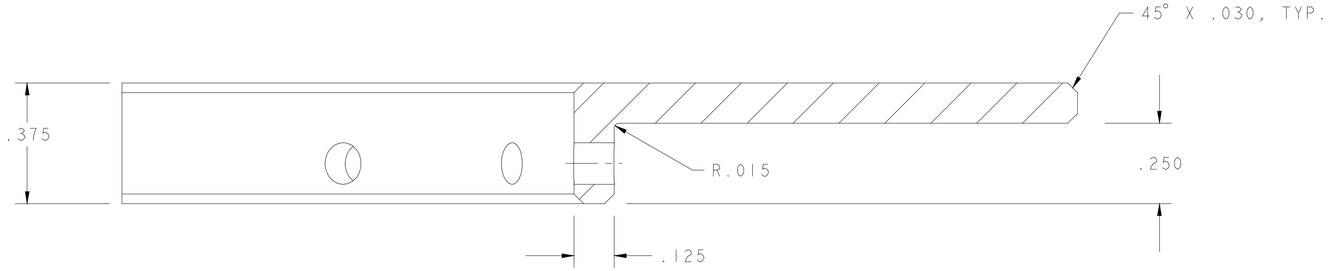
MICROFILMED: | PATENT CLEAR:
DWG. TYPE: ASSEM | DESIGN ACCT. NO. -
SHOWN ON: - | CATEGORY CODE FE3313
SCALE: 2/1 | DO NOT SCALE PRINTS
SHEET 1 OF 1
DWG. NO. 25B1964 | SIZE A | REV.

Dwg. File: 25B1964_Model File: 25B194

DWG. NO. 25B1974 | SIZE A | REV. 1 | SH.







SECTION A - A
SCALE 4/1

NOTES

1. FINISH SPECIFICATIONS:
   PAINT: SERIES 89
   TYPE: TIGER DRYLAC (POWDER COAT) RAL 5015
   TEXTURE: SMOOTH
   MAXIMUM THICKNESS NOT TO EXCESS 0.001"

REV	DWG	CHK	ZONE	DATE	CHANGES

UNLESS OTHERWISE SPECIFIED
PROJECTION:
TOLERANCES: X.X ± 0.1 | FRAC. ± 1/64 | X.XX ± 0.01 | Angles ± 0.5° | X.XXX ± 0.005 | FINISH 125
DO NOT SCALE PRINT
THREADS ARE CLASS 2
CHAMFER ENDS OF ALL SCREW TREADS 30°
CUT ROUND, 1.5 THREAD RELIEF ON MACHINED THREADS
BREAK EDGES .016 MAX. ON MACHINED WORK
REMOVE BURRS, WELD SPLATTER & LOOSE SCALE
IN ACCORDANCE WITH ASME Y14.5M & B46.1

-	ASTM A36 OR EQUIV	-
DESCRIPTION	MATERIAL	MAT. LOCATION

SHOP ORDERS
ACCT NO. -
NO. REQD -
DEL TO -
SER NO. -
DATE ISSD -
DATE REQD -
SURFACE TREATMT SEE NOTES
IDENT METHOD TAG
PROJECT NUMBER na
PROJECT NAME -
DWG BY TREVOR GOULDING DATE 20-Mar-00
CHK BY DARYL OSHATZ DATE -
APR BY DARYL OSHATZ DATE -

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UNIVERSITY OF CALIFORNIA - BERKELEY

SNS-FES MEBT
MECHANICAL SUBSYSTEMS
BCM 1 MAGNETIC SHIELD

MICROFILMED: | PATENT CLEAR:
DWG. TYPE: PART
SHOWN ON: -
SCALE: 1/1 | DO NOT SCALE PRINTS
SHEET 1 OF 1
DESIGN ACCT. NO.: -
CATEGORY CODE: FE3313
DWG. NO.: 25B1974
SIZE: A
REV.: A