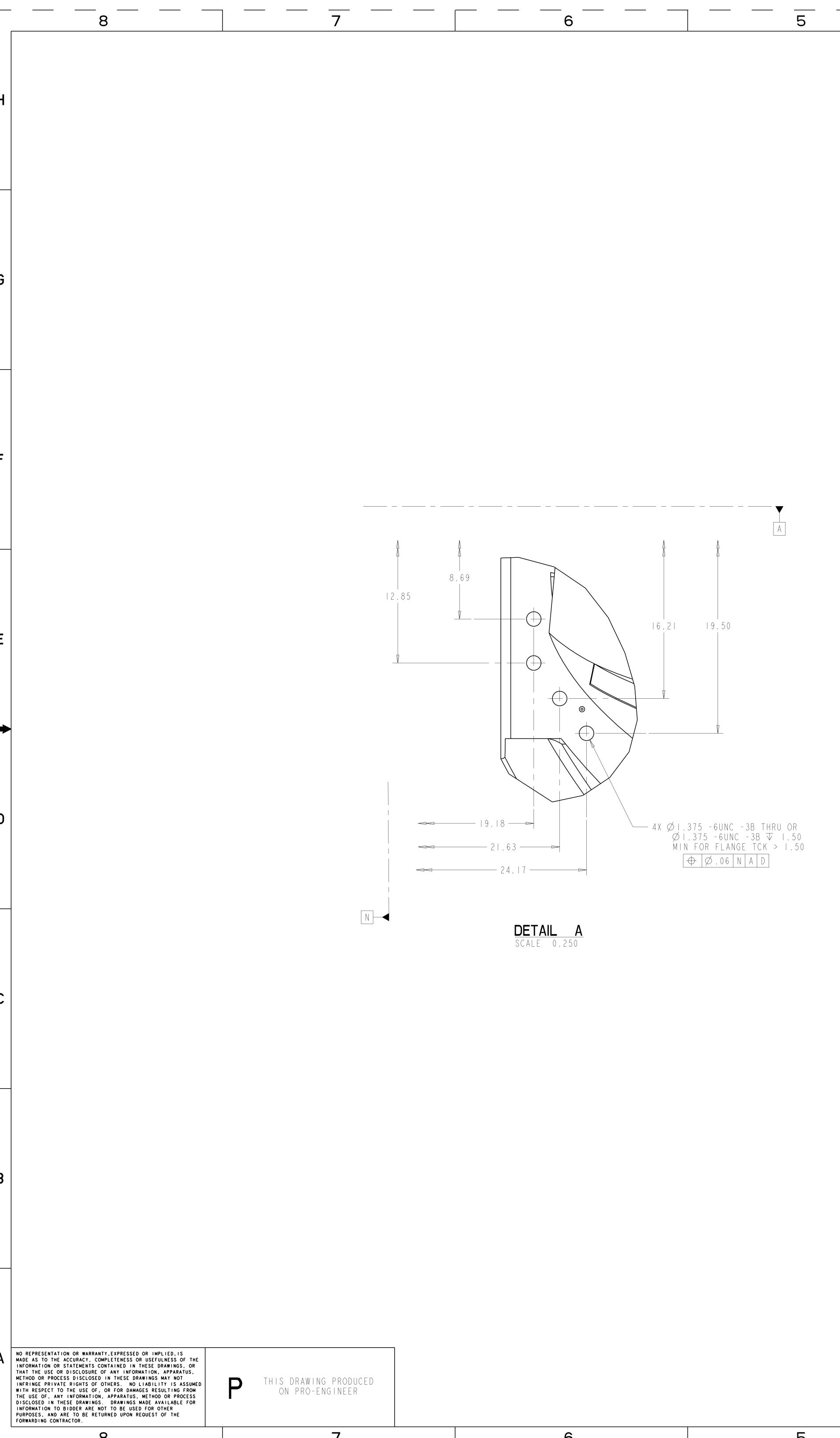
Modular Coil Assembly and Interface Design Issues

3/22/07

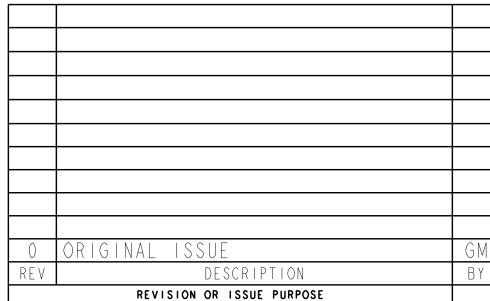
#### **Objectives**

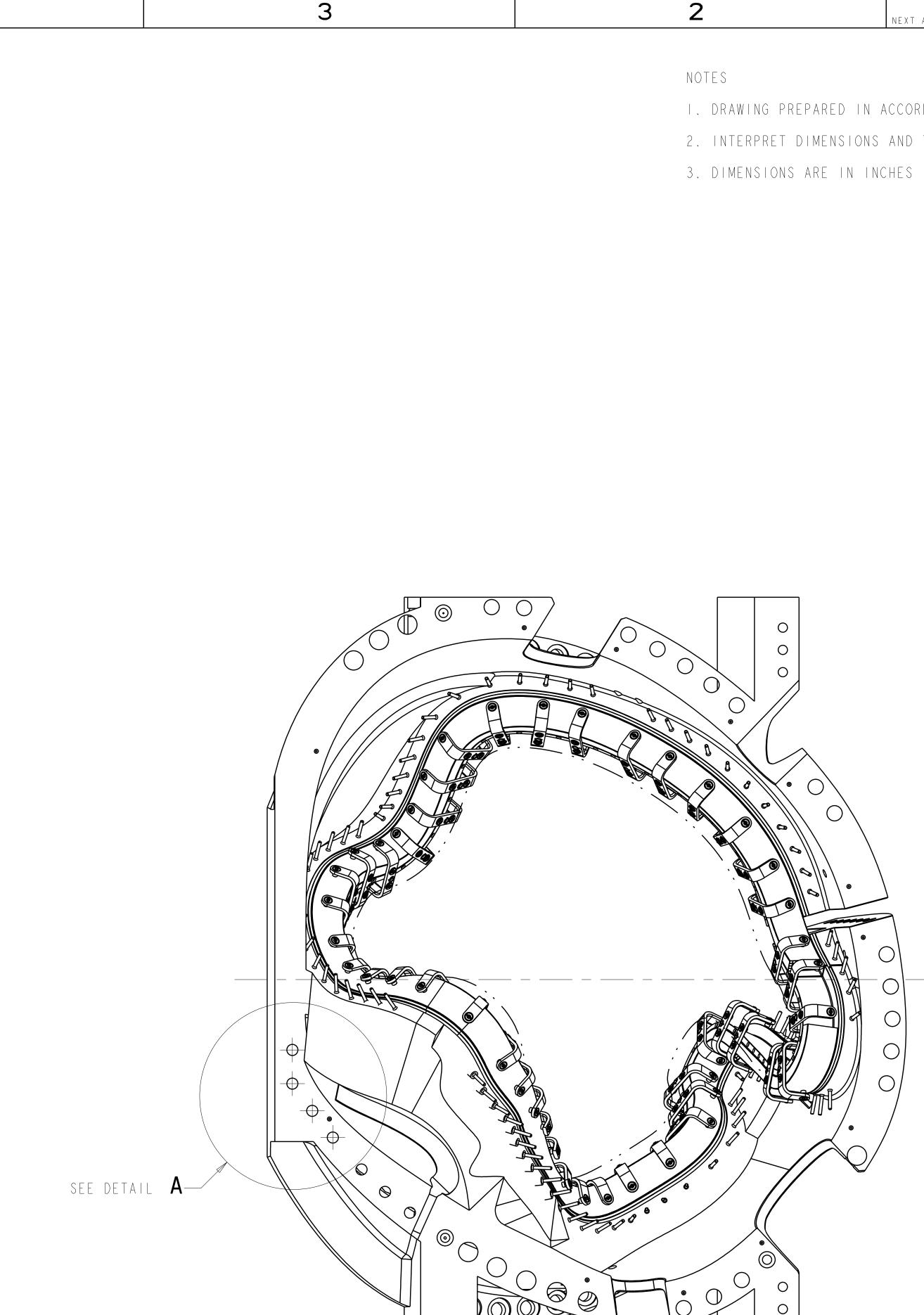
- Review chits and open issues from recent modular coil design reviews:
  - Bolted joint design, Feb-22
  - Coil instrumentation, Jan-24
- Other modular coil and interface issues:
  - Bladders
  - Bushings
  - Insulation
  - Clamps
- Prioritize needs for field period assembly start

- Shear loads with added inboard bolts
- Shim design, incl inboard shims
- Joint assembly and tightening



4





# TYPE C WINDING FORM VIEW AT DATUM D May be part only or partially assemblied scale 0.12

0

### REFERENCE MODEL FOR THIS DRAWING IS SEI4I-II6

													SCALE NOTED	DES D WILLIAMSON	03/07	Oak Ridge National Laboratory managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-000R22725
												-		drw G MCGINNIS	03/07	<b>IT_BATTELIF</b> US GOVERNMENT contract DE-AC05-000B22725
														Снк		UT-BATTELLE, LLC. Oak Ridge, Tennessee
													SPECIFIED	SECT :	:	NATIONAL COMPACT STELLARATOR EXPERIMENT
													FRACTIONS	DEPT :	:	NATIONAL COMPACT STELLARATOR EXPERIMENT
													XX DECIMALS $\pm .01$	PE :	:	
													XXX DECIMALS ±.005	CR :	:	TYPE C WINDING FORM
													<b>ANGLES</b> $\pm 0^{\circ}   5'$	PJ :	:	MODIFIED TO ADD INNER HOLES
													BREAK SHARP EDGES .06 MAX	REQ :	:	
													FINISH .125 UNLESS OTHERWISE SPECIFIED	PPPL DRFT J SIEGEL	03/07	VERSION NO. PLANT BLDG FL SHT OF TYPE CLASS
М	03/07												OTHERWISE SPECIFIED	•	:	0 ORNL 5700 3 I I S U
Y	DATE	СНК	DEPT	DATE	ΡE	REQ	DATE	ORNL	DOE	DATE				•	:	SF141-146
				RE	VISION	APPRO	VAL			•				DRAWING APPROVALS	DATE	SE141-140 0

NEXT ASS'Y:	1 FINAL ASS'Y:	

I. DRAWING PREPARED IN ACCORDANCE WITH ASME YI4.100-2004. 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME YI4.5M-1994.

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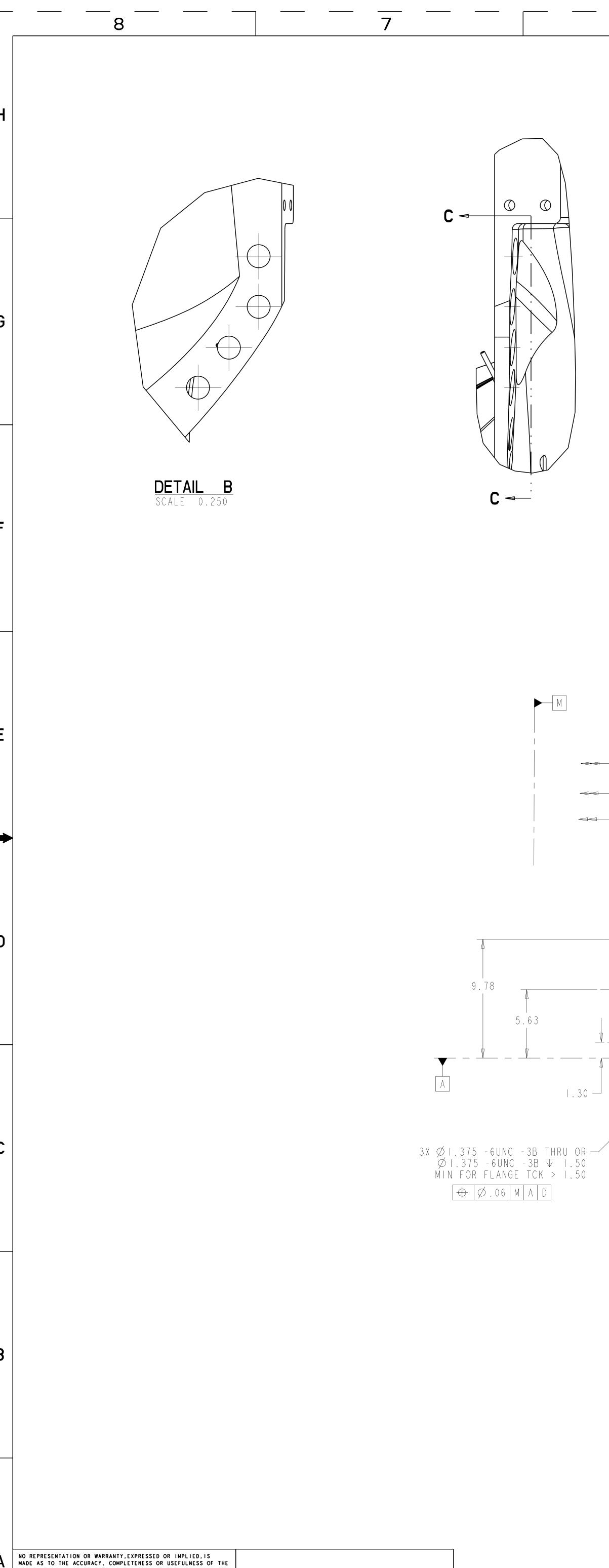
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**B** [SE | 4 |



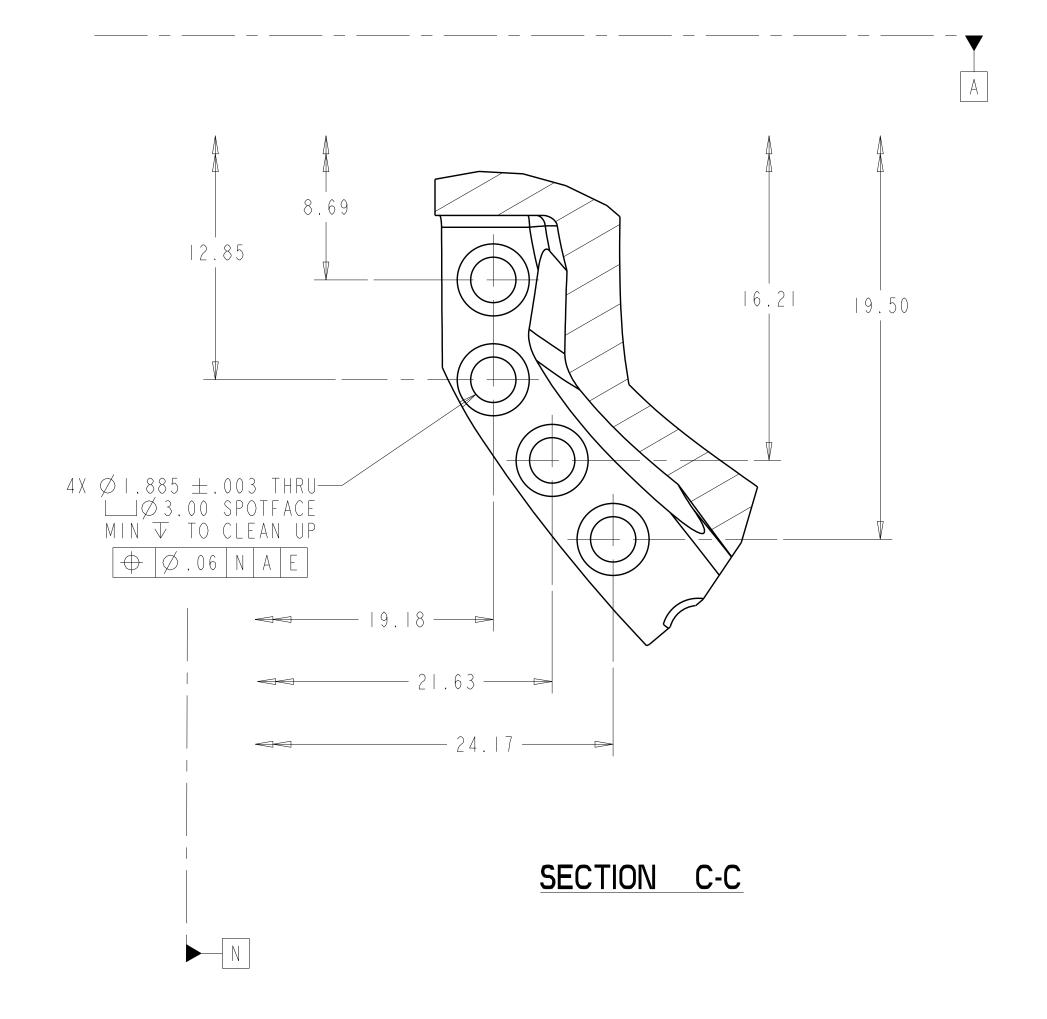
INFORMATION OR STATEMENTS CONTAINED IN THESE DRAWINGS, OR THAT THE USE OR DISCLOSURE OF ANY INFORMATION, APPARATUS, METHOD OR PROCESS DISCLOSED IN THESE DRAWINGS MAY NOT INFRINGE PRIVATE RIGHTS OF OTHERS. NO LIABILITY IS ASSUMED WITH RESPECT TO THE USE OF, OR FOR DAMAGES RESULTING FROM THE USE OF, ANY 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.

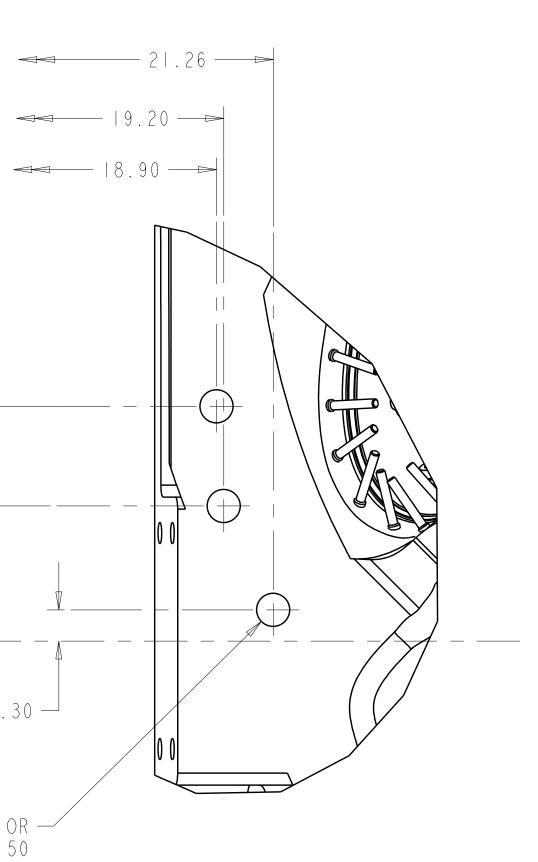


THIS DRAWING PRODUCED ON PRO-ENGINEER

7

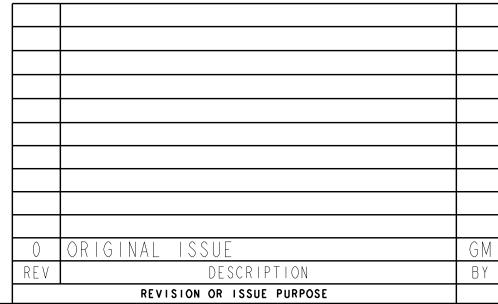


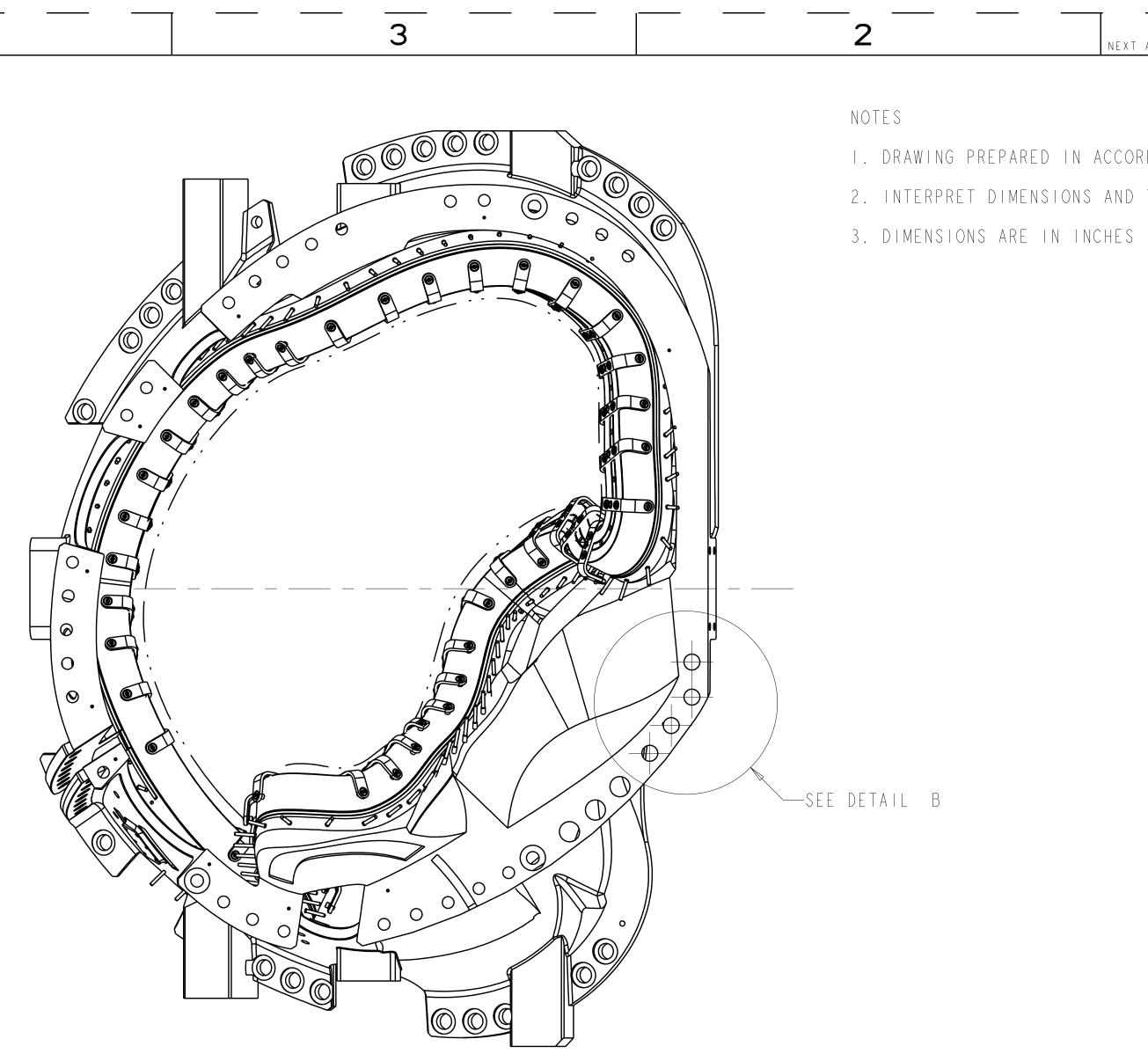
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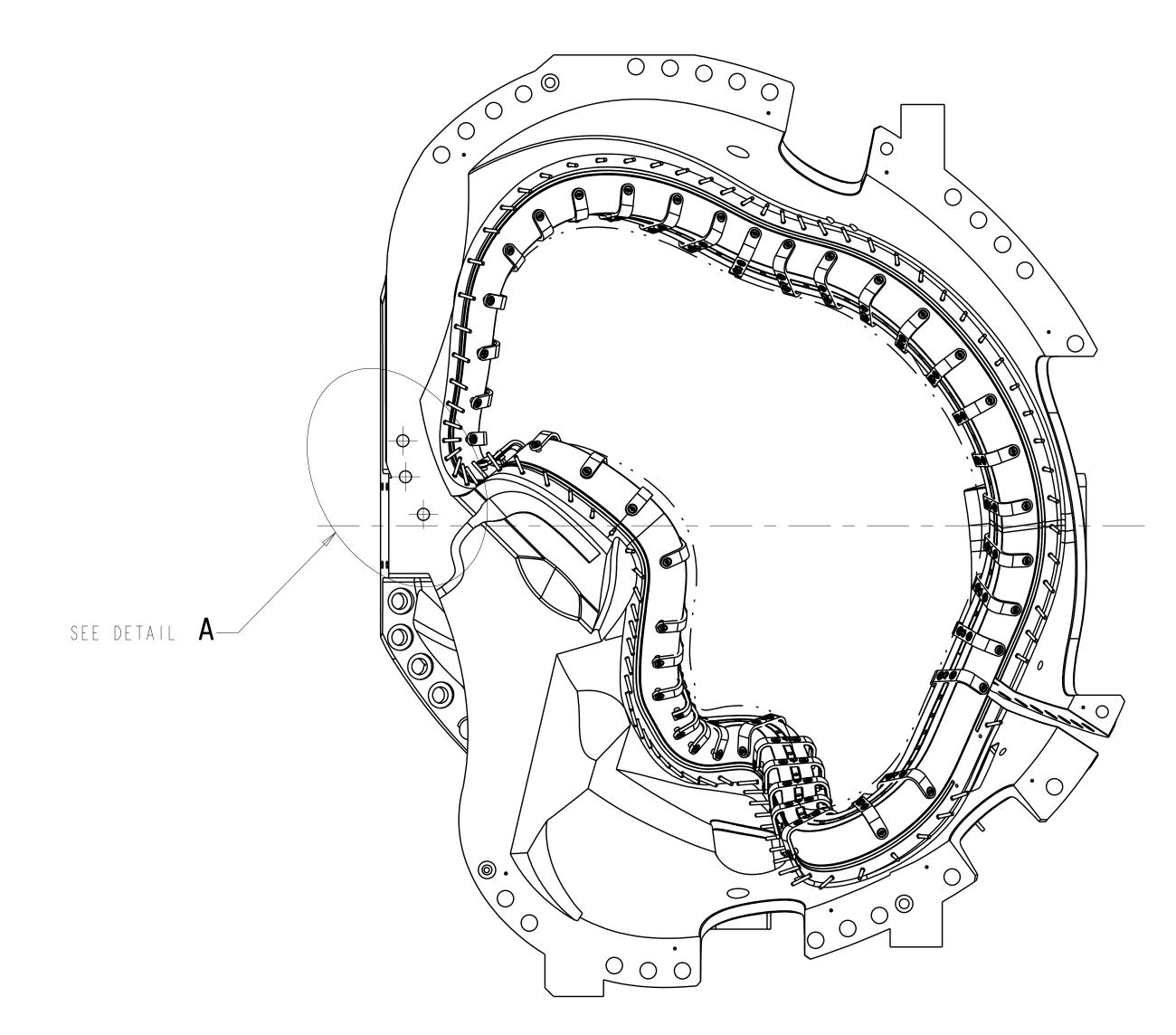
6

<u>DETAIL A</u> SCALE 0.250





# TYPE B WINDING FORM VIEW AT DATUM E May be part only or partially assemblied scale 0.10



# TYPE B WINDING FORM VIEW AT DATUM D May be part only or partially assemblied scale 0.10

## REFERENCE MODEL FOR THIS DRAWING IS SEI4I-II5

			DES D WILLIAMSON 03/07 DRW G MCGINNIS 03/07	Oak Ridge National Laboratory managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-000R22725
		TOLERANCES UNLESS OTHERWISE SPECIFIED	CHK SECT : :	NATIONAL COMPACT STELLARATOR EXPERIMENT
		FRACTIONS	DEPT : :	NATIONAL COMPACT STELLAKATOK EXPERIMENT
		XX DECIMALS ±.01 XXX DECIMALS ±.005	PE         :           CR         :	TYPE B WINDING FORM
			PJ : :	MODIFIED TO ADD INNER HOLES
		BREAK SHARP EDGES .06 MAX FINISH .125 UNLESS OTHERWISE SPECIFIED	•	VERSION NO. PLANT BLDG FL SHT OF TYPE CLASS
M 03/07		OIHERWISE SPECIFIED	: :	0   ORNL   5700   3   I   S   U
	PE REQ DATE ORNL DOE DATE		: :	RELEASE LEVEL SEI4I-145
REVI	SION APPROVAL		DRAWING APPROVALS DATE	

	 <u> </u>	-
NEXT ASS'Y:	T FINAL ASS'Y:	

I. DRAWING PREPARED IN ACCORDANCE WITH ASME YI4.100-2004. 2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME YI4.5M-1994.

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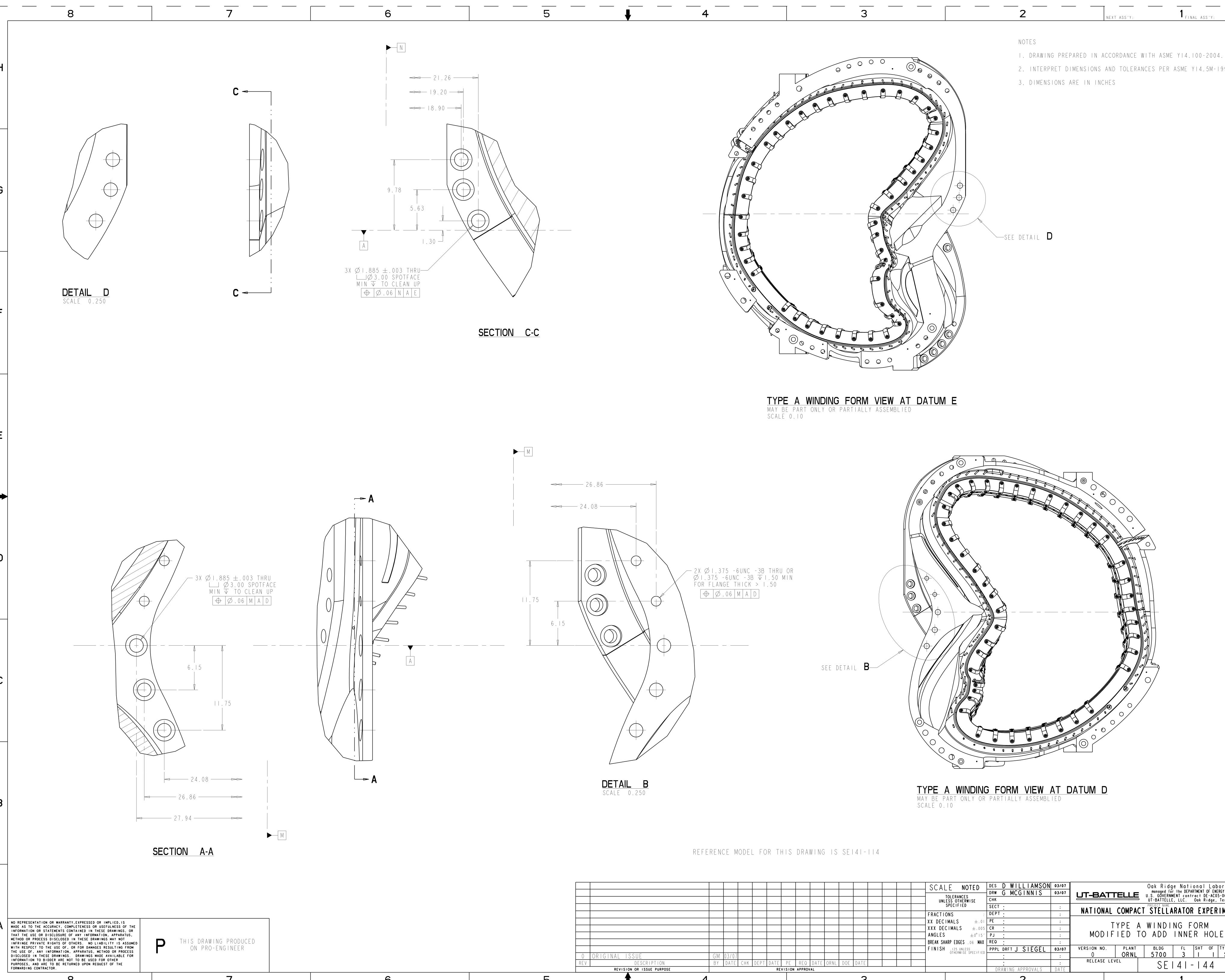
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				RE	VISION	APPRO	VAL			-	-			DRAWING APPROVALS	DATE			JL		0
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М	03/07												UTHERWISE SPECIFIED	•	:	0		5700		<u>S   U</u>
												FIN	IISH .125 UNLESS OTHERWISE SPECIFIED	PPPL DRFT J SIEGEL	03/07	VERSION NO.	PLANT	BLDG	FL SHT OF TY	PE CLASS
												BREA	K SHARP EDGES .06 MAX	REQ :	;					
												ANG	$\pm 0^{\circ}   5'$	PJ :	:	MODIF	IED	IO ADD	INNER HOLE	S
												XXX	<b>DECIMALS</b> $\pm.005$	CR :	:		TYPE A WINDING FORM			•
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														DRW G MCGINNIS	03/07			managed fo	ge National Labor r the DEPARTMENT OF ENERGY MENT contract DE-AC05-0	under AAR22725
												SC	CALE NOTED	DES D WILLIAMSON	03/07			Oak Ridg	ge National Labor	atory
					-		_			-	 -	 								

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NEXT ASS'Y:	FINAL ASS'Y:

2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME YI4.5M-1994.

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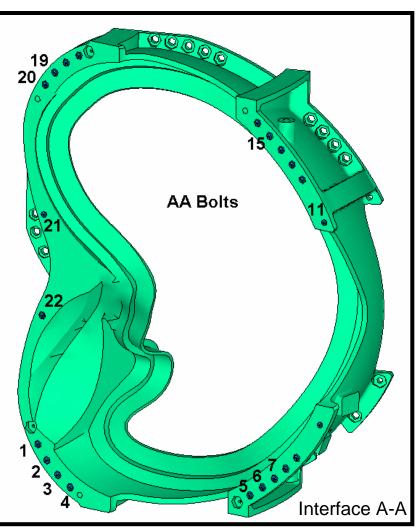
44

**B** SE 141

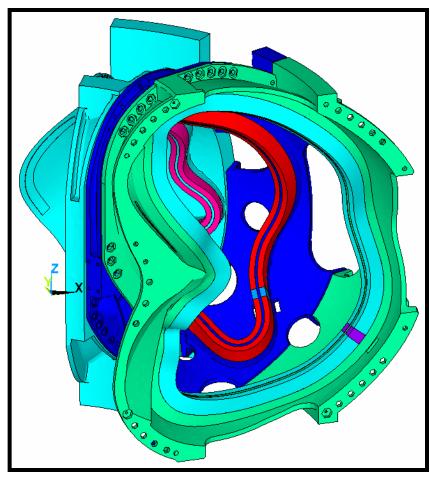
## Global w/ Bolts (3)

- Load step difference (preload/EM) used to determine alternating bolt load
- Results preliminary, but suggest alternating load is ~8% of preload

Dalt Na	Tension	LS Diff	Shear
Bolt No.	(kip)	(kip)	(kip)
1	76.5	-5.9	7.5
2	78.4	-3.4	4.8
3	79.1	-2.0	3.2
4	78.7	-1.7	2.8
5	83.6	0.7	5.2
6	81.2	0.4	3.1
7	80.8	0.3	3.0
8	81.0	0.0	3.4
9	82.7	-0.1	4.6
10	60.0	-0.4	0.6
11	60.0	-0.4	0.6
12	82.7	-0.1	4.6
13	81.0	0.1	3.4
14	80.9	0.3	3.0
15	81.2	0.5	3.1
16	83.7	0.8	5.2
17	78.6	-1.8	2.7
18	79.0	-2.1	3.0
19	78.2	-3.6	4.5
20	76.1	-6.3	7.0
21	78.2	-1.3	46.7
22	78.2	-0.8	46.9



## Model Revised to Include (5) A-A Inboard Bolts



19 March 2007

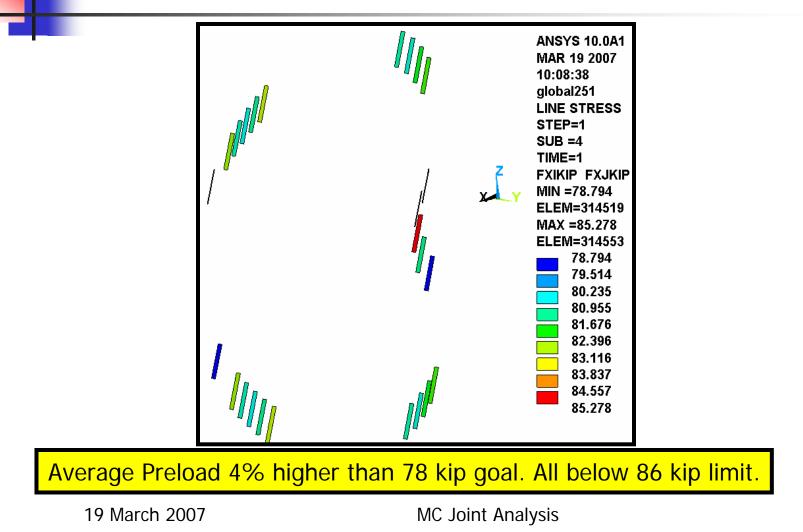
MC Joint Analysis

## Global Model Results, A-A

Various Contour Plots of A-A Flange Results:

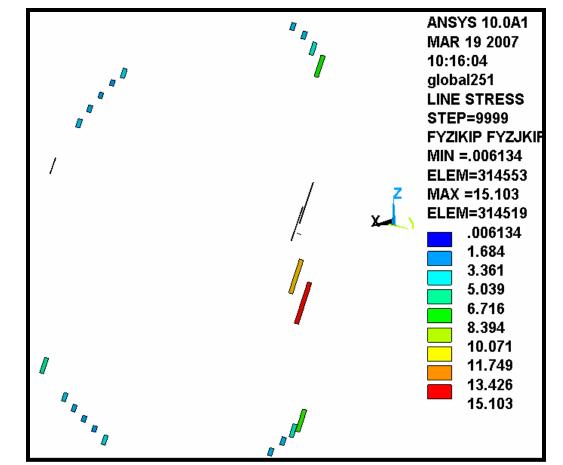
- Bolt Preload [k-lb or kip]
- Bolt Shear Force Range [k-lb or kip] produced by EM Load cycle. Non-zero value indicates that the joint is not completely isolated with preload & design-basis friction estimation (μ=0.3).
- Slippage produced by initial EM Load cycle (~0.3 mm at inboard leg).
- Incremental Position Shift Following EM ON-Off Cycle

## Preload [kip] in A-A Flange Bolts (79 min.<81 Average<85 max.)



# Shear Force Range in A-A Flange Bolts from EM Loads ( $\mu$ =0.3, 81 kip Preload)

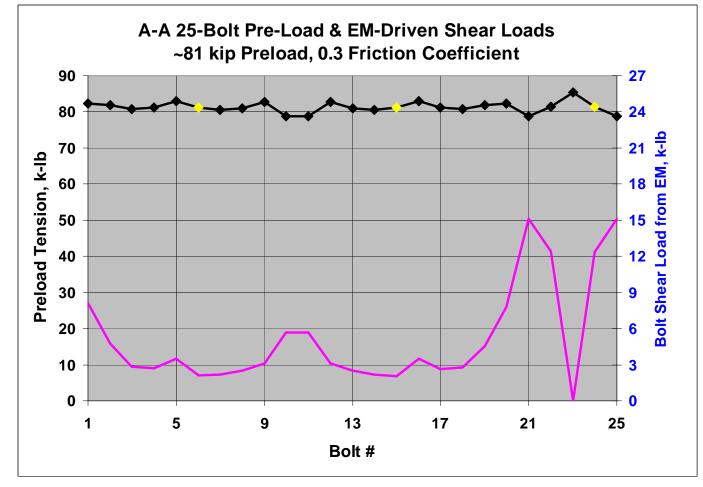
- The addition of (5) Inboard A-A bolts is not sufficient to isolate them from significant shear loads:
- Four of the five inboard bolts carry shear loads of 12-15 kip.



19 March 2007

MC Joint Analysis

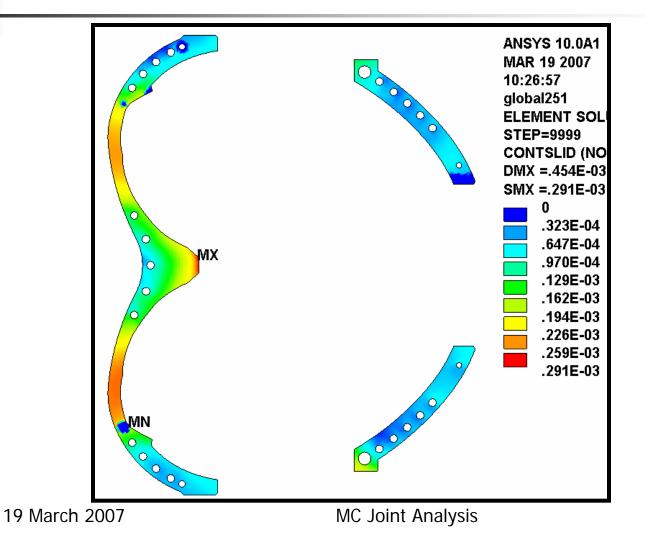
## A-A Bolt Preload & EM-Driven Shear Load Range



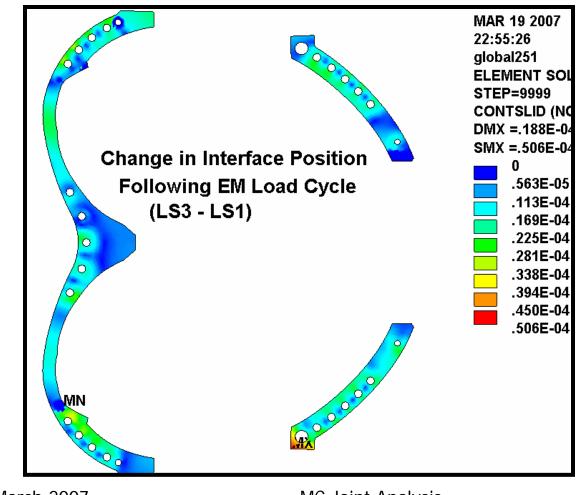
19 March 2007

MC Joint Analysis

## Contact Slippage [m] at A-A Flange From EM Loading ( $\mu$ =0.3, 81 kip Preload)



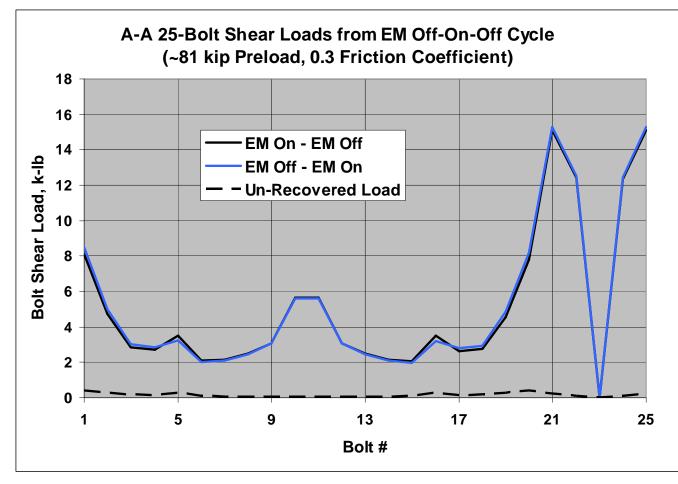
## Incremental Position Shift Following EM ON-Off Cycle



19 March 2007

MC Joint Analysis

## Bolt Shear Load Range History & Un-Recovered from EM Cycle



MC Joint Analysis

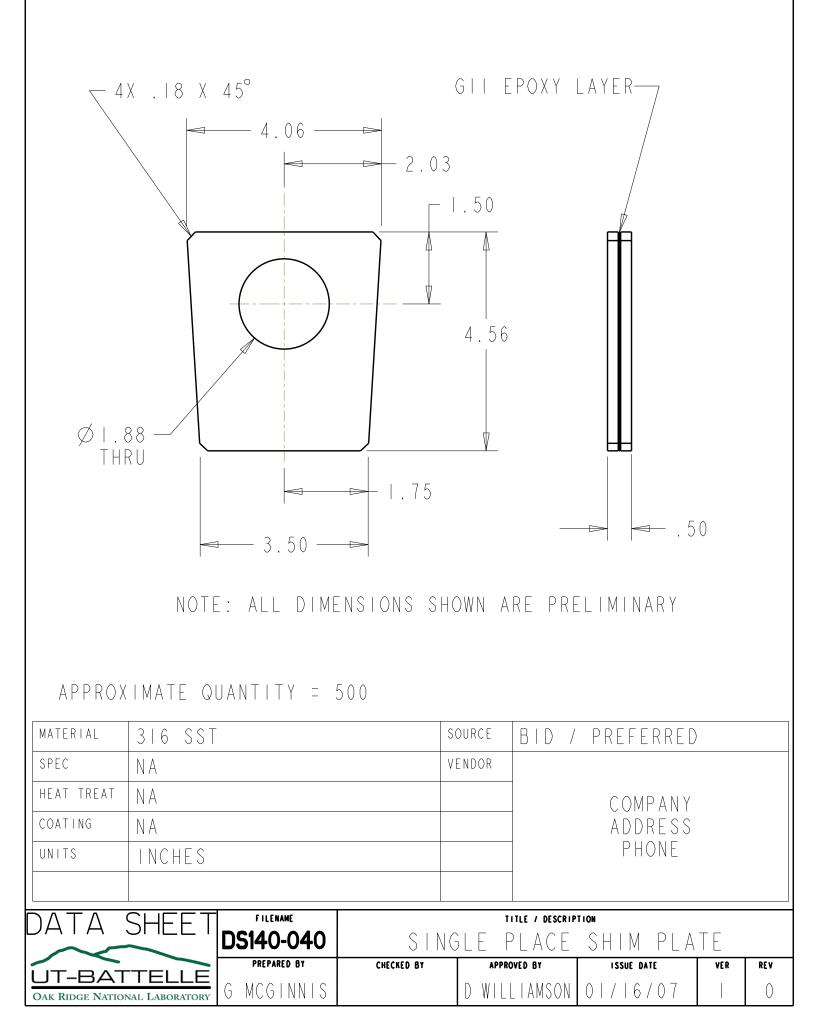
## **Observations: Revised A-A**

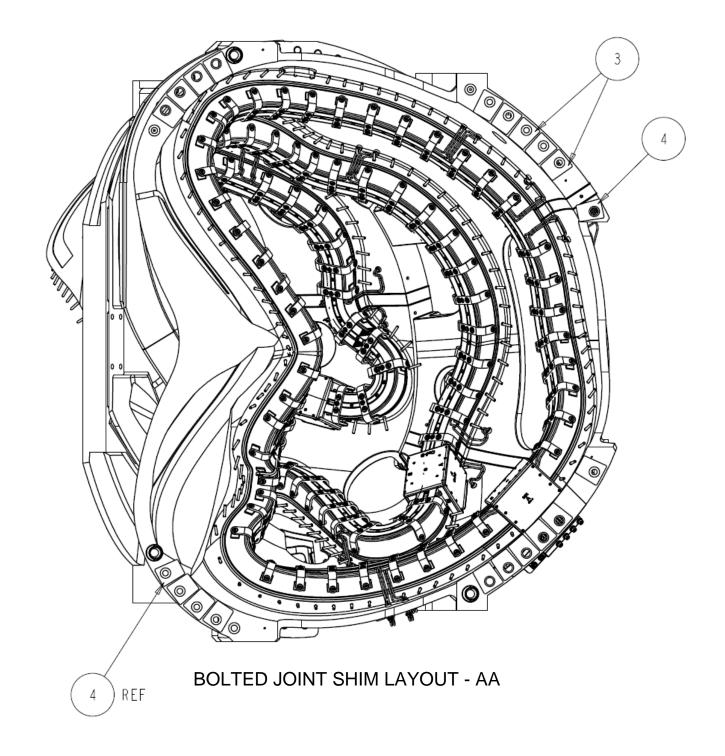
- (25) A-A bolts with 81 kip average preload cannot produce a no-slip interface.
- (4) of the (5) Inboard Leg bolts carry shear loads of 12.5 to 15 kip when EM loads are applied.
- The shear load in all of the bolts return to pre-EM load levels when EM forces are released.
- This implies that bolts will likely be exposed to a high number of bending stress cycles.
- There is a tiny (0-2 mil) incremental position change from the EM load cycle.

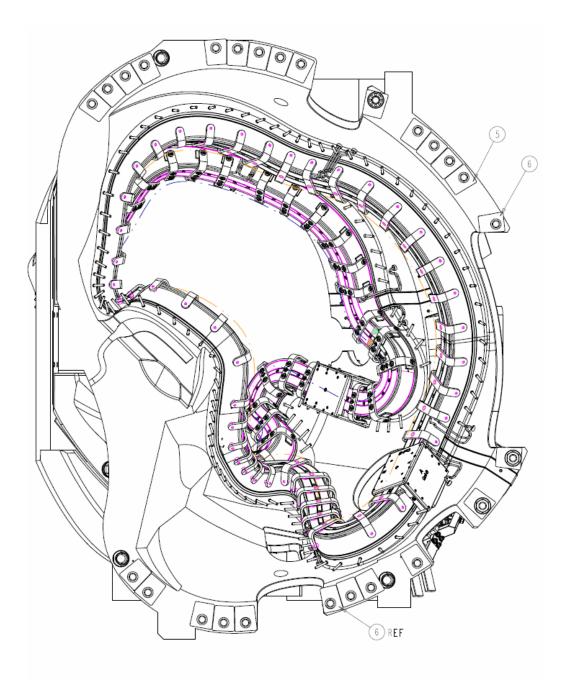
## Future Work

A more thorough analysis of the interface still requires a traditional contact analysis where flange separation can occur.

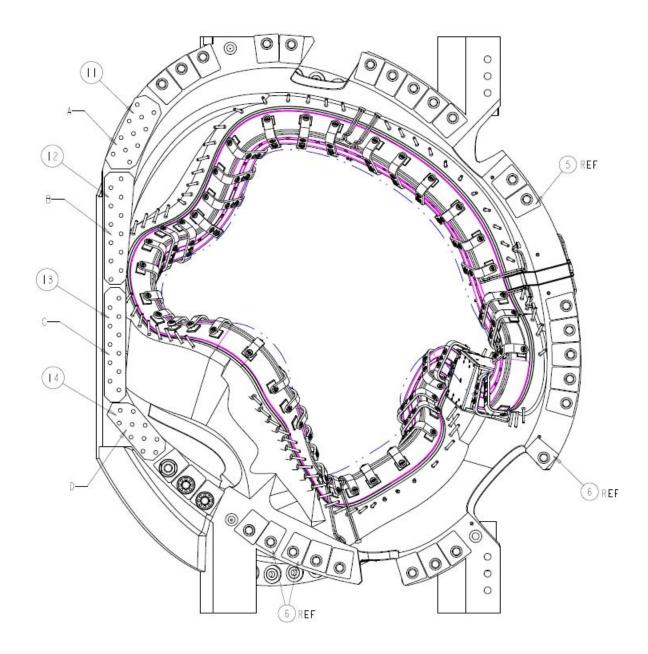
- Resist loads
- Maintain geometry
- Isolate electrically
- Capable of dissassembly
- Minimal fab/inst cost



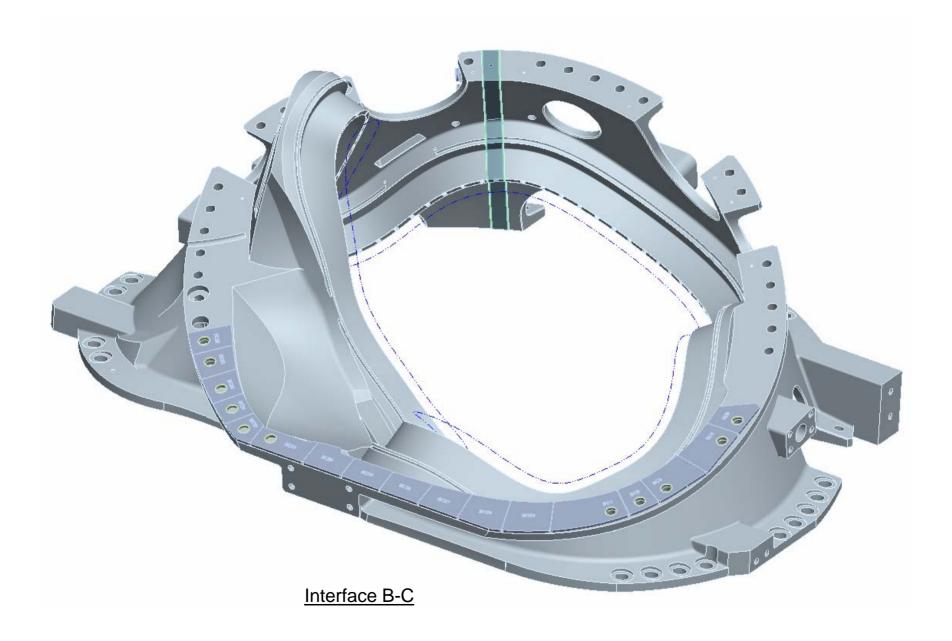


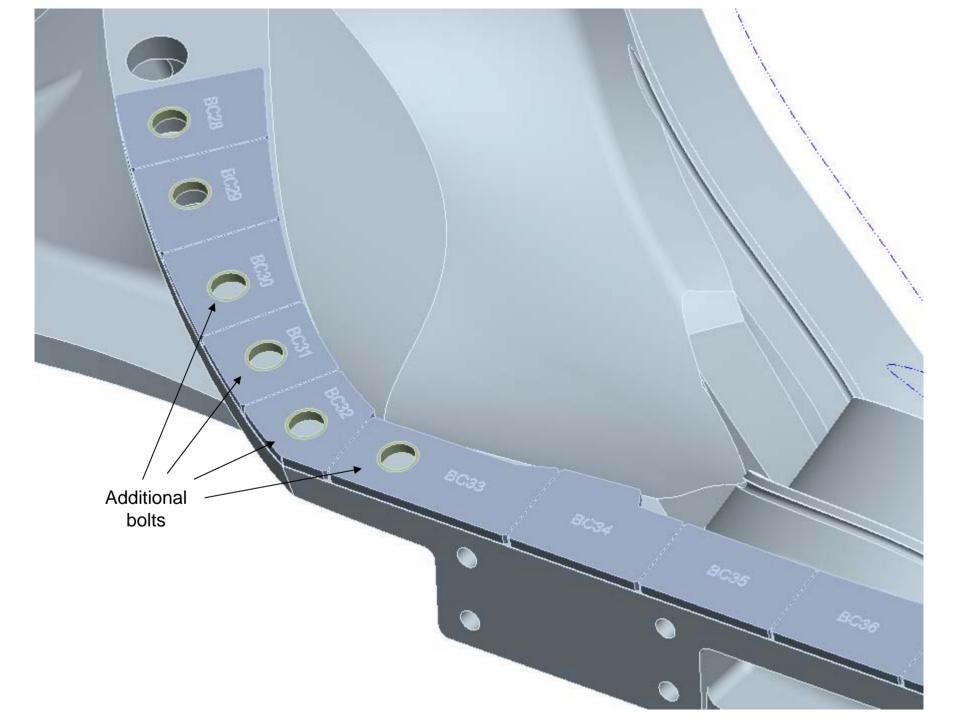


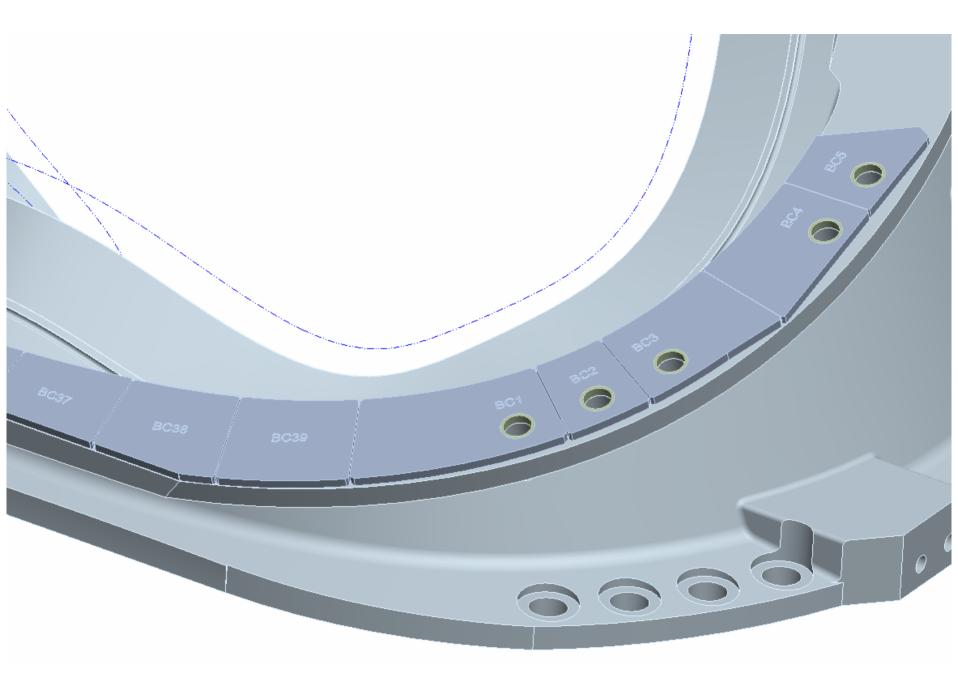
### VIEW C-C A-B SHIM-SHEAR PLATES

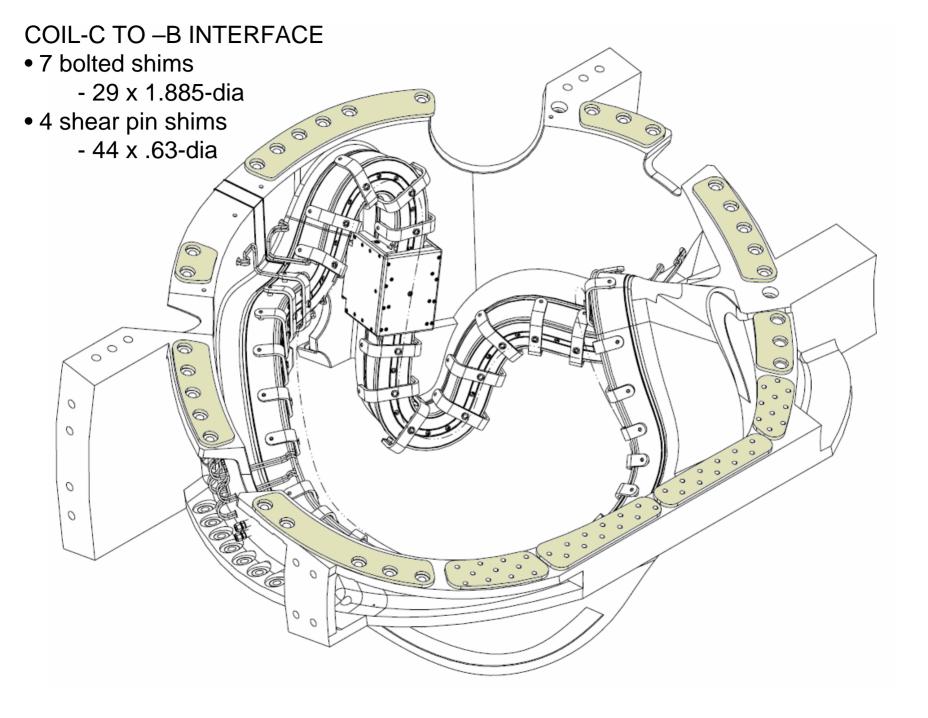


## VIEW D-D B-C SHIM-SHEAR PLATES

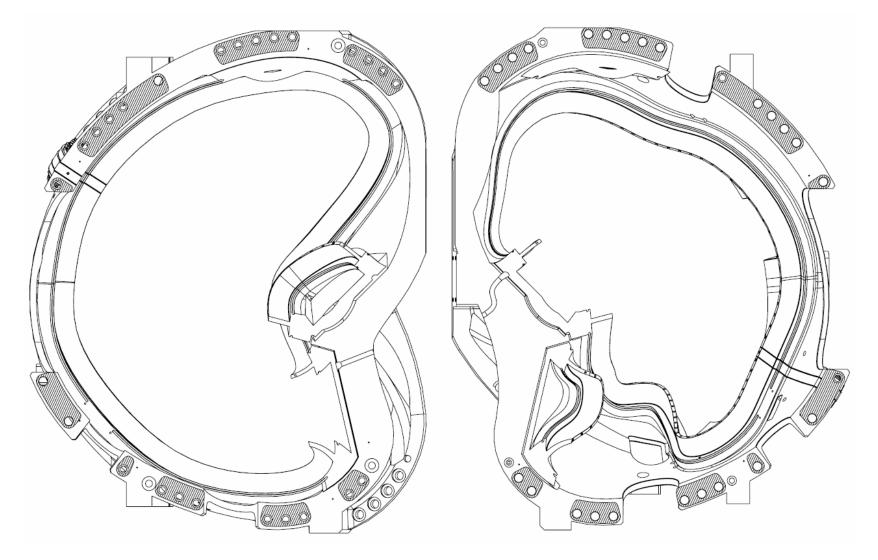






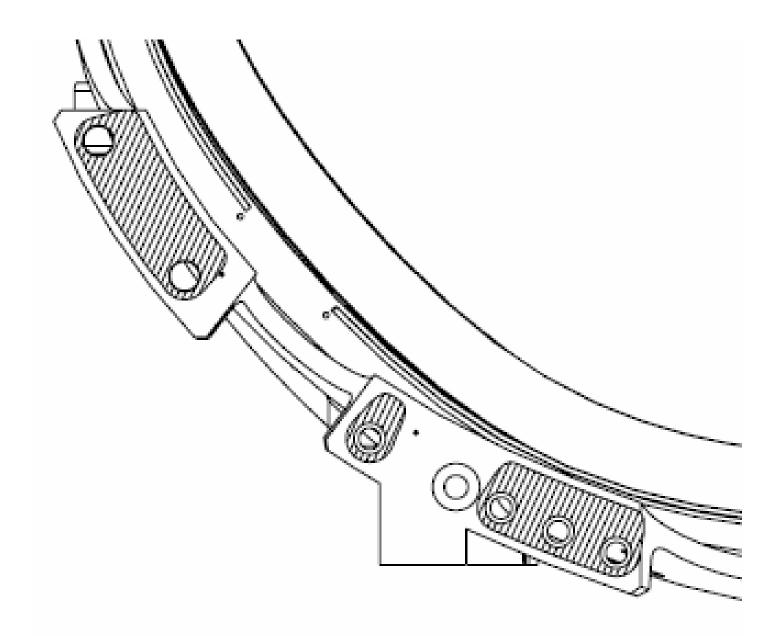


#### COIL TO COIL INTERFACE A-B

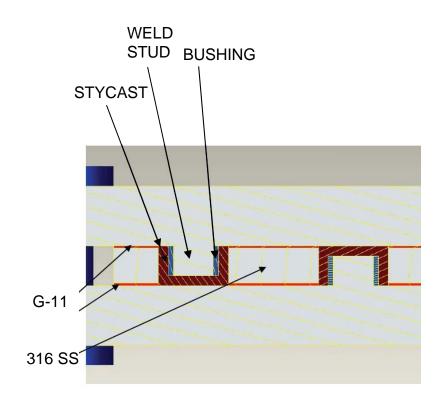


TYPE-A

TYPE-B

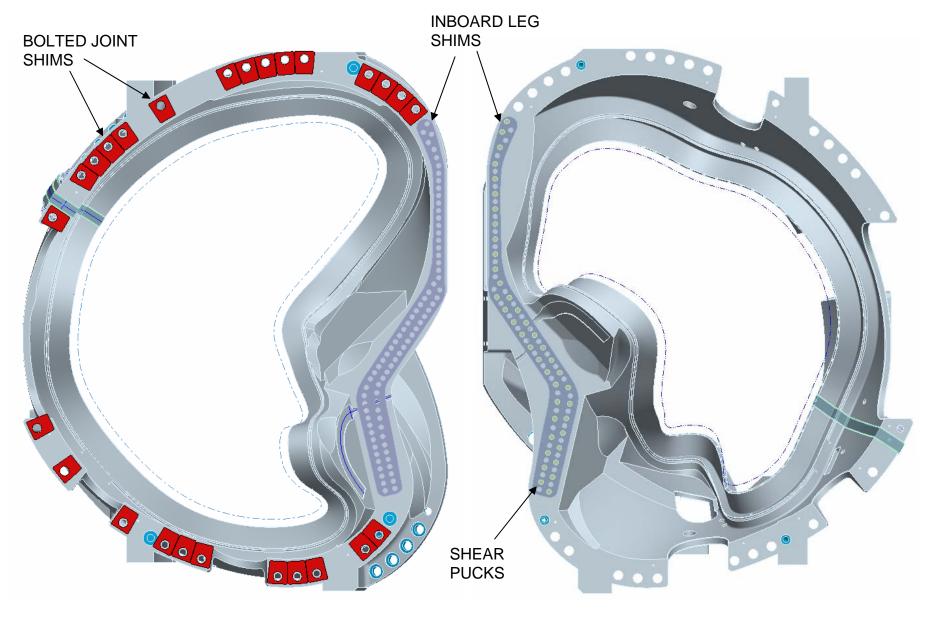


#### INBOARD LEG CONCEPT – SHEAR PINS



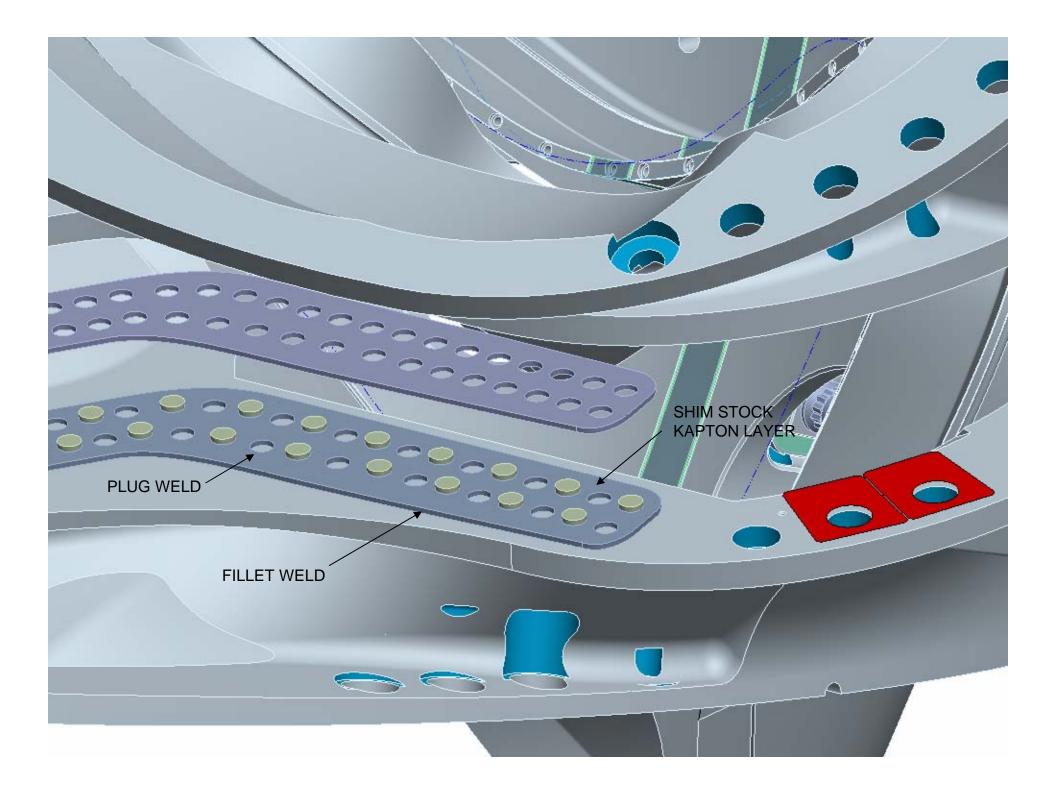


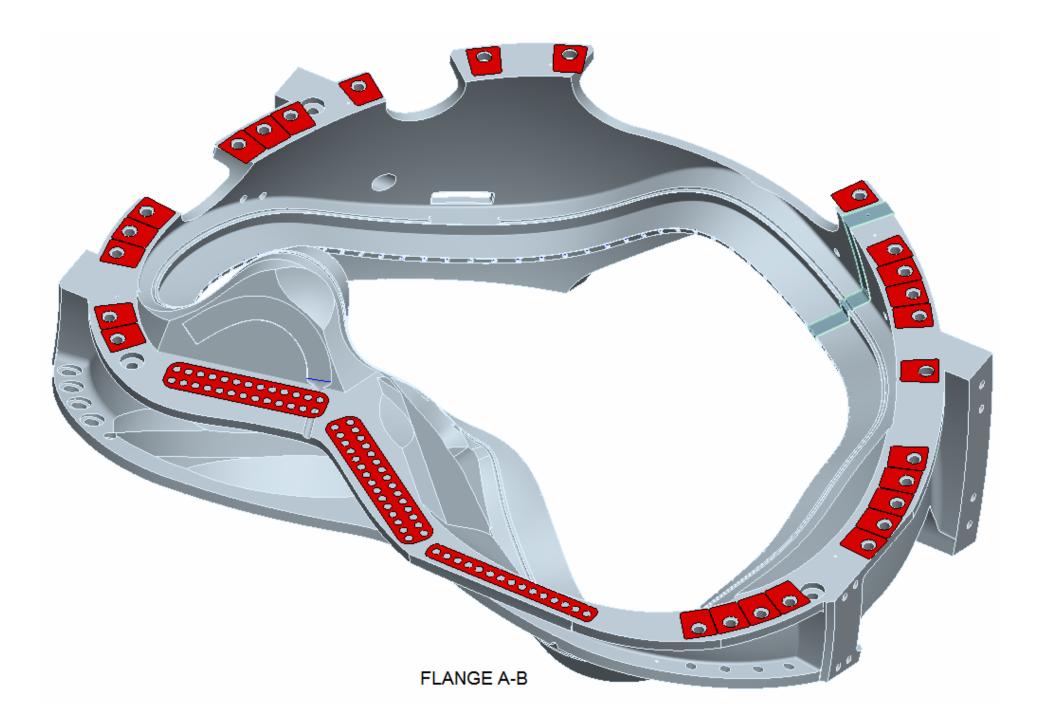
#### **INBOARD LEG CONCEPT – SHEAR PUCKS**



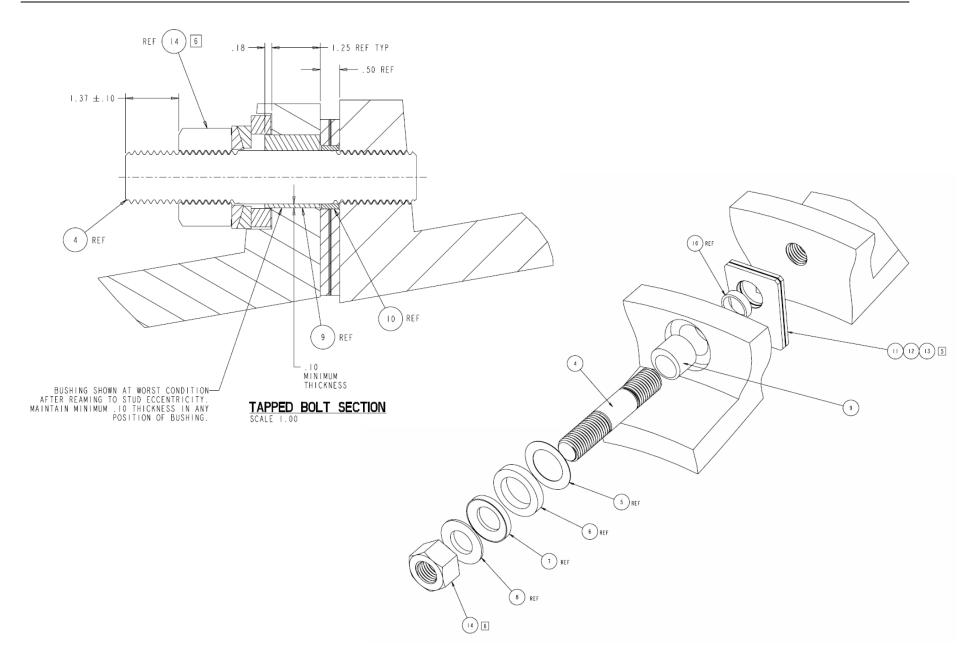
TYPE-A

TYPE-B

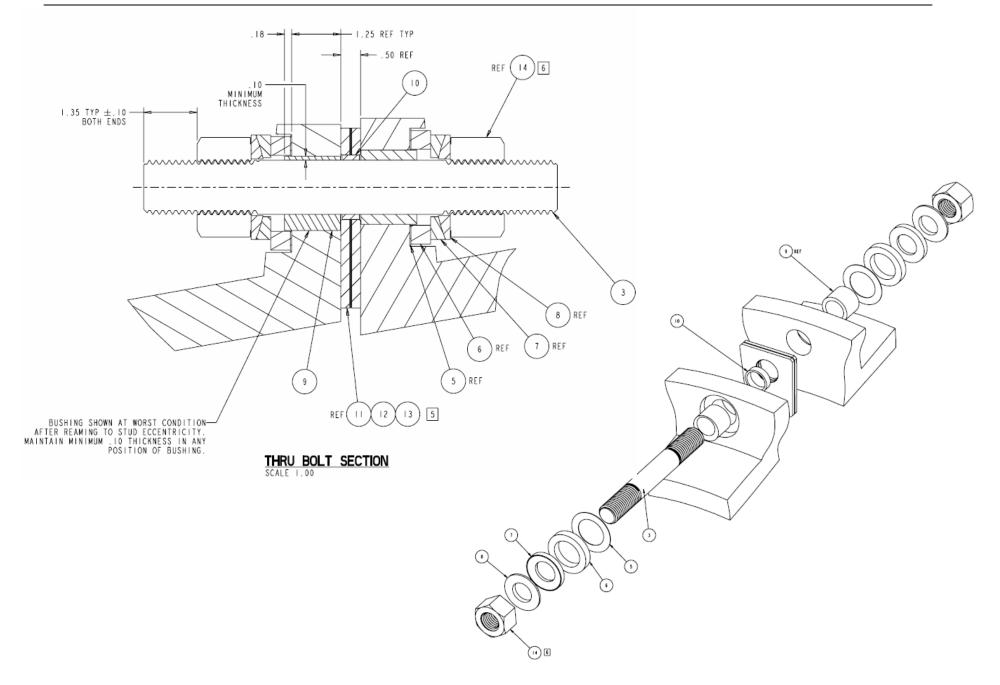




## Tapped Hole

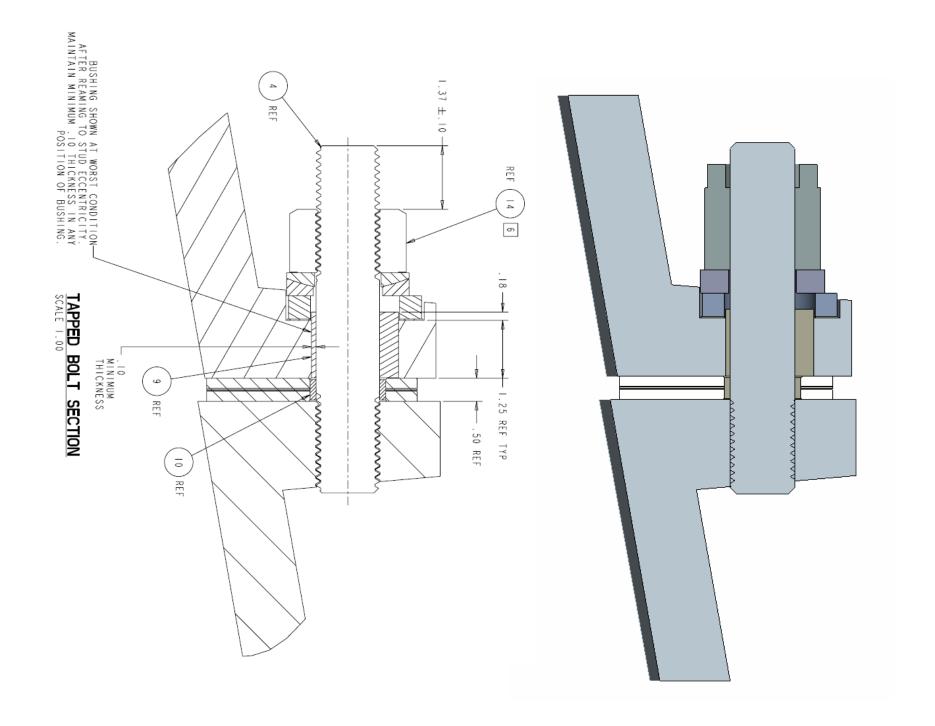


### **Through Hole**

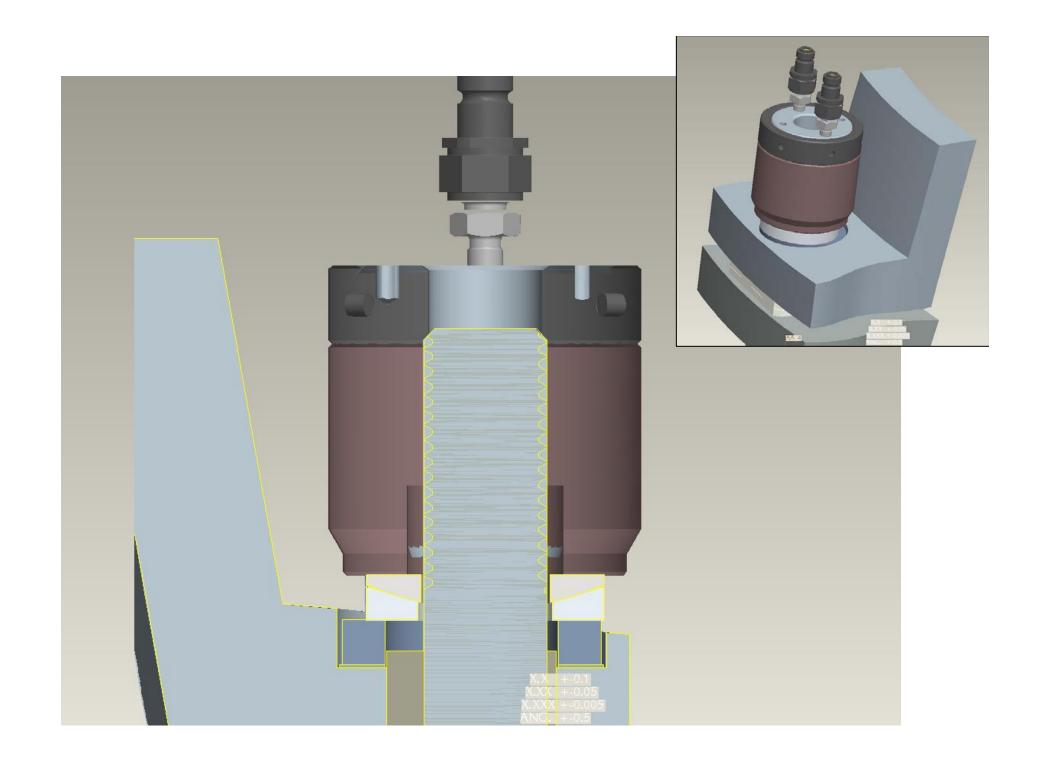


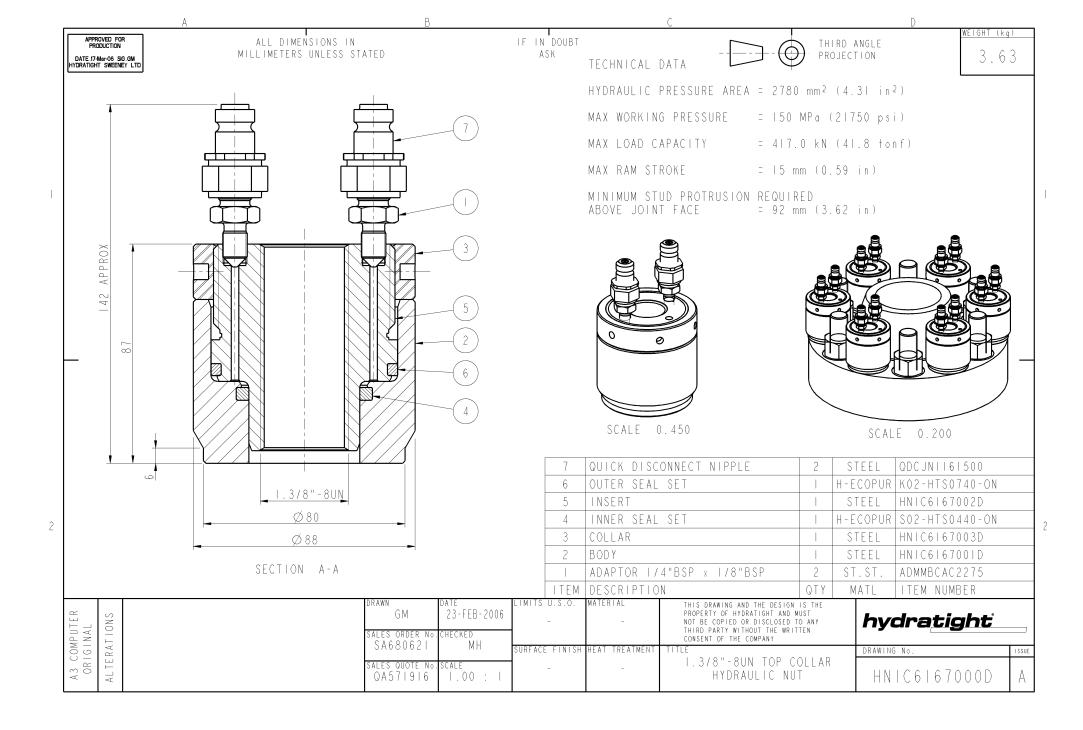
### Inventory of Tapped/Through Holes

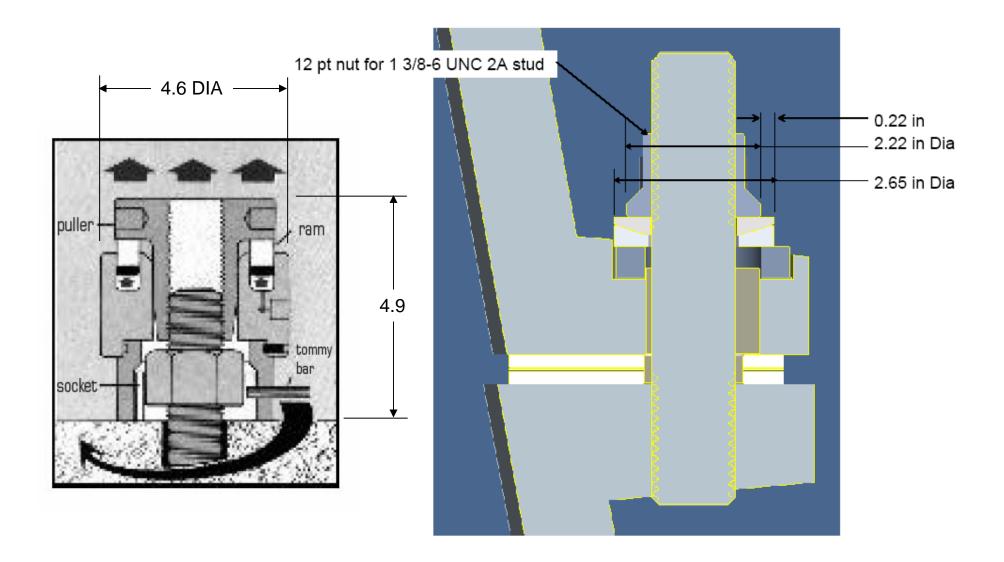
No	Interface	Typ	No. Tapped	Total	No. Thru	Total	Total
110.	Internace	тур	Holes	Tapped	Holes	Thru	Fasteners
1	A-B	5	25	125	125 1		
2	A1-B	1	7	7	19	19	
3	B-C	6	29	174	0	0	
4	A-A	2	20	40	0	0	
5	A1-A	1	6	6	14	14	
6	C-C	3	8	24	24	72	
	Total	18		376		110	486



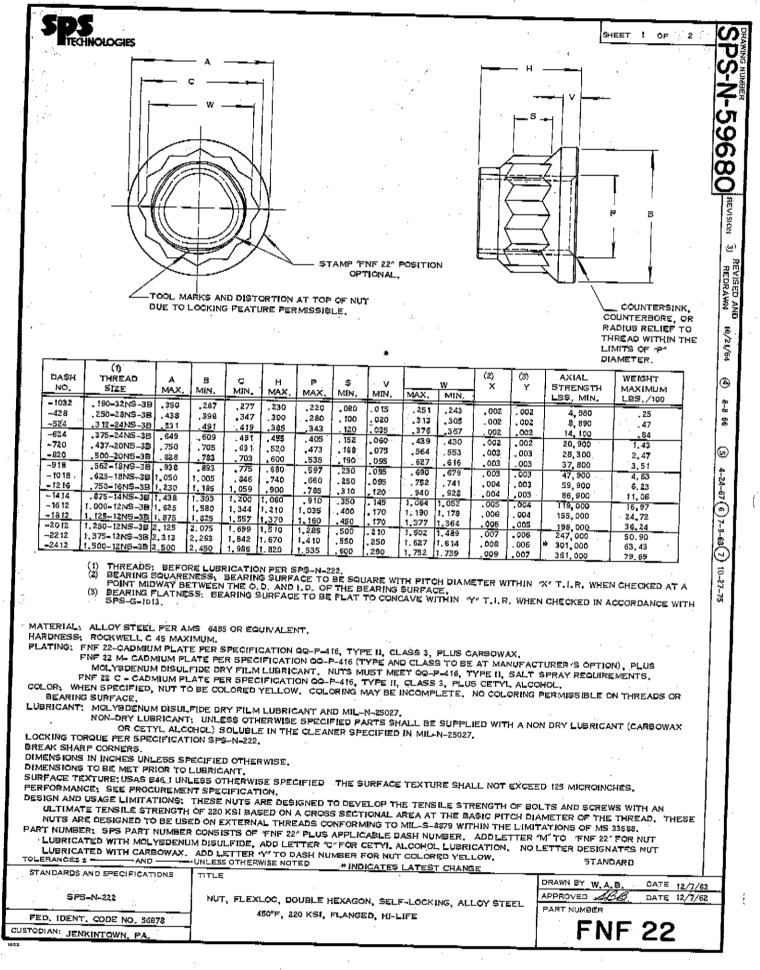


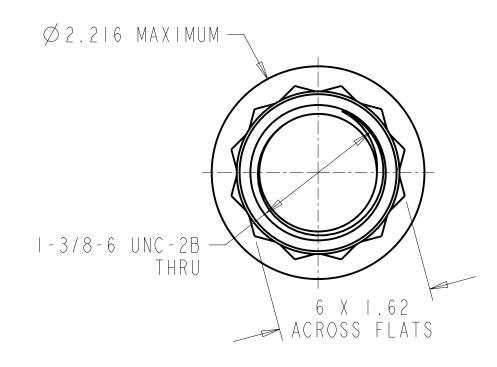






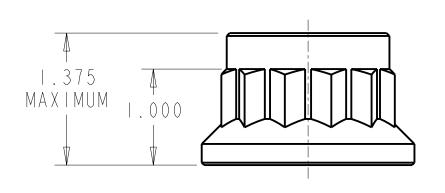
FUSIONORNL1







SCALE 0.500

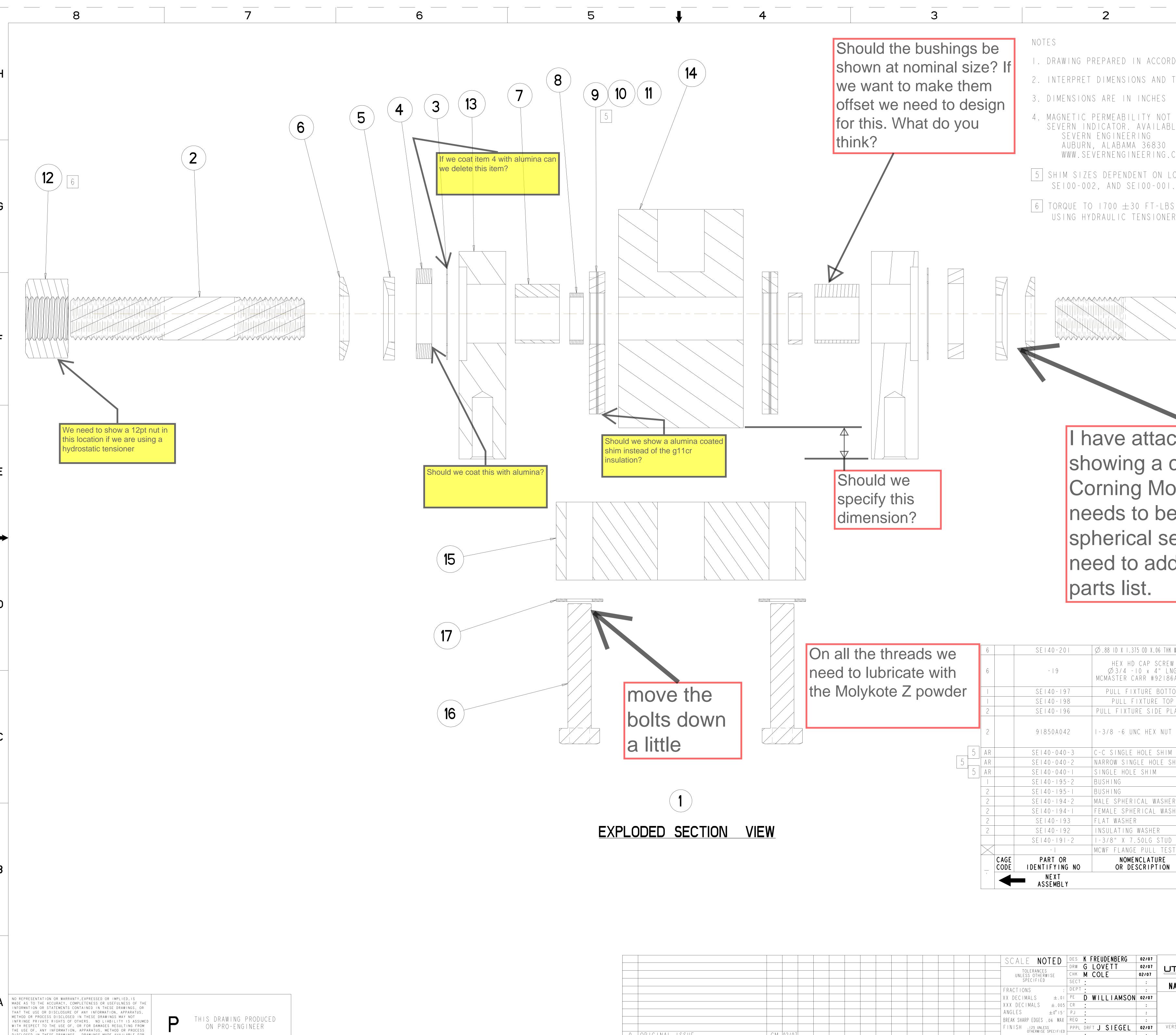


TOLERANCE =  $\pm$ .010 AND  $\pm$ 2°

 $\bigwedge$  material changed

DATA	SHEET DS141-060		ITLE / DESCRIPTION PT HEX I 375-611NC-2B
LUBRICANT			
UNITS	INCHES		JENKINTOWN, PA 19046 PHONE: 215-572-3000
COATING	SILVER PLATE PER AMS 2410		301 HIGHLAND AVENUE
HEAT TREAT	NA		PCC SPS Fastener Division
SPEC	ASTM A453 GRADE 660B	VENDOR	SUGGESTED VENDOR:
MATERIAL	UNS S66286	SOURCE	BID / PREFERRED

<b>DS141-060</b>	NU				
PREPARED BY	CHECKED BY	APPROVED BY	ISSUE DATE	VER	REV
MT BROWN	M COLE	D WILLIAMSON	6/24/04		



0	ORIGINAL ISSUE	GМ			
REV	DESCRIPTION	ΒY			
REVISION OR ISSUE PURPOSE					

DATE | CHK | DEPT | DATE | PE | REQ | DATE | ORNL | DOE | DATE |

REVISION APPROVAL

7

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.

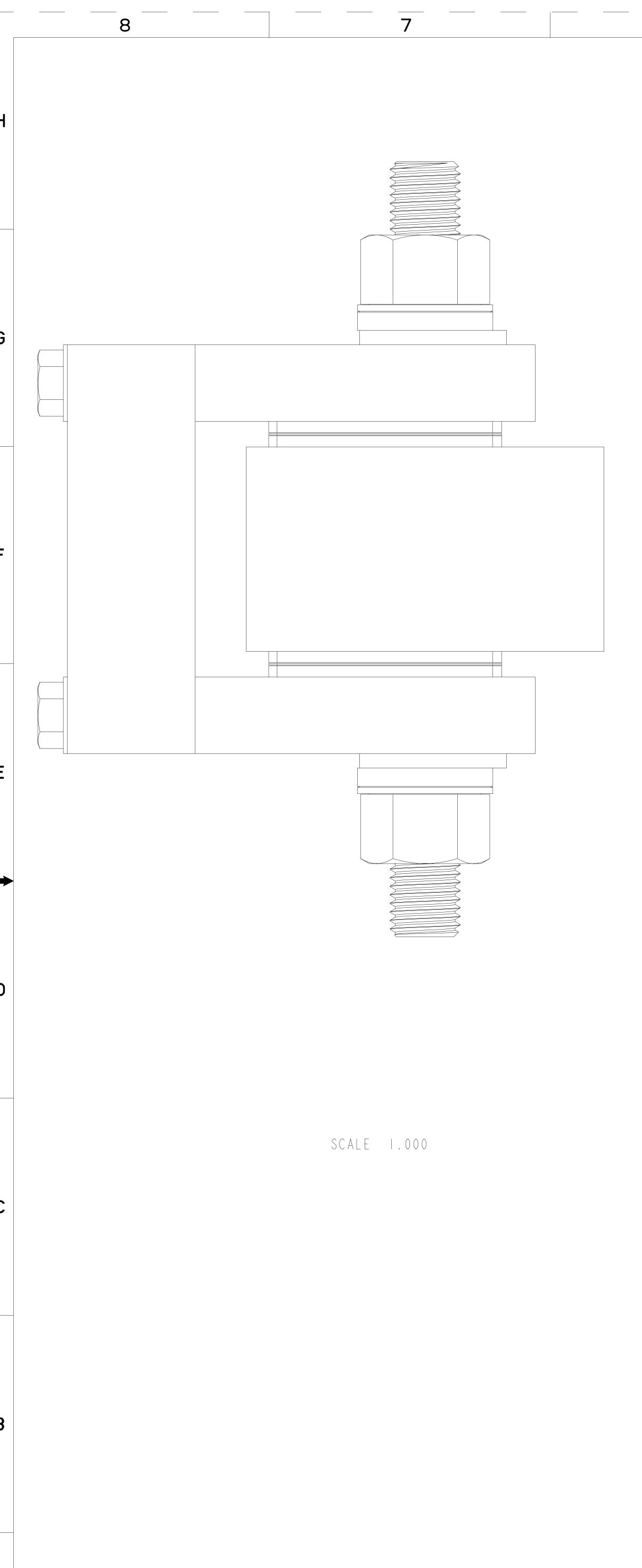
NEXT ASS'Y:	1 <sub>FINAL ASS'Y:</sub>	
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NATIONAL COMPACT STELL MCWF FLANGE P TEST ASSE	ARATOR EXPERIMENT ULL SHEAR	<b>A</b>
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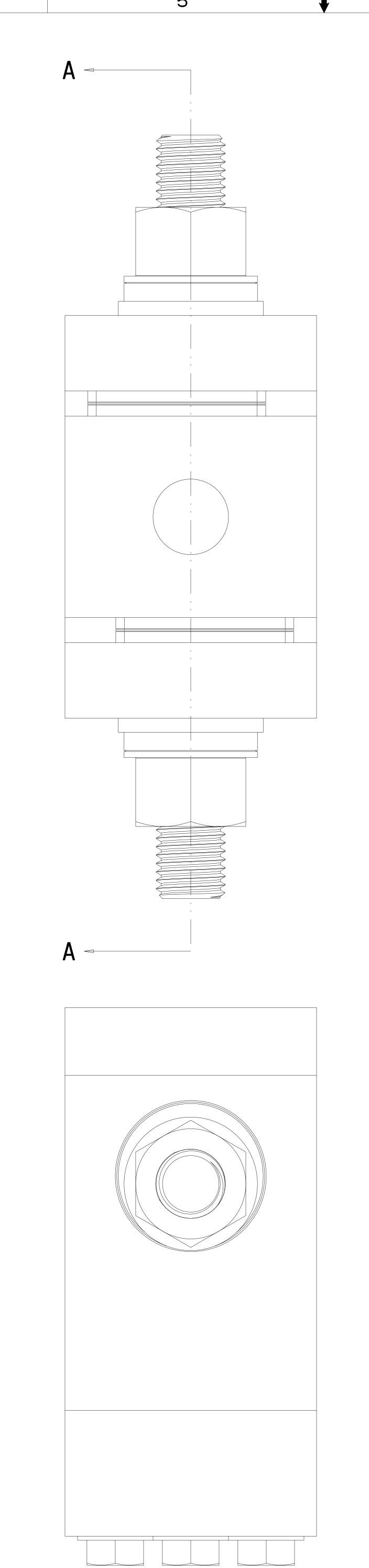
:

DATE

DRAWING APPROVALS

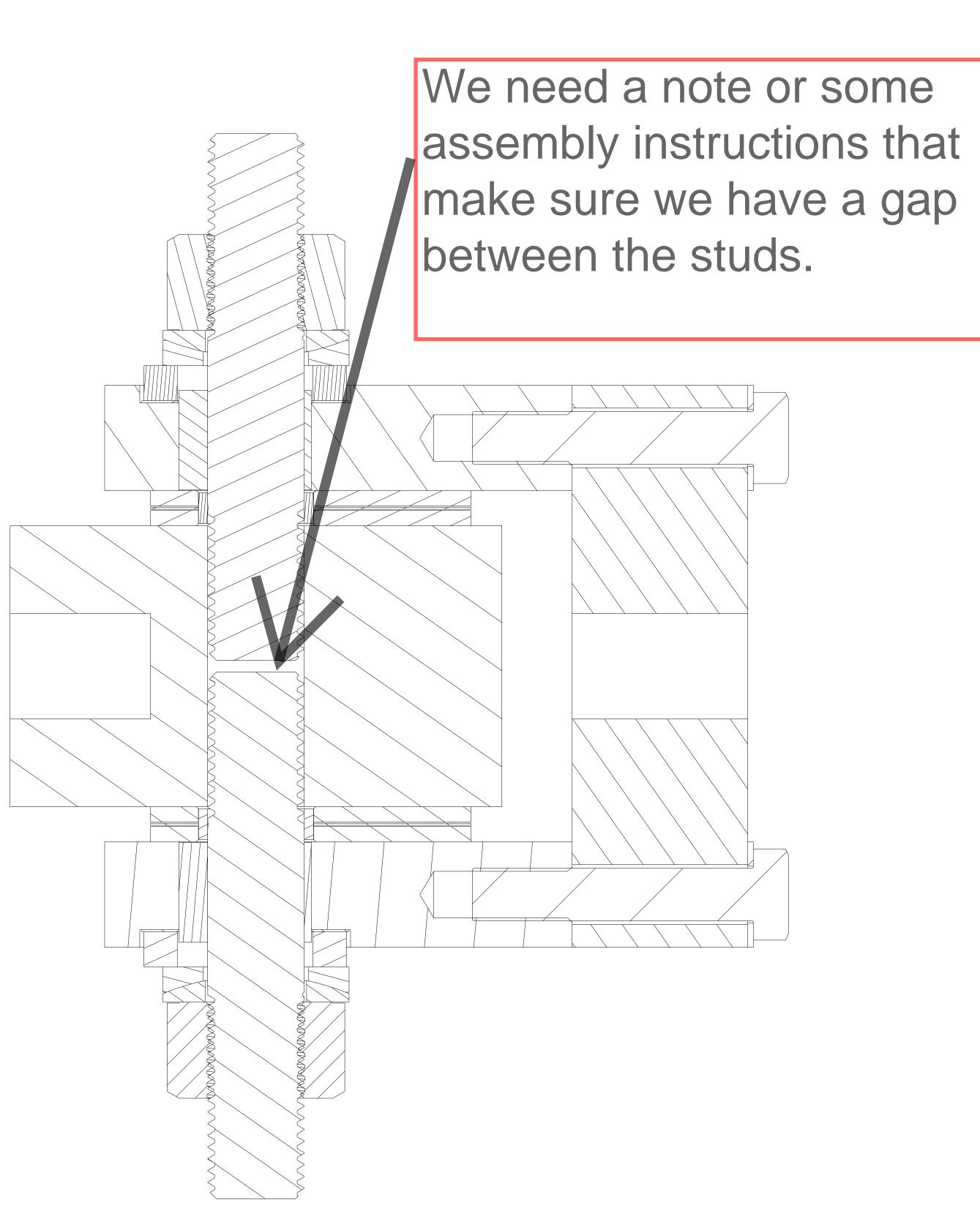
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3

SECTION A-A

We need to show some overall dimensions on this dwg. and some center lines for the screws?

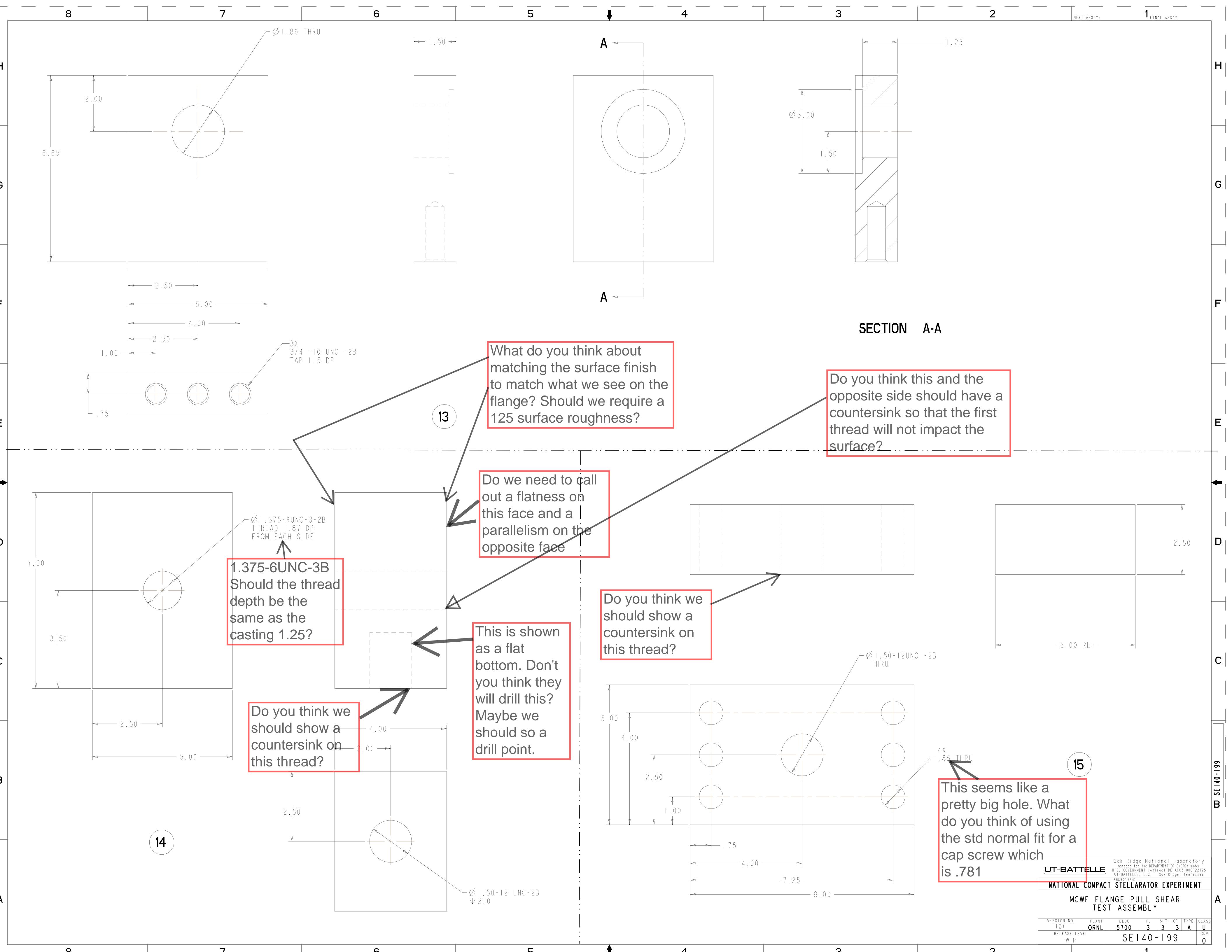
NEXT ASS'Y:

**1** Final Ass'y:

2

**B** SE I 40 - I 99

JT-BATTELLE U.S. GOVERNMENT contract DE-ACO5-000R2272 UT-BATTELLE, LLC. Oak Ridge, Tennessee PROJECT NAME						
PRO IECT NAME						
NATIONAL COMPACT STELLARATOR EXPERIMENT						
MCWF FLANGE PULL SHEAR TEST ASSEMBLY						
PLANT BLDG FL SHT OF TYPE CL.						
12+ ORNL 5700 3 2 3 A U						
RELEASE LEVEL CELAO LOO RI						
$\begin{array}{c} \text{WIP} \\ \text{WIP} \\ \end{array} = \begin{array}{c} \text{SEI40-199} \\ \text{(} \end{array}$						



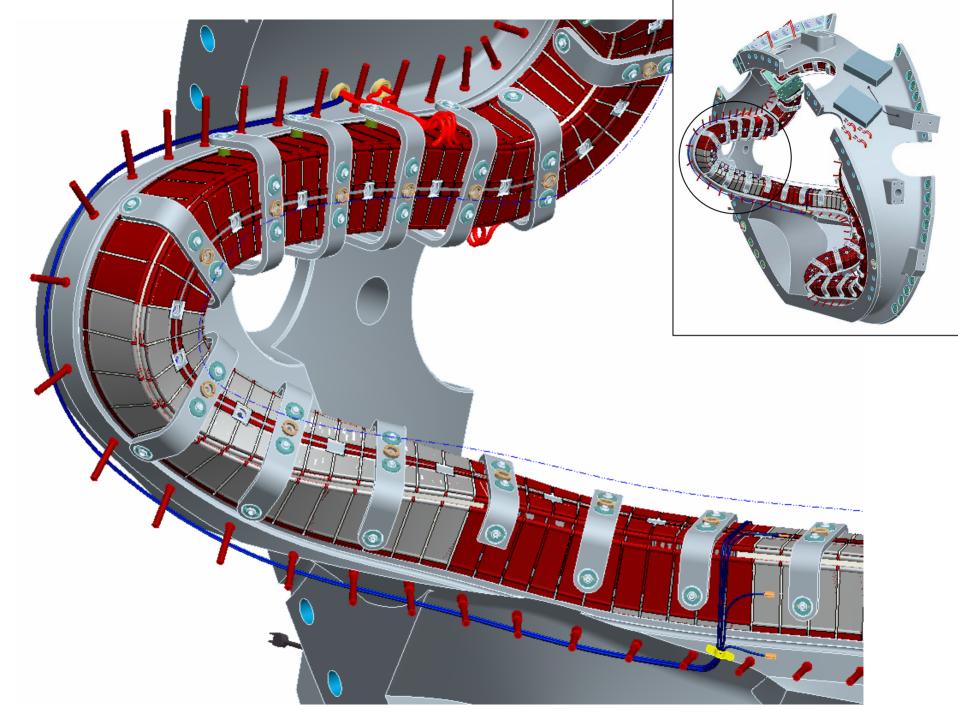
Design Review/QA Audit				Review Board	
[Cog Engr/RLM/Chair]	Rvw Date	#	Chit/Audit Finding [Originator]	Recommendation	Project Disposition
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	1	Consider a "Plan B" for the possible condition of inadequate fit-up which might require additional machining of the shims. [Reiersen]	Concur	<ol> <li>Worst case fitups are being analyzed. May preclude using constant thickness shims everywhere. (Brooks)</li> <li>Production prototype (A1:A2 will determine whether contour shims are required. If so, use of a high friction foil or a spray application of alumina can be done post-machining.</li> </ol>
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	2	Identify if any of the existing holes need to be worked on. [Cole]	Concur	Holes should be examined and cataloged as to whether any re work is required. Bushing OD could be determined at the sar time.
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	3	What are tolerance requirement for the half-period assembly? Need to consciously define. Needs more attention. [Cole]	Concur	Requirements for positioning th coil current centers will be provided in the Station 2 assembly specification. (Cole) Input to be provided by Brooks
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	4	Establish criteria for adequate fit-up of the shims [Cole]	Concur	<ol> <li>FEA analysis indicates that maximum deflections will be on the order of 1 mil (Fan)</li> <li>Joint tension tests will meas deflections upon tensioning the bolts (Gettelfinger)</li> <li>Approach to finalize fit-up criteria is TBD</li> </ol>
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	5	Do ultrasonic testing during tension test. [Cole]	Concur	UT will be performed during tension test
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	6	Measure μ at LN temperature with Stellalloy. Since Stellalloy seems stronger at LN temperature than standard stainless and since the failure seems to be destruction of the SS surface the maximum μ may be higher with Stellalloy. [Zarnstorff]	Concur	Stellalloy and SS316LN have ve comparable strength properties There are no plans to machine Stellalloy test pieces out of the prototype casting for friction tests.
Modular Coil Interface Hardware PDR Williamson/Nelson/Reiersen	2/22/2007	7		Concur - Friction testing should be performed over an appropriate range of pressures.	Friction testing will be performe over a representative range of pressures.

2/2007 8	в Г	Tabulate deflection and bolt shear loads	Concur - Need to resolve	The second second in the State of the second in the second s
		in case without additional inner leg bolts with ~ no friction on inner leg region. Consider if this is a more attractive solution than added bolt design.		The overloading of the bushings on the A-A flange will be resolved by adding additional bolts.
	H	have a handle for insertion and positioning. [Viola]	in shims.	A handling feature for the shims will be added.
2/2007 10	-  t	Unnecessarily costly and potential loss of	Concur -Consider	<ol> <li>Loss of preload will be tested in bolt tension tests with spherical washers and flat washers. Test will also provide cost data.</li> <li>Design solution may be to use only where necessary to save cost. Spherical washers are needed where stud is not normal to spotface.</li> </ol>
2/2007 1	1	the MC before the diamond coated shims	determined by	The assembly sequence will be worked out on the production protoype (A1:A2)
	2 I	Make as many similar parts as possible i.e. all shims have same shape. [Viola]		Plan is to minimize the number of different parts
2/2007 13	ł	hole adapters" use A286 nuts and washers. Use box wrench to resist rotation during tightening operations.	Concur	A1 adapters to replace through holes with tapped holes will be replaced with standard nuts
	a t	assembly prototyping to resolve issues that cannot be otherwise addressed. [Reiersen]	Concur	Daily meetings are being held at 3:45 to review daily progress and make plans for the following day.
	r G	requirements for the shim. Also, determine where the preferred contact area is [Reiersen]	Concur	<ol> <li>See Chit 4 re fit-up criteria.</li> <li>Good fit-up around the stud is seen as important to provide a good load path for the bolt preload. The impact of not having good fit-up in the shell region will be investigated.</li> </ol>
	i t	a smaller area. Shear is the glass epoxy favors a larger area. [Reiersen]		See chits 12 and 15.
	<ul> <li>/2007</li> <li>1</li> <li1< li=""></li1<></ul>	/2007       9         /2007       10         /2007       10         /2007       11         /2007       12         /2007       12         /2007       13         /2007       14         /2007       15         /2007       16	Consider if this is a more attractive solution than added bolt design.         [Zarnstorff]         /2007       9         Shims must protrude beyond flange or have a handle for insertion and positioning. [Viola]         /2007       10         Eliminate spherical washers!         Unnecessarily costly and potential loss of preload. [Viola]         /2007       11         The concern is do we have a pre fit-up of the MC before the diamond coated shims are installed? [Brown]         /2007       12         Make as many similar parts as possible i.e. all shims have same shape. [Viola]         /2007       13         In place of planned " welded threaded hole adapters" use A286 nuts and washers. Use box wrench to resist rotation during tightening operations. [Heitzenroeder]         /2007       14         Expedite completion of coil-to-coil assembly prototyping to resolve issues that cannot be otherwise addressed. [Reiersen]         /2007       15         Need to establish acceptable fit up requirements for the shim. Also, determine where the preferred contact area is [Reiersen]         /2007       16         Need to finalize shim area. Fit up favors a smaller area. Shear is the glass epoxy favors a larger area. [Reiersen]	2007       9       Shims must protrude beyond flange or have a handle for insertion and positioning. [Viola]       Concur - Also beneficial for reducing peak stresses in shims.         2007       10       Eliminate spherical washers! Unnecessarily costly and potential loss of preload. [Viola]       Concur - Consider         2007       11       The concern is do we have a pre fit-up of the MC before the diamond coated shims are installed? [Brown]       Concur - If needed to be determined by prototyping.         2007       12       Make as many similar parts as possible i.e. all shims have same shape. [Viola]       Concur         2007       13       In place of planned " welded threaded hole adapters" use A286 nuts and washers. Use box wrench to resist rotation during tightening operations. [Heitzenroeder]       Concur         2007       14       Expedite completion of coil-to-coil assembly prototyping to resolve issues that cannot be otherwise addressed. [Reiersen]       Concur         2007       15       Need to establish acceptable fit up requirements for the shim. Also, determine where the preferred contact area is [Reiersen]       Concur         2007       16       Need to finalize shim area. Fit up favors a smaller area. Shear is the glass epoxy favors a larger area. [Reiersen]       Concur

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Modular Coil Interface Hardware PDR	2/22/2007	17	Load washer may have to be modified to	Concur	Interface with hydraulic
Williamson/Nelson/Reiersen			accommodate hydraulic tensioners.		tensioners will be investigated.
			[Reiersen]		_
Modular Coil Interface Hardware PDR	2/22/2007	18	Resolve issue of what the stress	Concur	Stress allowaqbles will be
Williamson/Nelson/Reiersen			allowables should be in the G-11 bushing.		reviewed and set per the NCSX
			[Reiersen]		Structural and Cryogenic Design
					Criteria.
Modular Coil Interface Hardware PDR	2/22/2007	19	Send analysis results to Fan for checking.	Concur	Analyses will be documented and
Williamson/Nelson/Reiersen			[Reiersen]		provided for proejct review.
Modular Coil Interface Hardware PDR	2/22/2007	20	Finalize location of bolts to resolve peak	Concur	Adding more bolts on A-A will be
Williamson/Nelson/Reiersen			bushing stress concerns especially on A-		investigated for reducing peak
			A [Reiersen]		bushing stresses.
Modular Coil Interface Hardware PDR	2/22/2007	21	Confirm that single shear test setup is	Concur	Double shear setup is being
Williamson/Nelson/Reiersen			OK. If not, consider setting it up a a		considered.
			double shear test. [Reiersen]		

### Coil instrumentation – open issues

- Fiber optic gage calibration
- Length of leads



<u>COMPONENT</u>	CABLE LENGTHS
A-Coil Plug-in TC #1	65"
A-Coil Plug-in TC #2	48"
A-Coil Surface Mount TC (dual)	12"
A-Coil Strain Set near Hole 64	192"
A-Coil Strain Set near Hole 44	90"
B-Coil Plug-in TC #1	60"
B-Coil Plug-in TC #2	30"
B-Coil Surface Mount TC (dual)	60"
B-Coil Strain Set near Hole 64	120"
C-Coil Plug-in TC #1	54"
C-Coil Plug-in TC #2	42"
C-Coil Surface Mount TC (dual)	12"
C-Coil Strain Set near Hole 68	96"
C-Coil Strain Set near Hole 46	112"

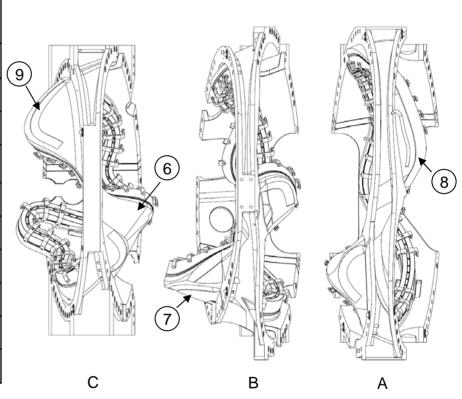
Design Review/QA Audit [Cog Engr/RLM/Chair]	Rvw Date	#	Chit/Audit Finding [Originator]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	1	Strain gages on steel will be fairly each to interpret but gages on the composite conductor and chill plates may yield readings that are not so easy to interpret due to the uncertainty of the material. [Brooks]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	2	Perform accuracy measurement on FBG sensors. [Dong]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	3	Assume that installation and electronics costs are in WBS1 as they are not in WBS 5. [Gettelfinger]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	4	Consider monitoring the coolant tube inlet and outlet temperatures. Useful diagnostic for monitoring will cooldown. [Reiersen]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	5	Monitor coil resistance to infer coil temperature. Reduce number of TC's. 600 looks to be an excessive number fold into coil protection. [Reiersen]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	6	Verify that problems with displacement gage were due to condensation could be done at PPPL. Also consider installing on machine. [Reiersen]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	7	Investigate the calibration of FBG's so they have the same issues as Fabry Perot gages. [Reiersen]
Modular Coil Strain Gage FDR Willamson/Nelson/Reiersen	1/24/2007	8	We need to use calibrated gages if they are used to validate the structures models. Require the use of weldable gages. [Reiersen]

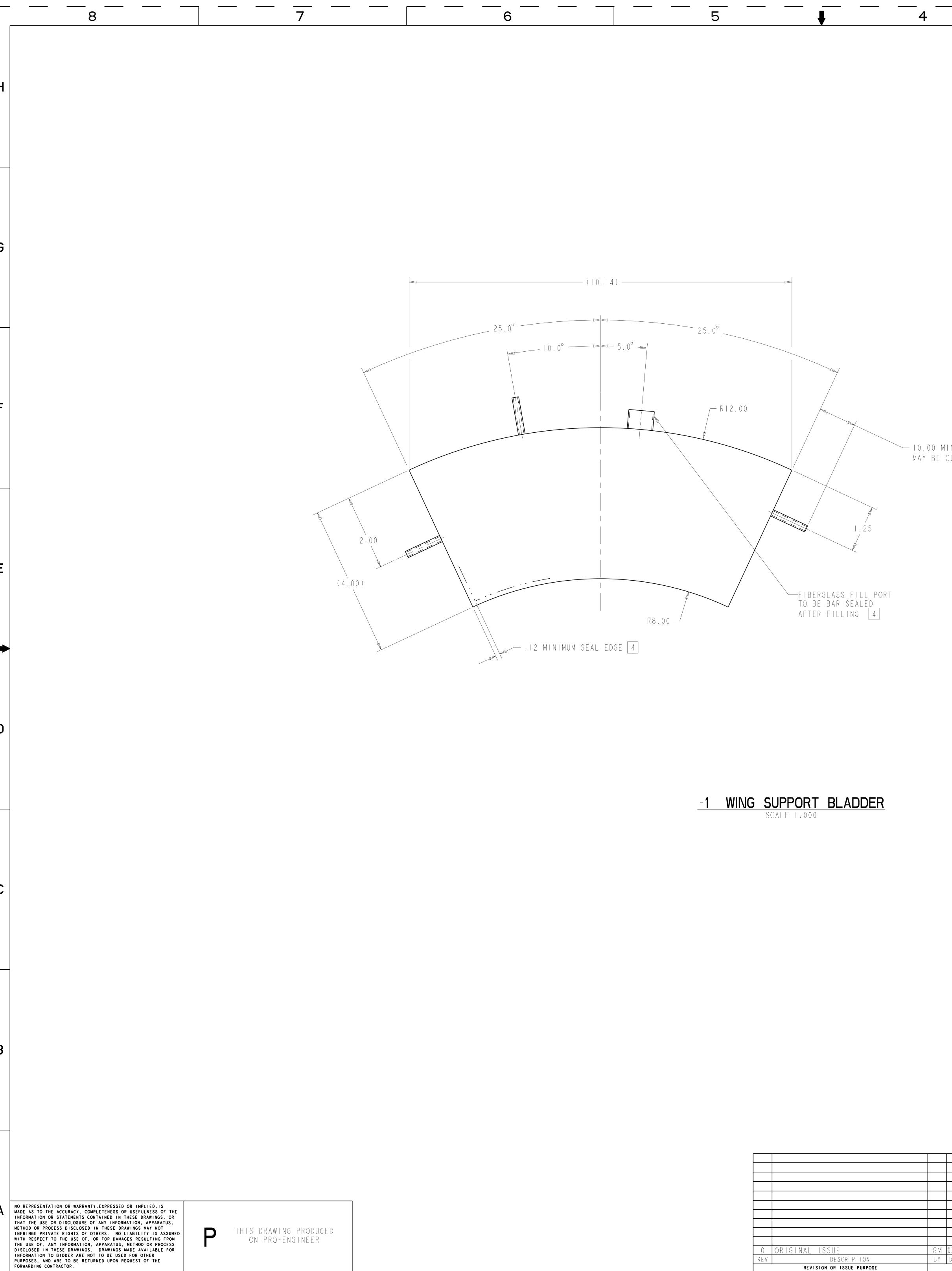
### Bladder – open issues

- Drawing of standard shape
- Prototyping AB, BC, or CC

# Inventory of wing surfaces:

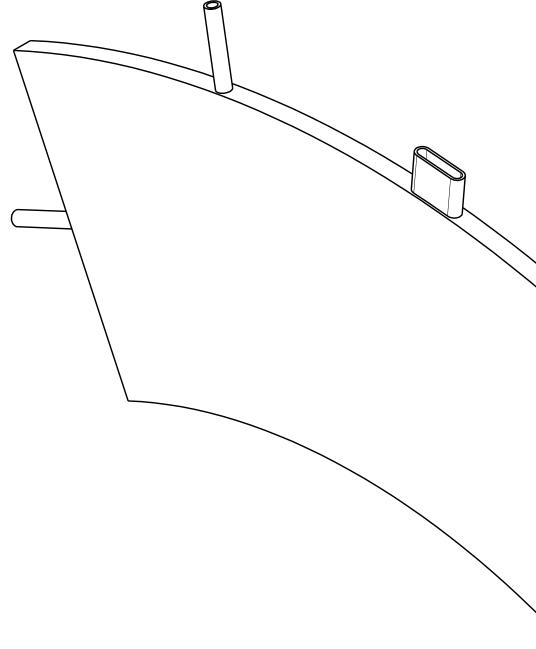
No.	Coil Type	Interface	Location	Area (in2)
1	А	A-B	outboard	84
2	В	A-B	inboard	233
3	А	A-B	inboard	211
4	В	B-C	outboard	10
5	В	B-C	inboard	~0
6	С	B-C	inboard	433
7	В	B-C	inboard	293
8	А	A-A	inboard	301
9	С	C-C	inboard	408
10	С	C-C	outboard	131





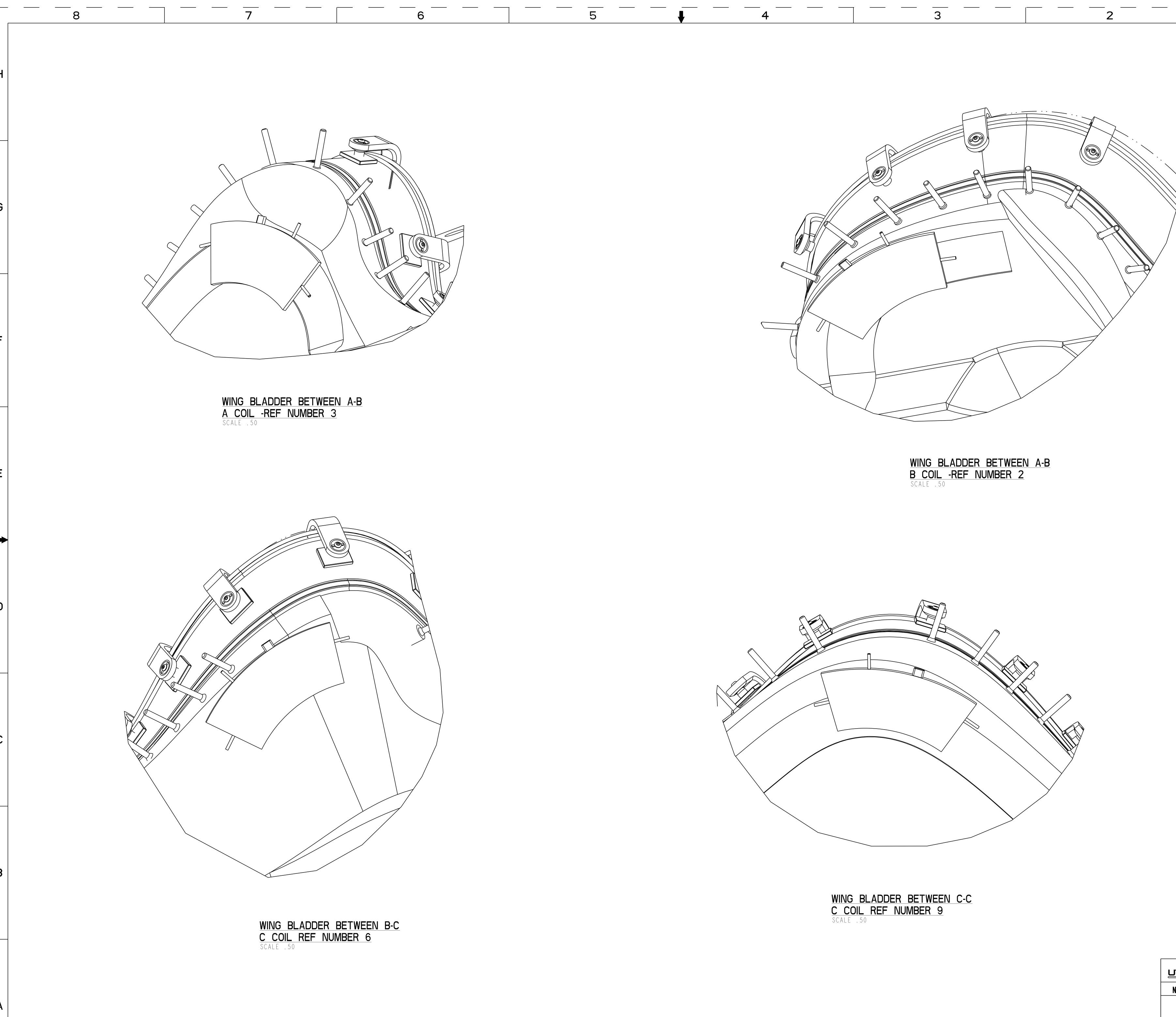
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3.	DIMEN	SIO	NS	/
4	BAG CONT BOND	INU	OUS	



3	2	NEXT ASS'Y:	1 <sub>FINAL ASS'Y:</sub>	
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Image: Cock of the second		NATIONAL COMPACT ST WING SUPPO VERSION NO. PLANT BL 0+ ORNL 57	Ridge National Labora aged for the DEPARTMENT OF ENERGY u GOVERNMENT contract DE-AC05-000 ATTELLE, LLC. Oak Ridge, Tenn T NAME ELLARATOR EXPERIME ORT BLADDER DG FL SHT OF TYPE 00 3 1 2 S SEI40-050	<u>NT</u>     

	3		2	NEXT ASS'Y:	1 <sub>FINAL ASS'Y:</sub>	
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	SEE SHEET 2 FOR	APPROXIMATE WINC	<u>3 LOCATIONS</u>			C
	AR AR SE100-001 SE100-001 SE100-001	- I WING PART OR IDENTIFYING NO NEXT ASSEMBLY	SUPPORT BLADDER NOMENCLATURE OR DESCRIPTION	TEFLON FEP 4 MATERIAL PARTS LIST	ASTM D-882 (MECHANICAL) SPECIFICATION	<b>B</b> SE 140-050
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IH6-021	Procure materials for 1st FPA	USMARU/	21	UZAPRU/	UZAPRU/	
Bladder Te	ests	·				
1421-3002	Test plan,Setup test fixt.Order matl	01JAN07A	5	31JAN07A	19JAN07	
1421-3004	Rvw struct analyses.Verify perf of Teflon bladde	01FEB07*	5	07FEB07	26JAN07	
1421-3006	Perform Tests to develop epoxy filling techniq	29JAN07A	13*	14FEB07	02FEB07	
1421-3019	Determ if "one size fits all"&bladder dwgs	22JAN07A	18*	14FEB07	02FEB07	
1421-3011	Test 1/2" bag with CTD, Stycast 2850	29JAN07A	1	31JAN07A	06FEB07	
1421-3012	Fill &Test Teflon bladder to determine properti	29JAN07A	14*	15FEB07	15MAR07	
1421-3016	Procure/fab prototype bladder for C-C installati	16FEB07	15	08MAR07	05APR07	
1421-3021	Conduct FDR of bladder design	16MAR07	1	16MAR07	13APR07	
1421-3023	Resolve FDR issues, release proc dwgs for fab	19MAR07	5	23MAR07	20APR07	
1421-3025	Procure bladders for first FPA (2 ea)	26MAR07	20	20APR07	18MAY07	
1421-3028	Bladders available for FPA		0	20APR07	18MAY07	
IH2-030.01	Finalize Requirements	01DEC06A	31*	22JAN07A	22JAN07A	0701
IH2-030.02	Procure Samples	01DEC06A	15*	22DEC06A	22DEC06A	0701
IH2-030.03	Epoxy Fill Equipment	01DEC06A	15*	22DEC06A	22DEC06A	0701
Buehing T	oet					

## Bushings – open issues

• Drawing for "perfect" bushing

Gage is inserted over the stud and into hole to measure offset.

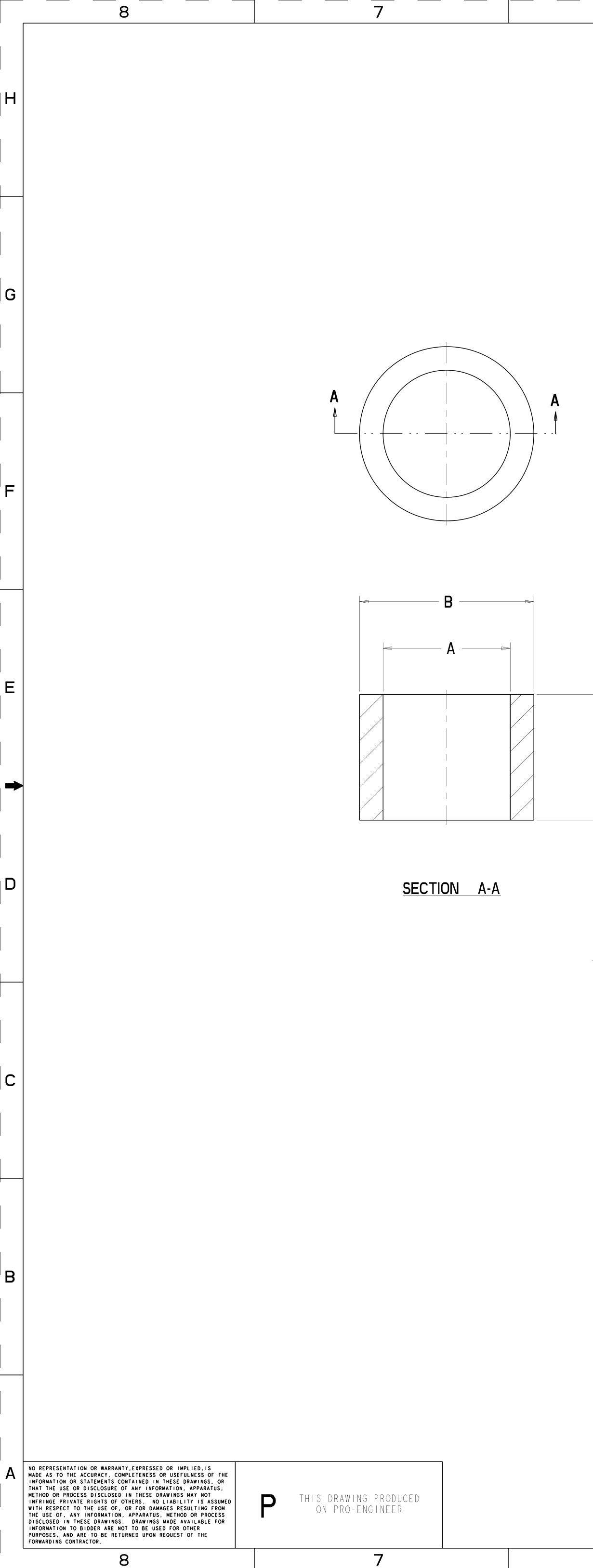
In this particular case, the line corresponding to #7 indicated where the gage touched the hole wall.

#7 on the chart reads that the hole centers are .033 offset, and this is the dimension needed to machine the bushing.

This is an example of a pretty good alignment.

View looking from underneath the hole after bushing was pressed into hole Hole used to test making a bushing with the gage and fitting it on the stud and pushing it into the hole

> A flashlight and a mirror were used to read the gage from underneath the flange





1.36

0 Rev	ORIGINAL ISSUE DESCRIPTION	G M B Y

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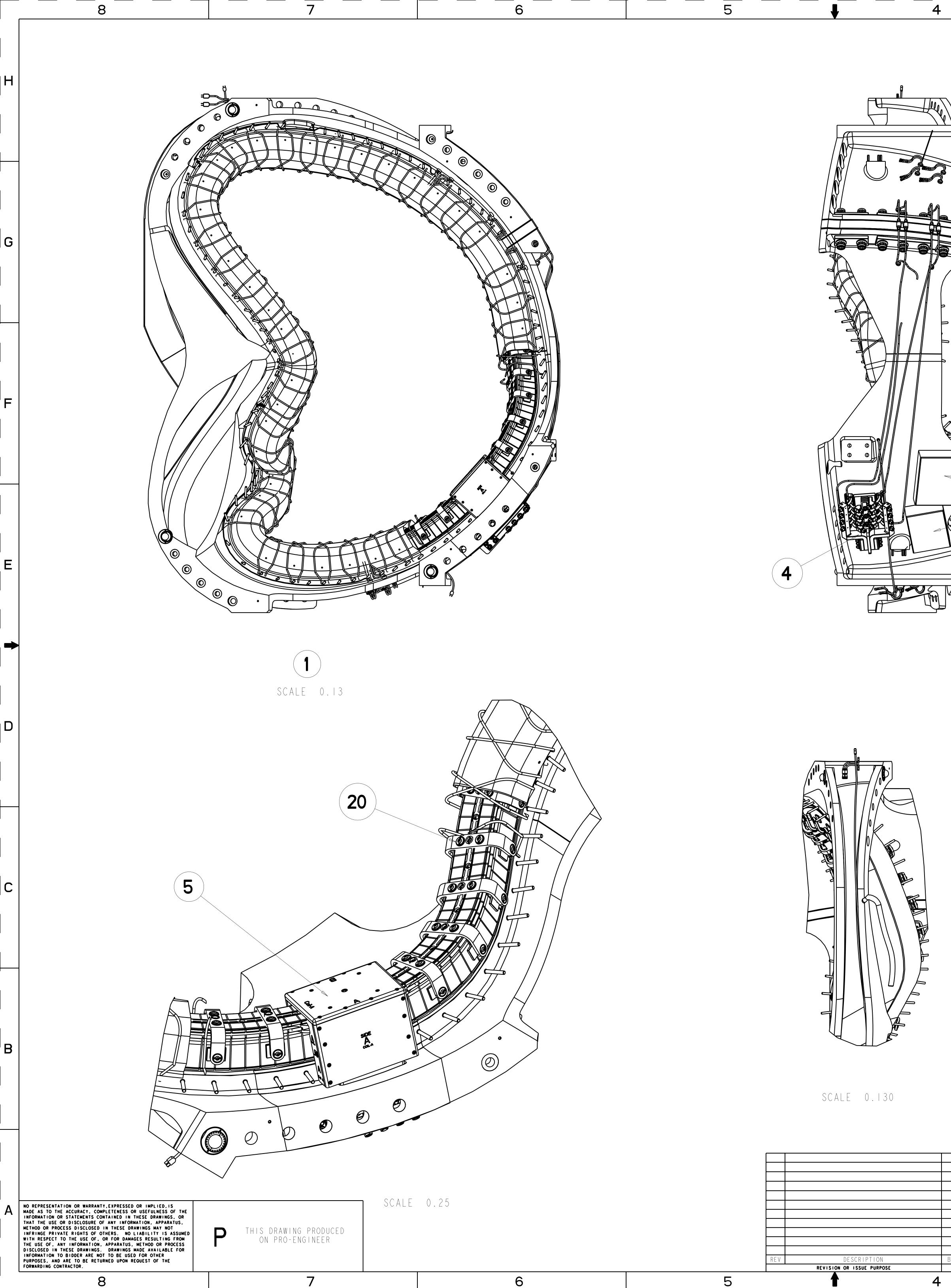
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													XXX DEC	CIMAL	<b>S</b> ±.00	CR	•			:	
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						D
	AR       -12         AR       -11         AR       -10         AR       -9         AR       -8         AR       -7         AR       -6         AR       -5		GAROLITE	G -		С
	AR     -4       AR     -3       AR     -2       AR     -1       CAGE     PART OR	MENCLATURE DESCRIPTION	MATERIAL PARTS LIST	SPECIFICATION	FIND NO	<b>B</b> SE 140 - 195
DATE	OCCALL     INCLED     DRW G N       TOLERANCES UNLESS OTHERWISE SPECIFIED     CHK       SECT :     SECT :       FRACTIONS     DEPT :       XX DECIMALS ± .01     PE :       XXX DECIMALS ± .005     CR :       ANGLES ± 0°15′     PJ :       BREAK SHARP EDGES .06 MAX     REQ :       FINISH     125 UNLESS OTHERWISE SPECIFIED       Image: Specified     Image: Specified	VILLIAMSON 11/06 ACGINNIS 11/06 : : : : JSIEGEL 11/06 : GAPPROVALS DATE 2	NATIONAL COMPACT ST BUS VERSION NO. PLANT B O ORNL 5	HING	ENT e class	Α

PART NO	DIM A	DIM B
-	Ø1.000	ØI.885
- 2	Ø1.000	ØI.887
- 3	Ø1.000	ØI.889
- 4	Ø1.000	Ø1.901
- 5	Ø1.000	ØI.903
- 6	ØI.000	ØI.905
- 7	ØI.375	ØI.885
- 8	ØI.375	ØI.887
- 9	ØI.375	ØI.889
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-	ØI.375	ØI.903
-   2	$\emptyset$ I. 375	ØI.905

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Bushing T	est				
1421-3094	Schemes for tight fit bushing Prepare sketches.	01JAN07A	5	08JAN07A	26JAN07
1421-3096	Procure bushing materials for tests. Fabricate	09JAN07A	15	15JAN07A	16FEB07
1421-3099	Procure tools&materials required f/ bushing assy	16JAN07A	15	22JAN07A	16FEB07
1421-3102	Trial bushing installations on a production coil	23JAN07A	10	31JAN07A	02MAR07
1421-3104	Doc. test results. Select bushing config. Peer r	08MAR07	5	14MAR07	09MAR07
1421-3106	Proc bushing matls for assy operations. Fab bush	15MAR07	30	25APR07	20APR07
1421-3109	Bushings available for FPA operations		0	25APR07	20APR07
1421-3109	Bushings available for FPA operations		0	25APR07	20A

- Prototyping
- Callout on drawing

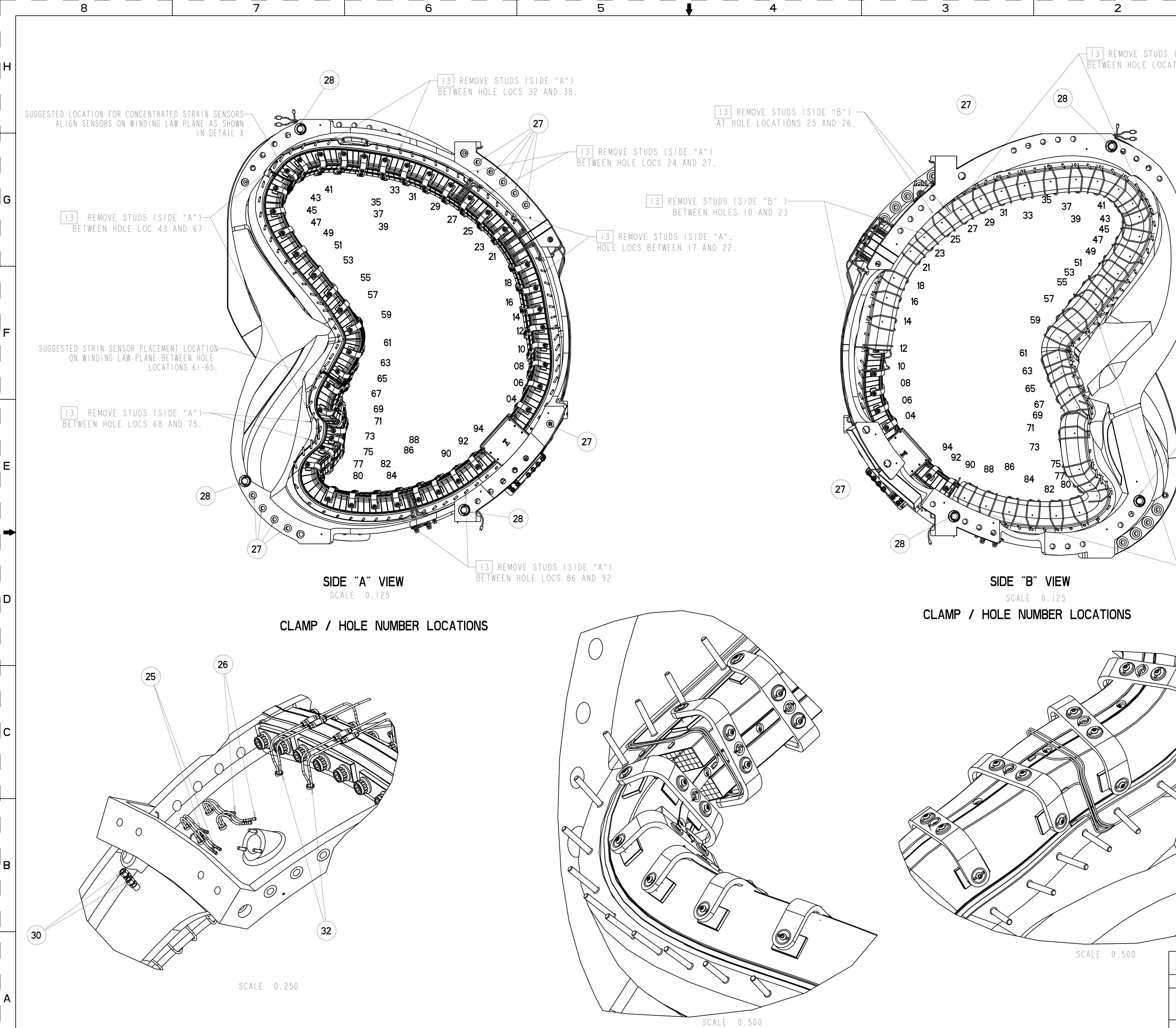


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3		2	NEXT ASS'Y:	1 <sub>FINAL ASS'Y:</sub>	
	2. INTERPRET D 3. DIMENSIONS 4. DIMENSIONS 5. LEADS AREA	IMENSIONS AND TOLE ARE IN INCHES APPLY AT ROOM TEMP SHALL BE COVERED	E WITH ASME YI4.100 RANCES PER ANSI YI4 ERATURE. OPERATING OR SPRAYED WITH AN	.5M TEMP 80 K. INSULATING	Н
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		ACCEPTANCE CRITERI ORMATION: TRU PO MT 91 ORMATION: FISC 50 QU 41 ORMATION: OMEGA ONE	A OF AWS DI.6. LY TUBULAR FITTING BOX 1160 VERNON, NY 10550 4-664-8686 OR WWW.T FIBER OPTICS 0 ST. JEAN BAPTISTE EBEC QC, G2E 5R CAN 8-688-8065 OR WWW.F OMEGA DRIVE	CORP RULYTUBULAR.COM AVE SUITE 195 ADA	F
	ACTUAL PAR ACTUAL PAR	80 IN THIS ASSEMBLY TS/ASSEMBLIES. PAR TS. FOR FULL MODEL	AMFORD, CT 06907 0-848-4286 OR WWW. ARE GRAPHIC REPRESE T IDENTIFICATION NU ED ASSEMBLY SEE SEI STUDS AFTER CLAMP A MBLED (POST VPI).	INTATIONS OF MBERS REFER TO 40-102-	E
2 4 12 2 10 AR 2 11 2 11 6 13 6 13 AR 2 2 2 2 2 2 2	- 34 - 33 SEI42C-014 SEI42C-015 SEI42C-013 SS-810-1-8 TEMP-THERMOCOUPLERI SEI851-170 SEI41-204 SEI42C-011 SEI42C-011 SEI42A-025 90FF-4 10FF-4	WASHER 3/8 - IGUNC HE LINED INSULATING 3"X8"XI2" FLUX L FISO FIBER OPTIC ST BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAM POL BR CONNECTOR TRULY TUBULAR I/	SLEEVEOOP BOXRAIN SENSOREERSSEMBLYNGSITTINGPASSEMBLY4 ELBOW4 UNION	SS 316L           SS 316L           BRAZETYTE           BRAZETYTE           BRAZETYTE	33 32 31 30 29 28 27 26 25 24 23 22
	SEI22-009         SEI42A-010         SEI42A-248         SEI42A-246-4         SEI42A-246-3         SEI42A-243         SEI42A-244         SEI42A-244-4         SEI42A-258         SEI42A-256-4         SEI42A-256-3         SEI42A-256-3         SEI42A-256-3         SEI42A-254-4         SEI42A-254-4         SEI42A-254-3         SEI42A-254-3         SEI42A-254-3         SEI42A-254-3         SEI42A-254-3         SEI42A-080         SEI41-121         SEI41-121         SEI41-101         -1         AGE         PART OR         IDENTIFYING NO         NEXT         ASSEMBLY	SIDE "B" UPPER CHILL SIDE "B" GROUN SIDE "B" WINDING SIDE "B" LOWER CLAD SIDE "B" UPPER CLADD SIDE A COOLING SIDE A LOWER CHILL P SIDE A UPPER CHILL P SIDE A WP GROU SIDE "A" WINDINGS SIDE "A" LOWER CLAD	BLYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYDING (BASE)ING (SEPTUM)TUBESATES (SIDE)LATES (TOP)NDWRAPASSEMBLYDING (BASE)ING (SEPTUM)SEMBLYSEMBLYSSEMBLYT 2)SSEMBLY TYPE-AASM		21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b> <b>1</b>
ATE		DRW         G         LOVEII         07-06           CHK         M         COLE         08-06           SECT         :         :           DEPT         :         :           PE         D         WILLIAMSON         8-06           CR         :         :         :           PJ         :         :         :           X         REQ         :         :	NATIONAL COMPACT S MCWF FULL COI VERSION NO. PLANT 25 X-10 5 RELEASE LEVEL	ak Ridge National Labora nanaged for the DEPARTMENT OF ENERGY un . GOVERNMENT contract DE-AC05-000 -BATTELLE, LLC. Oak Ridge, Tenn DJECT NAME TELLARATOR EXPERIME TYPE "A" L ASSEMBLY BLDG FL SHT OF TYPE 3700 3 1 2 S SEI40-101 1	essee

	2	NEXT ASS'Y:	1 <sub>final ass'y:</sub>	]
NOTES:				
		E WITH ASME YI4.10		
		RANCES PER ANSI YI	4.5M	H
3. DIMENSIONS A		ERATURE. OPERATING	TEMP 80 K	
		OR SPRAYED WITH AN		
	PREVENT DEBRIS FR	om causing an elec		
	LANKET INSULATION NG SEI22-009 FOR I	ASSEMBLY, F/N 18, NSTALLATION.	NOT SHOWN.	
	REVISION OF PROCE IONAL REQUIREMENTS	DURE D-NCSX-MCF-00		G
		N ACCORDANCE WITH URE NO. ENG-037. V		
WELD INSPE		RFORMED IN ACCORDA		
9 VENDOR INFO		LY TUBULAR FITTING Box 1160	CORP	
	MT	VERNON, NY 10550 4-664-8686 or www.	TRULYTUBULAR.COM	
IO VENDOR INFO		FIBER OPTICS O ST. JEAN BAPTIST	E AVE SILLTE LQ5	F
	$\bigcirc \cup$	EBEC QC, G2E 5R CA 8-688-8065 OR WWW.	NADA	
II VENDOR INF	ORMATION: OMEGA	ENGINEERING CORP		
	ST	OMEGA DRIVE AMFORD, CT 06907		
12 SOME PARTS		0-848-4286 OR WWW ARE GRAPHIC REPRES		
ACTUAL PART	TS/ASSEMBLIES. PAR	T IDENTIFICATION N ED ASSEMBLY SEE SE	UMBERS REFER TO	
		STUDS AFTER CLAMP		E
	BLANKETS ARE ASSE			
- 3 4	WASHER		SS 316L	
- 3 3 SE   4 2 C - 0   4	3/8 - I6UNC HE LINED INSULATING		SS 316L	33
	3"X8"XI2" FLUX L			2.2
SE   42C - 0   5 SE   42C - 0   3	FISO FIBER OPTIC STR	RAIN SENSOR		32
SE   42C - 0   3 SS - 8   0 - 1 - 8 TEMP - THERMOCOUPLER I	FISO FIBER OPTIC STE BLEED VALV THERMO COUPL	RAIN SENSOR E ER		3   3 0 2 9
SE   42C - 0   3 SS - 8   0 -   - 8	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI	RAIN SENSOR E ER SSEMBLY NGS	BRA7ETYTE	31 30 29 28 27
SE   42C - 0   3 SS - 8   0 - 1 - 8 TEMP - THERMOCOUPLER   SE   851 - 170	FISO FIBER OPTIC STE BLEED VALV THERMO COUPL BALL ALIGNMENT A	RAIN SENSOR E ER SSEMBLY NGS ITTING	BRAZETYTE	31 30 29 28 27
SE   42C - 0   3 SS - 8   0 - 1 - 8 TEMP - THERMOCOUPLER I SE   85   - 170 SE   4   - 204 SE   42C - 0   1	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMF	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW	BRAZETYTE BRAZETYTE BRAZETYTE	31 30 29 28 27 26 25
SE   42C - 0   3 SS - 8   0 - 1 - 8 TEMP - THE RMOCOUPLER   SE   85   - 170 SE   4   - 204 SE   42C - 0   1 SE   42A - 025 90FF - 4	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSY	BRAZETYTE	3   3 0 2 9 2 8 2 7 2 6 2 5 2 4 2 3
SEI42C-0I3         SS-8I0-I-8         TEMP-THERMOCOUPLERI         SEI85I-I70         SEI4I-204         SEI42C-0II         SEI42C-0II         SEI42A-025         90FF-4         I0FF-4         SEI22-009	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMF POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSYBLY	BRAZETYTE	3   3 0 2 9 2 8 2 7 2 6 2 5 2 4 2 3 2 2 2 1
SE   42C - 0   3 SS - 8   0 - 1 - 8 TEMP - THE RMOCOUPLER   SE   85   - 170 SE   4   - 204 SE   42C - 0   1 SE   42A - 025 90FF - 4 I 0FF - 4 SE   22 - 009 SE   42A - 248 SE   42A - 246 - 4 SE   42A - 246 - 3 SE   42A - 243	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMF POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" GROUN	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSYBLYTUBESTES (SIDE)PLATES (TOP)DWRAP	BRAZETYTE	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16
SE   42C - 0   3 SS - 8   0 - 1 - 8 TEMP - THE RMOCOUPLER I SE   85   - 170 SE   4   - 204 SE   42C - 0   1 SE   42A - 025 90FF - 4 I 0FF - 4 SE   22 - 009 SE   42A - 248 SE   42A - 248 SE   42A - 246 - 4 SE   42A - 246 - 3 SE   42A - 246 - 3 SE   42A - 244 - 4	FISO FIBER OPTIC STE BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAME POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" WINDING	RAIN SENSOREEERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSYBLYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYDING (BASE)	BRAZETYTE	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14
SE I 42C - 0 I 3 SS - 8 I 0 - I - 8 TEMP - THE RMOCOUPLER I SE I 85I - I 70 SE I 41 - 204 SE I 42C - 0 I I SE I 42A - 025 90FF - 4 I 0FF - 4 SE I 22 - 009 SE I 42A - 248 SE I 42A - 248 SE I 42A - 246 - 4 SE I 42A - 246 - 3 SE I 42A - 244 - 4 SE I 42A - 244 - 4 SE I 42A - 244 - 4 SE I 42A - 244 - 3 SE I 42A - 258	FISO FIBER OPTIC STE BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAME POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSYBLYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYING (BASE)ING (SEPTUM)TUBES	BRAZETYTE	31         30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142C-025         90FF-4         10FF-4         SE142A-010         SE142A-248         SE142A-246-4         SE142A-246-3         SE142A-246-3         SE142A-246-3         SE142A-244-4         SE142A-244-3         SE142A-244-3         SE142A-244-3         SE142A-258         SE142A-256-3	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE BCOOLING SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CHILL PL	RAIN SENSOREERSSEMBLYNGSITTINGASSEMBLYASSEMBLY4 ELBOW4 UNIONATION ASSY3LYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYING (BASE)ING (SEPTUM)TUBESATES (SIDE)LATES (TOP)	BRAZETYTE	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142A-025         90FF-4         10FF-4         SE142A-010         SE142A-248         SE142A-246-4         SE142A-246-3         SE142A-245-3         SE142A-245	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A COOLING SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSY3LYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYDING (BASE)ING (SEPTUM)TUBES_ATES (SIDE)LATES (TOP)NWRAPASSEMBLYDING SEPTUM)TUBESATES (SIDE)LATES (TOP)NDWRAPASSEMBLYDING SEPTUM)ASSEMBLYDING SEPTUM)TUBESATES (SIDE)LATES (TOP)NDWRAPASSEMBLY	BRAZETYTE	31         30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         11
SE I 42C - 0 I 3 SS - 8 I 0 - I - 8 TEMP - THE RMOCOUPLER I SE I 85 I - I 70 SE I 4 I - 204 SE I 42C - 0 I I SE I 42A - 0 25 90 F F - 4 I 0 F F - 4 SE I 22 - 009 SE I 42A - 248 SE I 42A - 248 SE I 42A - 246 - 4 SE I 42A - 246 - 3 SE I 42A - 246 - 3 SE I 42A - 241 SE I 42A - 244 - 4 SE I 42A - 244 - 4 SE I 42A - 244 - 4 SE I 42A - 258 SE I 42A - 256 - 4 SE I 42A - 256 - 3 SE I 42A - 253	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMF POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CLADD SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL	RAIN SENSOREERSSEMBLYNGSITTINGDASSEMBLY4 ELBOW4 UNIONATION ASSY3LYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYDING (BASE)ING (SEPTUM)TUBESATES (TOP)NDWRAPASSEMBLYING (SEPTUM)TUBESASSEMBLYING (SEPTUM)ING (SEPTUM)ING (SEPTUM)ING (SEPTUM)ING (SEPTUM)ING (SEPTUM)ING (SEPTUM)	BRAZETYTE	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9
$\begin{array}{c} SE   42C - 0   3 \\ SS - 8   0 - 1 - 8 \\ \hline TEMP - THE RMOCOUPLER   \\ SE   85   - 170 \\ \hline SE   41 - 204 \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CLADD SIDE A LOWER CHILL PLA	RAIN SENSOREERSSEMBLYNGSITTINGASSEMBLY4 ELBOW4 UNIONATION ASSY3LYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYING (BASE)ING (SEPTUM)TUBESATES (TOP)NDWRAPASSEMBLYING (BASE)ING (BASE)ING (SEPTUM)SEMBLYDING (BASE)ING (SEPTUM)SSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLYASSEMBLY	BRAZETYTE	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 C 5 4 3 7 6 5 4 3
SE   42C - 0   3         SS - 8   0 - 1 - 8         TEMP - THE RMOCOUPLER I         SE   85   - 170         SE   42C - 0   1         SE   42A - 0   5         90 F F - 4         10 F F - 4         SE   42A - 2 48         SE   42A - 2 46 - 4         SE   42A - 2 46 - 3         SE   42A - 2 46 - 3         SE   42A - 2 44 - 4         SE   42A - 2 44 - 4         SE   42A - 2 44 - 3         SE   42A - 2 58         SE   42A - 2 56 - 3         SE   42A - 2 56 - 3         SE   42A - 2 56 - 3         SE   42A - 2 54 - 4         SE   42A - 2 54 - 3         SE   42A - 2 54 - 3         SE   42A - 2 54 - 3         SE   42A - 0 80         SE   42C - 0 50	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" UPPER CHILL SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CHILL PI SIDE A LOWER CHILL PI SIDE A UPPER CHILL PI SIDE A LOWER CLADD SIDE A LOWER CLADD SIDE A UPPER CLADD	RAIN SENSOREERSSEMBLYNGSITTINGASSEMBLY4 ELBOW4 UNIONATION ASSY3LYTUBESTES (SIDE)PLATES (TOP)DWRAPASSEMBLYDING (BASE)ING (SEPTUM)TUBESATES (SIDE)LATES (TOP)DNG (BASE)ING (SEPTUM)TUBESATES (SIDE)LATES (TOP)NDWRAPASSEMBLYDING (BASE)ING (SEPTUM)SEMBLYASSEMBLYDING (BASE)ING (SEPTUM)SSEMBLYASSEMBLYZ)SSEMBLY TYPE-A	BRAZETYTE	31         30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         11         10         9         8         7         6         5         4
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE141-204         SE142C-011         SE142C-025         90FF-4         10FF-4         SE142A-025         90FF-4         SE142A-046         SE142A-246-4         SE142A-246-4         SE142A-246-3         SE142A-244-4         SE142A-244-4         SE142A-244-3         SE142A-244-3         SE142A-244-4         SE142A-244-3         SE142A-256-4         SE142A-256-3         SE142A-256-3         SE142A-256-3         SE142A-256-3         SE142A-254-3         SE142A-101         -1	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR 1/ TRULY TUBULAR 1/ TRULY TUBULAR 1/ WINDING FORM INSULA CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" LOWER CLADD SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL	RAIN SENSOR E E ER SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NDWRAP ASSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY T 2) SSEMBLY TYPE-A ASM	B R A Z E T Y T E B R A Z E T Y T E B R A Z E T Y T E	31         30         29         28         27         26         27         26         27         26         27         26         27         26         27         26         27         26         27         28         27         26         27         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         0         7         6         5         4         3         2         1         0         10         7         6 <td< td=""></td<>
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142C-025         90FF-4         10FF-4         SE122-009         SE142A-246-4         SE142A-246-4         SE142A-246-3         SE142A-246-3         SE142A-246-3         SE142A-244-4         SE142A-244-3         SE142A-244-3         SE142A-244-3         SE142A-258         SE142A-256-3         SE142A-256-3         SE142A-256-3         SE142A-256-3         SE142A-254-4         SE142A-254-3         SE142A-254-3         SE142A-254-1	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSUL/ CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CLADD SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL	RAIN SENSOR E E ER SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NDWRAP ASSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY T 2) SSEMBLY TYPE-A ASM	BRAZETYTE BRAZETYTE	31         30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142C-025         90FF-4         10FF-4         SE142A-010         SE142A-246         SE142A-246-3         SE142A-246-3         SE142A-244-4         SE142A-244-4         SE142A-244-3         SE142A-258         SE142A-256-4         SE142A-256-3         SE142A-256-3         SE142A-254-4         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-254-1         SE142A-254-3         SE142A-254-3         SE142A-254-1         SE142A-254-3         SE142A-254-3	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSUL/ CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CLADD SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL	RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NDWRAP ASSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY TYPE-A ASM REMON	BRAZETYTE BRAZETYTE	31         30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3     <
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142C-025         90FF-4         10FF-4         SE142A-010         SE142A-246         SE142A-246-3         SE142A-246-3         SE142A-244-4         SE142A-244-4         SE142A-244-3         SE142A-258         SE142A-256-4         SE142A-256-3         SE142A-256-3         SE142A-254-4         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-254-1         SE142A-254-3         SE142A-254-3         SE142A-254-1         SE142A-254-3         SE142A-254-3	FISO FIBER OPTIC STR BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAMP POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSUL/ CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" WINDING SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CLADD SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL SIDE SIDE A UPPER CHILL PL SIDE A UPPER CHILL PL	RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NDWRAP ASSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY TYPE-A ASM REMON	BRAZETYTE BRAZETYTE	31         30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5
SE 1 42C - 0 1 3 SS - 8 10 - 1 - 8 TEMP - THE RMOCOUPLER I SE 1 85 1 - 1 70 SE 1 4 1 - 20 4 SE 1 4 2 C - 0 1 1 SE 1 4 2 A - 0 2 5 90 FF - 4 10 FF - 4 SE 1 2 2 - 0 0 9 SE 1 4 2 A - 2 4 8 SE 1 4 2 A - 2 4 8 SE 1 4 2 A - 2 4 6 - 3 SE 1 4 2 A - 2 4 6 - 3 SE 1 4 2 A - 2 4 4 - 4 SE 1 4 2 A - 2 4 4 - 4 SE 1 4 2 A - 2 4 4 - 4 SE 1 4 2 A - 2 5 6 - 4 SE 1 4 2 A - 2 5 6 - 4 SE 1 4 2 A - 2 5 6 - 3 SE 1 4 2 A - 2 5 6 - 3 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 4 SE 1 4 2 A - 2 5 4 - 3 SE 1 4 2 A - 2 5 4 - 3 SE 1 4 2 A - 0 8 0 SE 1 4 1 - 1 0 1 - 1 PART OR IDENTIFYING NO	FISO FIBER OPTIC STE BLEED VALV THERMO COUPL BALL ALIGNMENT A FLANGE BUSHI TRULY TUBULAR F TUBE CLAME POL BR CONNECTOR TRULY TUBULAR I/ TRULY TUBULAR I/ WINDING FORM INSUL/ CLAMP ASSEME SIDE B COOLING SIDE "B" CHILL PLA SIDE "B" UPPER CHILL SIDE "B" UPPER CHILL SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE "B" UPPER CLADD SIDE A LOWER CLAD SIDE A LOWER CHILL PL SIDE A LOWER CHILL PL SIDE A UPPER CHILL PL SIDE A LOWER CHILL PL SIDE A LOWER CHILL PL SIDE A LOWER CLADD SIDE TA" WINDINGS SIDE "A" UPPER CLADD TYPE "A" TERMINAL STUDS (SEE SH MOD COIL WINDING FORM AS MCWF-TYPE A	RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NDWRAP ASSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY ASSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY TYPE-A ASM RE ION MATER	BRAZETYTE BRAZETYTE BRAZETYTE BRAZETYTE IAL SPECIFICATION L I S T	31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 10 9 8 7 6 5 4 3 2 1 1 1 10 9 8 7 6 5 4 3 2 1 1 1 1 1 1 1 1 1 1 1 1 1
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142C-011         SE142A-025         90FF-4         10FF-4         SE142A-010         SE142A-248         SE142A-246-4         SE142A-246-3         SE142A-244-4         SE142A-244-3         SE142A-244-3         SE142A-244-3         SE142A-256-4         SE142A-256-3         SE142A-256-3         SE142A-256-3         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-080         SE142A-101         -1         PART OR	FISO FIBER OPTIC STF         BLEED VALV         THERMO COUPL         BALL ALIGNMENT A         FLANGE BUSHI         TRULY TUBULAR F         TUBE CLAMF         POL BR CONNECTOR         TRULY TUBULAR I/         TRULY TUBULAR I/         TRULY TUBULAR I/         WINDING FORM INSUL/         CLAMP ASSEME         SIDE "B" CHILL PLA         SIDE "B" CHILL PLA         SIDE "B" UPPER CHILL         SIDE "B" UPPER CLADD         SIDE "B" UPPER CLADD         SIDE "B" UPPER CLADD         SIDE A LOWER CHILL PL         SIDE A LOWER CHILL PL         SIDE A LOWER CHILL PL         SIDE A LOWER CLADD         SIDE A UPPER CHILL PL         SIDE A LOWER CLADD         SIDE A UPPER CLADD	RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NOWRAP ASSEMBLY ING (BASE) ING (BASE) ING (BASE) ING (BASE) ING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY ASSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY A	Dak Ridge National Laborat monged for the DEPARTMENT OF EMERGY units LIST	3   3 0 2 9 2 8 2 7 2 6 2 5 2 4 2 3 2 2 2 1 2 0 1 9 1 8 1 7 1 6 1 5 1 4 1 3 1 2 1 1 1 0 9 8 7 6 5 4 3 2 1 1 1 1 0 9 8 7 6 5 4 3 2 1 1 1 1 1 1 1 1 1 1 1 1 1
SE142C - 013         SS - 810 - 1 - 8         TEMP - THE RMOCOUPLERI         SE1851 - 170         SE141 - 204         SE142C - 011         SE142C - 011         SE142A - 025         90FF - 4         10FF - 4         SE142A - 010         SE142A - 246 - 4         SE142A - 246 - 3         SE142A - 246 - 3         SE142A - 246 - 3         SE142A - 244 - 4         SE142A - 244 - 4         SE142A - 244 - 3         SE142A - 256 - 4         SE142A - 256 - 3         SE142A - 256 - 3         SE142A - 256 - 3         SE142A - 254 - 4         SE142A - 254 - 3         SE142A - 050         SE142A - 050         SE141 - 101         -1         PART OR         IDENTIFYING NO         SE141 - 101         -1         PART OR         IDENTIFYING NO         SE141 - 101         -1         FRACTIONS	FISO FIBER OPTIC STF         BLEED VALV         THERMO COUPL         BALL ALIGNMENT A         FLANGE BUSHI         TRULY TUBULAR F         TUBE CLAMF         POL BR CONNECTOR         TRULY TUBULAR I/         TRULY TUBULAR I/         WINDING FORM INSUL/         CLAMP ASSEME         SIDE B COOLING         SIDE B'' CHILL PLA         SIDE B'' UPPER CLADD         SIDE B'' UPPER CLADD         SIDE A LOWER CLADD         SIDE A LOWER CHILL PL         SIDE A UPPER CHILL PL         SIDE A UPPER CLADD         SIDE A'' UPPER CLADD         TYPE ''A'' TERMINAL         STUDS (SEE SH         MOD COIL WINDING FORM AS         MOD COIL WINDING FORM AS<	RAIN SENSOR E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES .ATES (SIDE) LATES (TOP) VDWRAP ASSEMBLY ING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY ING (SEPTUM) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY T 2) SSEMBLY T 2) SSEMBLY ASSEMBLY ASSEMBLY ASSEMBLY PARTS	Dak Ridge National Laborat BRAZETYTE BRAZE	3           30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         I         NO         B          Market          NO          NO          NO          NO          NO          NO          NO         NO          NO
SE I 42C - 0 I 3         SS - 8 I 0 - I - 8         TEMP - THE RMOCOUPLERI         SE I 851 - I 70         SE I 41 - 204         SE I 42C - 0 I I         SE I 42A - 0 25         90FF - 4         I 0FF - 4         SE I 42A - 0 10         SE I 42A - 246 - 4         SE I 42A - 246 - 4         SE I 42A - 246 - 3         SE I 42A - 244 - 4         SE I 42A - 244 - 4         SE I 42A - 244 - 4         SE I 42A - 256 - 3         SE I 42A - 256 - 3         SE I 42A - 254 - 3         SE I 42A - 080         SE I 42A - 080         SE I 42C - 050         SE I 42A - 080         SE I 41 - 121         SE I 41 - 121         SE I 41 - 121         SE I 41 - 101         - 1         PART OR         IDENTIFYING NO	FISO FIBER OPTIC STF         BLEED VALV         THERMO COUPL         BALL ALIGNMENT A         FLANGE BUSHI         TRULY TUBULAR F         TUBE CLAMF         POL BR CONNECTOR         TRULY TUBULAR I/         WINDING FORM INSUL/         CLAMP ASSEME         SIDE B COOLING         SIDE B COOLING         SIDE B' CHILL PLA         SIDE B' CHILL PLA         SIDE B' CHILL PLA         SIDE B' CHILL PLA         SIDE B' COLING         SIDE B' UPPER CLADD         SIDE B' UPPER CLADD         SIDE A LOWER CLADD         SIDE A LOWER CHILL PL         SIDE A LOWER CHILL PL         SIDE A LOWER CLADD         SIDE A' UPPER CLADD         SIDE A'' UPPER CLADD         SIDE A'' UPPER CLADD         SIDE A'' LOWER CLADD         SIDE A'' UPPER CLADD         MOD COIL WINDING FORM AS <t< td=""><td>RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) VDWRAP ASSEMBLY ASSEMBLY ING (BASE) ING (BASE) ING (BASE) ING (BASE) ING (SEPTUM) SSEMBLY ASSEM</td><td>Dak Ridge National Laborat managed for the DEPARTMENT OF EMERGY un S. GOVERNMENT contract DE ACOS-000R JT-BATTELLE, LLC. Oak Ridge, Tenne</td><td>3           30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         7         6</td></t<>	RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) VDWRAP ASSEMBLY ASSEMBLY ING (BASE) ING (BASE) ING (BASE) ING (BASE) ING (SEPTUM) SSEMBLY ASSEM	Dak Ridge National Laborat managed for the DEPARTMENT OF EMERGY un S. GOVERNMENT contract DE ACOS-000R JT-BATTELLE, LLC. Oak Ridge, Tenne	3           30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         1         10         9         8         7         7         6
SEI42C-013         SS-810-1-8         TEMP-THERMOCOUPLERI         SE1851-170         SE141-204         SE142C-011         SE142C-025         90FF-4         10FF-4         SE142A-010         SE142A-248         SE142A-246-3         SE142A-246-3         SE142A-244-3         SE142A-244-3         SE142A-244-3         SE142A-244-3         SE142A-258         SE142A-256-3         SE142A-256-4         SE142A-256-3         SE142A-254-4         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-254-4         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-254-3         SE142A-030         SE142A-050         SE142A-050         SE142A-050         SE142A-050         SE142A-254-3         SE142A-050         SE142A-050         SE142A-050         SE142A-050         SE142A-050         SE142A-050         SE142A-050         SE142A-050         <	FISO FIBER OPTIC STR         BLEED VALV         THERMO COUPL         BALL ALIGNMENT A         FLANGE BUSHI         TRULY TUBULAR F         TUBE CLAMF         POL BR CONNECTOR         TRULY TUBULAR I/         WINDING FORM INSULA         CLAMP ASSEME         SIDE B COOLING         SIDE "B" CHILL PLA         SIDE "B" UPPER CHILL         SIDE "B" UPPER CHILL         SIDE "B" UPPER CLADD         SIDE "B" UPPER CLADD         SIDE "B" UPPER CLADD         SIDE A LOWER CHILL PL         SIDE A UPPER CLADD         SIDE A UPPE	RAIN SENSOR E E E R SSEMBLY NGS ITTING ASSEMBLY 4 ELBOW 4 UNION ATION ASSY 3LY TUBES TES (SIDE) PLATES (TOP) DWRAP ASSEMBLY DING (BASE) ING (SEPTUM) TUBES ATES (SIDE) LATES (TOP) NDWRAP ASSEMBLY DING (BASE) ING (SEPTUM) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY T 2) SSEMBLY ASSEMBLY T 2) SSEMBLY T 2) SSEMBLY T 2) SSEMBLY ASSEMBLY T 2) SSEMBLY ASSEMBLY T 2) SSEMBLY ASSEMBLY T 2) SSEMBLY ASSEMBLY T 2) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY ASSEMBLY T 2) SSEMBLY T 2) SSEMBLY T 2) SSEMBLY ASSEMBLY ASSEMBLY T 2) SSEMBLY T 2) SSEMBLY ASSEM	Dak Ridge National Laborat monged for the Contract Department of ENERGY und AL SPECIFICATION LIST NAL SPECIFICATION TYPE "A"	3           30         29         28         27         26         25         24         23         22         21         20         19         18         17         16         15         14         13         12         10         9         8         7         6         5         4         3         2         1         10         9         8         7         6         5         4         3         2         I         NO         B          Market          NO          NO          NO          NO          NO          NO          NO         NO          NO

	2	NEXT ASS'Y:	1 Final ass'y:		
2. INTERPRET DI 3. DIMENSIONS A 4. DIMENSIONS A 5. LEADS AREA	APPLY AT ROOM TEMP Shall be covered	RANCES PER ANSI Y ERATURE. OPERATIN <sup>G</sup> OR SPRAYED WITH A	I4.5M G TEMP 80 K. N INSULATING	F	4
MATERIAL TO DURING OPERA	PREVENT DEBRIS FR ATION.	om causing an ele	CTRICAL SHORT		
	LANKET INSULATION NG SEI22-009 FOR I		NOT SHOWN.		
	REVISION OF PROCE IONAL REQUIREMENTS		0	G	3
REQUIREMEN Weld inspe	ALL BE PERFORMED I NTS OF PPPL PROCED ECTION SHALL BE PE ACCEPTANCE CRITERI	URE NO. ENG-037. RFORMED IN ACCORD	VISUAL		
9 VENDOR INFO		LY TUBULAR FITTIN Box 1160	G CORP		
		VERNON, NY 10550 4-664-8686 OR WWW	.TRULYTUBULAR.COM		
IO VENDOR INFO	50 QU	FIBER OPTICS OST. JEAN BAPTIS EBEC QC, G2E 5R C 8-688-8065 OR WWW	ANADA	F	=
II VENDOR INFO	ONE	ENGINEERING CORP OMEGA DRIVE			
		AMFORD, CT 06907 0-848-4286 OR WW'	W.OMEGA.COM		
ACTUAL PARI	IN THIS ASSEMBLY TS/ASSEMBLIES. PAR TS. FOR FULL MODEL	T IDENTIFICATION	NUMBERS REFER TO		
I 3 TYPE "A" CO	OIL: REMOVE NOTED Blankets are asse		AND INSULATION	E	Ξ
		MDLED (FVSI VFI).			
- 3 4 - 3 3 SE   4 2 C - 0   4	WASHER 3/8 - IGUNC HE LINED INSULATING		SS 316L SS 316L	33	
SE142C-014 SE142C-015 SE142C-013	3"X8"XI2" FLUX L FISO FIBER OPTIC STR	OOP BOX		32	
SS-810-1-8 TEMP-THERMOCOUPLERI	BLEED VALV THERMO COUPL	E		30	
SE   85   -   70 SE   4   - 204	BALL ALIGNMENT A FLANGE BUSHI	SSEMBLY		28 27	<b>`</b>
SE   42C - 0	TRULY TUBULAR F TUBE CLAMF		BRAZETYTE	26 25	J
SEI42A-025 90FF-4 I0FF-4	POL BR CONNECTOR TRULY TUBULAR 1/	4 ELBOW	BRAZETYTE BRAZETYTE	24 23 22	
SE   22 - 009 SE   42A - 010	TRULY TUBULAR 17 WINDING FORM INSUL7 CLAMP ASSEME	ATION ASSY	DRAZEITIE	21	
SE 1 4 2 A - 2 4 8 SE 1 4 2 A - 2 4 6 - 4	SIDE B COOLING			19	
SEI42A-246-3 SEI42A-243	SIDE "B" UPPER CHILL SIDE "B" GROUN	PLATES (TOP)		7	
SEI42A-24I SEI42A-244-4	SIDE "B" WINDING SIDE "B" LOWER CLAD	ASSEMBLY DING (BASE)		5	
SE   42A - 244 - 3 SE   42A - 258	SIDE "B" UPPER CLADD SIDE A COOLING	ING (SEPTUM) TUBES		3   2   2	
SEI 42A - 256 - 4 SEI 42A - 256 - 3	SIDE A LOWER CHILL PL SIDE A UPPER CHILL P	LATES (TOP)			
SEI42A-253 SEI42A-251	SIDE-A WP GROUN SIDE "A" WINDINGS	ASSEMBLY		9 8 7	
SE   42A - 254 - 4 SE   42A - 254 - 3 SE   42A - 080	SIDE "A" LOWER CLADI SIDE "A" UPPER CLADD TYPE "A" LEADS A	ING (SEPTUM)		6	
SE   42C - 050 SE   4   -   2	TYPE "A" TERMINAL STUDS (SEE SH	ASSEMBLY		4	
SE   4   -   0   -	MOD COIL WINDING FORM AS MCWF-TYPE A				
PART OR IDENTIFYING NO				FIND	ン  す
NFYT	NOMENCLATU OR DESCRIPT			NO	
NEXT ASSEMBLY					2
					2
					<b>О</b>
ASSEMBLY		PARTS	LIST		<b>О</b>
	OR DESCRIPT	PARTS	LIST Oak Ridge National Labora managed for the DEPARTMENT OF ENERGY u U.S. GOVERNMENT contract DE-ACO5-000 UT-BATTELLE, LLC. Oak Ridge, Tenn	NO Lu MO Lu MO B B B B B B B B B B B B B B B B B B	2
ASSEMBLY SCALE NOTED UNLESS OTHERWISE SPECIFIED FRACTIONS XX DECIMALS ±.01	DES D WILLIAMSON 07-06 DRW G LOVETT 07-06 CHK M COLE 08-06 SECT : : PE D WILLIAMSON 8-06	PARTS UT-BATTELLE NATIONAL COMPACT	LIST Oak Ridge National Labora managed for the DEPARTMENT OF ENERGY u U.S. GOVERNMENT contract DE-AC05-000 UT-BATTELLE, LLC. Oak Ridge, Tenn	NO Lu MO Lu MO B B B B B B B B B B B B B B B B B B	ر ۲
ASSEMBLY SCALE NOTED UNLESS OTHERWISE SPECIFIED FRACTIONS XX DECIMALS ±.005 ANGLES ±0°157 BREAK SHARP EDGES .06 MAX FINISH 125 UNLESS	DES       D       WILLIAMSON       07-06         DRW       G       LOVETT       07-06         DRW       G       LOVETT       07-06         CHK       M       COLE       08-06         SECT       :       :       :         PE       D       WILLIAMSON       8-06         CR       :       :       :         PJ       :       :       :         REQ       :       :       :	PARTS PARTS UT-BATTELLE NATIONAL COMPACT MCWF FULL C	LIST Oak Ridge National Labora managed for the DEPARTMENT OF ENERGY u U.S. GOVERNMENT contract DE-ACO5-000 UT-BATTELLE, LLC. Oak Ridge, Tenn PROJECT NAME STELLARATOR EXPERIME TYPE "A" OIL ASSEMBLY	NO Lu MO B B B tory Inder R22725 ressee NT A	ر ۲
ASSEMBLY SCALE NOTED UNLESS OTHERWISE SPECIFIED FRACTIONS XX DECIMALS ±.005 ANGLES ±0°157	DES       D       WILLIAMSON       07-06         DRW       G       LOVETT       07-06         DRW       G       LOVETT       07-06         CHK       M       COLE       08-06         SECT       :       :       :         PE       D       WILLIAMSON       8-06         CR       :       :       :         PJ       :       :       :         REQ       :       :       :	PARTS PARTS UT-BATTELLE NATIONAL COMPACT MCWF FULL C	LIST Oak Ridge National Labora managed for the DEPARTMENT OF ENERGY u U.S. GOVERNMENT contract DE-ACO5-000 UT-BATTELLE, LLC. Oak Ridge, Tenn PROJECT NAME STELLARATOR EXPERIME TYPE "A"	NO Lu MO B B B tory Inder R22725 Inessee NT A	ر ۲



NEXT ASS'Y:	1 <sub>FINAL ASSY:</sub>
(SIDE "B") Ations 28 and 43	
28	
I 3 REMOVE STUDS BETWEEN HOLE LOC	S (SIDE "B") ATIONS 56 AND 89

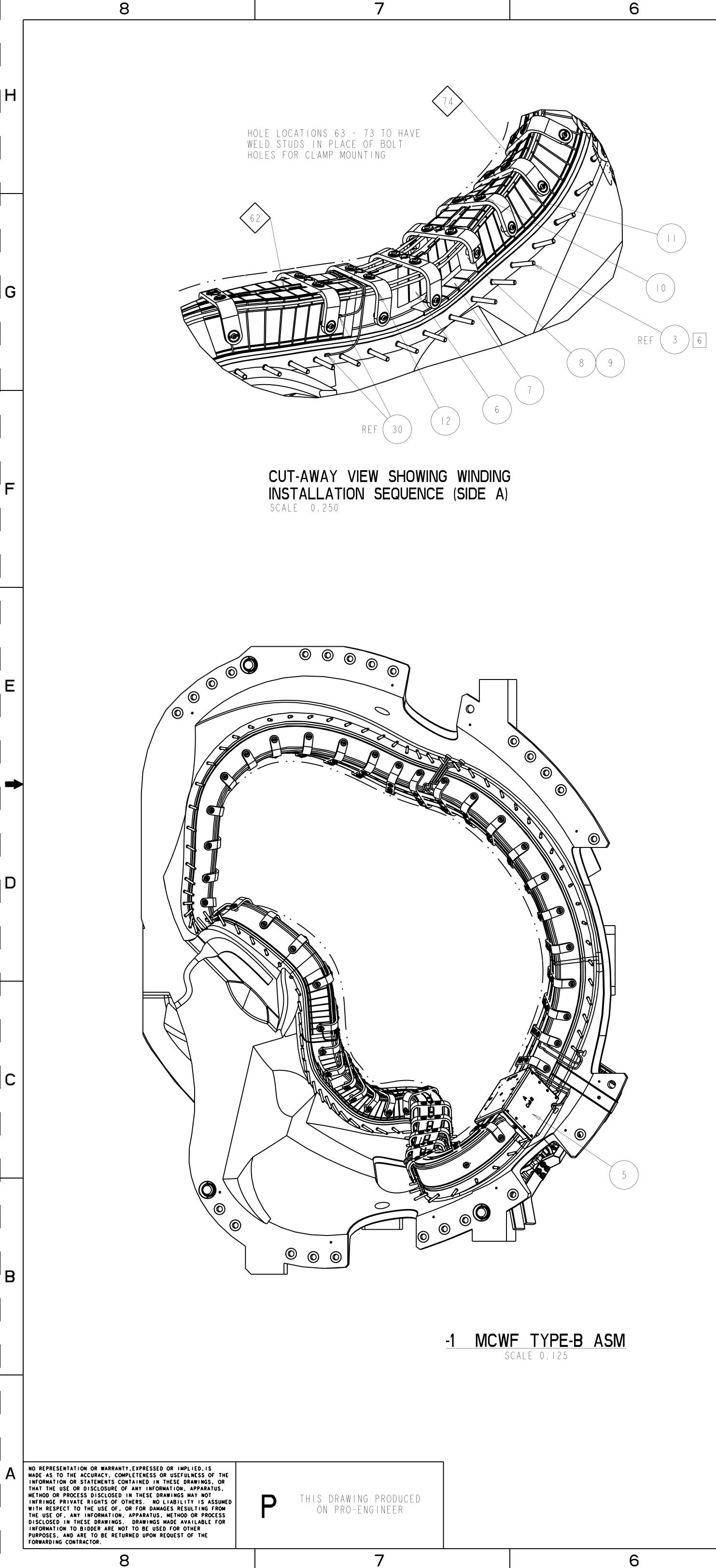
UT-BATTELLE Oak Ridge National Laboratory managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-000R22725 UT-BATTELLE, LLC. Oak Ridge, Tennessee NATIONAL COMPACT STELLARATOR EXPERIMENT MCWF TYPE "A"

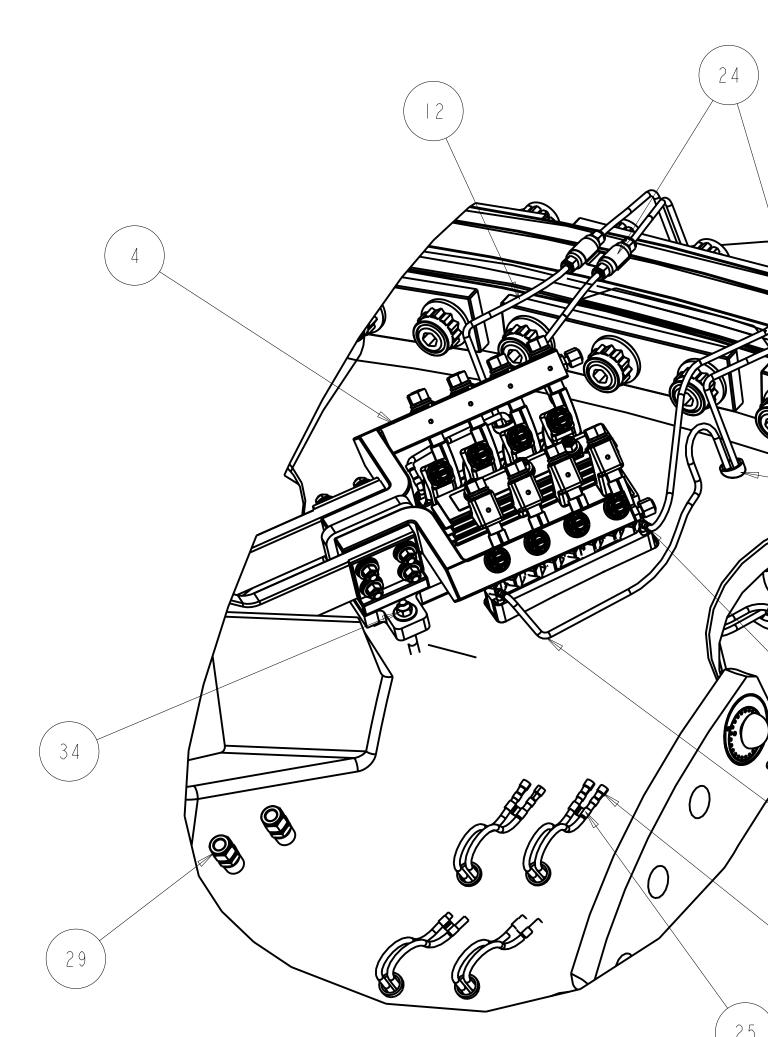
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SE 140

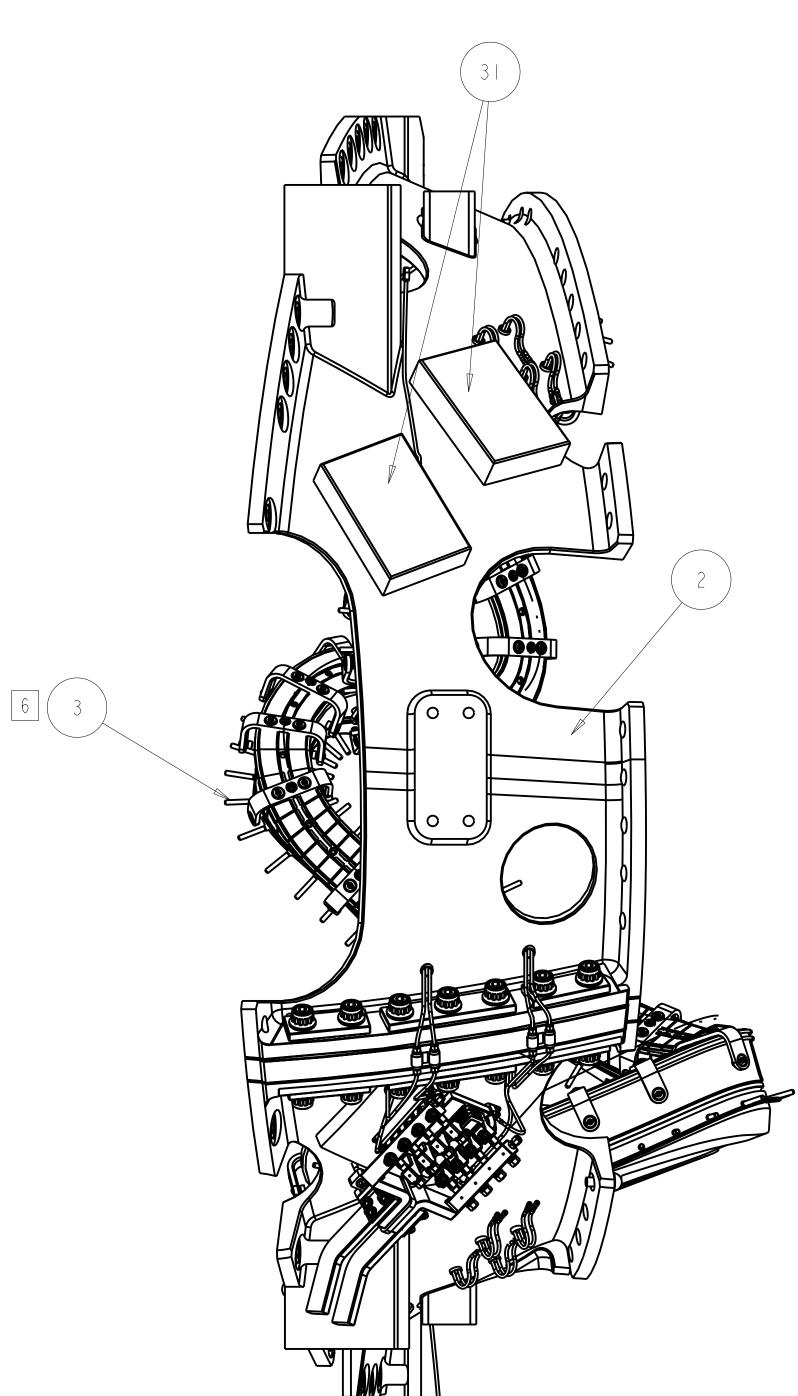
B

ł	FULL C	OIL AS	SSEM	BLY			
VERSION NO.	PLANT	BLDG	FL	SHT	OF	TYPE	CLASS
48	X - I O	5700	3	2	2	S	U
RELEASE LEV	/EL	сгі	10	1.0			REV
WIP		SEI	40	-   (			0
			1				





# TUBING AT POLOIDAL BREA SCALE 0.250

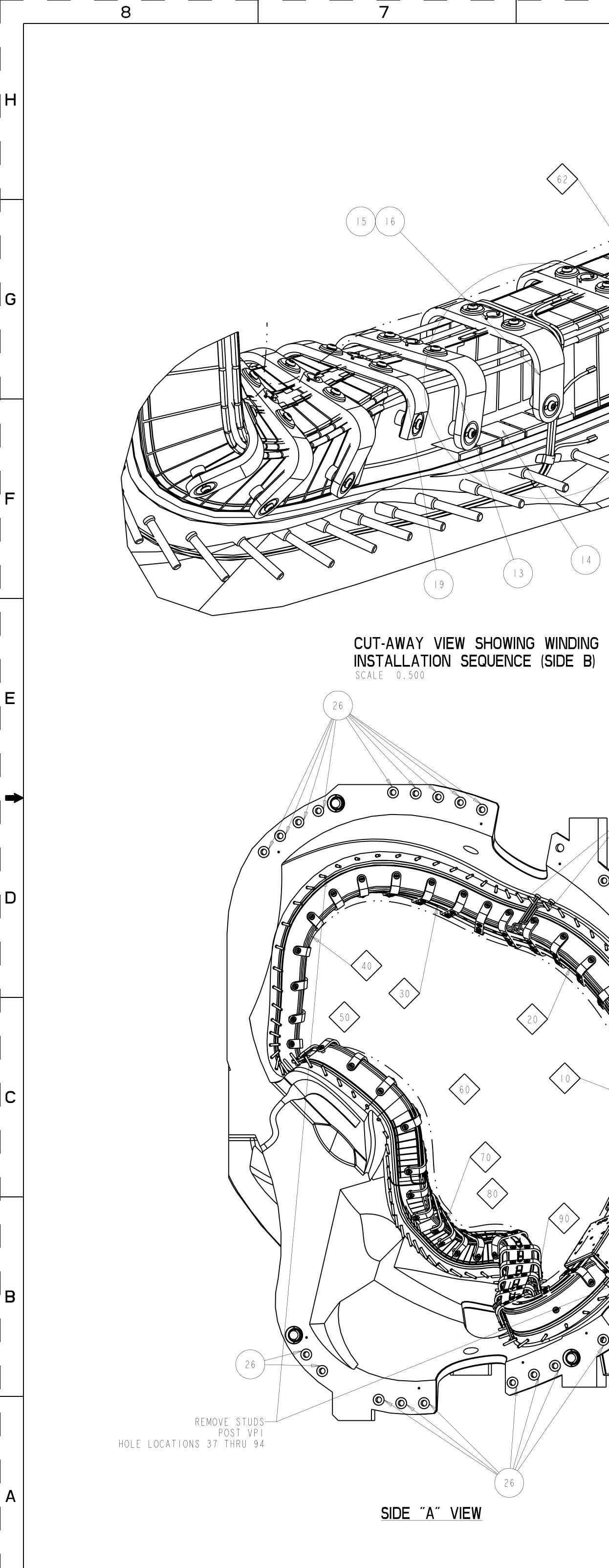


ORIGINAL ISSUE DESCRIPTION REVISION OR ISSUE PURPOSE

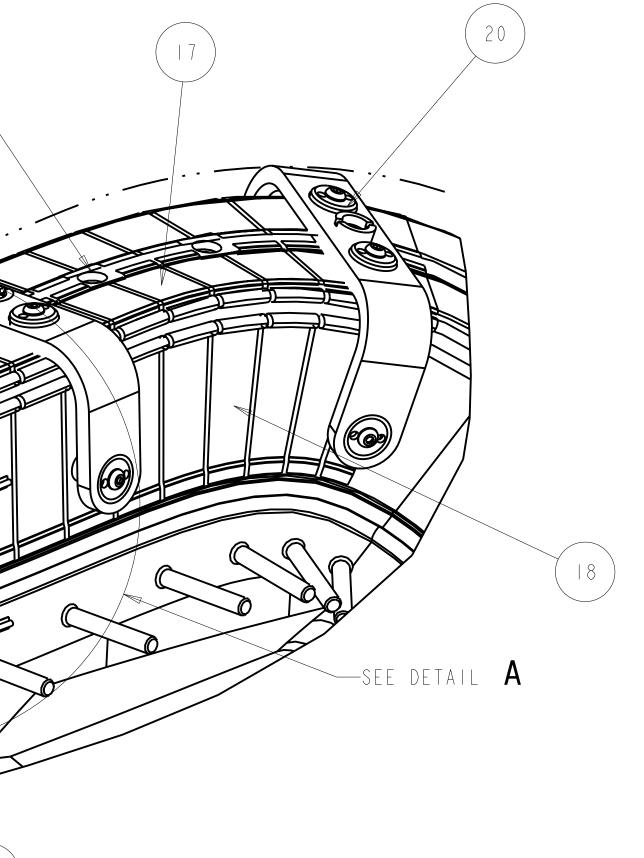
3	2
	NOTES: I. DRAWING PREPARED IN ACCORDANCI
	2. INTERPRET DIMENSIONS AND TOLE
	3. DIMENSIONS ARE IN INCHES
	4. DIMENSIONS APPLY AT ROOM TEMPI
	5. LEADS AREA SHALL BE COVERED MATERIAL TO PREVENT DEBRIS FRO DURING OPERATION.
	6. OPTIONAL BLANKET INSULATION SEE DRAWING SEI22-009 FOR II
32	7. SEE LATEST REVISION OF PROCE FOR ADDITIONAL REQUIREMENTS
	8. WELDING SHALL BE PERFORMED I REQUIREMENTS OF PPPL PROCED WELD INSPECTION SHALL BE PEI WITH THE ACCEPTANCE CRITERI,
	9 VENDOR INFORMATION: TRU PO E MT ' 91-
	IO VENDOR INFORMATION: FISO 50 Qui 413
<u>EAK</u>	II VENDOR INFORMATION: OMEGA ONE ST, 801

3		2	NEXT ASS'Y: FINAL ASS'Y:	
	NOTES: I. DRAWING	PREPARED IN ACCORDANCE WITH	ASME YI4.100-2000.	
	2. INTERPR	ET DIMENSIONS AND TOLERANCES	PER ANSI YI4.5M	Н
		ONS ARE IN INCHES		
		ONS APPLY AT ROOM TEMPERATURE AREA SHALL BE COVERED OR SPRA		
	MATERIA	L TO PREVENT DEBRIS FROM CAUS OPERATION.		
		IAL BLANKET INSULATION ASSEMBL RAWING SEI22-009 FOR INSTALLA		
		TEST REVISION OF PROCEDURE D- DDITIONAL REQUIREMENTS.	- NCSX - MCF - 001	G
	REQUI WELD	IG SHALL BE PERFORMED IN ACCOP REMENTS OF PPPL PROCEDURE NO. INSPECTION SHALL BE PERFORMED THE ACCEPTANCE CRITERIA OF AW	ENG-037. VISUAL IN ACCORDANCE	
	9 VENDOR	INFORMATION: TRULY TUBU PO BOX 116	JLAR FITTING CORP 0	
		MT VERNON,		
	IO VENDOF	QUEBEC QC	OPTICS EAN BAPTISTE AVE SUITE 195 , G2E 5R CANADA 065 OR WWW.FISO.COM	F
	II VENDOF			
	ACTUAL	PARTS IN THIS ASSEMBLY ARE GRA PARTS/ASSEMBLIES. PART IDENT PARTS. FOR FULL MODELED ASSE	APHIC REPRESENTATIONS OF IFICATION NUMBERS REFER TO	
	I3 TYPE '	B" COIL: REMOVE NOTED STUDS A BLANKETS ARE ASSEMBLED (		E
4 AR	3/8 - 16 UNC SE 142B - 030 SE 142C - 014	HEX NUT WIRE CLAMP INSULATING SLEEVE		34 33 32 ◀ ■
2	SE   42C - 0   5 FOS - N - BA - C   - F   - M2 - R 3 -			31
	SS-810-1-8 NCSX-PRL-003 SE1851-170	BLEED VALVE THERMOCOUPLE BALL ALIGNMENT ASSEMBLY	INCONEL 718 2	<u>29</u> 28 27
I 3 A R	SE   4   - 20 4 SE   42C - 0   1	FLANGE BUSHINGS TUBE CLAMP	2 2 2	26 <b>D</b>
2	SE I 42B - 020 5FF - 5 - 4	POL BR CONNECTOR ASSEMBLY 1/4" X 5/16" REDUCER UNION		<u>2</u> 4 <u>2</u> 3
9 2	90FF-4 10FF-4	I/4" ELBOW		22
AR		CLAMP ASSEMBLY SIDE "B" COOLING TUBES	2	20
	SEI42A-246-4 SEI42A-246-3	SIDE "B" CHILL PLATES (SIDE) SIDE "B" UPPER CHILL PLATES (TOP)		8
A R		SIDE "B" GROUNDWRAP SIDE "B" WINDING ASSEMBLY		6
	SE   42A - 244 - 4 SE   42B - 244 - 3	SIDE "B" LOWER CLADDING (BASE) SIDE "B" UPPER CLADDING (SEPTUM)		4 3 <b>C</b>
A R	SE   42B - 258 SE   42B - 256 - 4	SIDE A COOLING TUBES SIDE A LOWER CHILL PLATES (SIDE)		2
I A R	SE   42B - 256 - 3 SE   42B - 253	SIDE A UPPER CHILL PLATES (TOP) SIDE-A WP GROUNDWRAP		9
	SE   42B - 25   SE   42B - 254 - 4	SIDE "A" WINDINGS ASSEMBLY SIDE "A" LOWER CLADDING (BASE)		8 7
	SE   42B - 254 - 3 SE   42B - 080	SIDE"A"UPPERCLADDING(SEPTUM)TYPE"B"LEADSASSEMBLY		6 5
6	SEI42B-050           SEI42B-STUDS	TYPE "B" TERMINAL ASSEMBLY STUDS		4 <b>~ ~ ~ ~ 0</b>
A R	SE   4   -   0 2 -	MOD COIL WINDING FORM ASSEMBLY TYPE-B MCWF-TYPE "B" ASM		2 1
<b>-</b> 40 - 003	CAGE PART OR CODE IDENTIFYING NO NEXT	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION N	00 01 01 01 01
SE L	ASSEMBLY		PARTS LIST	
	SCALE NOTE		Oak Ridge National Laborator managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC05-000R227 UT-BATTELLE LLC Oak Ridge Tennesse	y 25
	UNLESS OTHERWISI SPECIFIED FRACTIONS	DEPT NATIONA	UT-BATTELLE, LLC. Ook Ridge, Tennesse PROJECT NAME STELLARATOR EXPERIMENT	
	XXX DECIMALS	±.01 PE D WILLIAMSON 11/06 =.005 CR : : 0°15′ PJ : :	MCWF TYPE "B" FULL COIL ASSEMBLY	A
	BREAK SHARP EDGES . 06 FINISH . 125 UNLESS OTHERWISE SPE	MAX REQ : : PPPL DRFT J SIEGLE 11/06 VERSION NO.	PLANT BLDG FL SHT OF TYPE CI	LASS
ORNL DOE DATE		RELEASE       DRAWING APPROVALS     DATE		D REV O
2		2	1	

												I	<u> </u>	<b>-</b>				W I I	^ ^ ^		11/06	—
													SCAL	_E N(	DTED	DES			<u>LIAMS</u>			
															c	DRW	G	LOV	/ETT		11/06	
													UNL	TOLERANCE	WISE	СНК	Μ	COL	. E		11/06	
														SPECIFIED		SECT	•				:	
													FRACTIO	ONS	:	DEPT	•				:	
													XX DECI	MALS	±.01	PE	DI	VILL	IAMSON		11/06	
													XXX DEC	CIMALS	$\pm$ .005	CR	•				:	
													ANGLES		$\pm$ 0°   5′	ΡJ	•				;	
													BREAK SH	ARP EDGES	.06 <b>Max</b>	REQ	•				;	
													FINISH	.125 UNLE	SS SPECIFIED	PPPL	DRF	тJ	SIEGL	. E	11/06	
GM	/06													UTHERWIJE	SFECIFIED		•				:	
ΒY	DATE	CHK	DEPT	DATE	ΡE	REQ	DATE	ORNL	DOE	DATE											:	
				RE	VISION	APPROV	'AL									DF	RAWI	NG A	PPROVAL.	S	DATE	
										3									2			



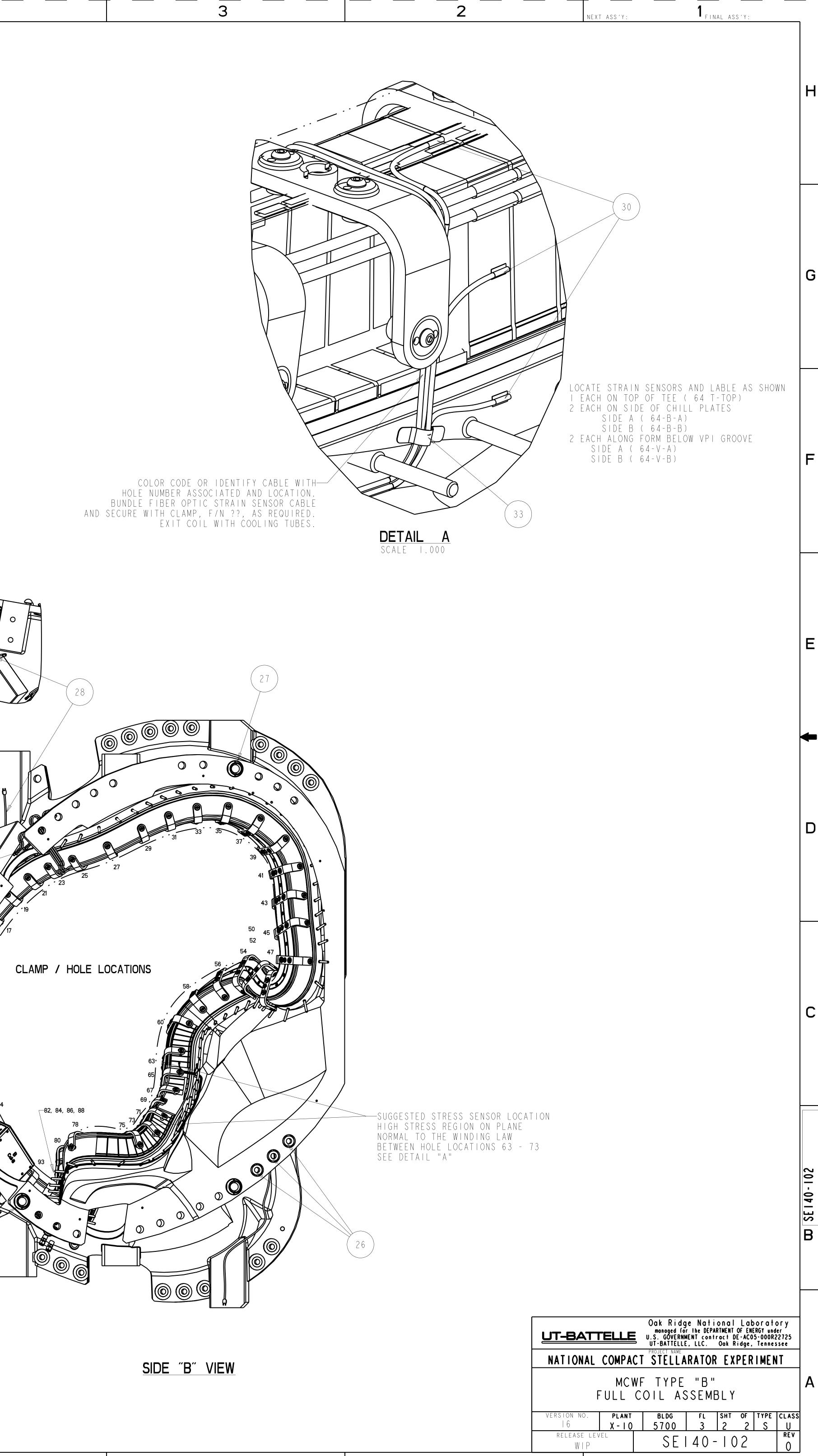


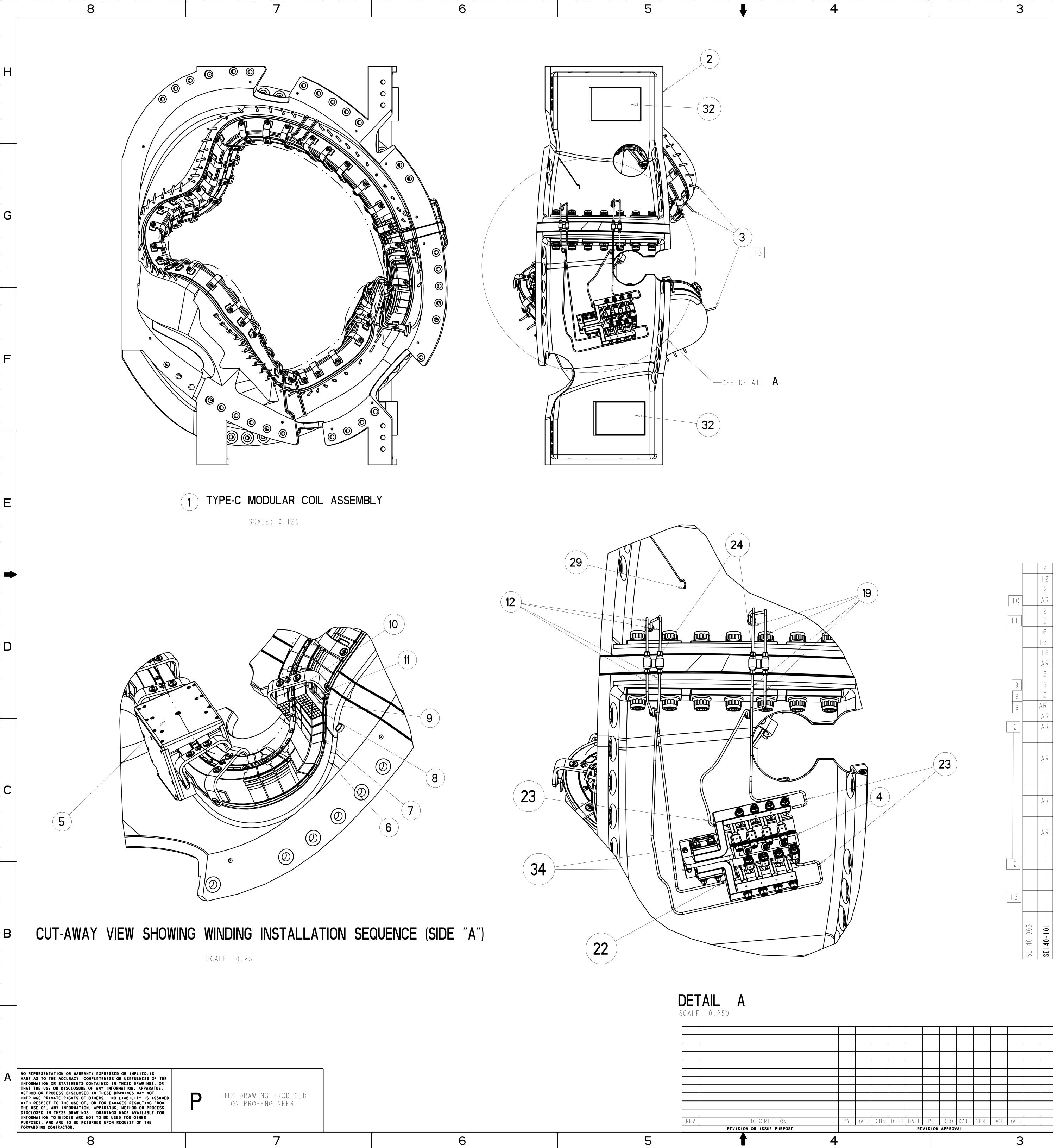


REMOVE STUDS (POST VPI) HOLE LOCATIONS 22 THRU 25

I3 "KEEP" STUDS FROM HOLE LOCATIONS 8-22-REMOVE ALL OTHER STUDS (SIDE B) POST VPI

>---REMOVE STUDS (POST VPI) FROM HOLE LOCATIONS 4 THRU 15





													SCA	LE NOTED		D WILLIAMSON	10-06	UT-BAT		Oak Ride	e Nation	al Labor	atory	
																G LOVETT	10-06	UT-BAT	TELLE	managed fo U.S.GOVERN	r the DEPARTM JENT contrac	INT OF ENERGY	under )0R22725	1
													UN	TOLERANCES LESS OTHERWISE	Снк	MIKE COLE	11-06							
														SPECIFIED	SECT	•	:			CT STELLA			CNT	1
													FRACTI	IONS	DEPT	•	:		LUMPA	LI JIELLF		AFERIM		ł
													XX DEC	$\pm .01$	PE	•	*		ту					
													XXX DE	<b>ECIMALS</b> $\pm .005$	CR	•	*			PE "C'				A
													ANGLES	$\pm 0^{\circ}$ 15'	PJ	•	*		FINAL	COIL A	SSEMB	LY		i
													BREAK SI	HARP EDGES .06 MAX	REQ	•	*							
													FINISH	I .125 UNLESS OTHERWISE SPECIFIED	PPPL	DRFT J SIEGLE	11-06	VERSION NO.	PLANT		FL SI	IT OF TYP	PE CLASS	i
														OTHERWISE SPECIFIED		•	:	24	X - I O	5700	3	<u> </u>	<u>5 U</u>	l
Υ	DATE	СНК	DEPT	DATE	ΡE	REQ	DATE	ORNL	DOE	DATE							:	RELEASE L		٢F	40-1	$\cap \mathcal{A}$	REV	1
				RE	VISION	APPRO	VAL								DR	RAWING APPROVALS	DATE	WIP		JL	4V I	<u> </u>	0	I
										3	3					2					1			

		SEI4	SE I 4		NEXT ASSEMBLY	
		0 - 0 0 3	- (	AGE ODE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION
					-	MCWF-TYPE C ASM
					SE 4 - 03	MOD COIL WINDING FORM ASSEMBLY
	3				TEMP_060831A	STUDS (SEE NOTE 13)
					SEI42C-050	TYPE "C" TERMINAL ASSEMB
					SEI42C-080_2	TYPE "C" LEADS ASSEMBLY
	2				SE   42C - 382	SIDE "A" UPPER CLADDING (SE
					SE   42C - 384	SIDE "A" LOWER CLADDING (B
					SE   42C - 25	SIDE "A" WINDINGS ASSEMB
			AR		SEI42C-253	SIDE-A WP GROUNDWRAP
					SEI42C-386	SIDE A UPPER CHILL PLATES (
					SE   42C - 388	SIDE A LOWER CHILL PLATES (
			AR		SEI42C-258	SIDE A COOLING TUBES
					SEI 42C - 482	SIDE "B" UPPER CLADDING (SE
					SEI 42C - 484	SIDE "B" LOWER CLADDING (E
(23)					SE   42C - 24	SIDE "B" WINDING ASSEMBL
			AR		SE   42C - 243	SIDE "B" UPPER CHILL PLATES SIDE "B" GROUNDWRAP
					SE   42C - 488 SE   42C - 486	SIDE "B" CHILL PLATES (SI
	12		AR		SE   42C - 248	SIDE B COOLING TUBES
			AR		SE   42C - 0   0	CLAMP ASSEMBLY
	6		AR		SEI22-009	WINDING FORM INSULATION A
	9		2		10FF - 4	TRULY TUBULAR 1/4 UNION

IO VENDOR INFORMATION:

- 34

SE|42C-0|4

SE|42C-0|5

SE|42C-0|3

SS-8|0-|-8

SE|42C-0|6

SE|85|-|70

SEI4I-204

5FF-5-4

SE|42C-0||

SEI42C-020

90FF-4

AR

||3

| | 6

AR

DURING OPERATION.

NEVT	. V ` 22 A

FINAL ASS'Y:

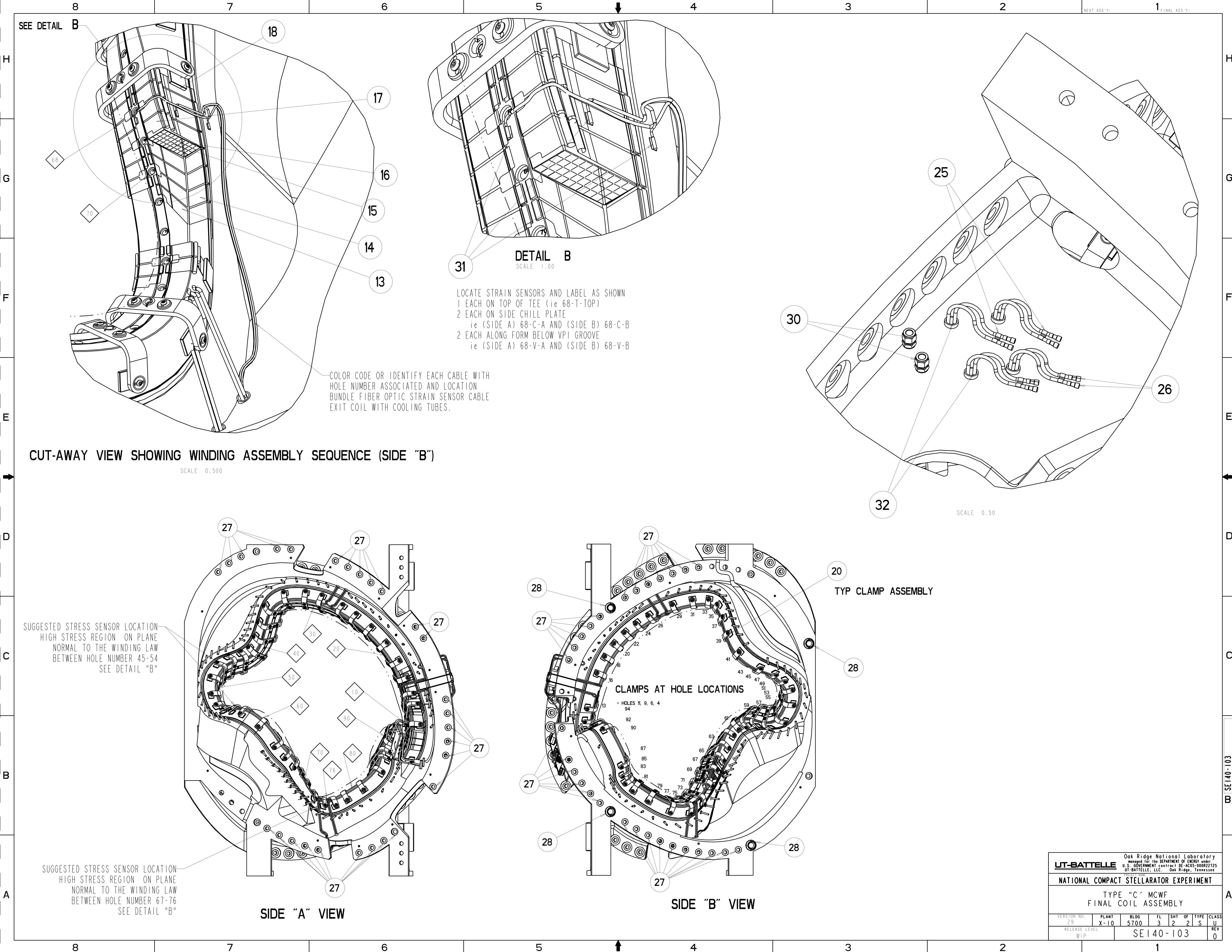
NOTES: I. DRAWING PREPARED IN ACCORDANCE WITH ASME YI4.100-2000. 2. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI YI4.5M 3. DIMENSIONS ARE IN INCHES 4. DIMENSIONS APPLY AT ROOM TEMPERATURE. OPERATING TEMP 80 K. 5. LEADS AREA SHALL BE COVERED OR SPRAYED WITH AN INSULATING MATERIAL TO PREVENT DEBRIS FROM CAUSING AN ELECTRICAL SHORT 6. OPTIONAL BLANKET INSULATION ASSEMBLY, F/N 18, NOT SHOWN. SEE DRAWING SEI22-009 FOR INSTALLATION. 7. SEE LATEST REVISION OF PROCEDURE D-NCSX-MCF-001 FOR ADDITIONAL REQUIREMENTS. 8. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF PPPL PROCEDURE NO. ENG-037. VISUAL WELD INSPECTION SHALL BE PERFORMED IN ACCORDANCE WITH THE ACCEPTANCE CRITERIA OF AWS DI.6. 9 VENDOR INFORMATION: TRULY TUBULAR FITTING CORP PO BOX 1160 MT VERNON, NY 10550 914-664-8686 OR WWW.TRULYTUBULAR.COM FISO FIBER OPTICS 500 ST. JEAN BAPTISTE AVE SUITE 195 QUEBEC QC, G2E 5R CANADA 418-688-8065 OR WWW.FISO.COM II VENDOR INFORMATION: OMEGA ENGINEERING CORP ONE OMEGA DRIVE STAMFORD, CT 06907 800-848-4286 OR WWW.OMEGA.COM

12 SOME PARTS IN THIS ASSEMBLY ARE GRAPHIC REPRESENTATIONS OF ACTUAL PARTS/ASSEMBLIES. PART IDENTIFICATION NUMBERS REFER TO ACTUAL PARTS. FOR FULL MODELED ASSEMBLY SEE SEI40-102-

I3 TYPE "C" COIL: REMOVE ALL STUDS AFTER CLAMP AND INSULATION BLANKETS ARE ASSEMBLED (POST VPI).

	PARTS LIST	
NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	FIND NO
MCWF-TYPE C ASM		
COIL WINDING FORM ASSEMBLY TYPE-A		2
STUDS (SEE NOTE 13)		3
TYPE "C" TERMINAL ASSEMBLY		4
TYPE "C" LEADS ASSEMBLY		5
E "A" UPPER CLADDING (SEPTUM)		6
DE "A" LOWER CLADDING (BASE)		7
SIDE "A" WINDINGS ASSEMBLY	I	8
SIDE-A WP GROUNDWRAP		9
DE A UPPER CHILL PLATES (JOP)		
E A LOWER CHILL PLATES (SIDE)		
SIDE A COOLING TUBES		12
E "B" UPPER CLADDING (SEPTUM)		4
SIDE "B" WINDING ASSEMBLY DE "B" LOWER CLADDING (BASE)		15
SIDE "B" GROUNDWRAP		16
E "B" UPPER CHILL PLATES (TOP)		17
IDE "B" CHILL PLATES (SIDE)		8
SIDE B COOLING TUBES		9
CLAMP ASSEMBLY		20
INDING FORM INSULATION ASSY		21
TRULY TUBULAR 1/4 UNION	BRAZETYTE	22
TRULY TUBULAR 1/4 ELBOW	BRAZETYTE	23
POL BR CONNECTOR ASSEMBLY		24
TUBE CLAMP		25
TRULY TUBULAR BRAZETYTE	BRAZETYTE	26
FLANGE BUSHINGS		27
BALL ALIGNMENT ASSEMBLY		28
THERMO COUPLER	INCONEL 718	29
BLEED VALVE		30
FIBER OPTIC STRAIN GAGE		31
3"x8"x12" FLUX LOOP BOX		32
3/8-16 UNC HEX NUT INSULATING SLEEVE	NEMA GRADE G-IICR	34

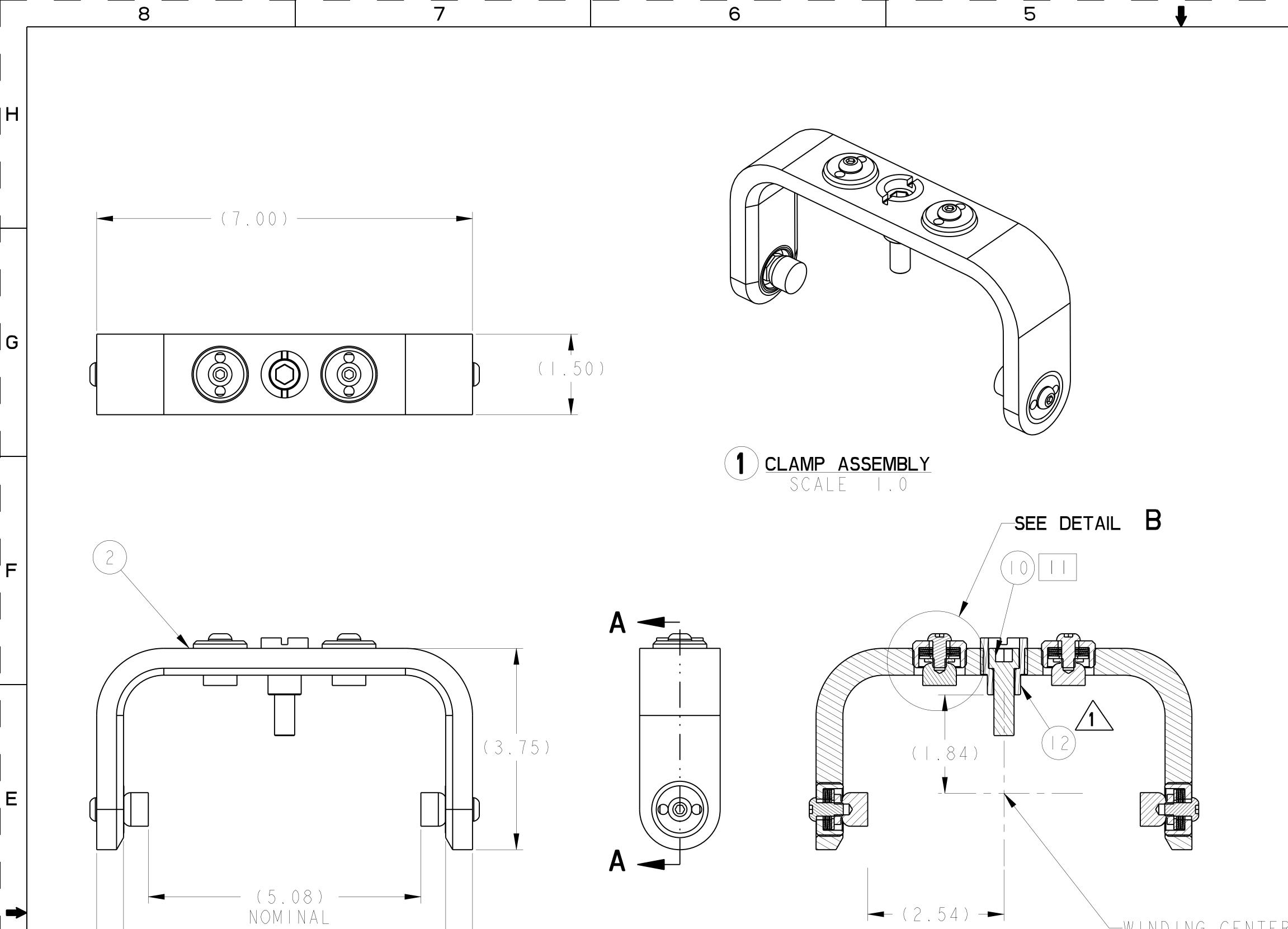
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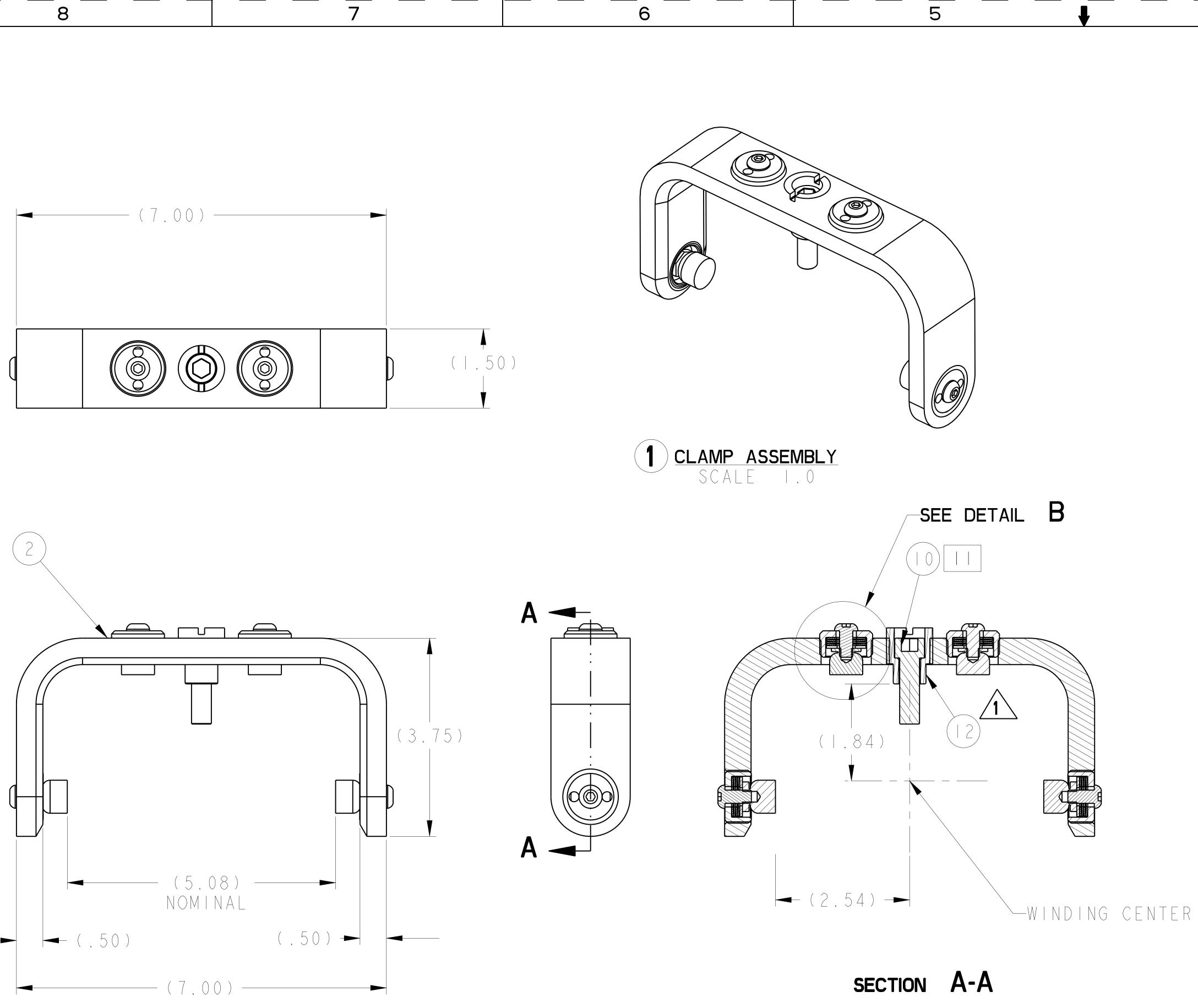


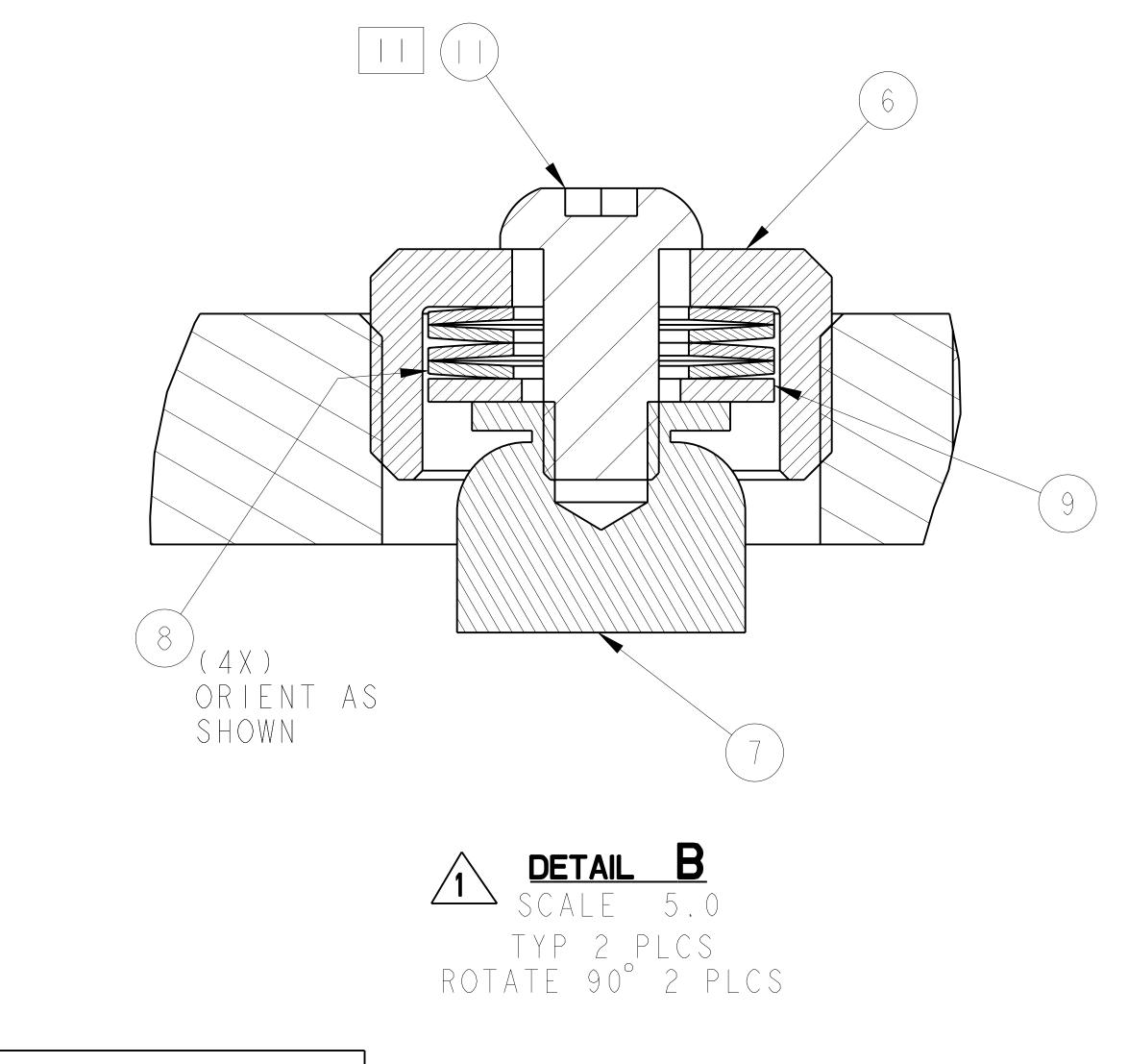


## Clamps – open issues

• Clamps to remove or modify







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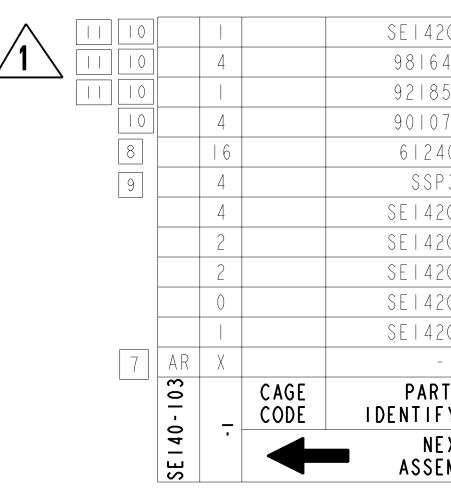
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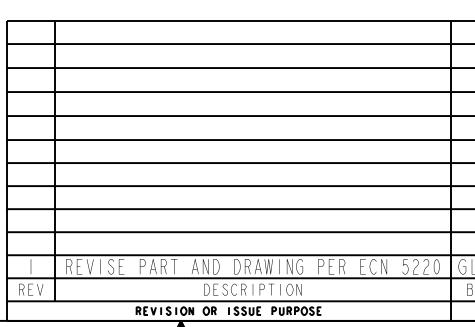
THIS DRAWING PRODUCED ON PRO-ENGINEER

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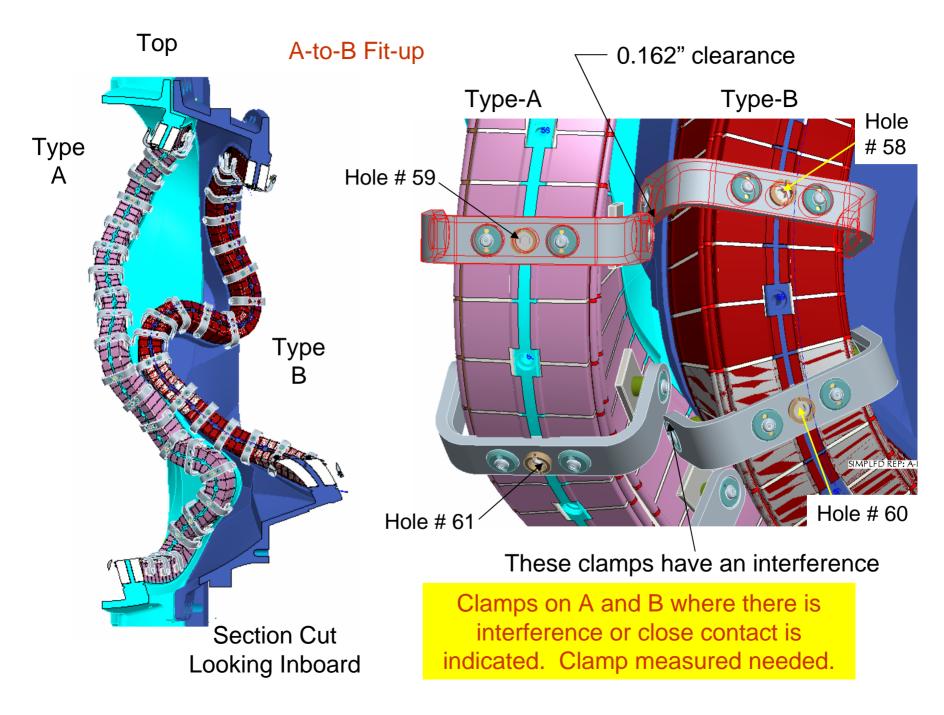


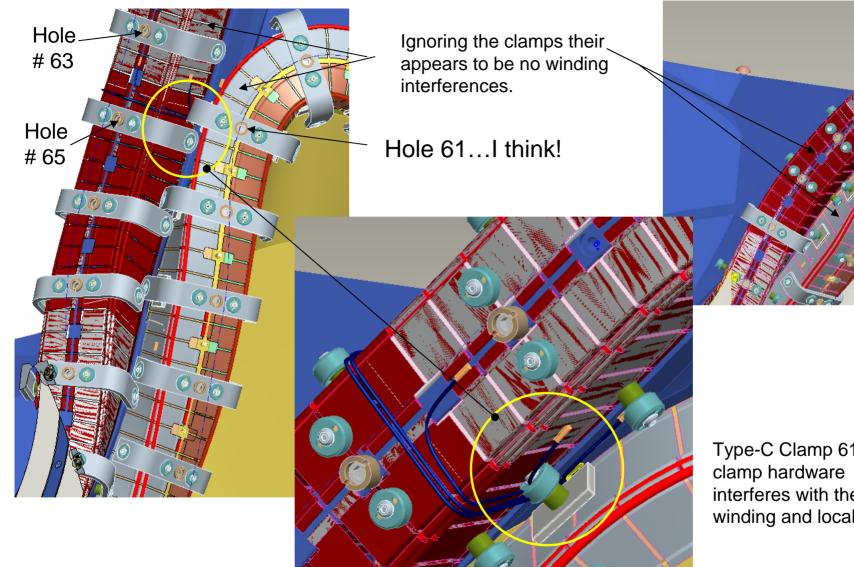
		3		2	NEXT ASS'Y:	1 <sub>FINAL ASSY:</sub>	
	NOTE	S:					
		DRAWING PREPARE					⊦
		INTERPRET DIME		OLERANCES PE	ER ANSI YI4.5M-	994.	
		DIMENSIONS ARE				$\circ \land \lor \checkmark$	
		DIMENSIONS APP Geometry is de					
		DRAWING AND MC					
	7.		ABILITY SHALL	NOT EXCEED	I.02 AS TESTED		
		SEVERN ENG	SINEERING COM	IP A N Y			
			AGE ROAD SUI Abama 36830	E 4			
	8	SOLON MANUFACT 7 ISLAND AVENU SKOWHEGAN, ME		PHONE:	207-474-62 3		
	9	VLIER 40 GUEST ST. BRIGHTON, MA C	2135	CAGE CODE: Phone: Fax:	800-82 - 090		F
		] MCMASTER-CARF 600 COUNTY LIN ELMHURST, IL 6	IE RD				
		] SILVER PLATE Plating thickn					
	2.	ITEM 6 USES SPA	NNER WRENCH,	598IAI FROM	MCMASTER CARR	OR EQUAL.	E
	<b>1</b> 3.	DELETED NOTE 13	, AT REVISION				
64A2II	BUTTONH	EAD CAP SCREW, 1/4-20 UNC > Socket HD CAP Screw 3/8-	(.50 LG, 5/32 HEX DRI	ING, SPACER IVE	UNS S31600 UNS S31600	2	
64A211 85A626 07A030 240718	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OI	( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE	IVE EHT	UNS S31600 UNS S31600 INCONEL 718	2         0   9   8	
64A211 85A626 07A030 240718 SP300 42C-275	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3	( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER	IVE E HT GTH 5/8 F, SCREW, SET	UNS S31600 UNS S31600	   0   9	
64A211 85A626 07A030 240718 SP300 42C-275 42C-274 42C-273	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OI	( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SF	IVE E HT GTH 5/8	UNS S31600 UNS S31600 INCONEL 718	   0   9   8   7   0	
64A211 85A626 07A030 240718 SP300 42C-275 42C-274 42C-273 42C-272 42C-271 -1	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE	( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP BUSHI BA CLAM	IVE E HT GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600	   0   9   8   7   6   7   6   5   4   3   2 	
64A211 85A626 07A030 240718 SP300 42C-275 42C-275 42C-273 42C-272 42C-271 -1 RT OR IFYING NO NEXT	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OI	<pre>( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP BUSHI BA CLAM RE</pre>	IVE E HT GTH 5/8 GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY	UNS S31600 UNS S31600 INCONEL 718	   0   9   8   7   0	
64A211 85A626 07A030 240718 5P300 42C-275 42C-275 42C-274 42C-272 42C-271 -1 <b>RT_OR</b> <b>IFYING_NO</b> <b>NEXT</b>	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SF BUSHI BA CLAM	IVE E HT GTH 5/8 GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600	Image:	
64A211 85A626 07A030 240718 SP300 42C-275 42C-275 42C-274 42C-272 42C-271 -1 RT OR IFYING NO NEXT	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( .50 LG, 5/32 HEX DRI 16 UNC X I.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SF BUSHI BA CLAM	IVE E HT GTH 5/8 GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600	Image:	
64A211 85A626 07A030 240718 SP300 42C-275 42C-275 42C-273 42C-272 42C-271 -1 RT OR IFYING NO NEXT	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( .50 LG, 5/32 HEX DRI 16 UNC X 1.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP WASHER, SF BUSHI BA CLAM RE ION PARTS LI	IVE	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600 MATERIAL		
64A211 85A626 07A030 240718 SP300 42C-275 42C-275 42C-274 42C-272 42C-271 -1 <b>RT OR</b> <b>IFYING NO</b> <b>NEXT</b>	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( .50 LG, 5/32 HEX DRI 16 UNC X 1.25 LG 44 ID X .050 THK X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP WASHER, SP BUSHI BA CLAM RE ON PARTS LI SCALE NOTED UNLESS OTHERWISE	IVE E HT GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY ST ST DES D WILLIAMSON 1-27- DRW GARY LOVETT 1-27- CHK TOM HARGROVE 8-26-	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600 MATERIAL	Image:	
42C - 294 64A211 85A626 07A030 240718 SP300 42C - 275 42C - 275 42C - 274 42C - 271 - 1 <b>RT OR</b> IFYING NO NEXT SEMBLY	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( . 50 LG, 5/32 HEX DRI 16 UNC X 1.25 LG 44 ID X .050 THK ) X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP BUSHI BA CLAM RE ON PARTS LI SCALE NOTED UNLESSOTHERWISE SPECIFIED FRACTIONS ::	IVE E HT GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY ST DES D WILLIAMSON 1-27- DRW GARY LOVETT 1-27-	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600 MATERIAL MATERIAL OC UT-BATTELLE US OC NATIONAL COMPACT S		
64A211 85A626 07A030 240718 SP300 42C-275 42C-275 42C-274 42C-272 42C-271 -1 <b>RT OR</b> <b>IFYING NO</b> <b>NEXT</b>	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( .50 LG, 5/32 HEX DRI 16 UNC X 1.25 LG 44 ID X .050 THK X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP BUSHI BA CLAM RE ON PARTS LI FRACTIONS XX DECIMALS ±.01 XXX DECIMALS ±.01 XXX DECIMALS ±.015 XXX	IVE IVE IVE E HT GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY ST ST ST DES D WILLIAMSON 1-27- DRW GARY LOVETT 1-27- CHK TOM HARGROVE 8-26- SECT : : : DEPT : : : PE :D WILLIAMSON 8-26- CR : : : :	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600 MATERIAL MATERIAL UT-BATTELLE U.S OG NATIONAL COMPACT S OS CLAMP	Image: Notional Laboratory         Im	
64A211 85A626 07A030 240718 5P300 42C-275 42C-274 42C-274 42C-272 42C-271 -1 <b>RT_OR</b> <b>FYING_NO</b> <b>NEXT</b>	WASHER, I	SOCKET HD CAP SCREW, 3/8- WASHER, FLAT, .75 OD X .3 BELLEVILLE, 3/8 ID X 3/4 OE L, I/4-20 UNC X 5/16 LG THE NOMENCLATUF	( .50 LG, 5/32 HEX DRI 16 UNC X 1.25 LG 44 ID X .050 THK X.040 THK X .056 FREE ), PAD DIA 5/8, OA LENG KEEPER WASHER, SP WASHER, SP WASHER, SF BUSHI BA CLAM RE ON PARTS LI FRACTIONS XX DECIMALS ±.01 XXX DECIMALS ±.01 XXXX DECIMALS ±.01 XXX DECIMALS ±.01 XXXX	IVE IVE IVE E HT GTH 5/8 C, SCREW, SET HERICAL, CONCAVE PHERICAL, CONVEX ING, SPACER R, CLAMP IP ASSEMBLY ST ST ST DES D WILLIAMSON 1-27- DRW GARY LOVETT 1-27- CHK TOM HARGROVE 8-26- SECT : : : DEPT : : : PE :D WILLIAMSON 8-26- CR : : : :	UNS S31600 UNS S31600 INCONEL 718 SS, UNS S31600 MATERIAL MATERIAL UT-BATTELLE U.S. OG UT-BATTELLE U.S. OG CLAMP CLAMP CLAMP	k       Ridge       Notional       Laboratory         NO       A         SPECIFICATION       FININO         I       SPECIFICATION       FININO         SPECIFICATION       FININO         I       SPECIFICATION       SPECIFICATION         I       SPECIFICATION       SPECIFICATION         I       SPECIFICATION       SPECIFICATION         I       SPECIFICATION	

2 .	ITEM 6	USES	SPANNER	WRENCH,	598   A	FROM	$\mathbb{M}$
13.	DELETE	) NOTE	E 13 AT	REVISION	.		

NEXT ASSEMBLY	PARTS LIST	
PART OR NTIFYING NO	NOMENCLATURE OR DESCRIPTION	
-	CLAMP ASSEMBLY	
E   42C - 27	BAR, CLAMP	
E   42C - 272	BUSHING, SPACER	
E   42C - 273	WASHER, SPHERICAL, CONVEX	
E   42C - 274	WASHER, SPHERICAL, CONCAVE	
E   42C - 275	KEEPER, SCREW, SET	
SSP300	CLAMP SWIVEL, 1/4-20 UNC X 5/16 LG THD, PAD DIA 5/8, OA LENGTH 5/8	S
6   2 4 0 7   8	WASHER, BELLEVILLE, 3/8 ID X 3/4 OD X.040 THK X .056 FREE HT	
0107A030	WASHER, FLAT, .75 OD X .344 ID X .050 THK	
2185A626	SOCKET HD CAP SCREW, 3/8-16 UNC X 1.25 LG	
8   6 4 A 2	BUTTONHEAD CAP SCREW, I/4-20 UNC X .50 LG, 5/32 HEX DRIVE	
E   42C - 294	BUSHING, SPACER	

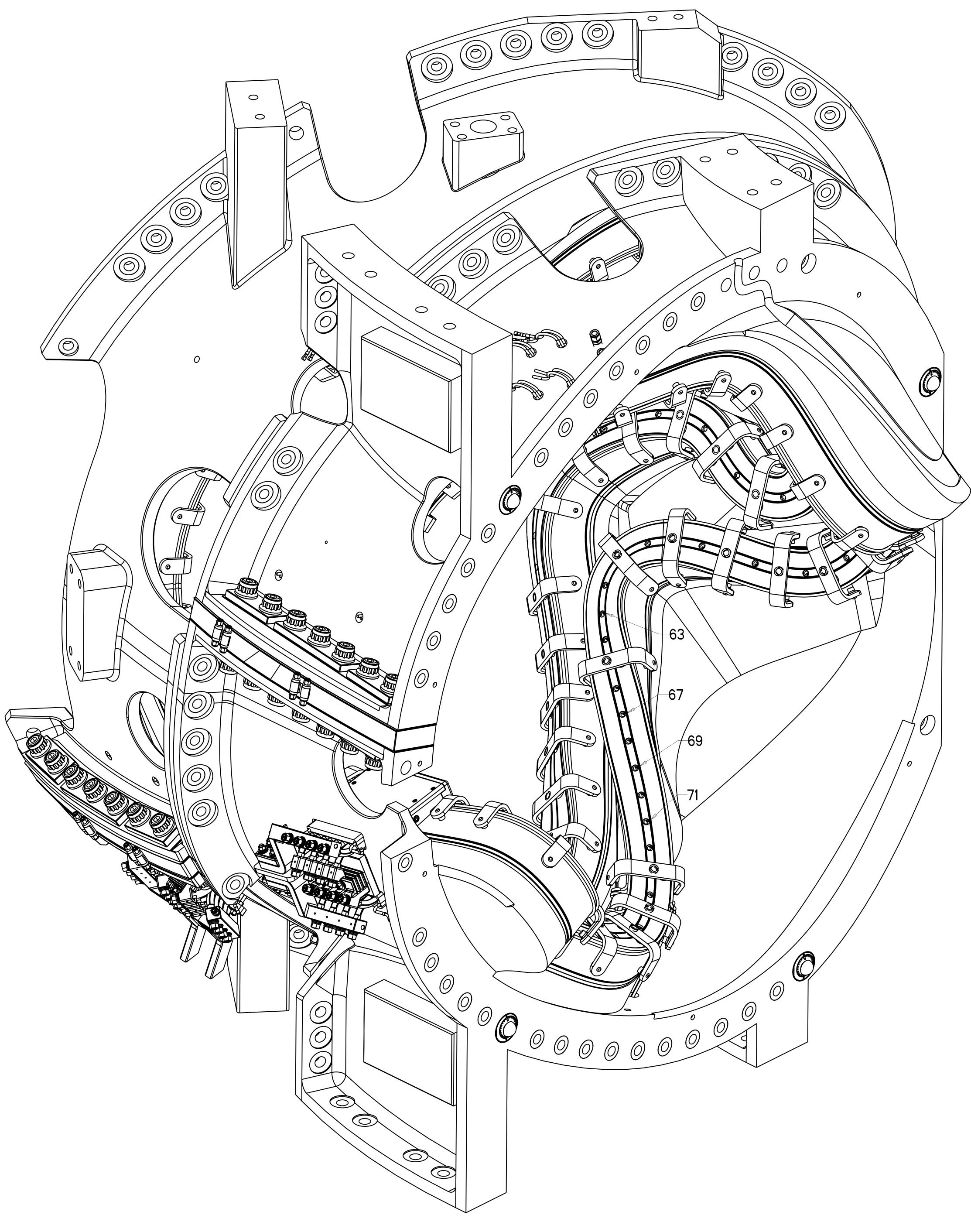
	-			-															-	
													SCAL	E NC	TFD	DES	DWI	LLIAMSO	N 1-27-05	5
																DRW	GARY	' LOVETT	1-27-05	5
													UNL	TOLERANCE ESS OTHER	WISE	Снк	TOM	HARGROV	E 8-26-05	5
														SPECIFIED		SECT	•		:	
													FRACTIO	ONS	:	DEPT	•		:	
													XX DECI	MALS	±.0	PE	:D WI	LLIAMSON	8-26-05	5
													XXX DEC	CIMALS	$\pm$ .005	CR	•		:	
													ANGLES		$\pm$ 0°   5 ′	ΡJ	•			
													BREAK SH	ARP EDGES	.06 <b>Max</b>	REQ	•		:	
													FINISH	.125 UNLE	SS SPECIFIED	PPPL	DRFT	I SIEGEL	8-26-05	5
	- 06	MJC			DEW									OTHERWIJE	SPECIFIED		•		:	
Y	DATE	CHK	DEPT	DATE	ΡE	REQ	DATE	ORNL	DOE	DATE									*	
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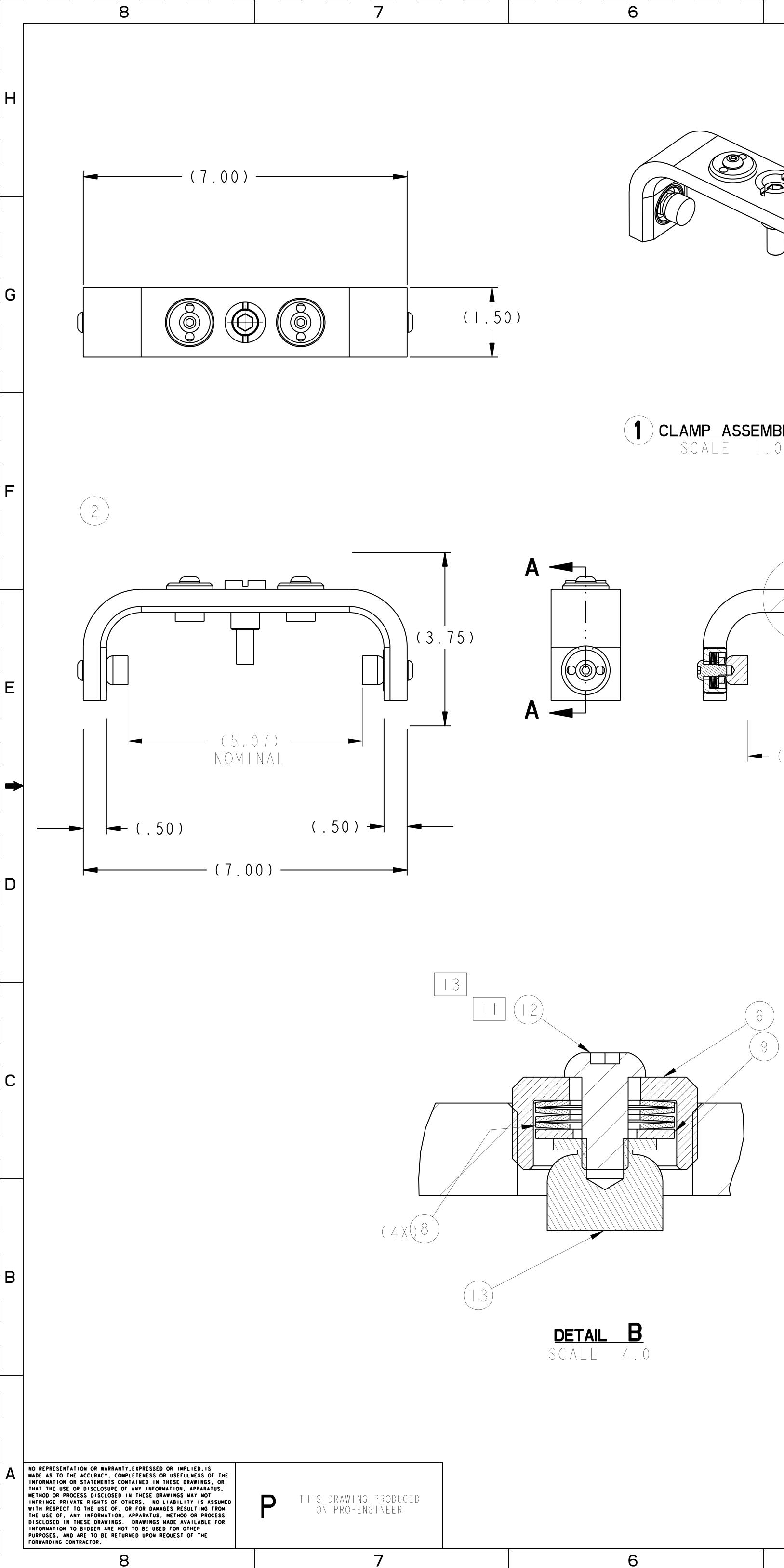


B-to-C Fit-up

Type-C Clamp 61 and interferes with the Type-B winding and local cable.



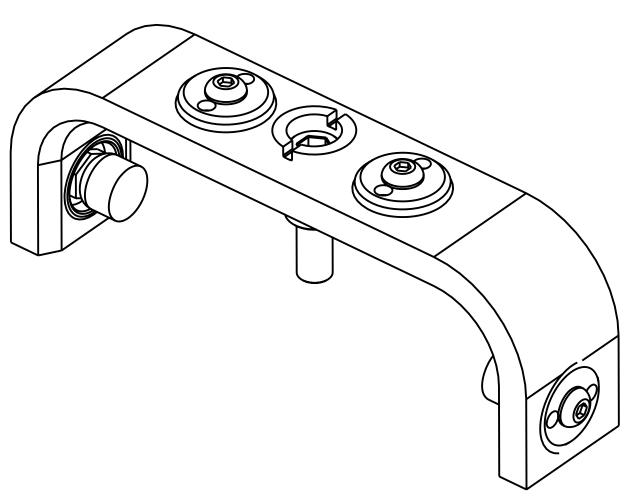
TYPE-C CLAMPS TO BE REMOVED



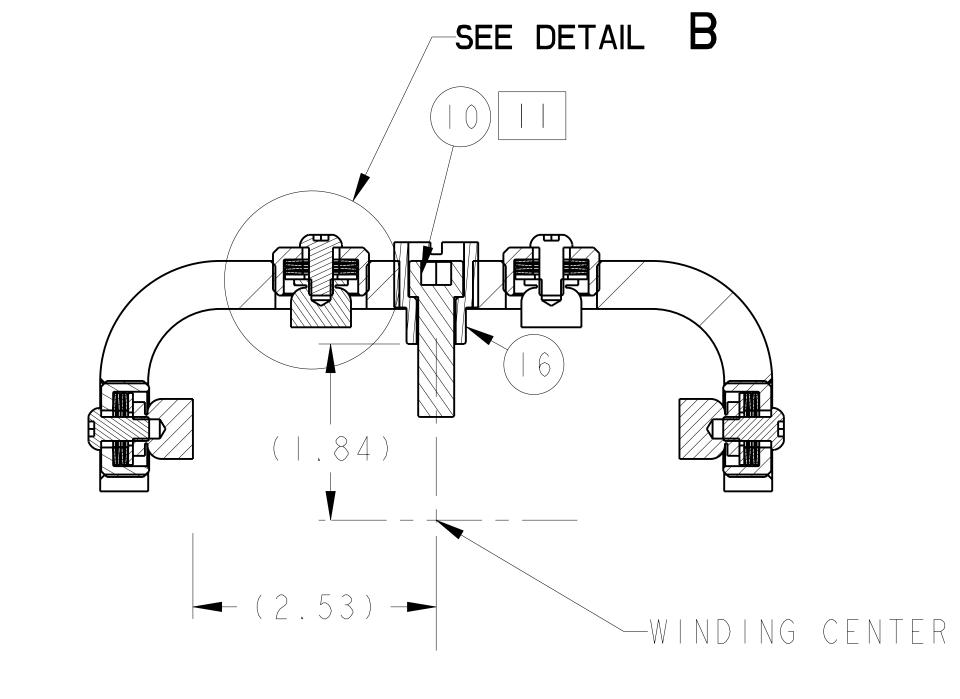




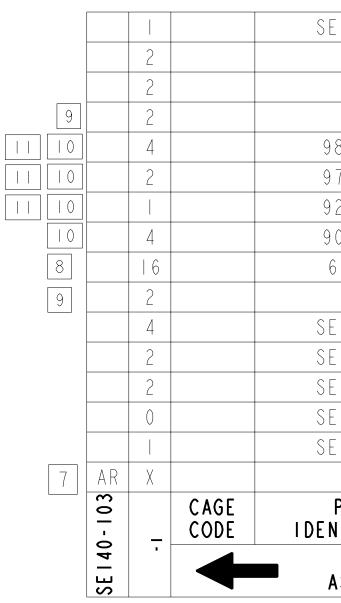


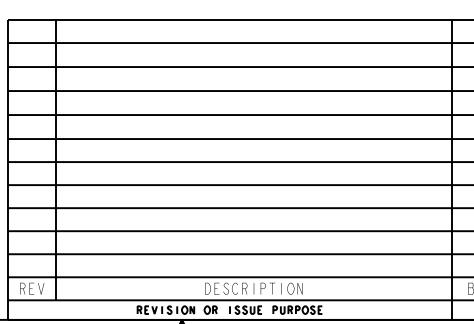






SECTION A-A

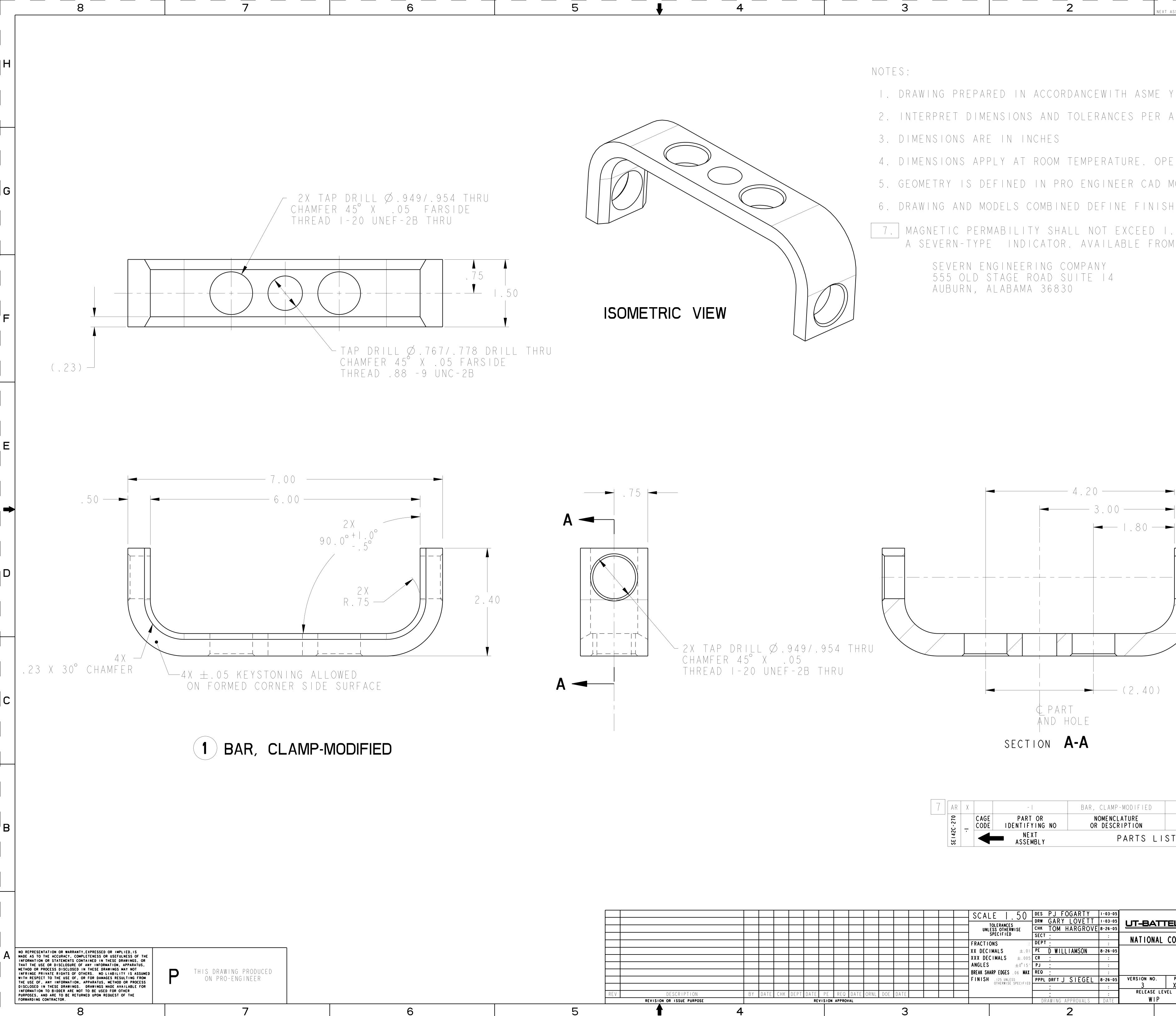




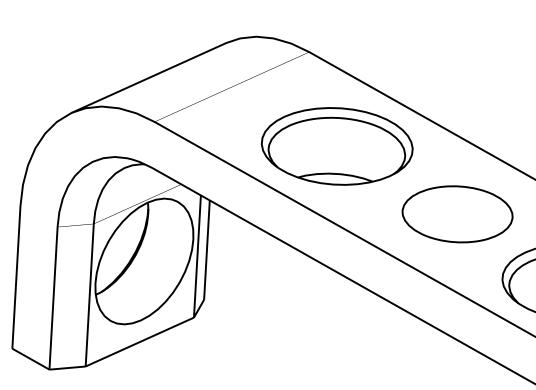
<ul> <li>NCTES:</li> <li>1. DRAWING PREPARED IN ACCORDANCEWITH ASVE VIA.100-2000.</li> <li>2. INTERPRET DIMENSIONS AND TOLEVANCES THE ANSTITATION 1994.</li> <li>3. DIMENSIONS ARE IN INFLES.</li> <li>4. DIMENSIONS APPLY AT ROOM HIMPERATURE. OPERATING TEMP 80 B</li> <li>5. GEOMETRY IS DEFINED IN PROTINENCE CAD MOBELS/FILLS.</li> <li>6. DRAWING AND MODELS COVE IN DICTINE TIMESTED MACTINED PART</li> <li>7. MACHITIC PERMABILITY STALL NOT EXCELD 1.02 AS TESTED BY A SEVERN TYPE INDICA OCT AVAILABLE TROV.</li> <li>8. VERN TROTHER CAD. SUPERY SSS OF SEVERAL ROAD SUPER THAT A THERN, ALAMA 56330</li> <li>8. SOLON VANUEACTIVING CO. CASE CODE: 51934 7. STAND AVENUE PIENTE PIENT: 207-774-6213 SKOWTECAN, WE 94876-TIC2 FAX: 207-764-733-0230</li> </ul>	
<ul> <li>2. IN ERPECT DIMENSIONS AND ICLEMANCES PER ANSI VI4.59-1994.</li> <li>3. DIMENSIONS ARE IN INCHES</li> <li>4. DIMENSIONS APELY AT ROOM TEMPERATURE, OPERATING TEVE SO K</li> <li>5. GEOVETRY IS DETINED IN PROENCINEER CAD MODELS/FILES</li> <li>6. DRAWING AND MODELS COMMINED DEFINE FINISHED MACHINED PART</li> <li>17. MAGNETIC FERMABILITY SHALL NOT EXCEED 1.02 AS TESTED BY A SEVERN-TYPE INDICATOR. AVAILABLE TROW</li> <li>SEVERN-TYPE INDICATOR. AVAILABLE TROW</li> <li>SOLON VANIFACTURING CO. CASE CODE: 5.934</li> <li>O GUEST ST. DIFT</li> <li>O GUEST ST. DIFT</li> <li>O GUEST ST. SUPPLY</li> <li>CASE CODE: 01228</li> <li>O GUEST ST. SUPPLY</li> <li>CASE CODE: 01228</li> <li>SOLOUNTY LINE RB</li> <li>PHONE: 830-833-030C</li> </ul>	
<ul> <li>3. DIMENSIONS ARE IN INCHES</li> <li>4. DIMENSIONS APPLY AT ROOM TEMPERATURE. OPERATING TEMP 80 K</li> <li>5. GEOMETRY IS DEFINED IN PROFINED DEFINE CAD MODELS/ELLES</li> <li>6. DRAWING AND MODELS COMBINED DEFINE FINISHED MACHINED PART</li> <li>7. MAGNETIC PERMAEILITY SHALL NOT EXCEED 1.02 AS TESTED BY A SEVERN ENGINEERING COMPANY SSS OLD STAGE ROAD SUITE 14 AUHURN, ALASAMA 36830</li> <li>8. SOLON MANUFACTURING CO. CASE CODE: 51934 7 ISLAND AVENUE PHONE: 207-474-6213 SKOWHLCAN, ME 04976 TH02 TAX: 207 474-6213 SKOWHLCAN, ME 04976 TH02 TAX: 207 474-7320</li> <li>9. VLIER CAGE CODE: 01226 40 GUEST ST. PHONE: 800-821-1090 DRIGHTON, MA 02135 TAX: 800 457-2020</li> <li>10. MCMASTER-CARS SUPPLY CASE CODE: 39428 600 COUNTY LINE RD FHONE: 630-833-030C</li> </ul>	F
<ul> <li>A. DIMENSIONS APPLY AT ROOM TEMPERATURE. OPERATING TEMP 80 K</li> <li>S. GEOMETRY IS DEFINED IN PRO ENGINEER CAD MODELS/FILES</li> <li>G. DRAWING AND MODELS COMBINED DEFINE FINISHED MACHINED PART</li> <li>7. MAGNETIC PERVABILITY SHALL NOT EXCEED 1.02 AS TESTED BY A SEVERN-TYPE INDICATOR. AVAILABLE FROM</li> <li>SEVERN ENCINEERING COMPANY S55 OLD STAGE ROAD SUITE 14 AUDURN, ALABAMA 36830</li> <li>8 SOLON MANUFACTURING CO. CACE CODE: SL934 7 ISLAND AVENUE PHONE: 207-474-6213 SKOWHEGAN, ME 04976-1102 FAX: 207-474-6213 SKOWHEGAN, ME 04976-1102 FAX: 207-474-7320</li> <li>9 VLIER CACE CODE: 01226 40 SHEST ST. PHONE: 800-821-1090 ERIGHTON, MA 02135 FAX: 800-457-2020</li> <li>10 MCMASTER-CARR SUPPLY CAGE CODE: 38428 800 COUNTY LINE RD PHONE: 630-833-0300</li> </ul>	- - - - -
<ul> <li>5. GEOMETRY IS DEFINED IN FRO ENGINEER CAD VODELS/FILES</li> <li>6. DRAWING AND MODELS COVEINED DEFINE FINISHED MACHINED PART</li> <li>7. MAGNETIC PERMABILITY SHALL NOT EXCEED 1.02 AS TESTED BY A SEVERN TYPE INDICATOR. AVAILABLE FROM</li> <li>SEVERN TYPE INDICATOR. AVAILABLE FROM</li> <li>SEVERN FNGINEERING COMPANY 555 OLD STACE ROAD SUITE 14 AUBJRN, ALABAMA 36830</li> <li>8. SOLON MANUFACTURING CO. CAGE CODE: 51934</li> <li>7. ISLAND AVENUE PHONE: 207-474-5213 SKOWHEGAN, ME 048/6-1102 FAX: 207-474-5213 SKOWHEGAN, ME 048/6-1102 FAX: 207-474-7320</li> <li>9. VLIER CAGE CODE: 01226 PHONE: 830-821-1090 FAX: 800-457-2020</li> <li>10. MCVASTER-CARR SUPPLY CAGE CODE: 39428 SOC COUNTY LINE RD FHONE: 630-833-0300</li> </ul>	     
<ul> <li>8. DRAWING AND MODELS COMDINED DEFINE FINISHED MACHINED PART</li> <li>7. MAGNETIC PERMABILITY SHALL NOT EXCEED 1.02 AS TESTED BY A SEVERN-TYPE INDICATOR. AVAILABLE FROM</li> <li>SEVERN ENGINEIRING COMPANY SS5 OLD STAGE ROAD SUITE 14 AUBURN. ALAEAMA 36830</li> <li>8. SOLON MANUFACTURING CO. CAGE CODE: 51934 7 ISLAND AVENUE PHONE: 207-474-6213 SKOWHEGAN. ME 04976-1102 FAX: 207-474-6213 SKOWHEGAN. ME 04976-1102 FAX: 207-474-7320</li> <li>9. VLIER CAGE CODE: 01226 40 GJEST ST. PHONE: 800-821-1090 BRIGHTON, MA 02135 FAX: 800-457-2020</li> <li>10. NCMASTER-CARR SUPPLY CAGE CODE: 39428 600 COUNTY LINE RD FHONE: 630-633-0300</li> </ul>	F
<ul> <li>MAGNETIC PERMABILITY SHALL NOT EXCEED 1.02 AS TESTED BY A SEVERN-TYPE INDICATOR. AVAILABLE FROM</li> <li>SEVERN ENGINEERING COMPANY 555 OLD STAGE ROAD SUITE 14 AJBURN, ALABAMA 36830</li> <li>SOLON MANUFACTURING CO. CACE CODE: 51934 7 ISLAND AVENUE PHONE: 207-474-6213 SKOWHEGAN, ME 04976-1102 FAX: 207-474-7320</li> <li>VLIER CACE CODE: 01226 46 GUEST ST. PHONE: 200-6321-1090 ERIGHTON, WA 02135 FAX: 800-457-2020</li> <li>IC MCMASTER-CARR SUPPLY CAGE CODE: 39428 600 COUNTY LINE RD PHONE: 630-633-0300</li> </ul>	F
SEVERN-TYPE INDICATOR. AVAILABLE FROWSEVERN ENGINEERING COMPANY 555 OLD STAGE ROAD SUITE 14 AUBURN, ALABAMA 368308SOLON MANUFACTURING CO. T ISLAND AVENUECAGE CODE: 5L934 PHONE: 207-474-6213 SKOWHEGAN, ME 04976-11029VLIER 40 GJEST ST. BRIGHTON, MA 02135CAGE CODE: 01226 PHONE: 800-821-1090 FAX: 800-457-202010MCVASTER-CARR SUPPLY 600 COUNTY LINE RD ELMHJRST, TE 60126-2081CAGE CODE: 39428 PHONE: 630-833-0300	F
555 OLD STAGE ROAD SUITE 14 AUBURN, ALABAMA 368308SOLON MANUFACTURING CO. TISLAND AVENUECAGE CODE: 5L934 PHONE: 207-474-6213 SKOWHEGAN, ME 04976-11029VLIER 40 GUEST ST. HRIGHTON, MA 02135CAGE CODE: 01226 PHONE: 800-821-1090 FAX: 800-457-202010MCMASTER-CARR SUPPLY 600 COUNTY LINE RD ELWHURST, TE 80126-2081CAGE CODE: 39428 PHONE: 630-833-0300	F
8       SOLON MANJFACTURING CO.       CAGE CODE: 5L934         7       ISLAND AVENUE       PHONE: 207-474-6213         SKOWHEGAN, ME 04976-1102       FAX: 207-474-6213         9       VLIER       CAGE CODE: 01226         40       GUEST ST.       PHONE: 800-821-1090         ERIGHTON, MA 02135       FAX: 800-457-2020         10       MCMASTER-CARR SUPPLY       CAGE CODE: 39428         600       COUNTY LINE RD       PHONE: 630-833-0300	F
7       ISLAND AVENUE SKOWHEGAN, ME 04976-1102       PHONE:       207-474-6213 FAX:         9       VLIER 40 GJEST ST. BRIGHTON, MA 02135       CAGE CODE:       01226 PHONE:         800-821-1090 FAX:       800-821-1090 FAX:         10       MCMASTER-CARR SUPPLY 600 COUNTY LINE RD FIMHJRST, 11 60126-2081       CAGE CODE:       39428 PHONE:	F
40 GUEST ST. BRIGHTON, MA 02135       PHONE:       800-821-1090 FAX:         10       MCMASTER-CARR SUPPLY 600 COUNTY LINE RD ELMHURST, IL 60126-2081       CAGE CODE:       39428 PHONE:	F
600 COUNTY LINE RD Elmhurst, il 60126-2081	
PLATING THICKNESS .0002 TO .0005 INCH	
12. ITEM 6 USES SPANNER WRENCH, 598IAI FROM MCMASTER CARR OR EQUA	, L .
BUSHING, SPACER           15         SPACER 1.5 X 2.0 X .25 THK           14         SPACER 1.5 X 2.0 X .125 THK	6   5   4
P300CLAMP SWIVEL, I/4-20 UNC X 5/16 LG THD, PAD DIA 5/8, OA LENGTHUNS \$316004A211BUTTONHEAD CAP SCREW, I/4-20 UNC X .50 LG, 5/32 HEX DRIVEUNS \$316005A601BOLT SOC HEAD 5/16-18 UNC 375 OD X 3/8" LG SHUDD 3/8 HEX DRIVEUNS \$31600	3   2
5A601         BOLT, SOC HEAD, 5/16-18 UNC, .375 OD X 3/8" LG SHLDR , 3/8 HEX DRIVE         UNS \$31600           5A626         SOCKET HD CAP SCREW, 3/8-16 UNC X 1.25 LG         UNS \$31600           7A030         WASHER, FLAT, .75 OD X .344 ID X .050 THK         UNS \$31600	9
40718       WASHER, BELLEVILLE, 3/8 ID X 3/4 OD X.040 THK X.056 FREE HT       INCONEL 718         P300       CLAMP SWIVEL, 1/4-20 UNC X 5/16 LG THD, PAD DIA 5/8, OA LENGTH 5/8       SS, UNS S31600         P2-275       KEEPER, SCREW, SET	8 7
WASHER, SPHERICAL, CONCAVE       WC-273	
BUSHING, SPACER BAR, CLAMP CLAMP ASSEMBLY	
T OR NOMENCLATURE OR DESCRIPTION MATERIAL SPECIFIC	ATION FIND
PARTS LIST	
	-
Image: Constraint of the provided in the provid	Laboratory OF ENERGY under E-AC05-000R22725
SPECIFIED     SECT:     :     NATIONAL COMPACT STELLARATOR EXI	
Image: Second	ļ A
	I
	OF TYPE CLASS I S U O 3 REV O 3 O

NEXT ASSEMBLY	PARTS LIST	
PART OR NTIFYING NO	NOMENCLATURE OR DESCRIPTION	
-	CLAMP ASSEMBLY	
E   42C - 27	BAR, CLAMP	
E   42C - 272	BUSHING, SPACER	
E   42C - 273	WASHER, SPHERICAL, CONVEX	
E   42C - 274	WASHER, SPHERICAL, CONCAVE	
E   42C - 275	KEEPER, SCREW, SET	
SSP300	CLAMP SWIVEL, 1/4-20 UNC X 5/16 LG THD, PAD DIA 5/8, OA LENGTH 5/8	S.
6   2 4 0 7   8	WASHER, BELLEVILLE, 3/8 ID X 3/4 OD X.040 THK X .056 FREE HT	
0   0 7 A 0 3 0	WASHER, FLAT, .75 OD X .344 ID X .050 THK	
2 85A626	SOCKET HD CAP SCREW, 3/8-16 UNC X 1.25 LG	
7345A601	BOLT, SOC HEAD, 5/16-18 UNC, .375 OD X 3/8" LG SHLDR , 3/8 HEX DRIVE	
8   6 4 A 2	BUTTONHEAD CAP SCREW, I/4-20 UNC X .50 LG, 5/32 HEX DRIVE	
SSP300	CLAMP SWIVEL, 1/4-20 UNC X 5/16 LG THD, PAD DIA 5/8, OA LENGTH	
-   4	SPACER 1.5 X 2.0 X .125 THK	NEI
-   5	SPACER I.5 X 2.0 X .25 THK	NEI
E   42C - 294	BUSHING, SPACER	

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	REVISION APPROVAL																DF	RAWING	APPROVALS		DATE	L	
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NOTES:	
I. DRAWING PREPA	RED IN ACCORDANCEWITH
2. INTERPRET DIM	ENSIONS AND TOLERANCE
3. DIMENSIONS AR	E IN INCHES
4. DIMENSIONS AP	PLY AT ROOM TEMPERATU
5. GEOMETRY IS D	EFINED IN PRO ENGINEE
6. DRAWING AND M	ODELS COMBINED DEFINE

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