MODULAR COIL ASM DESIGN

9/27/06

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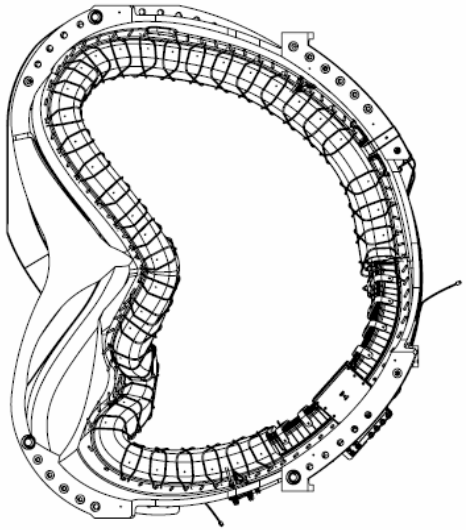
Completing the modular coil assembly

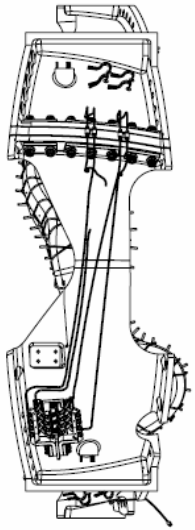
Design elements to be addressed by top-level models/drawings:
- Routing and termination of coolant tubes, flux loops
- Location of thermocouples and strain gages
- Winding pack thermal insulation
- Grounding, protective cover over leads, etc
- Vacuum vessel interface
- Coil-to-coil interface

Collecting as-built information for shims, asm planning:
- Geometry of wing and flange surfaces
- Profile of winding pack and clamp asm

What are the top-level drawings?

SE140-101, -102, -103



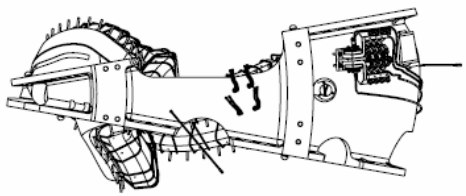


NOTES:

1. DRAWING PREPARED IN ACCORDANCE WITH ASME Y14.100-2000.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5M
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 DURING OPERATION.
6. OPTIONAL BLANKET INSULATION ASSEMBLY, F/N 18, NOT SHOWN. SEE DRAWING SE122-009 FOR INSTALLATION.

(1)

SCALE 0.13



	2	TEMP-THERMOCOUPLER1	THERMO COUPLER		27
	6	SE1851-170	BALL ALIGNMENT ASSEMBLY		26
	13	SE141-704	FLANGE BUSHINGS		25
	AR	TEMP_060921B	TUBE CLAMP		24
	2	TEMP060925E	POL BR CONNECTOR ASSEMBLY		23
	2	90FF-4	BRAZED ELBOW		22
	2	10FF-4	BRAZED UNION		21
	AR	SE122-009	WINDING FORM INSULATION ASSY		20
	AR	TYPE-A_CLAMP_POS	CLAMP ASSEMBLY		19
	1	SE142A-246-4	SIDE "B" CHILL PLATES (SIDE)		18
	1	SE142A-246-3	SIDE "B" UPPER CHILL PLATES (TOP)		17
	AR	SE142A-243	SIDE "B" GROUNDWRAP		16
	1	SE142A-241	SIDE "B" WINDING ASSEMBLY		15
	1	SE142A-244-4	SIDE "B" LOWER CLADDING (BASE)		14
	1	SE142A-244-3	SIDE "B" UPPER CLADDING (SEPTUM)		13
	AR	SE142A-258	SIDE A COOLING TUBES		12
	1	SE142A-256-4	SIDE A LOWER CHILL PLATES (SIDE)		11
	1	SE142A-256-3	SIDE A UPPER CHILL PLATES (TOP)		10
	AR	SE142A-253	SIDE-A WP GROUNDWRAP		9
	1	SE142A-251	SIDE "A" WINDINGS ASSEMBLY		8
	1	SE142A-254-4	SIDE "A" LOWER CLADDING (BASE)		7
	1	SE142A-254-3	SIDE "A" UPPER CLADDING (SEPTUM)		6
	1	SE142A-089	TYPE "A" LEADS ASSEMBLY		5
	1	SE142A-050	TYPE "A" TERMINAL ASSEMBLY		4
			STUDS (SEE TABLE)		3
	1	SE141-101	MOD COIL WINDING FORM ASSEMBLY TYPE-A		2
	1	-1	MCWF-TYPE A ASM		1
SE140-103	CAGE CODE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL	SPECIFICATION	FIND NO
	NEXT ASSEMBLY		PARTS LIST			

SE140-101 0

SCALE NOTED

DES D WILLIAMSON
DRN G LOVETT
CHK M COLE
DEPT
PE D WILLIAMSON
QA
PJ
MFG
APPR. DEPT J SIEGLE

UT-BATTELLE — Oak Ridge National Laboratory

NATIONAL COMPACT STELLARATOR EXPERIMENT

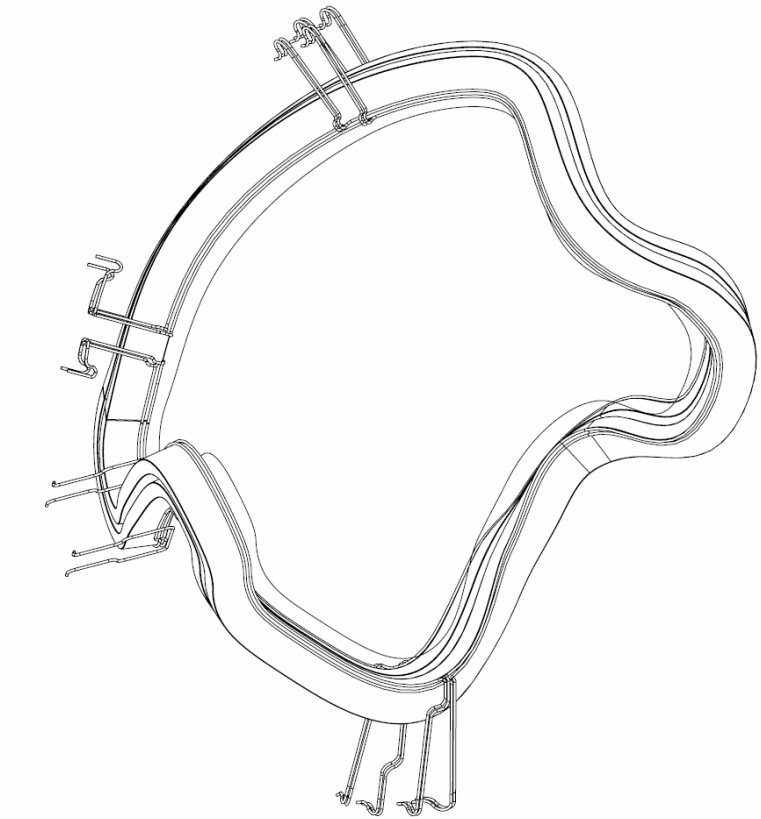
MCWF TYPE "A"
FULL COIL ASSEMBLY

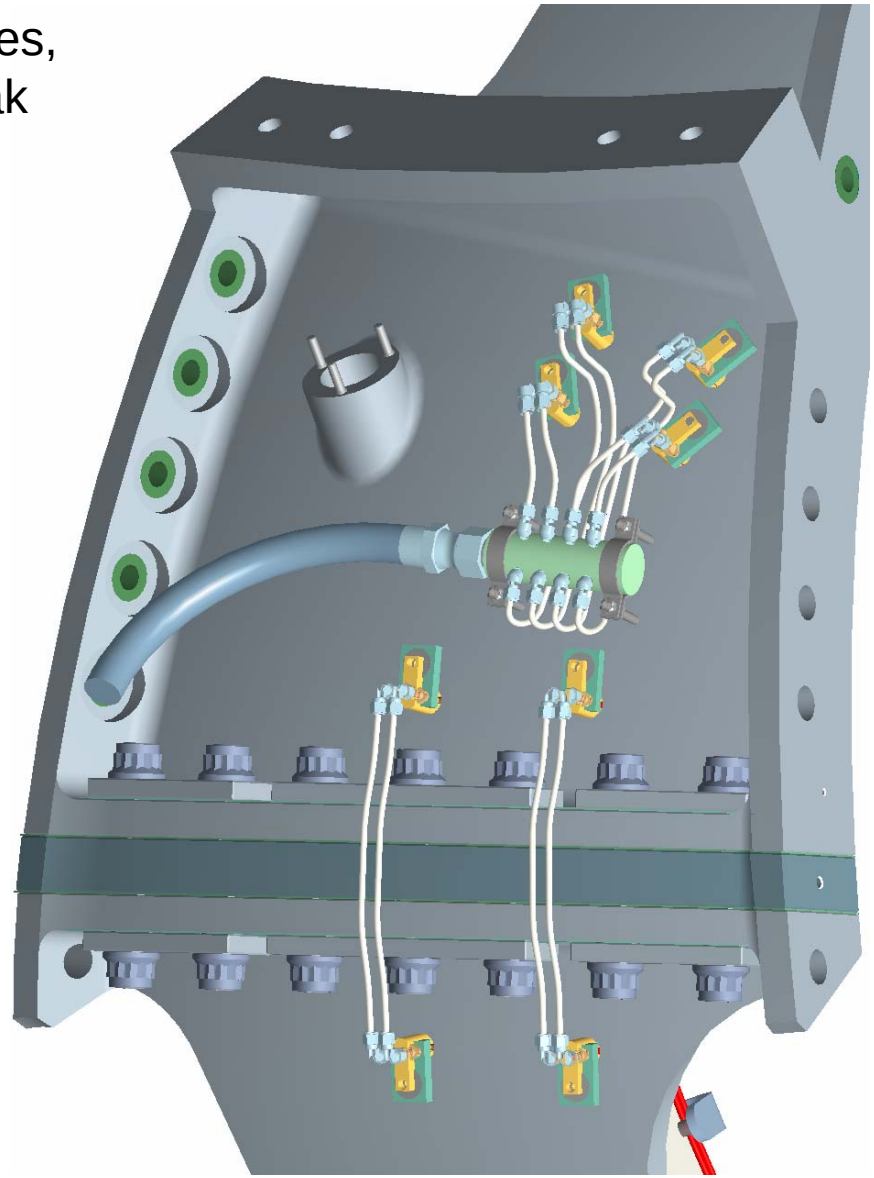
SE140-101

P THIS DRAWING PRODUCED ON PRO-ENGINEER

Coolant loops and termination

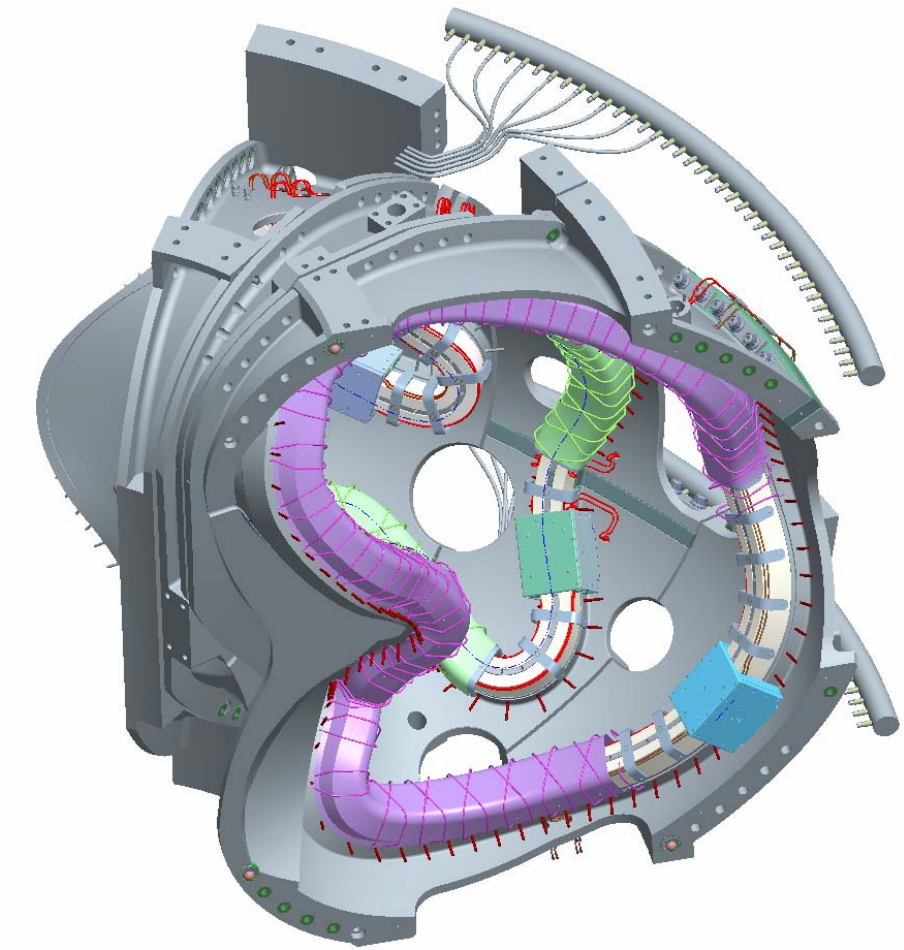
- Each winding pack has four inlet/outlet lines, with two lines interrupted by poloidal break
- One leads area chill plate per side
- Initial concept included a manifold mounted to winding form
- Issues of space, access for maintenance

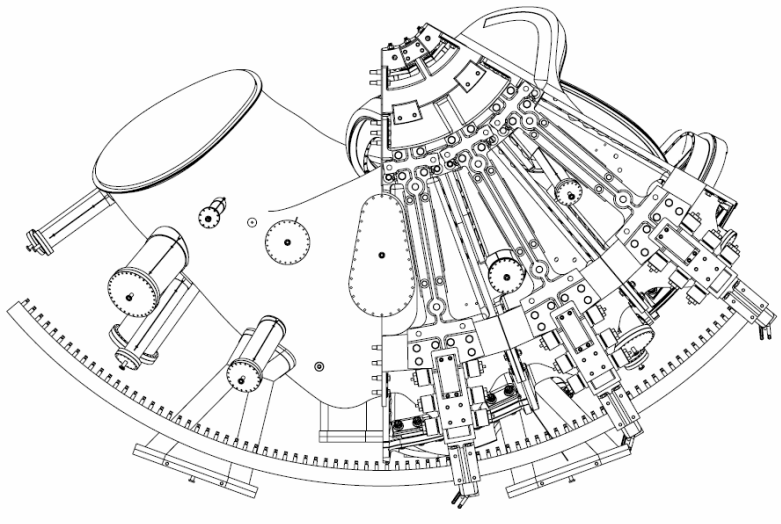


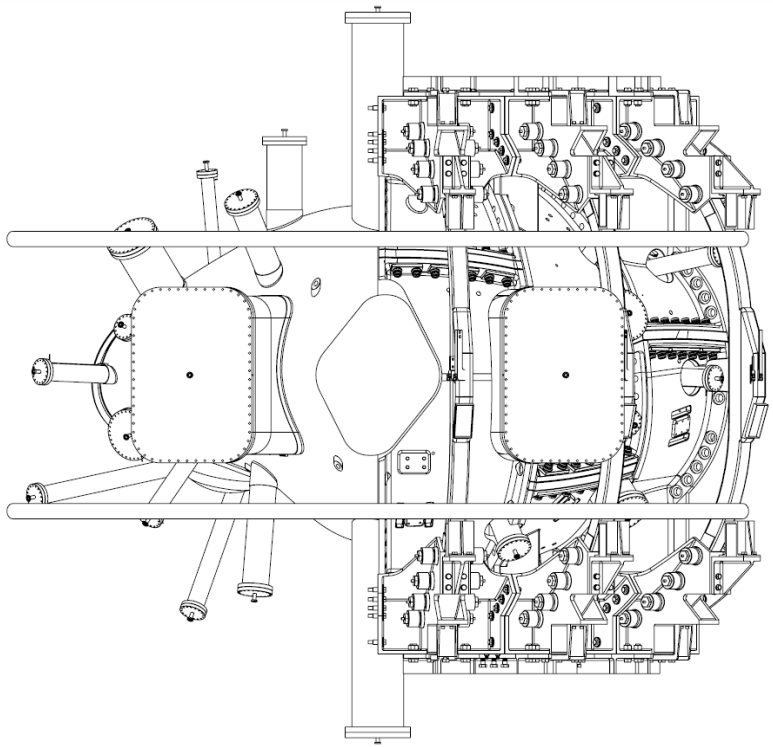


External manifold

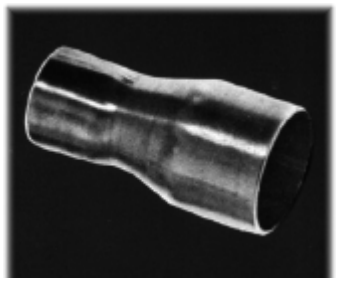
Transition to flex tubing at the winding form







Tube termination

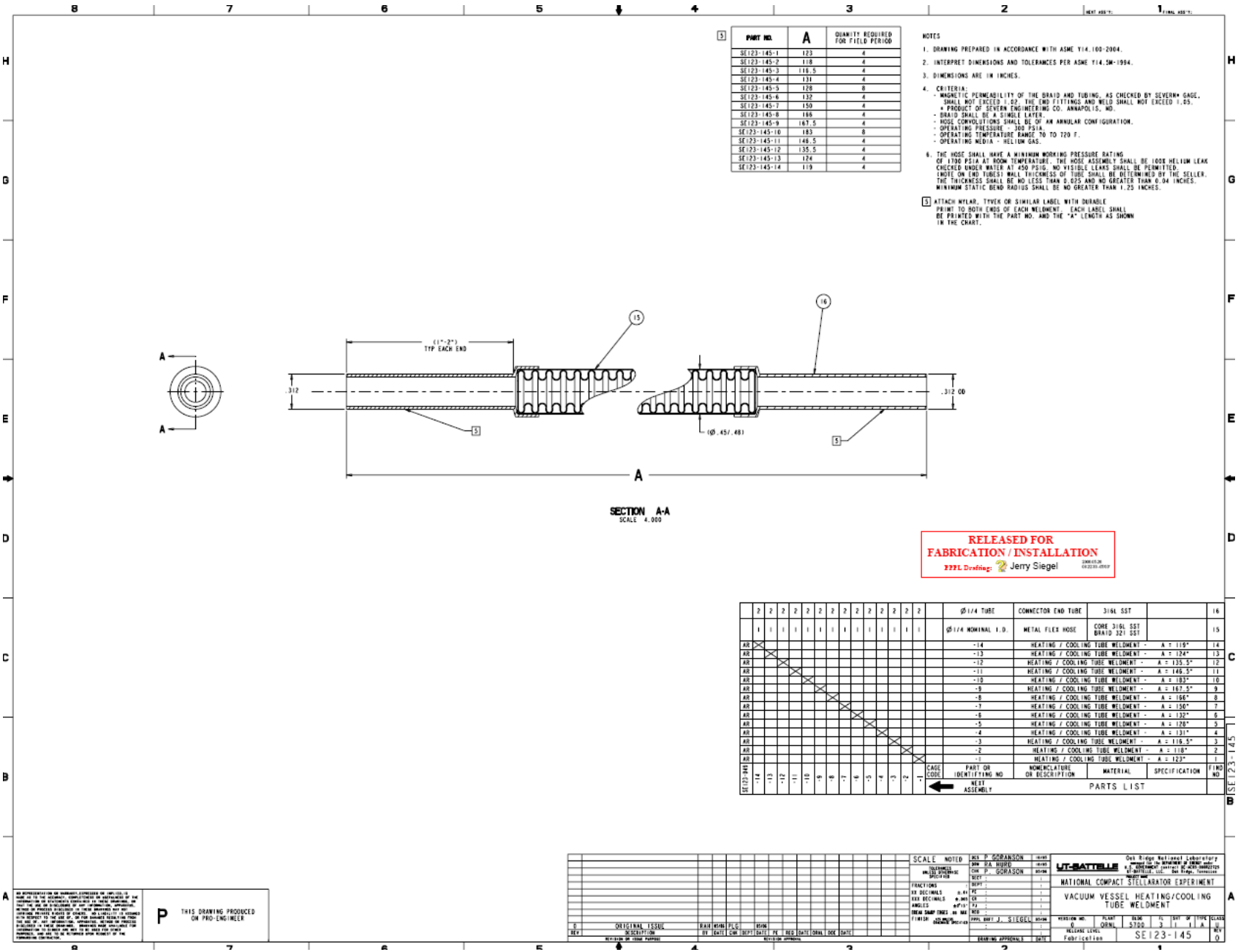


Truly Tubular
Brazetyte 5FF-5-4

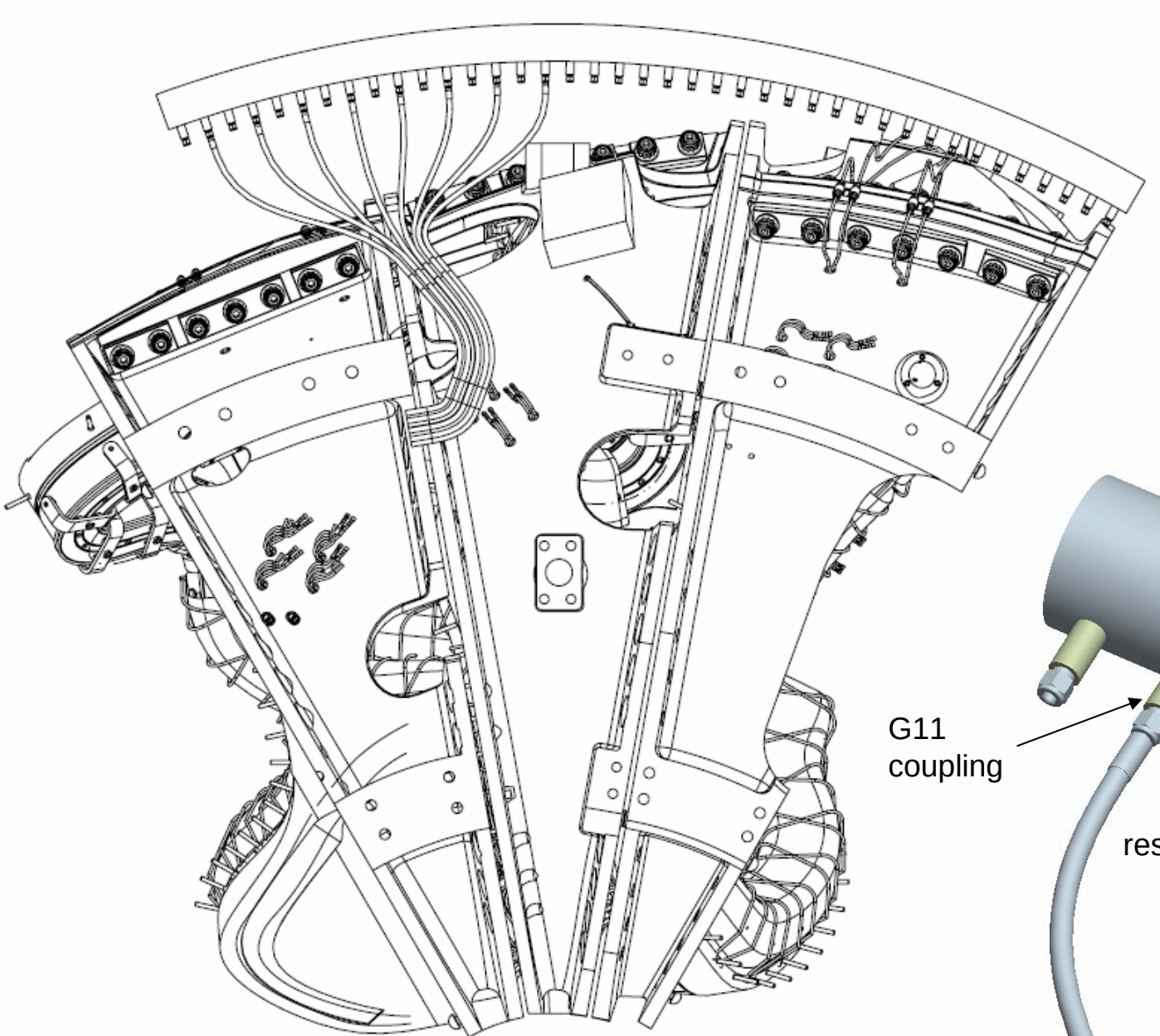
bleed hole
fittings

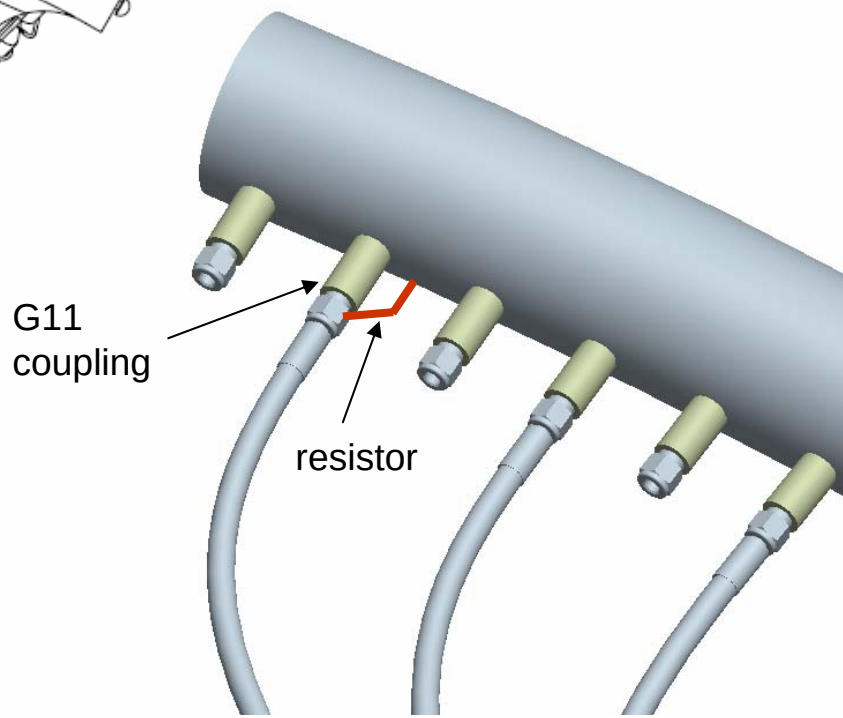
bracket

Metal flex hose

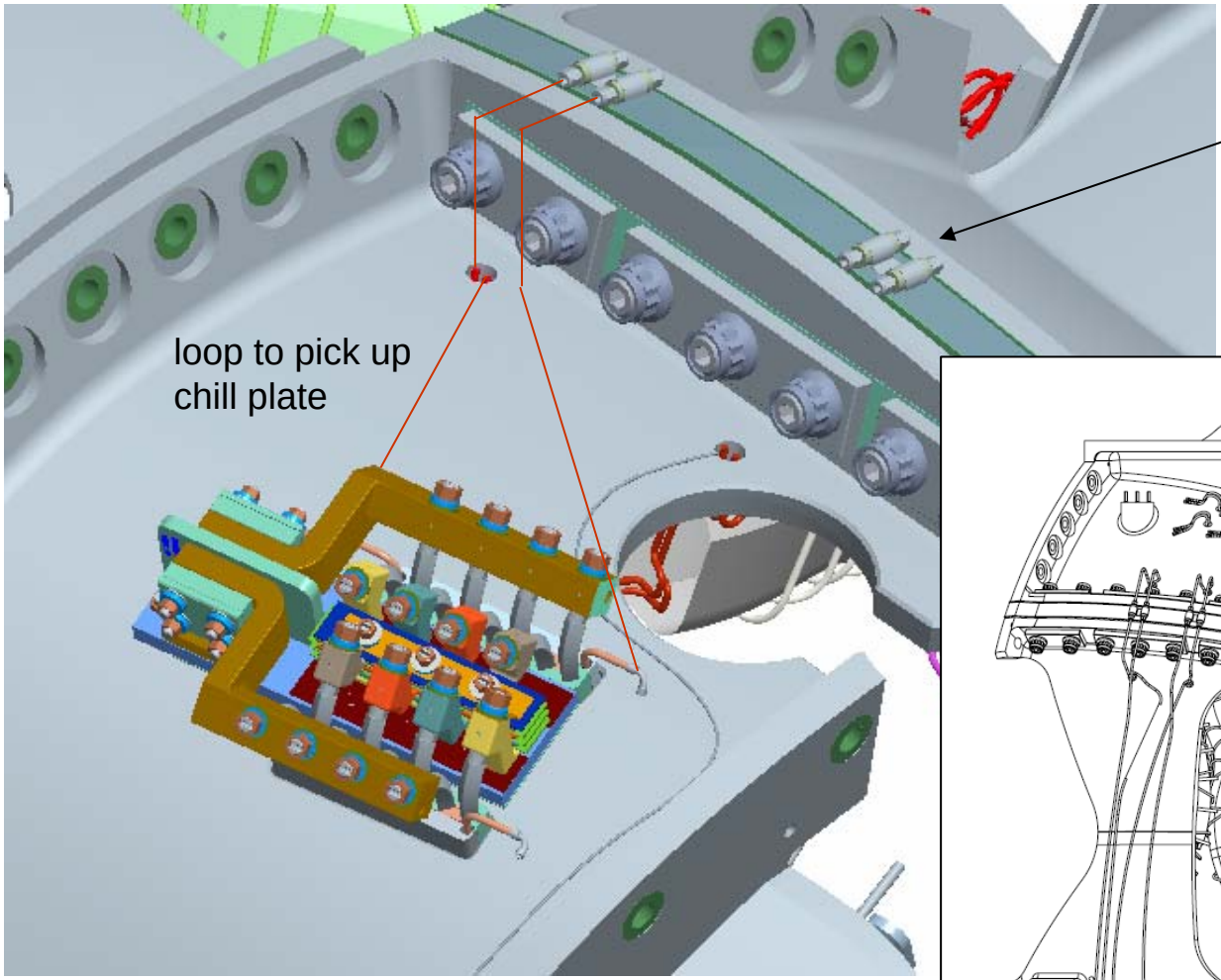


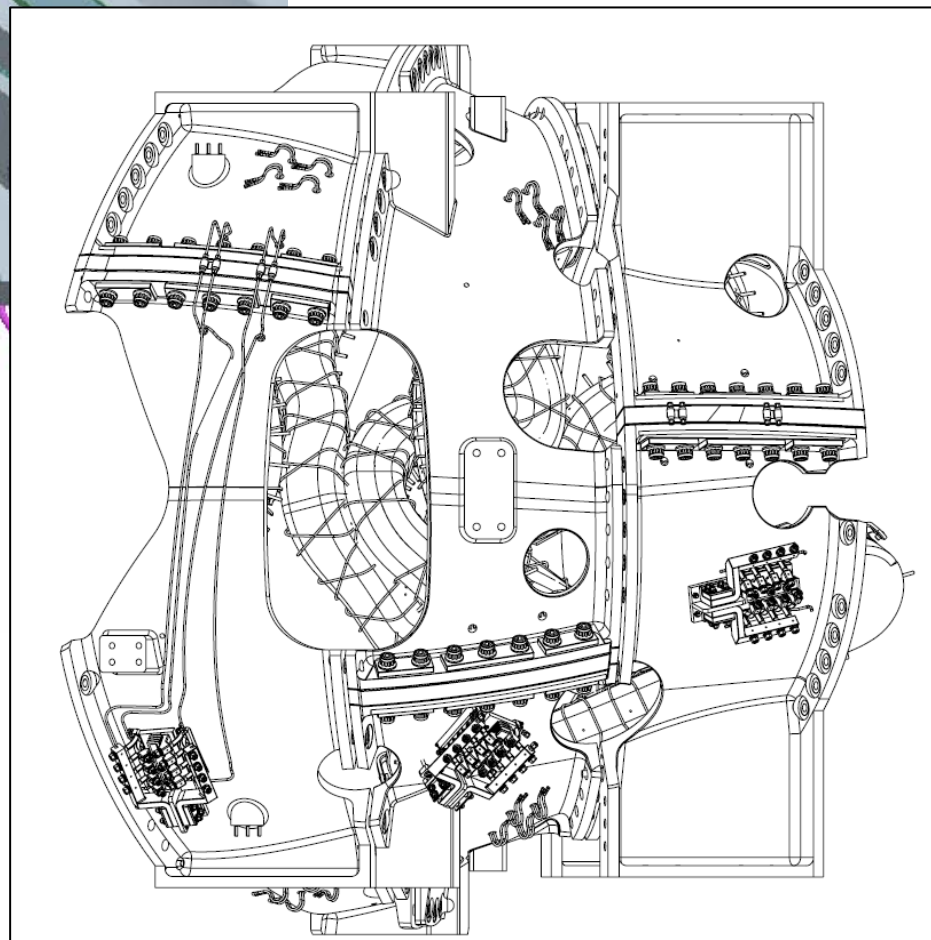
Flex hose routing



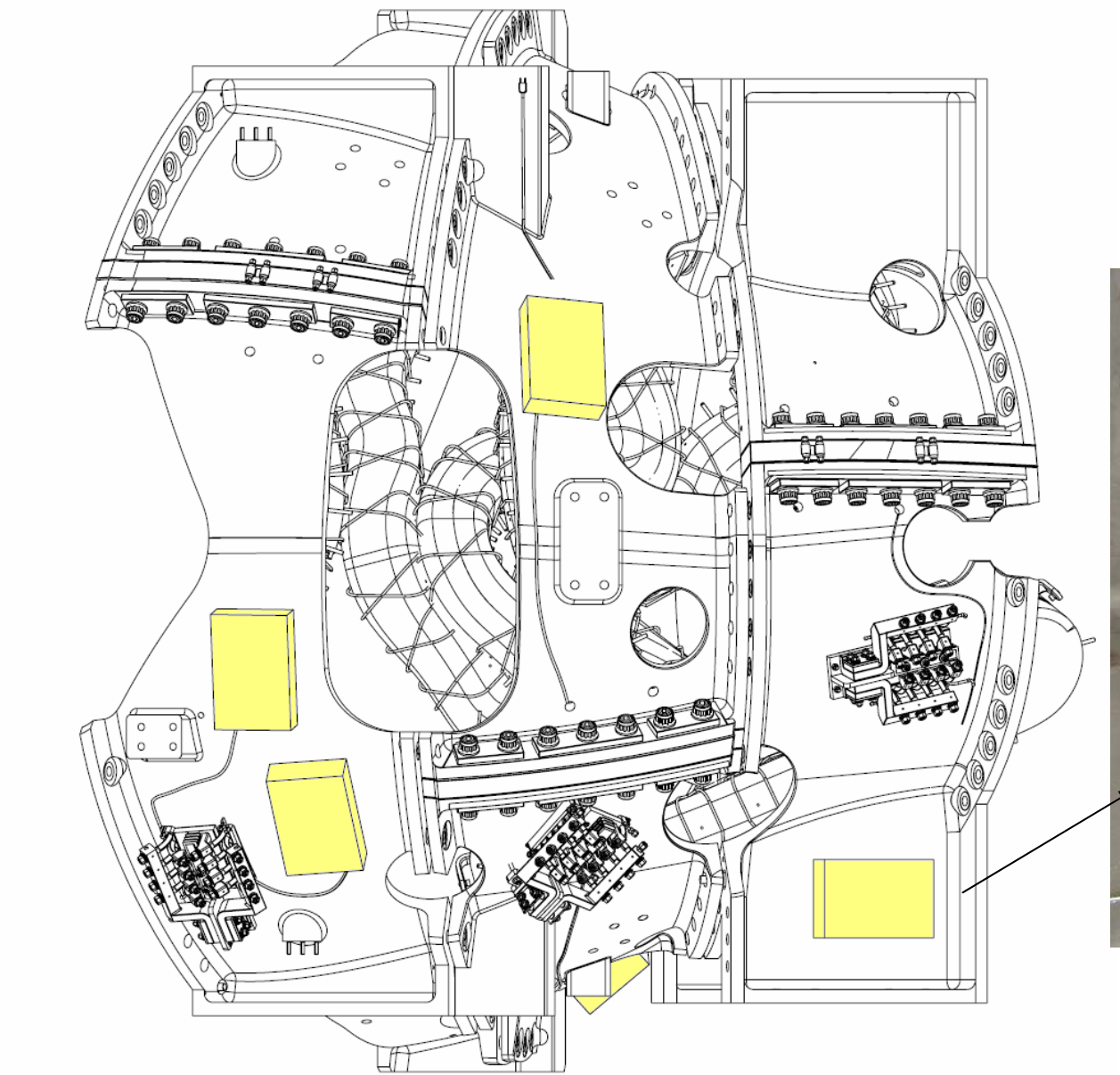


Lead area chill plates





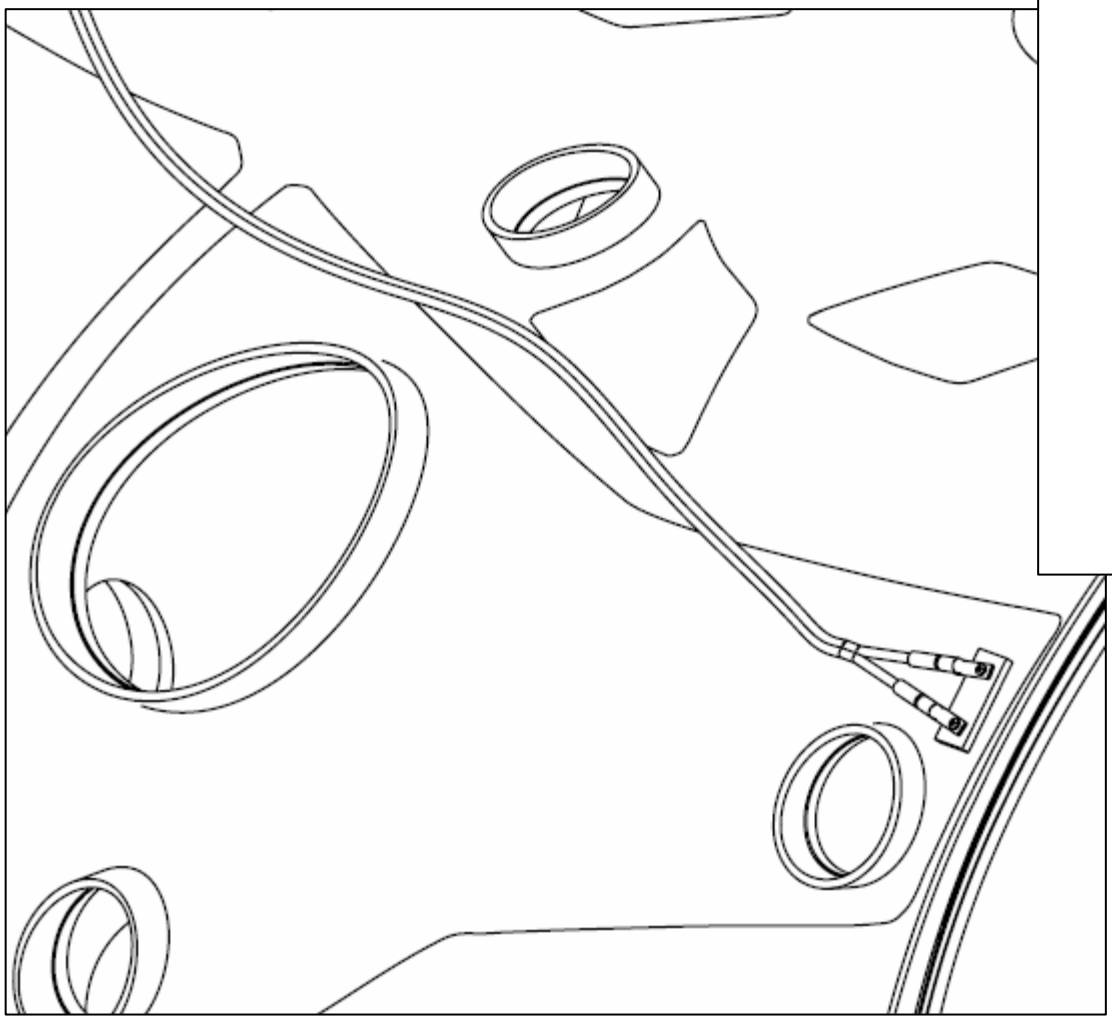
Flux loop termination

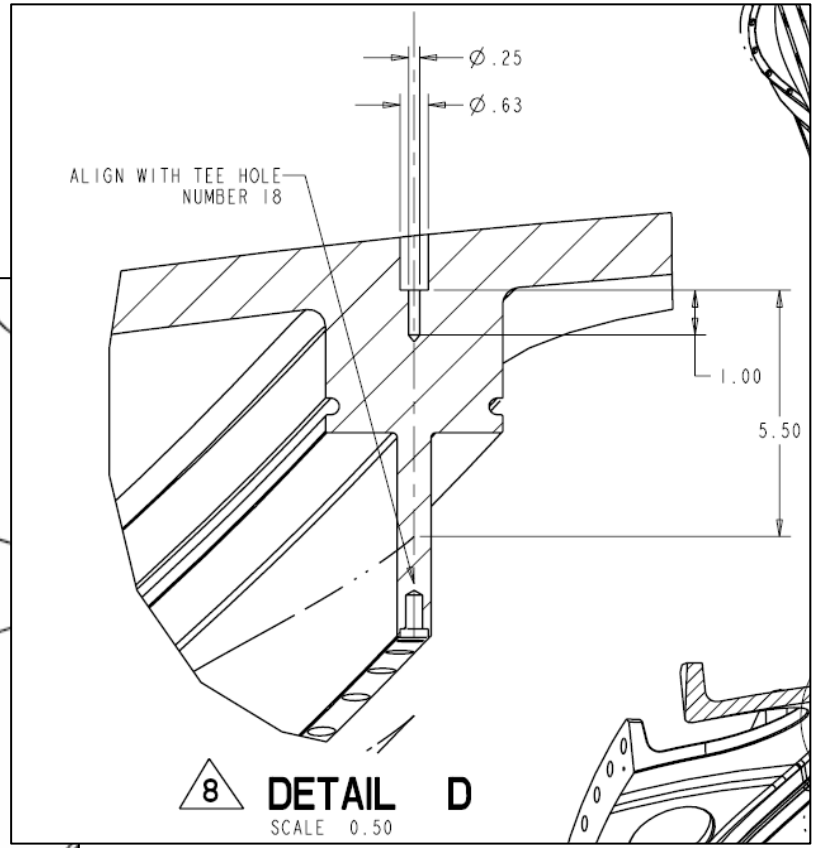


FLUX LOOP WIRE ENCLOSURE
APPROX 3 X 8 X 12-IN
ALUMINUM OR SST
PPPL TO SUPPLY

Thermocouples

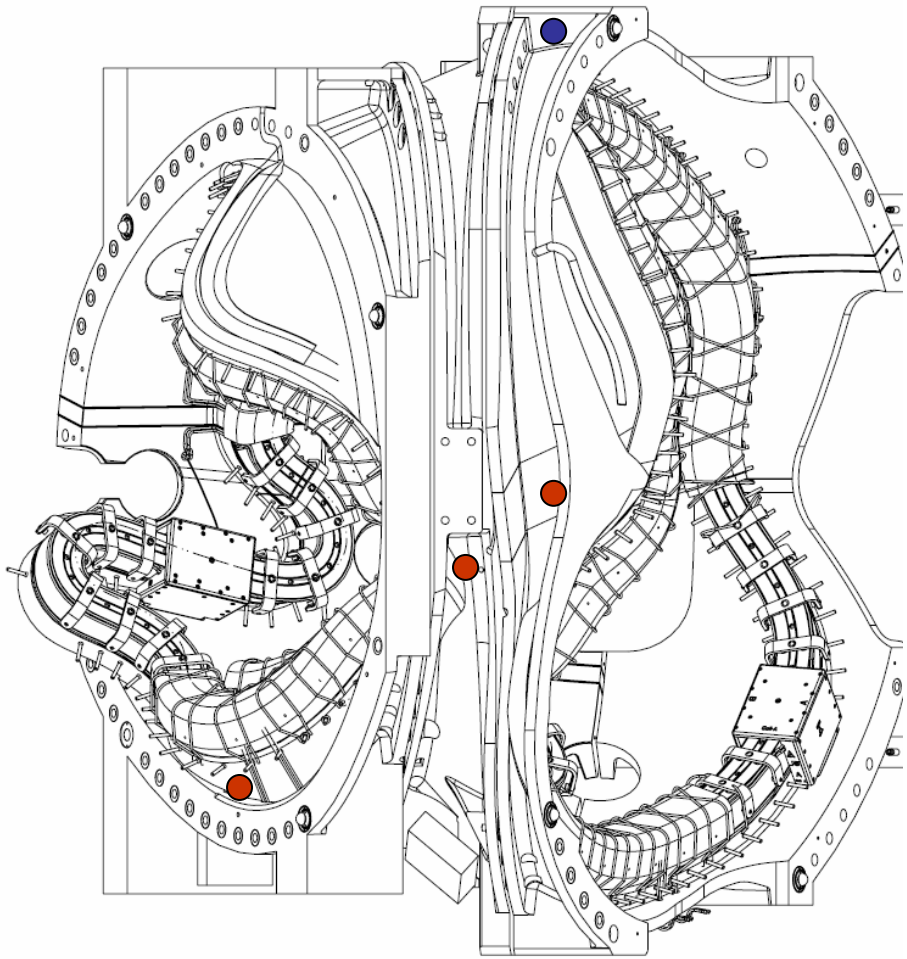
- Isolated Omega T/C as used on vessel
- Surface mounted and/or two holes/ winding form

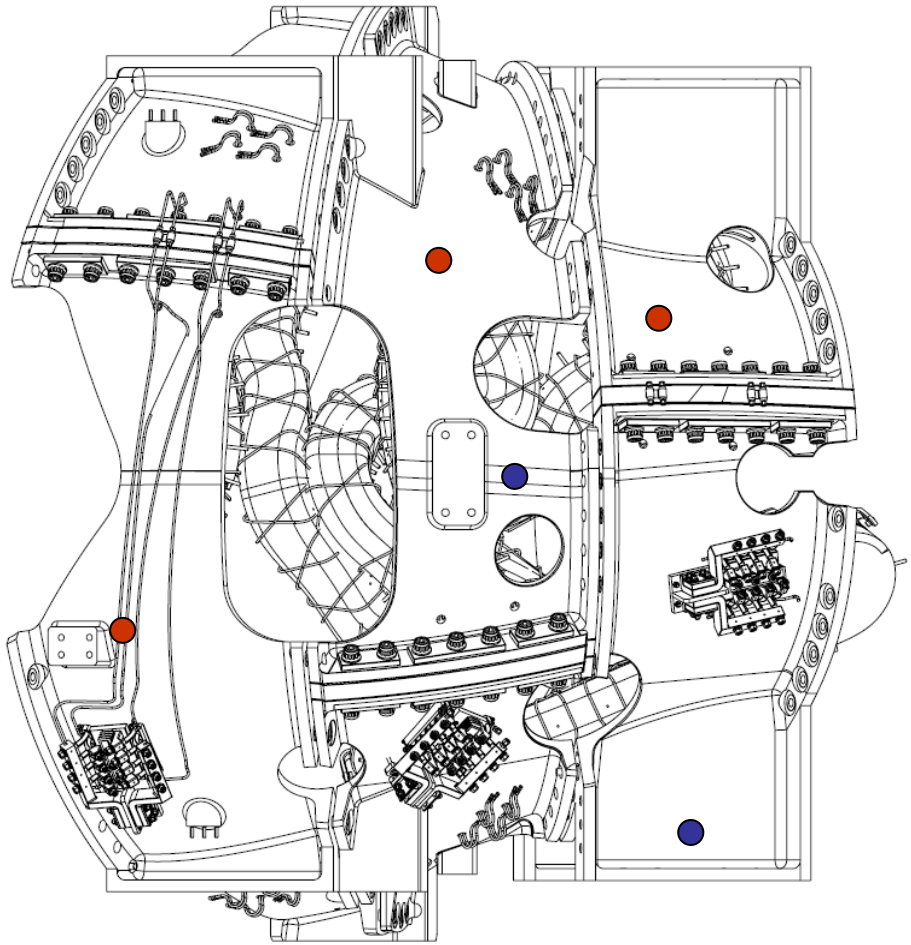




Thermocouples

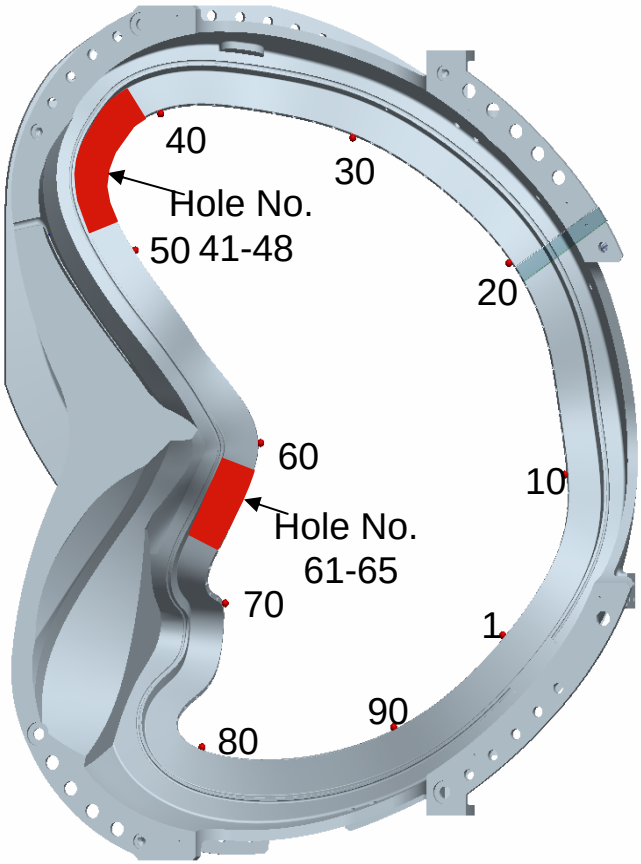
- Thermocouple holes
- Surface mounted

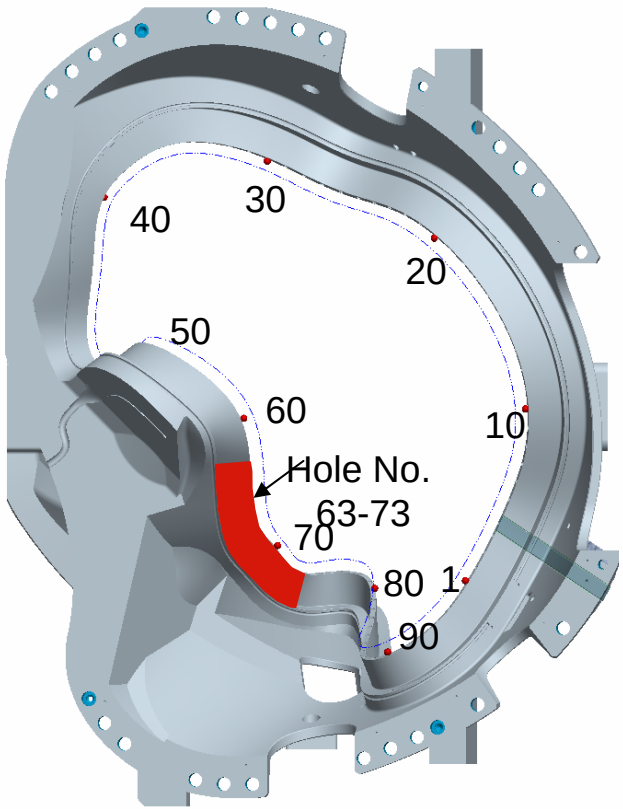


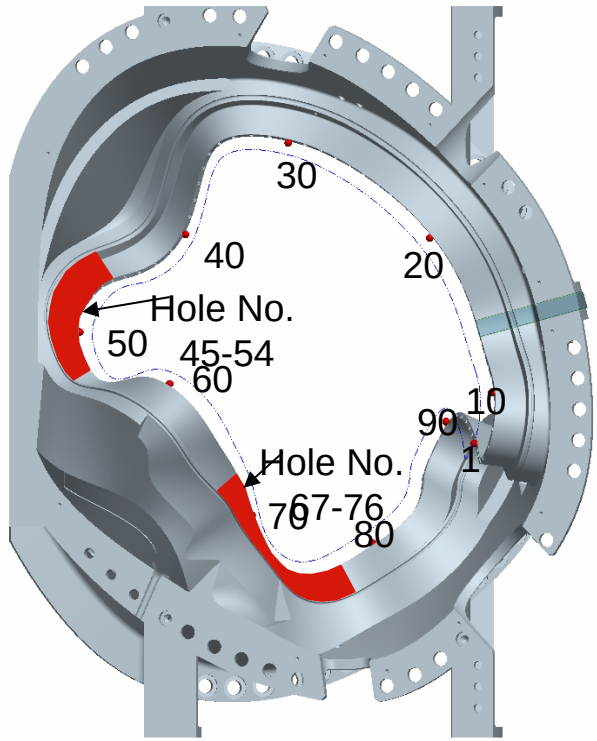


Fiber optic strain gages

- Cross-section plots used to identify regions of high stress in winding form
- Suggest concentrating strain gages on a winding law plane within each region
- Additional gages in benign region where gradients are small

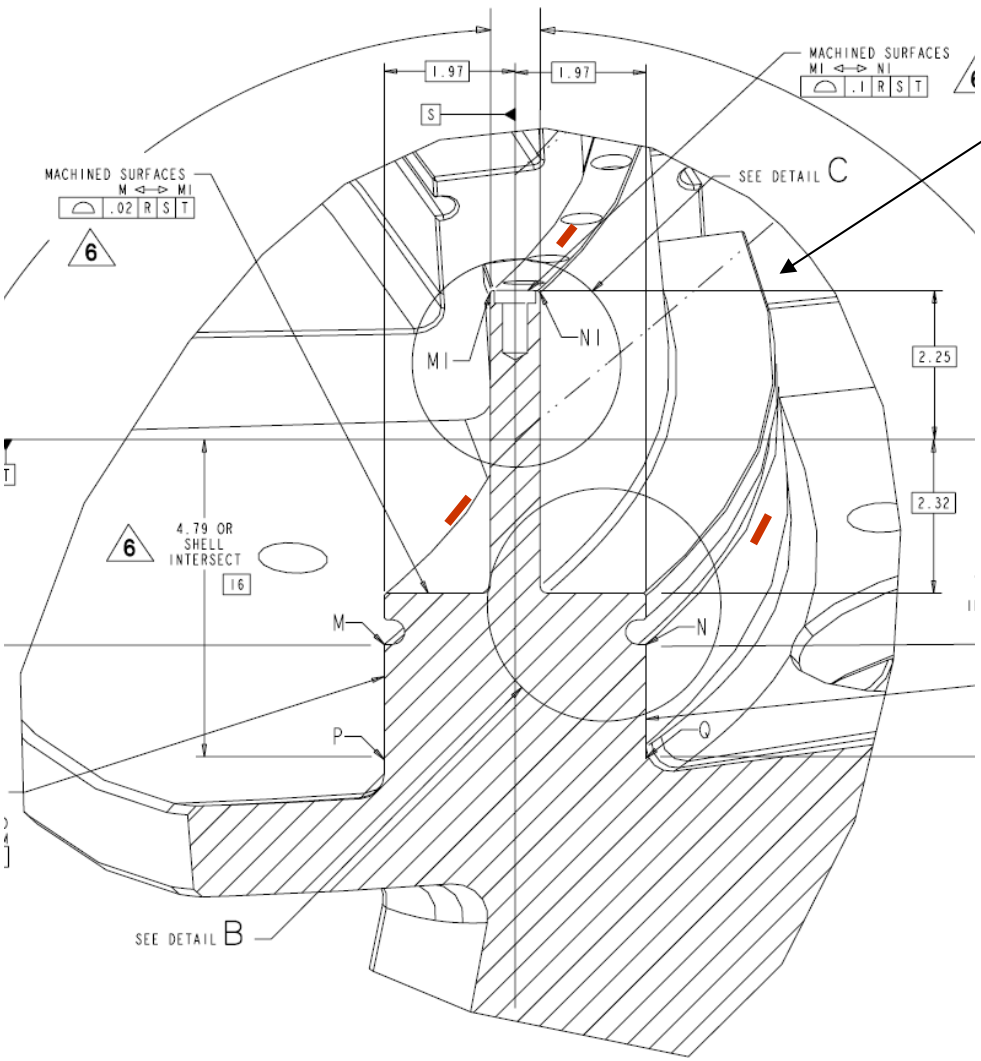






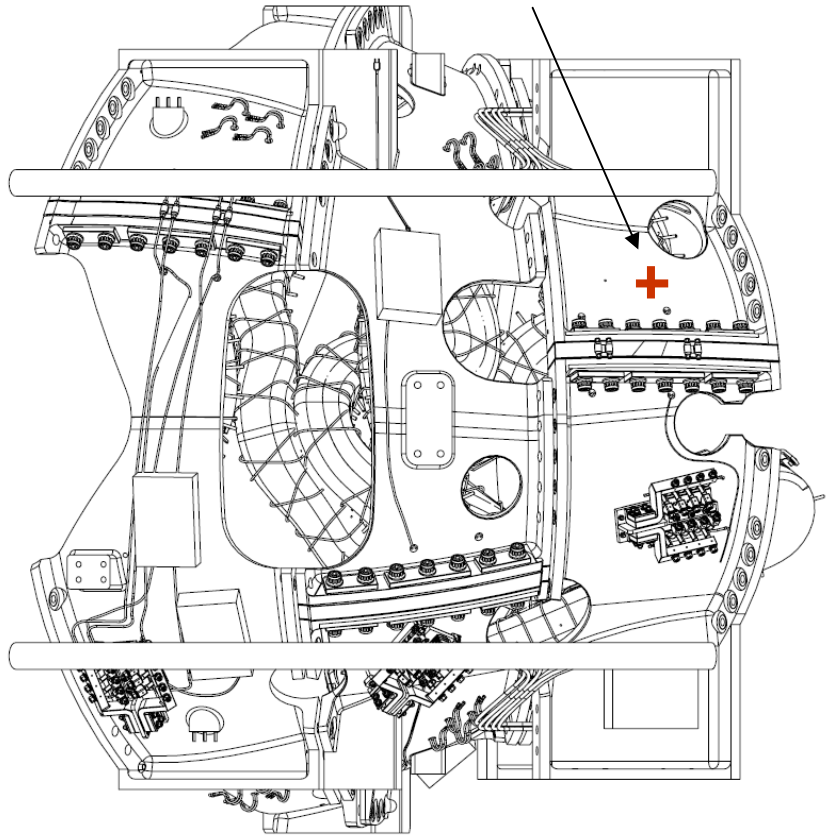
Strain gages

Multiple of 8 per three-coil sector

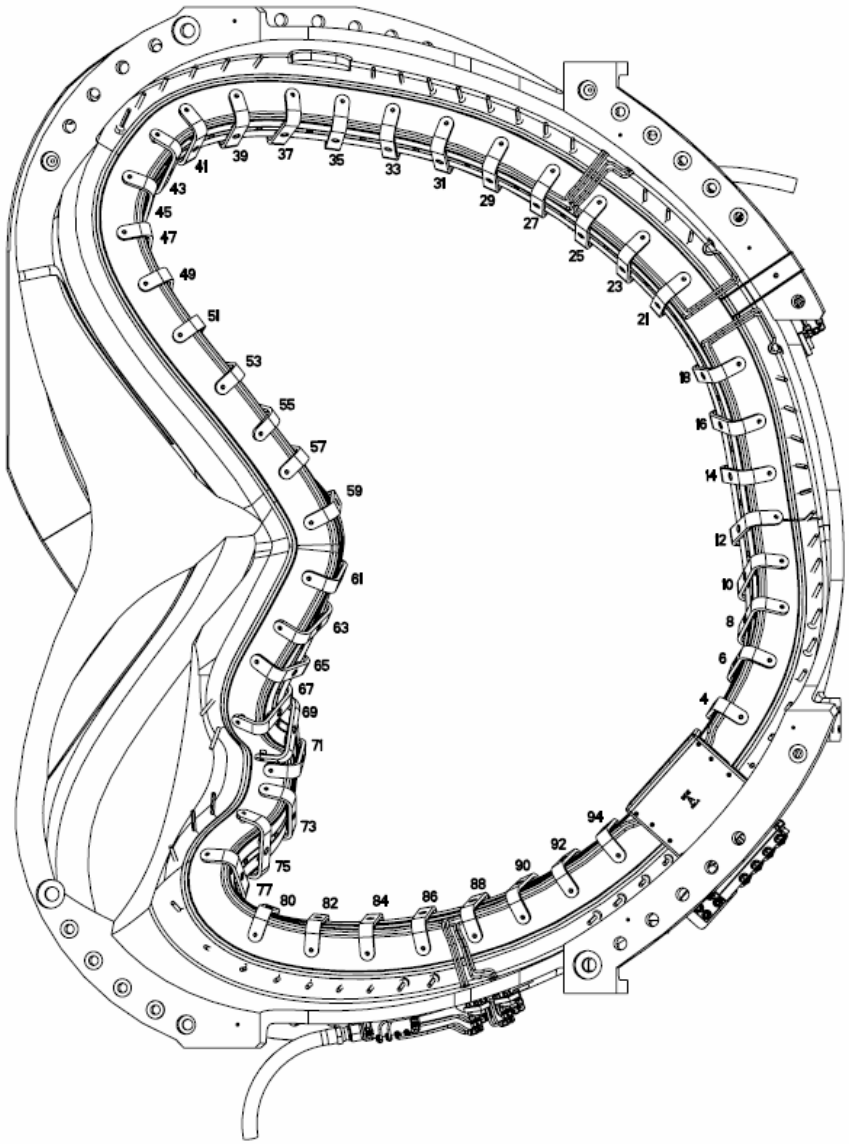


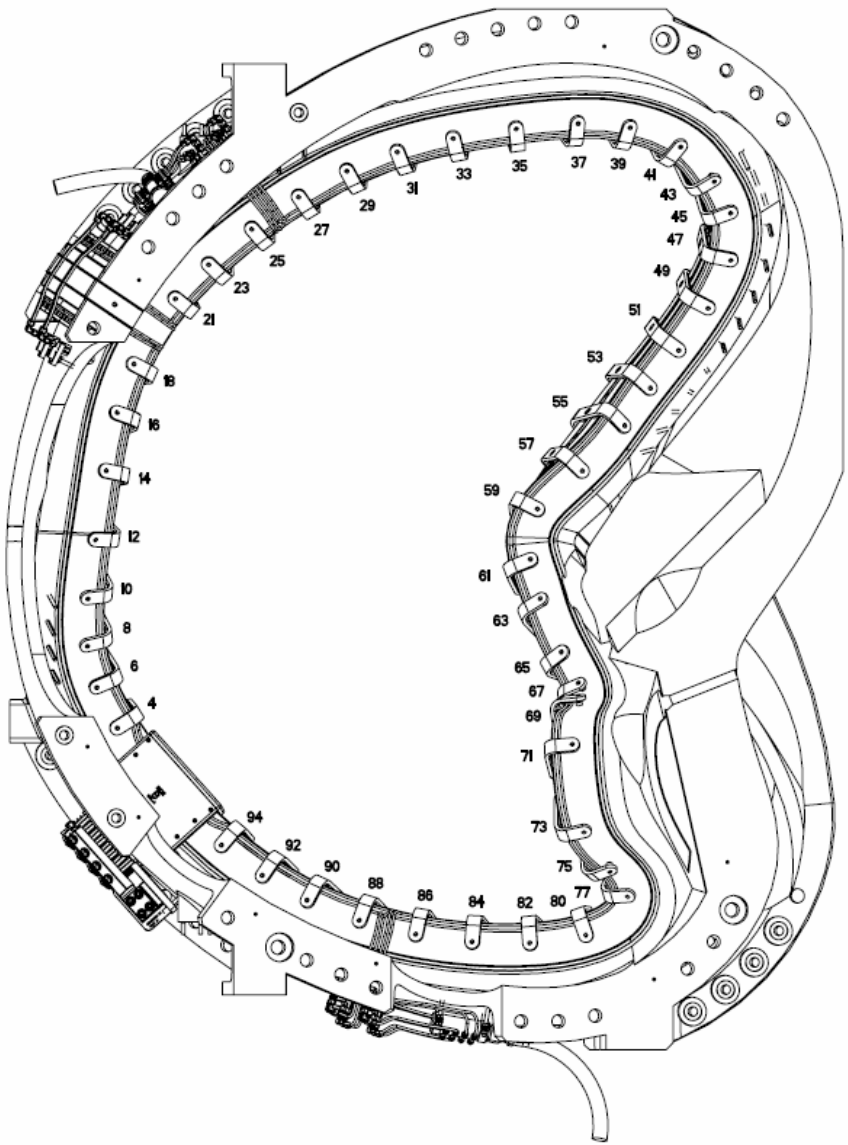
5 gages:
3 on tee
2 on wp

low stress region

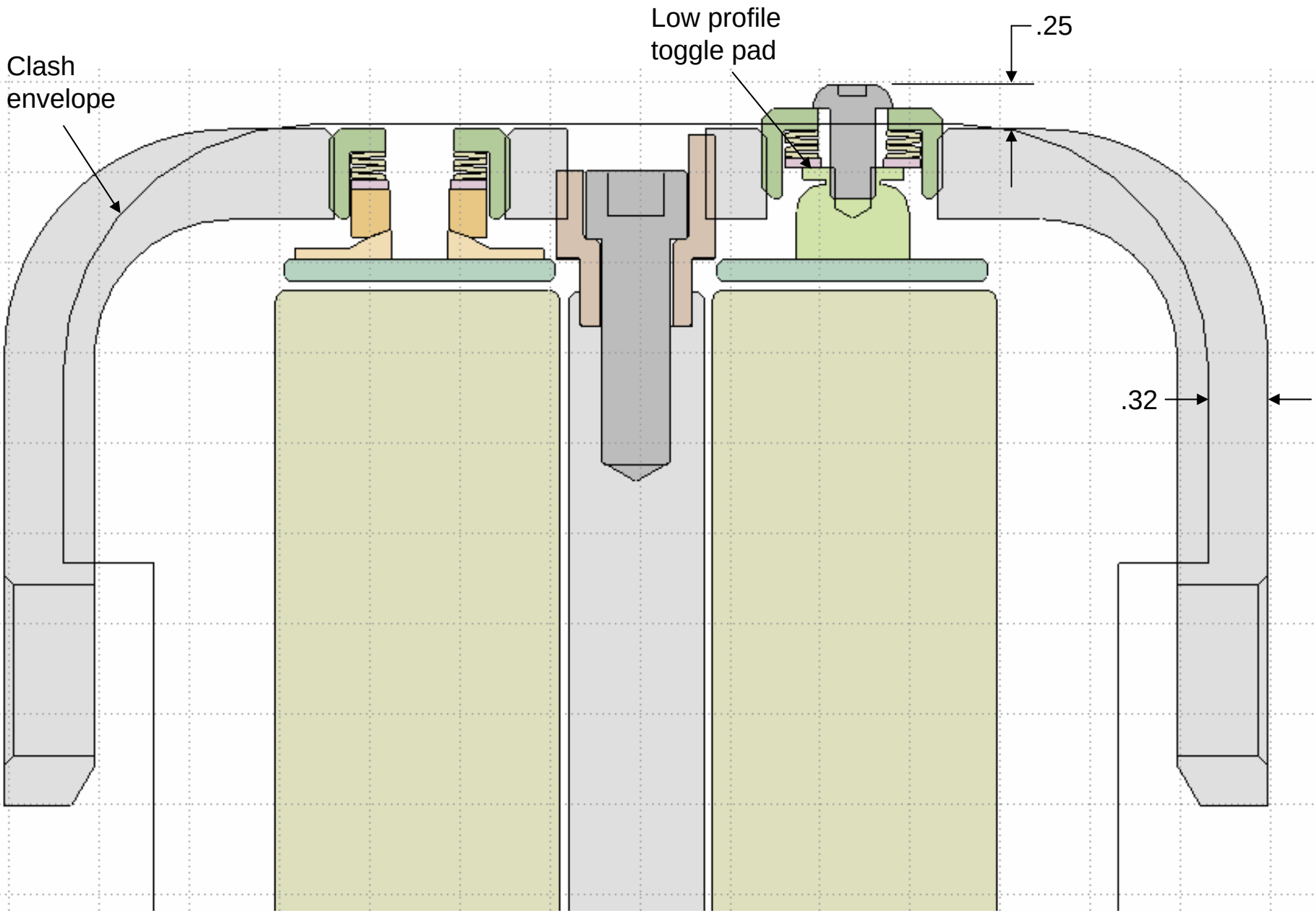


Clamp location

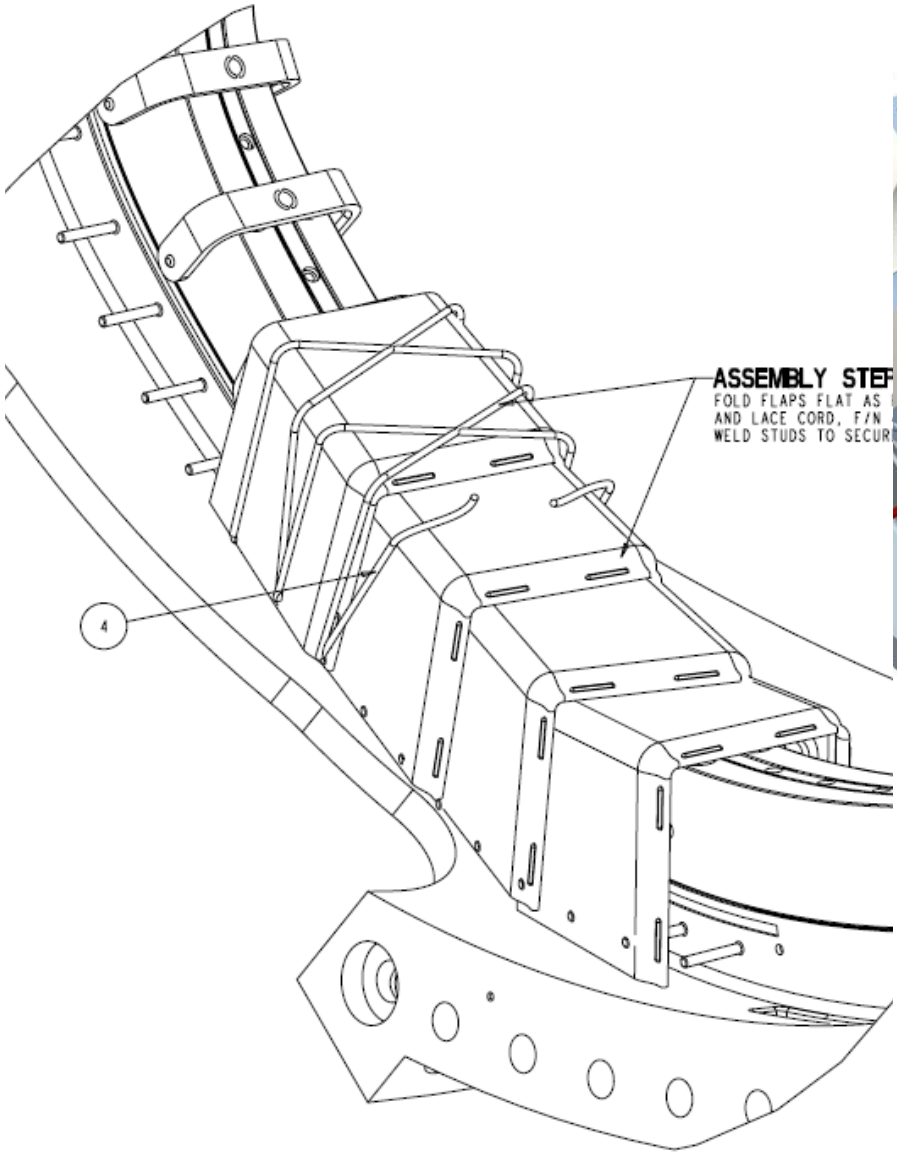


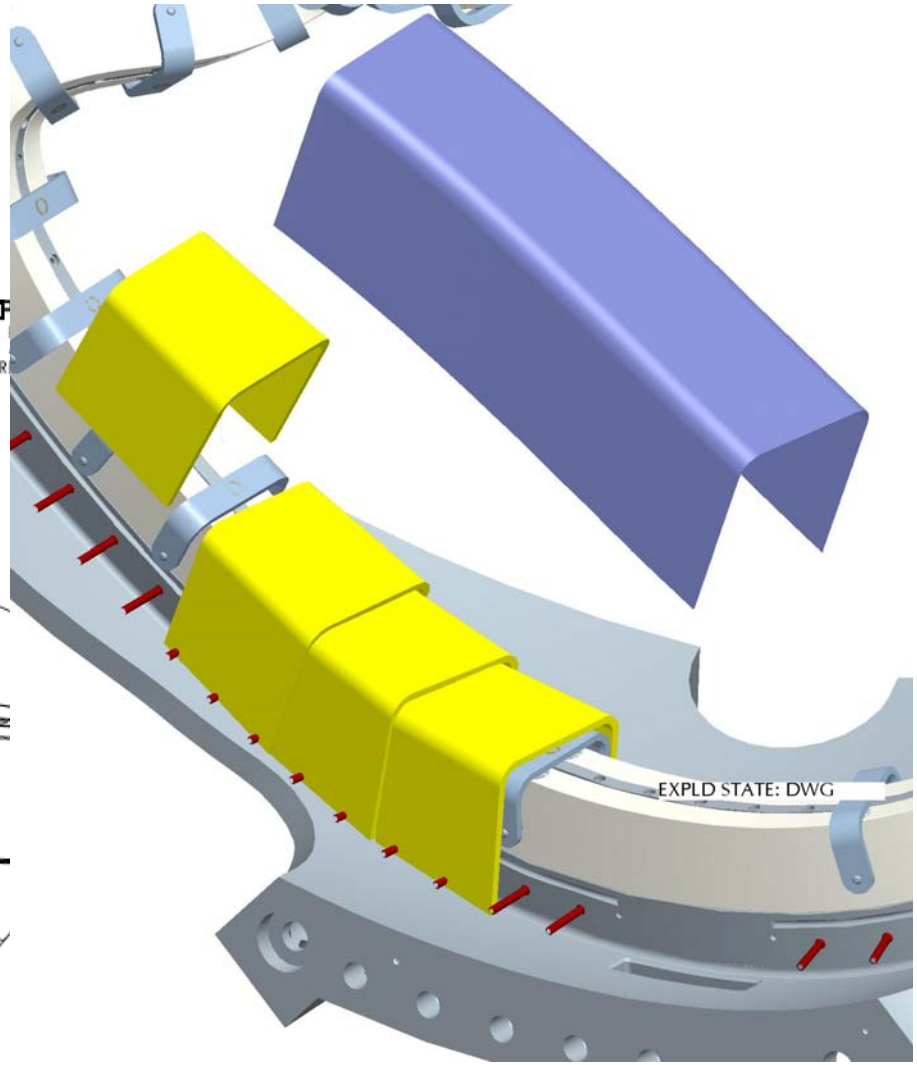


Clamp asm profile

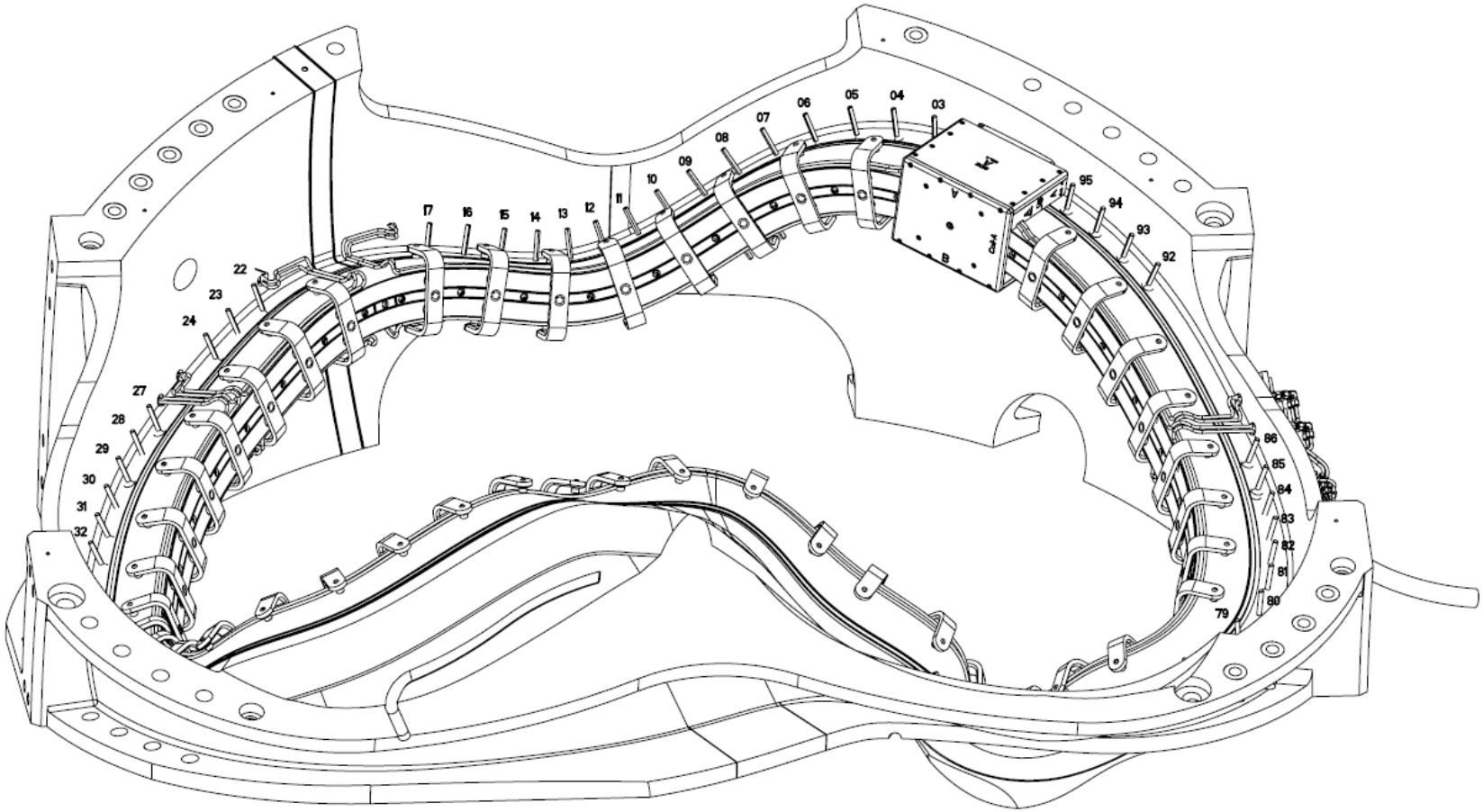


Thermal insulation

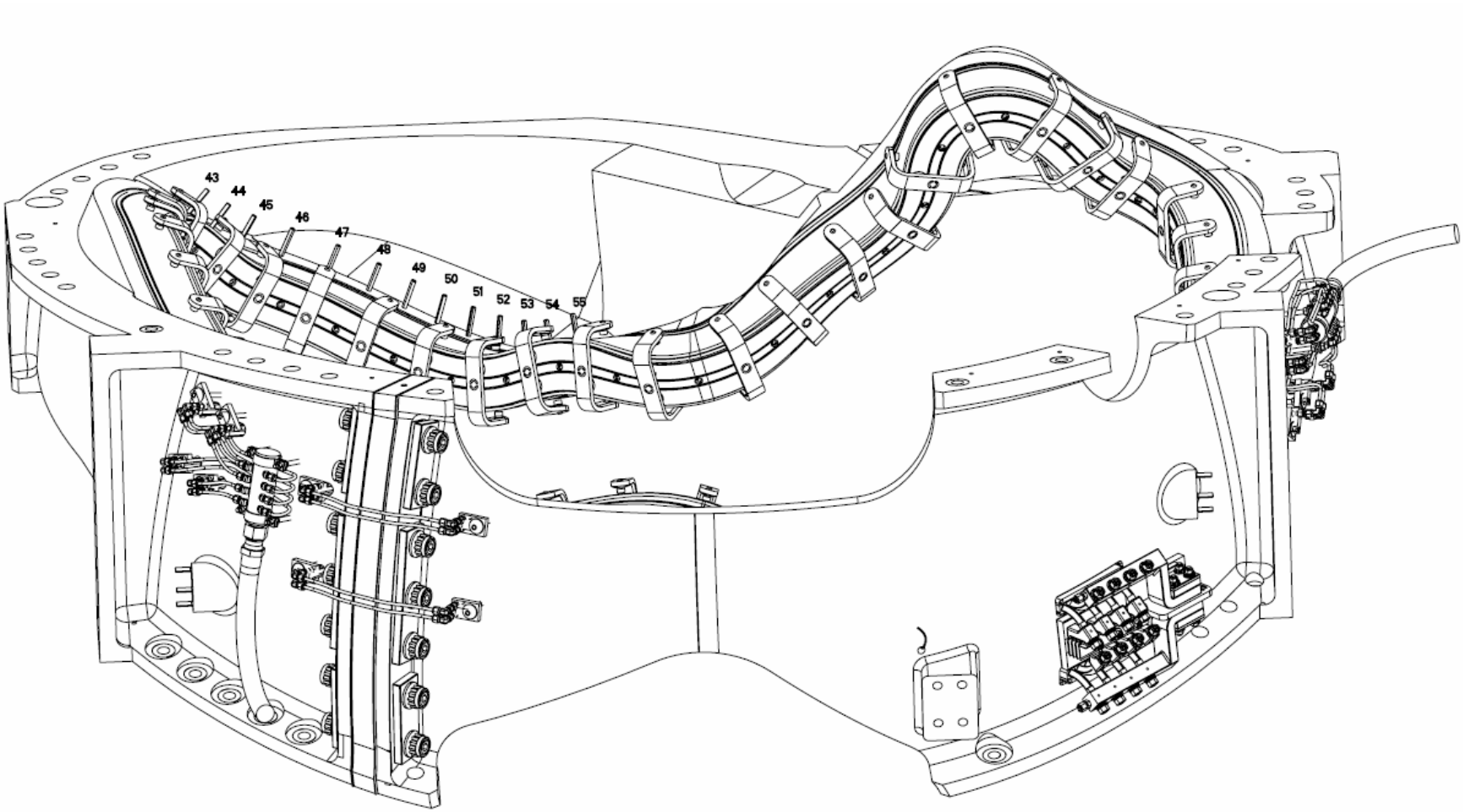




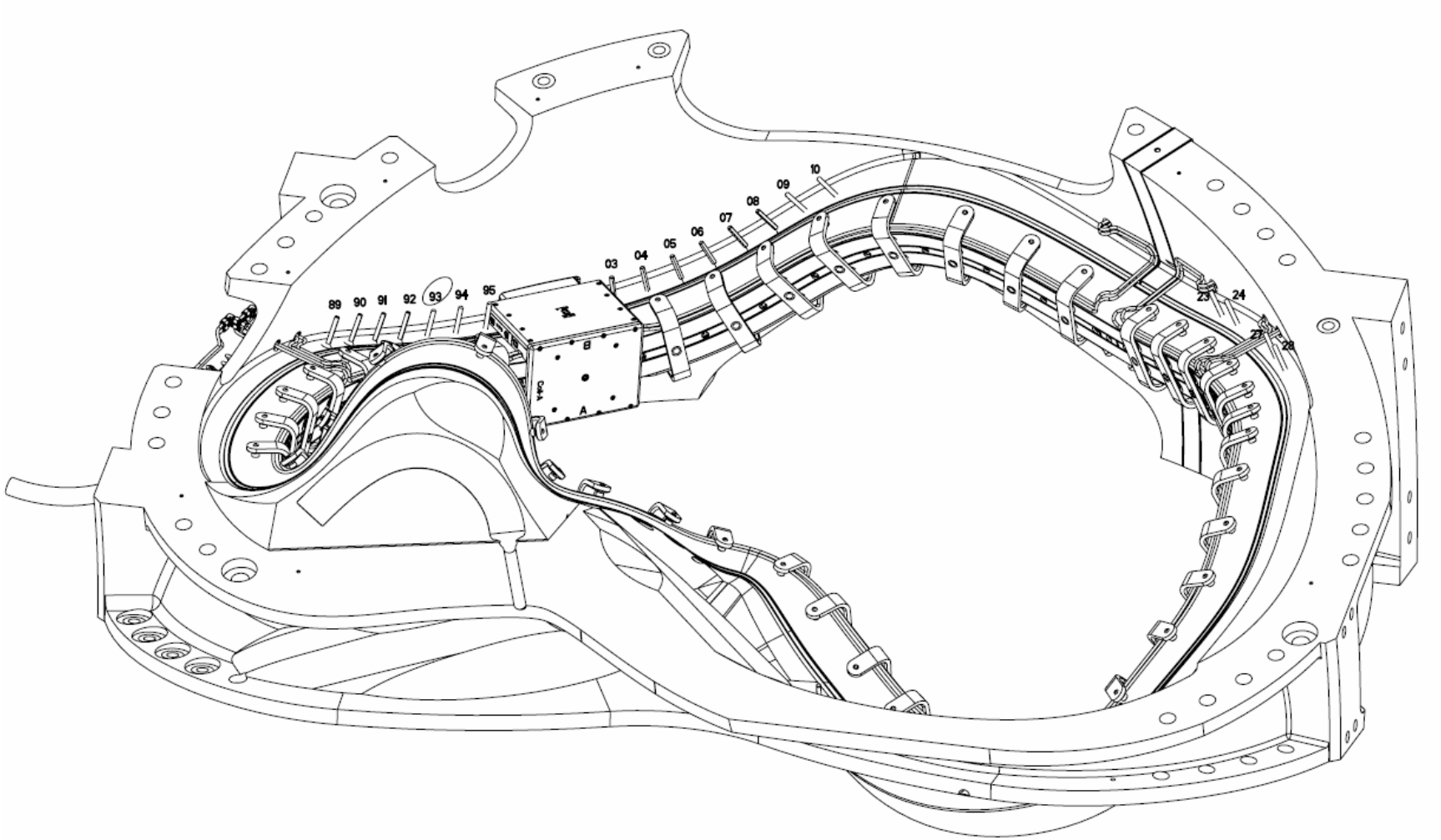
Studs that do not need to be removed



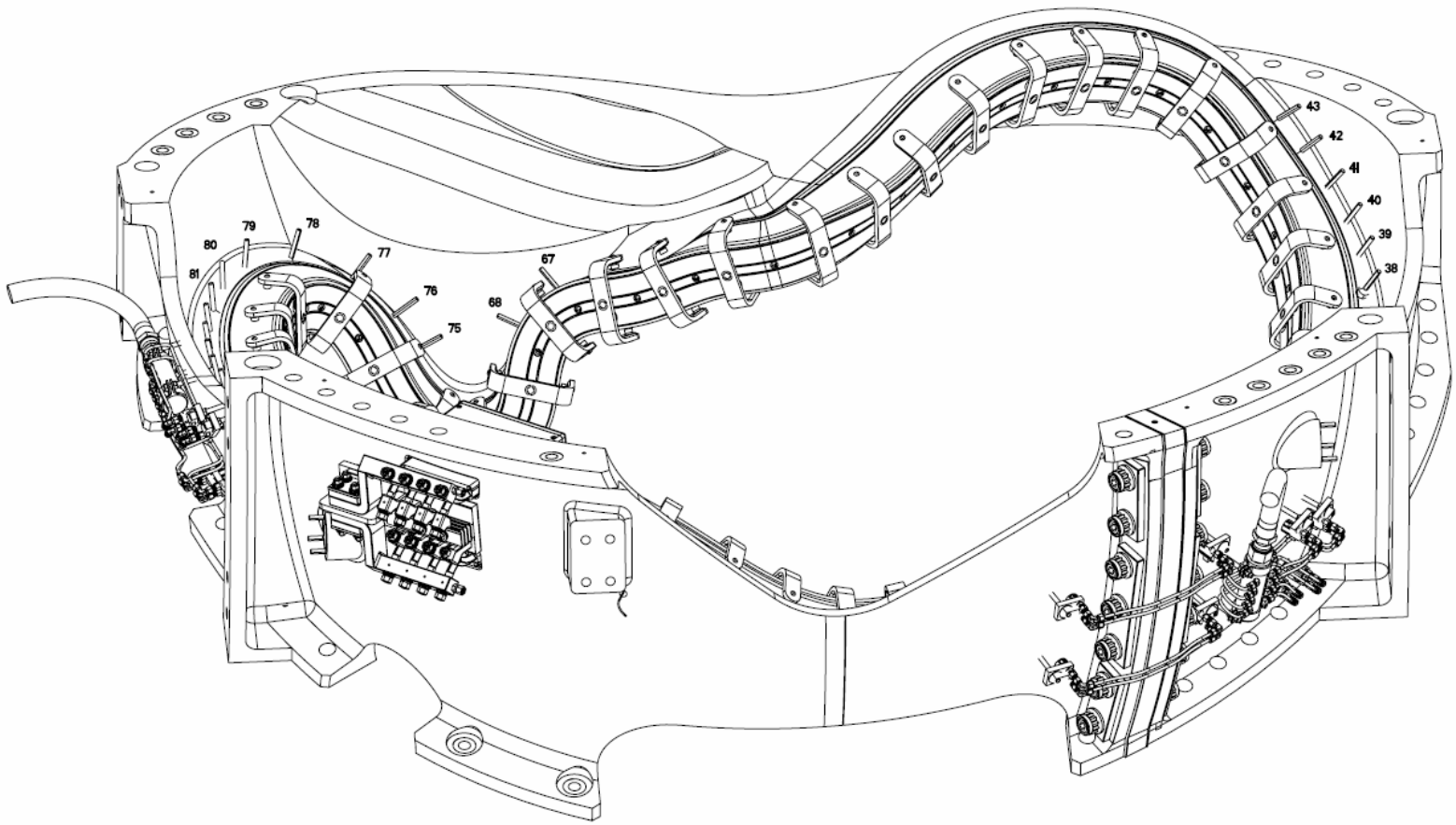
TYPE-A SIDE-A



TYPE-A SIDE-B



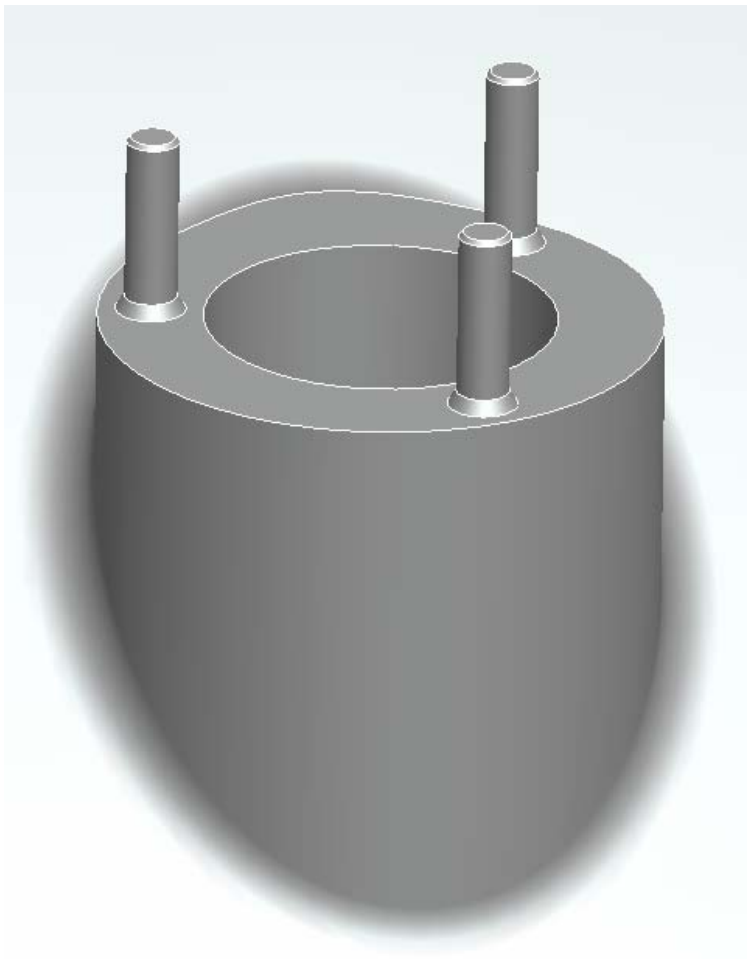
TYPE-A SIDE-B

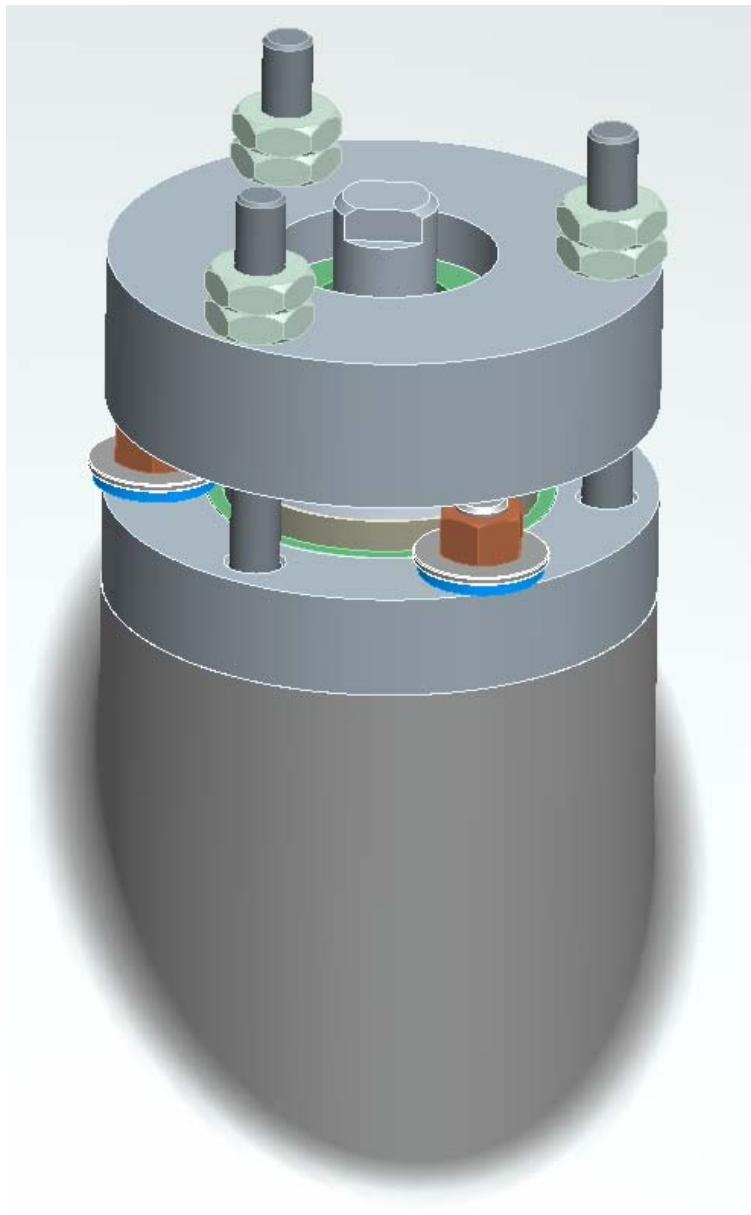


TYPE-A SIDE-A

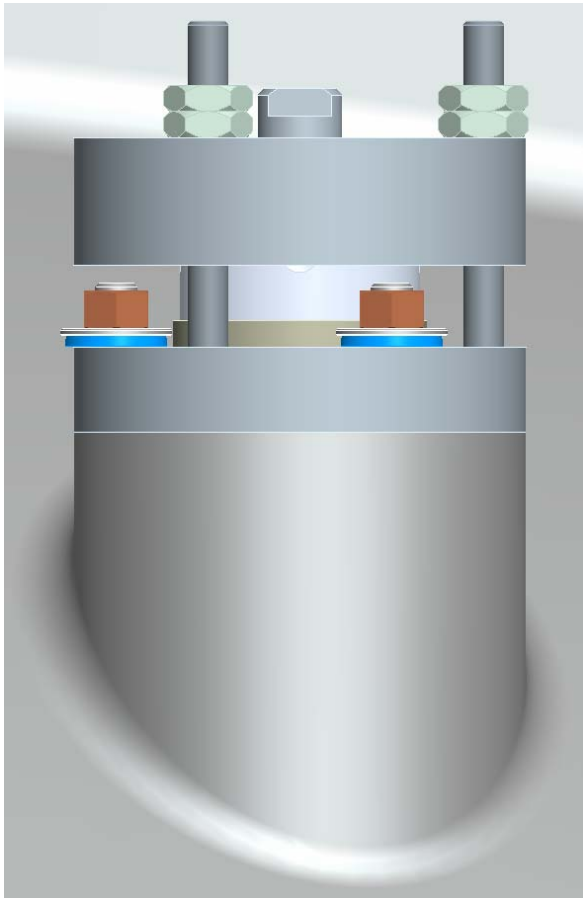
Vessel interface

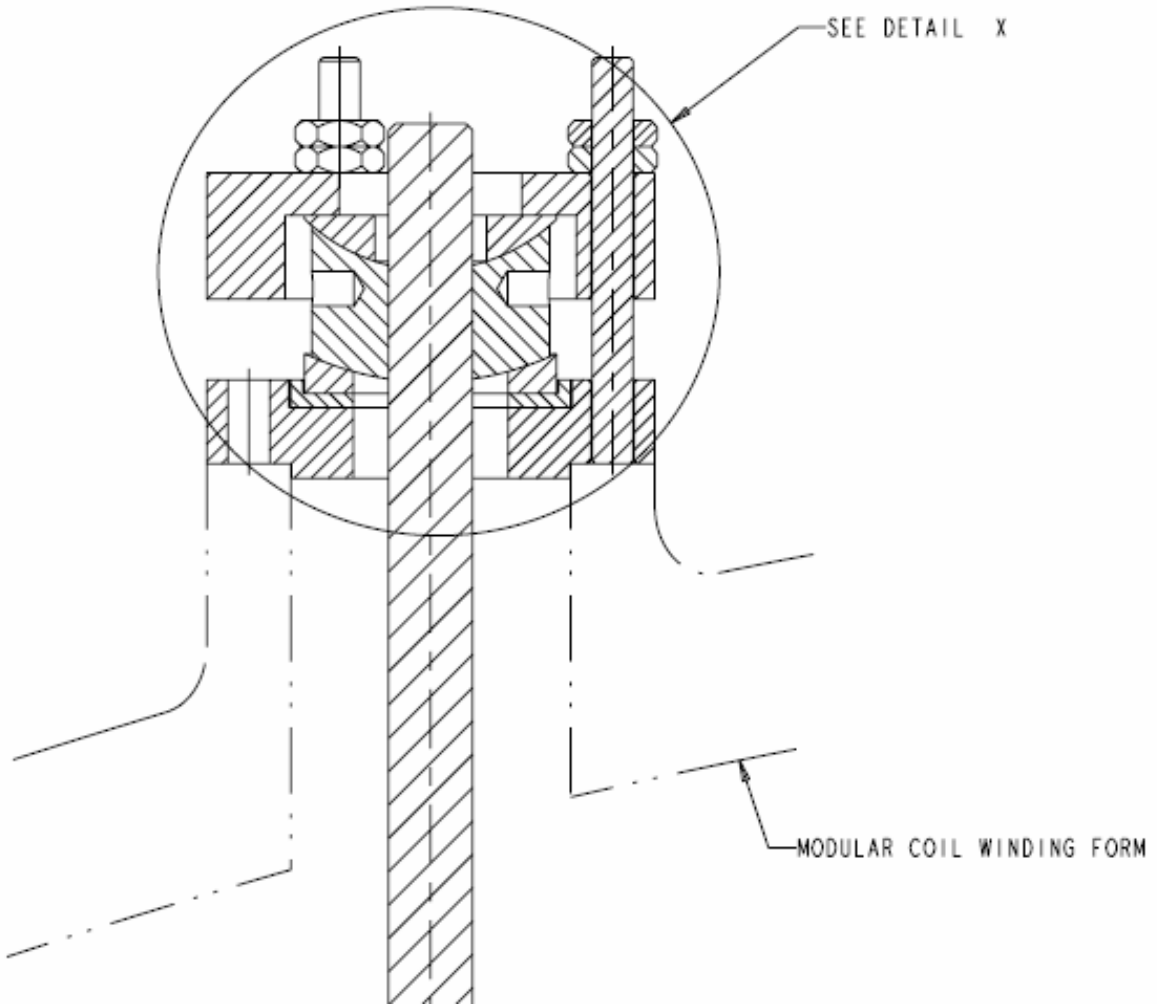
SE124-051, VERT UPPER SUPPORT ASM



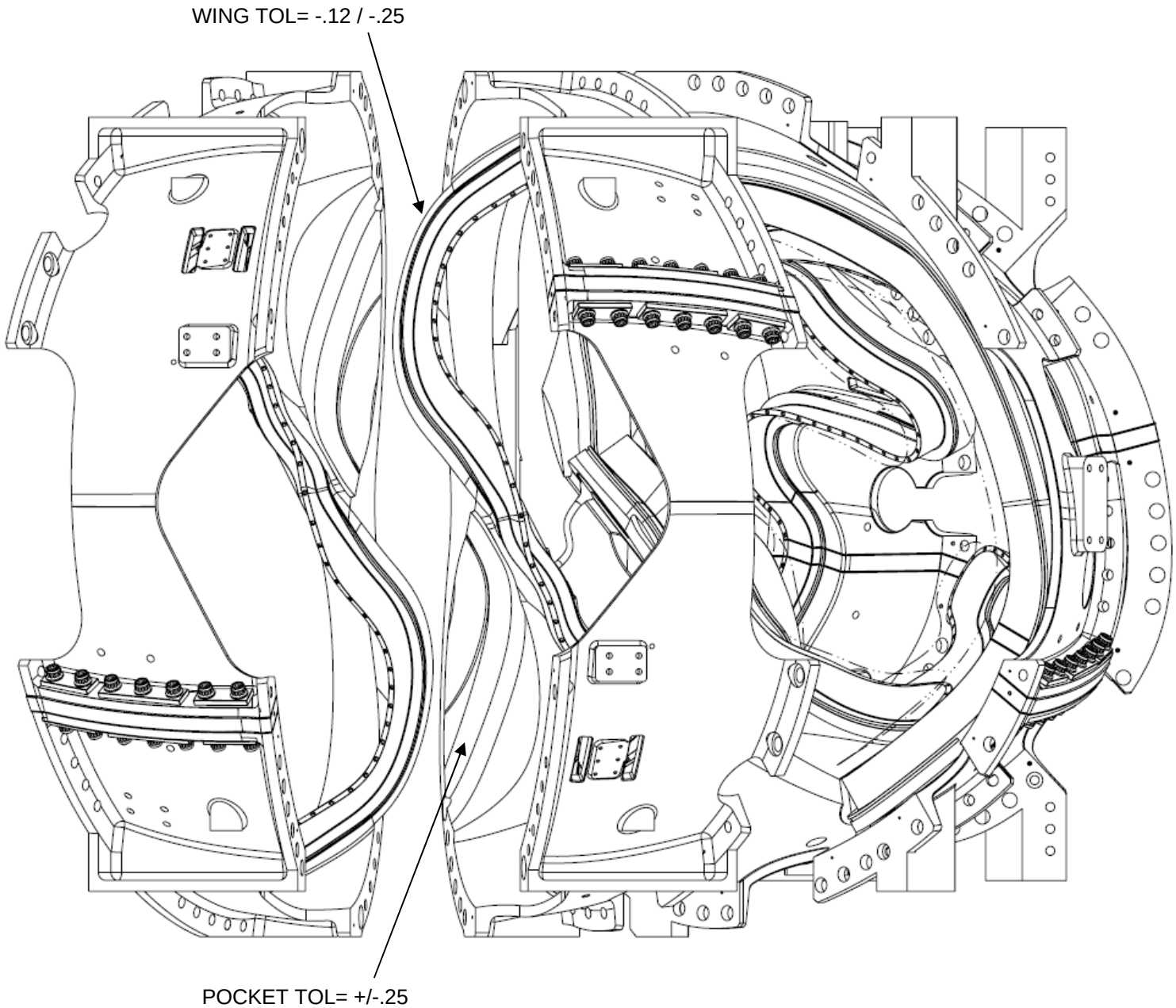


Vessel interface

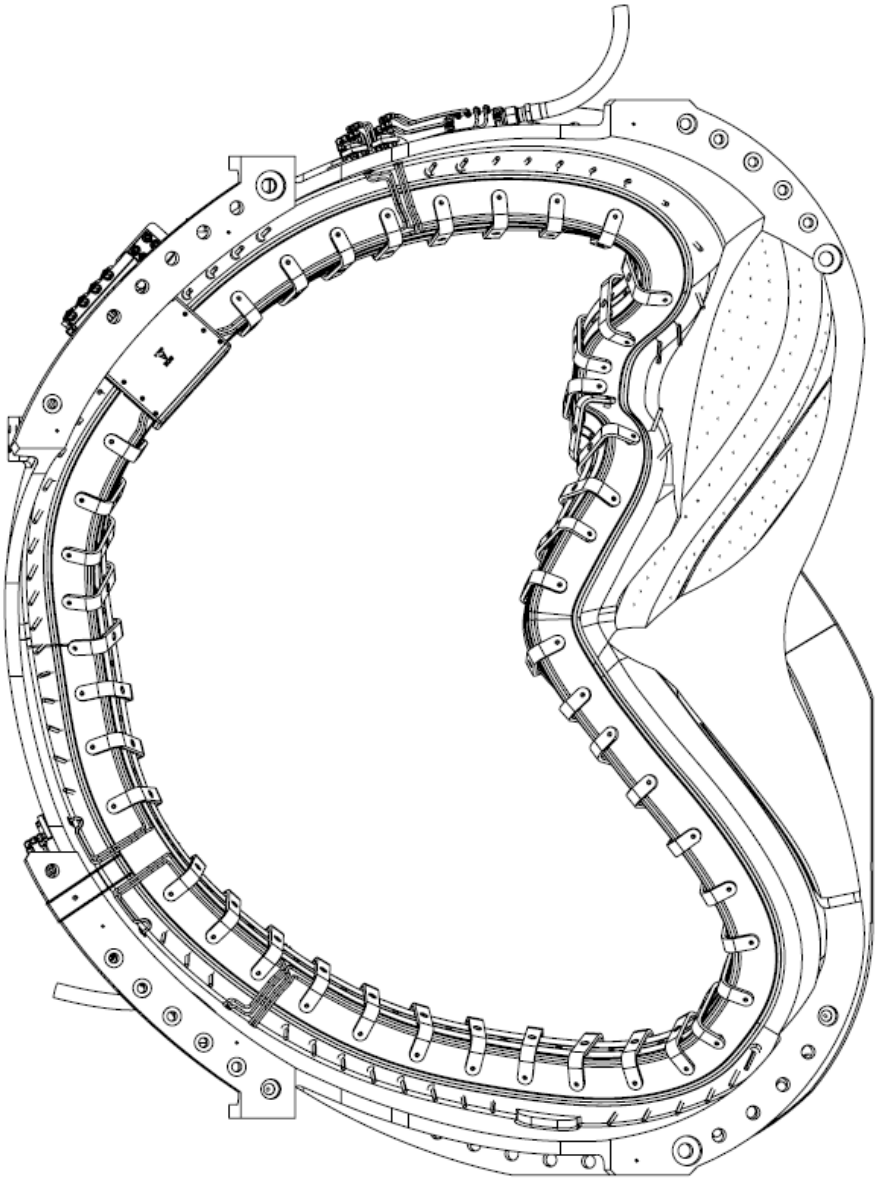




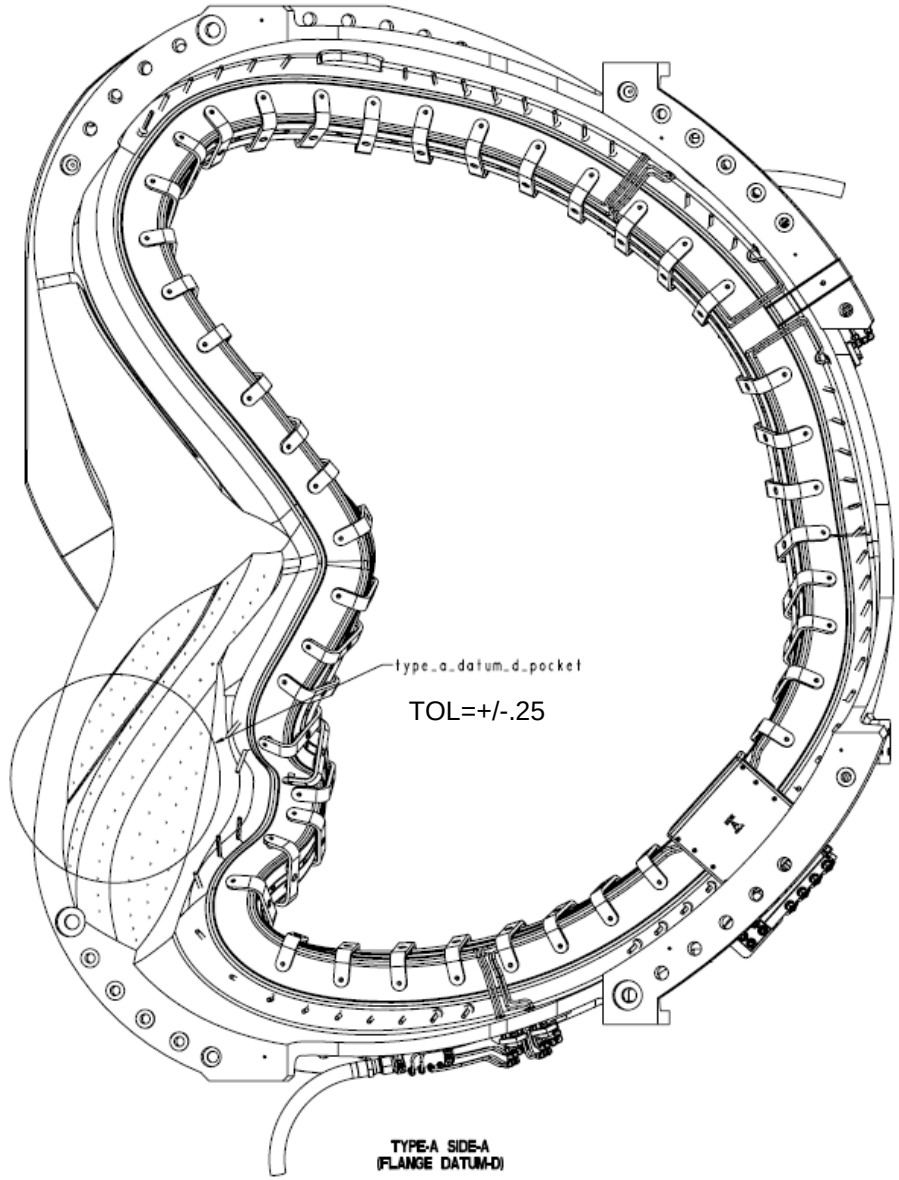
COIL TO COIL INTERFACE A-A



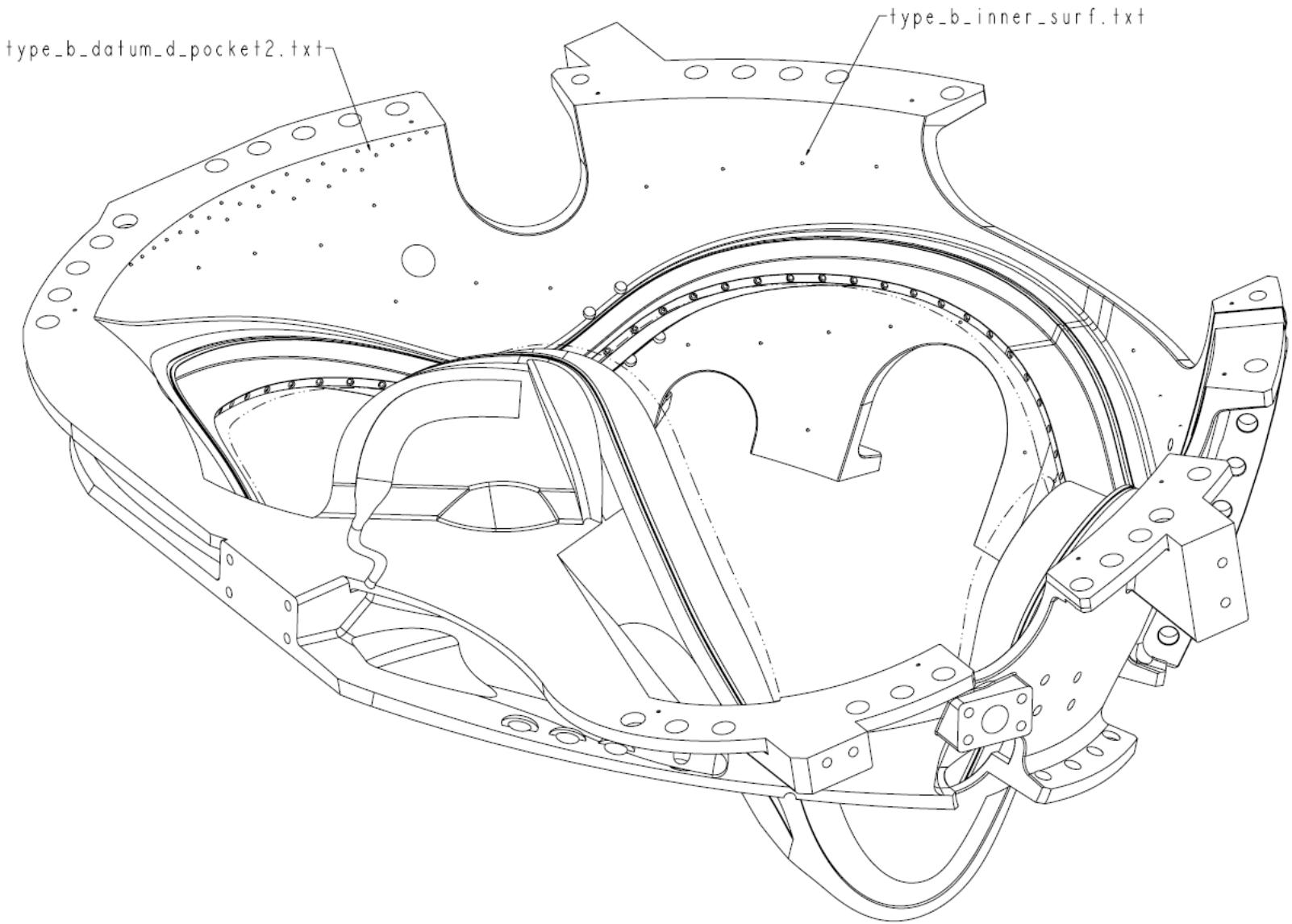
COIL TO COIL INTERFACE A-A



TYPE-A SIDE-A
(FLANGE DATUM-D)



TYPE-A SIDE-A
(FLANGE DATUM-D)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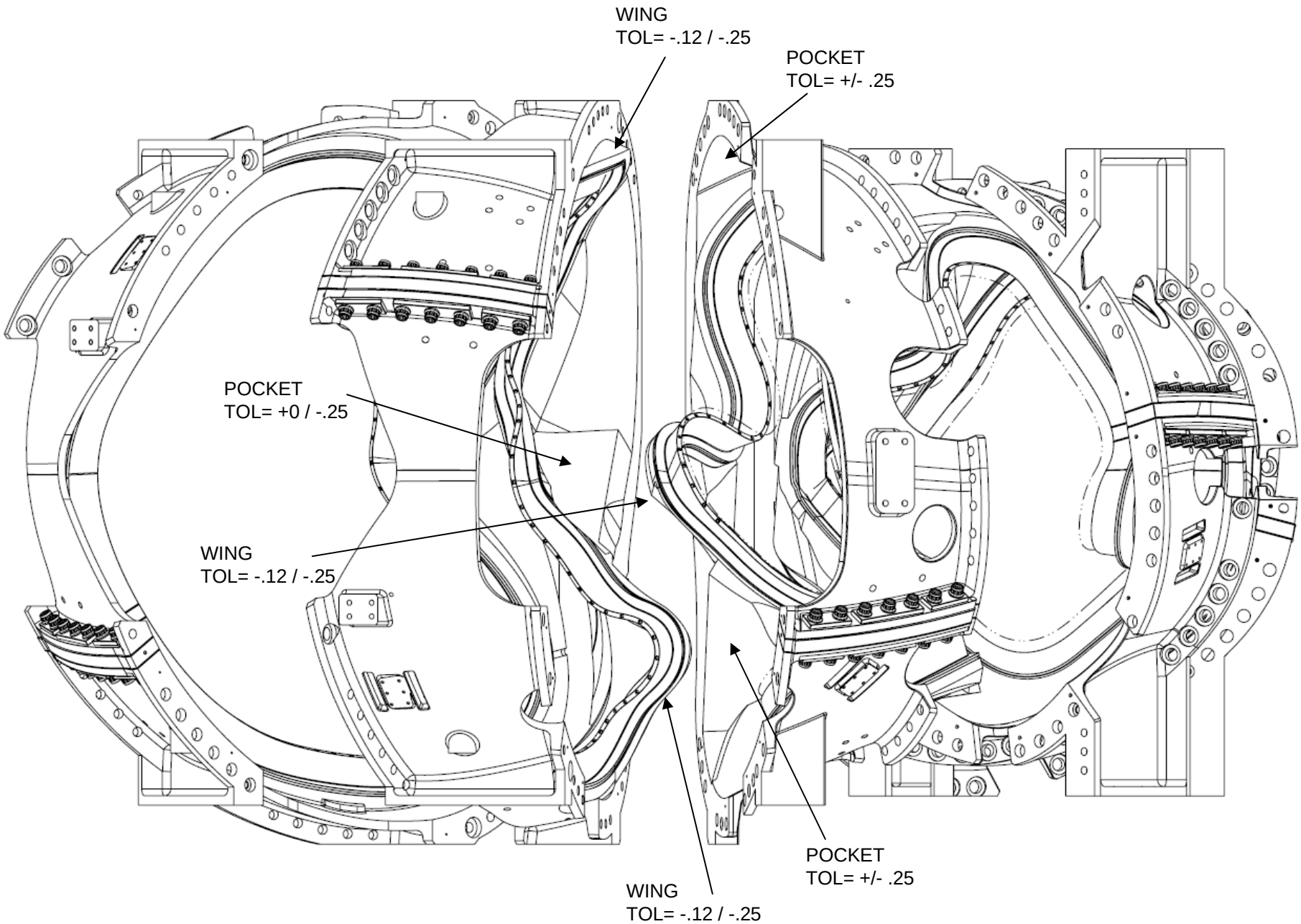
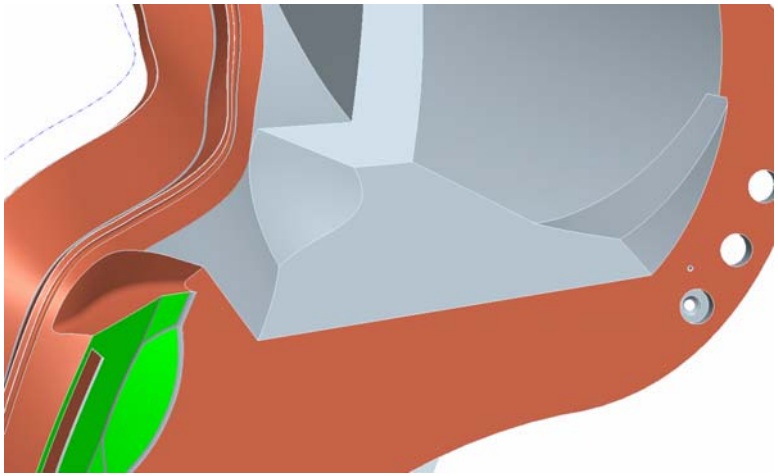
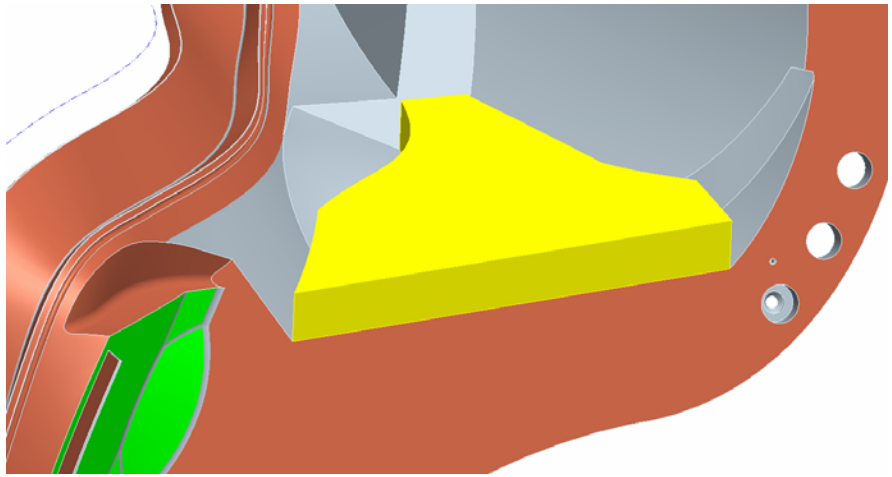
type_b_inner_surf.txt

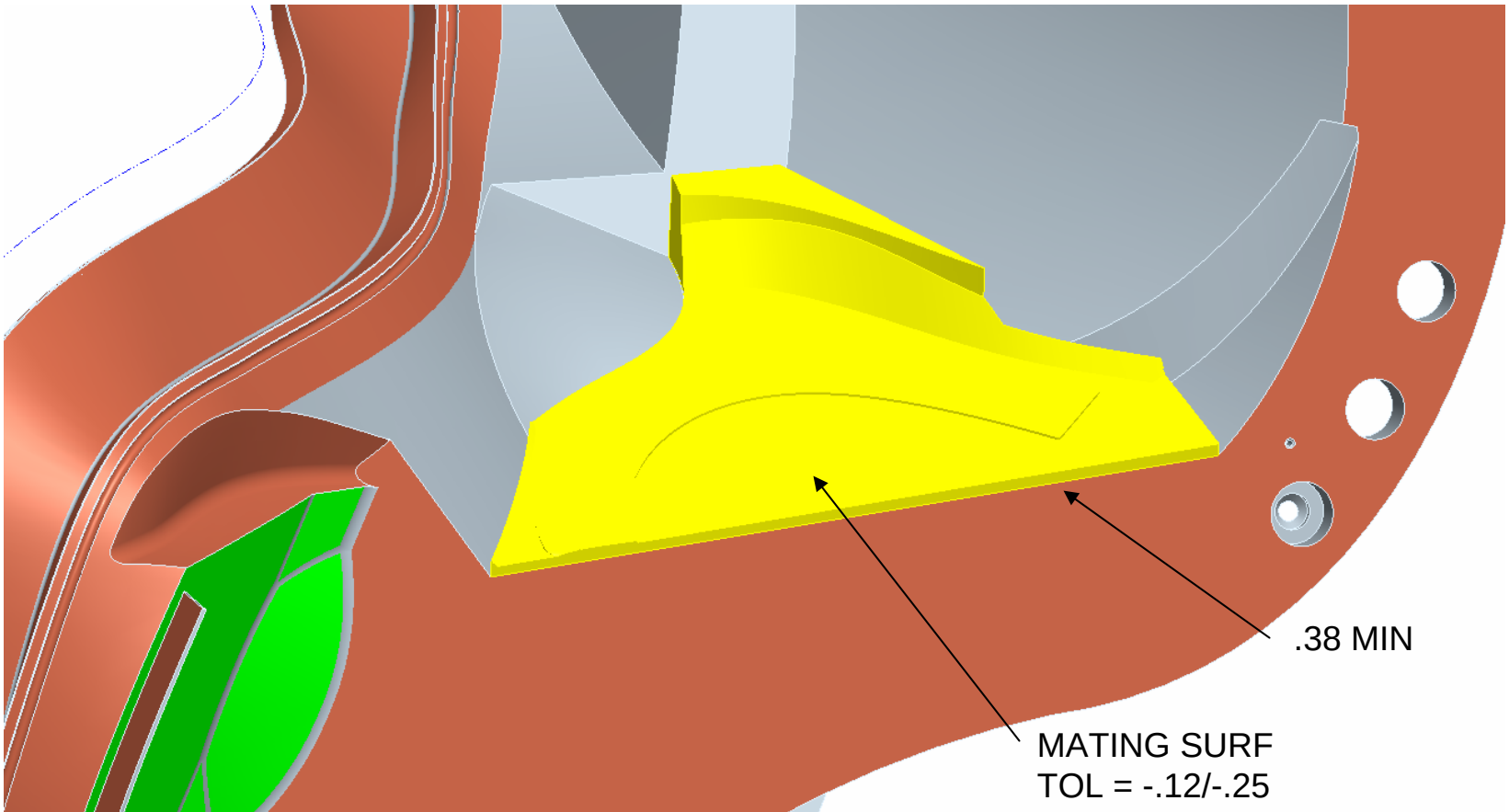
COIL TO COIL INTERFACE A-B



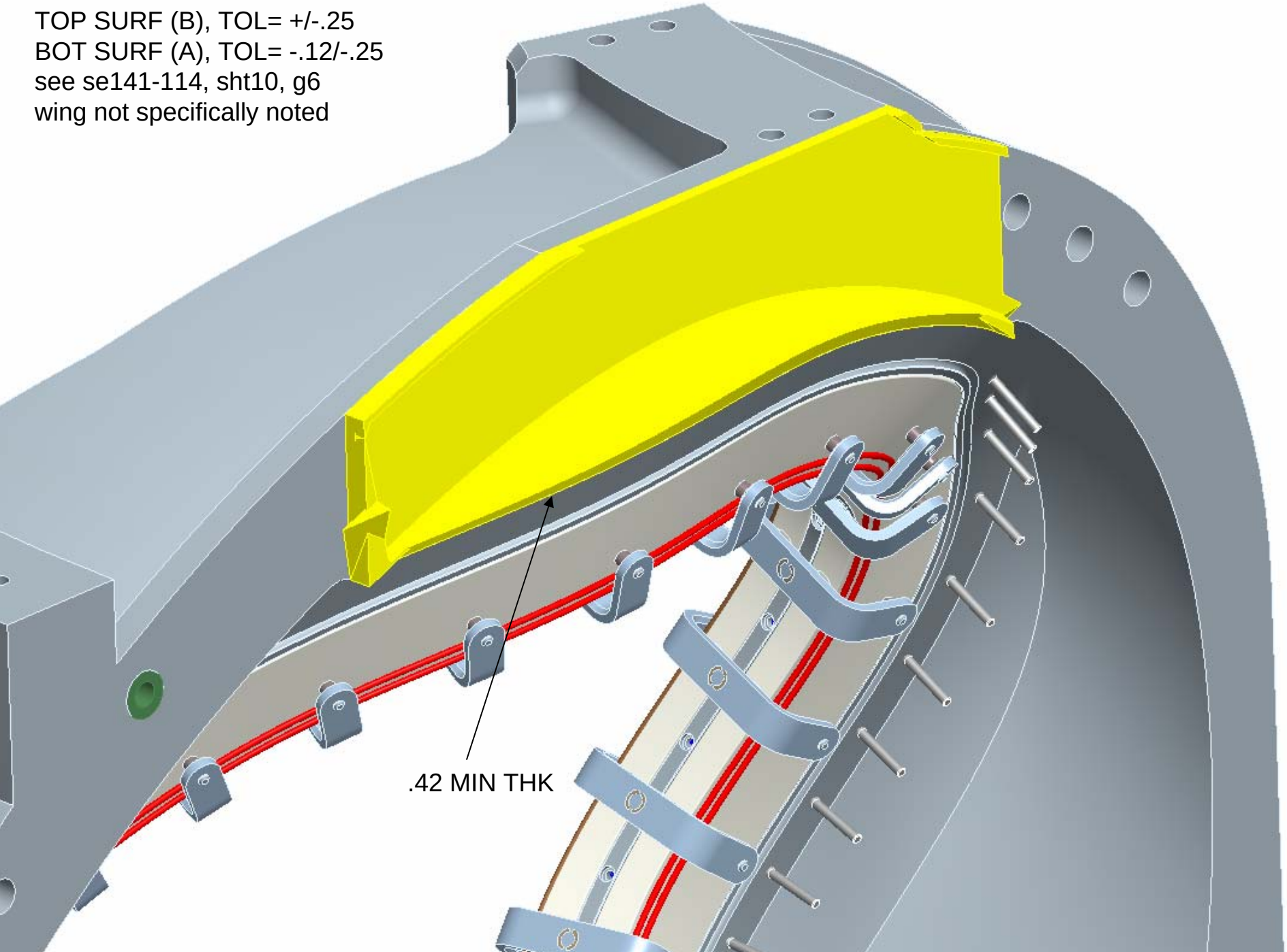
GAP BETWEEN MCWF A, B



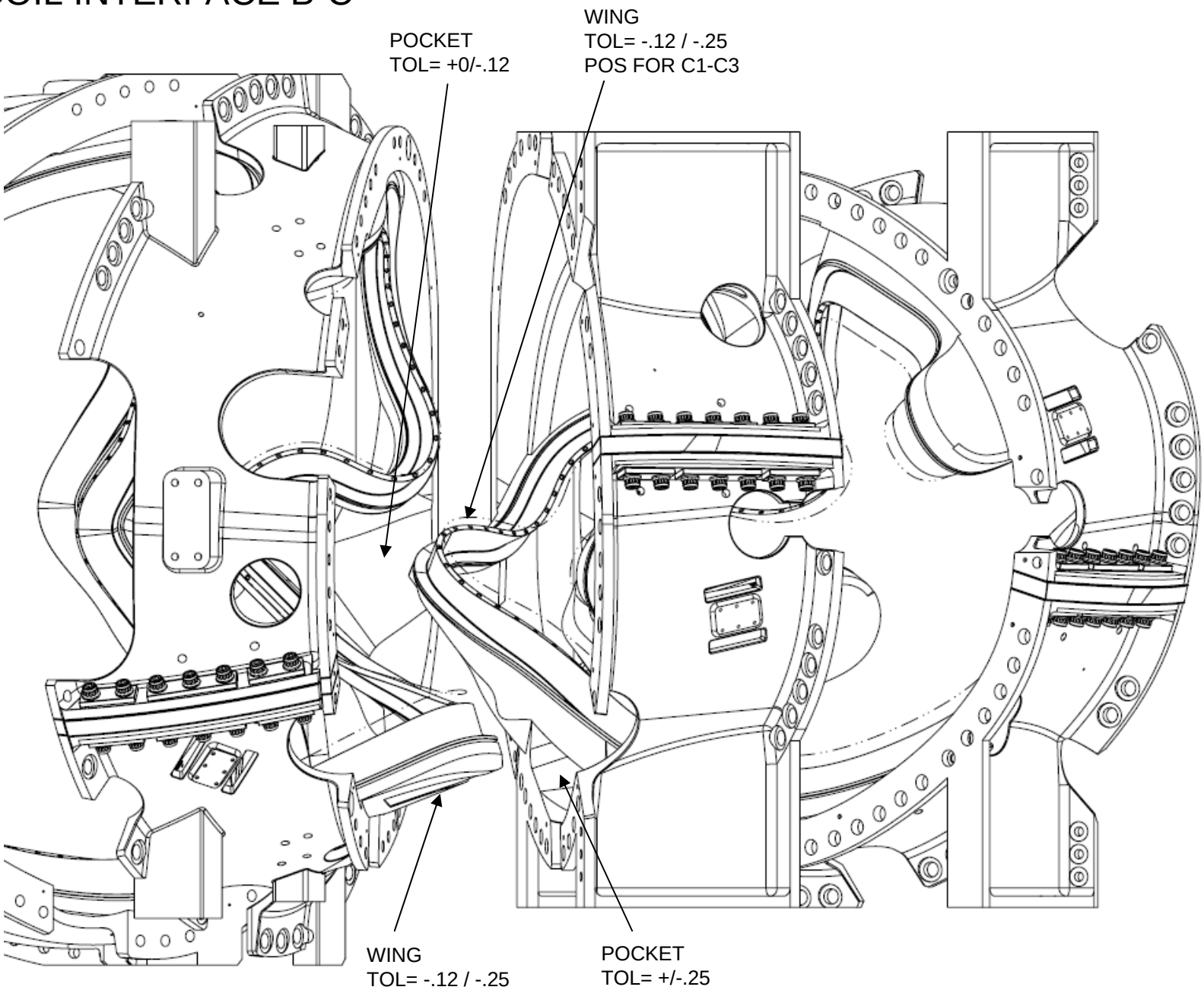




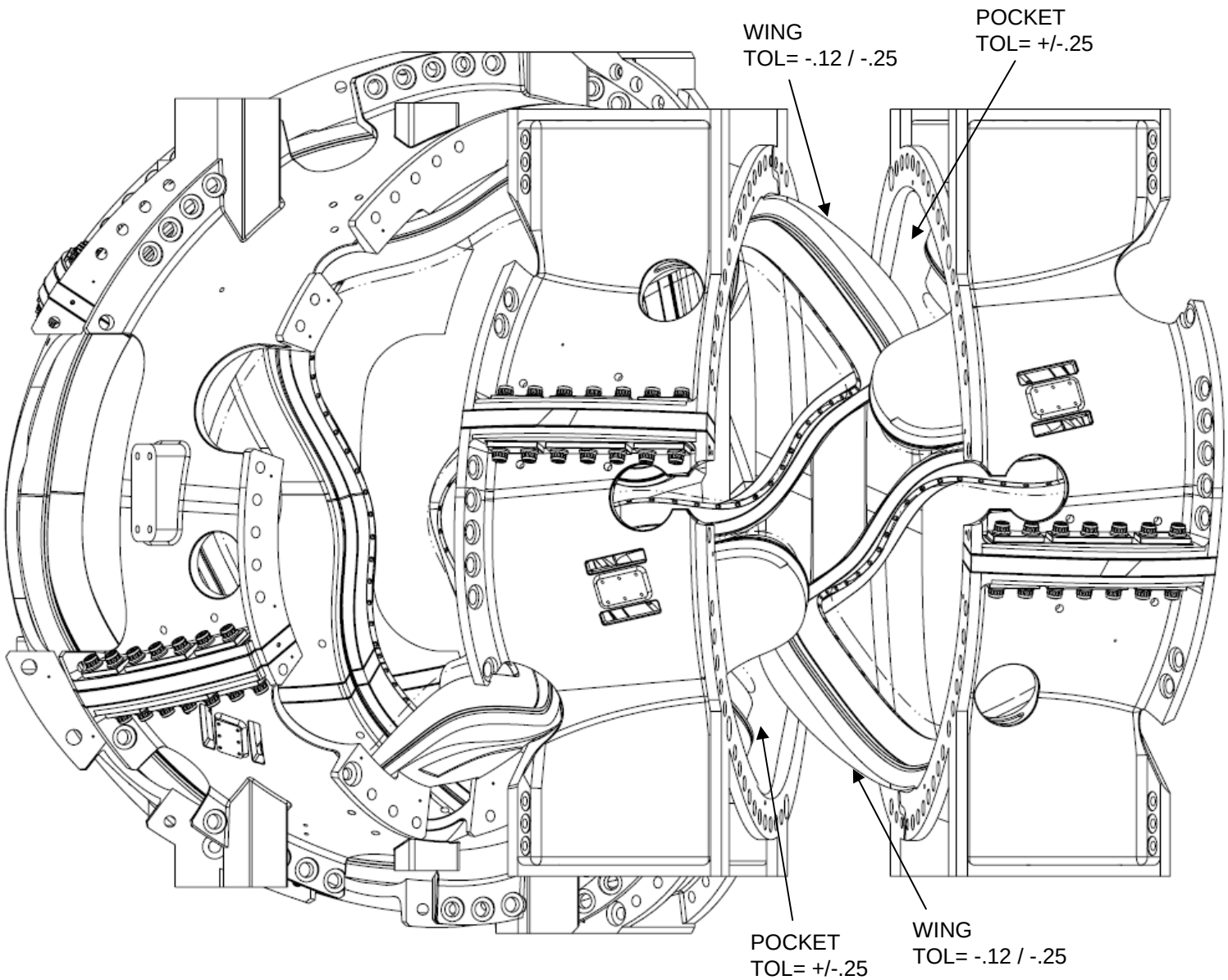
TOP SURF (B), TOL= +/-.25
BOT SURF (A), TOL= -.12/-.25
see se141-114, sht10, g6
wing not specifically noted



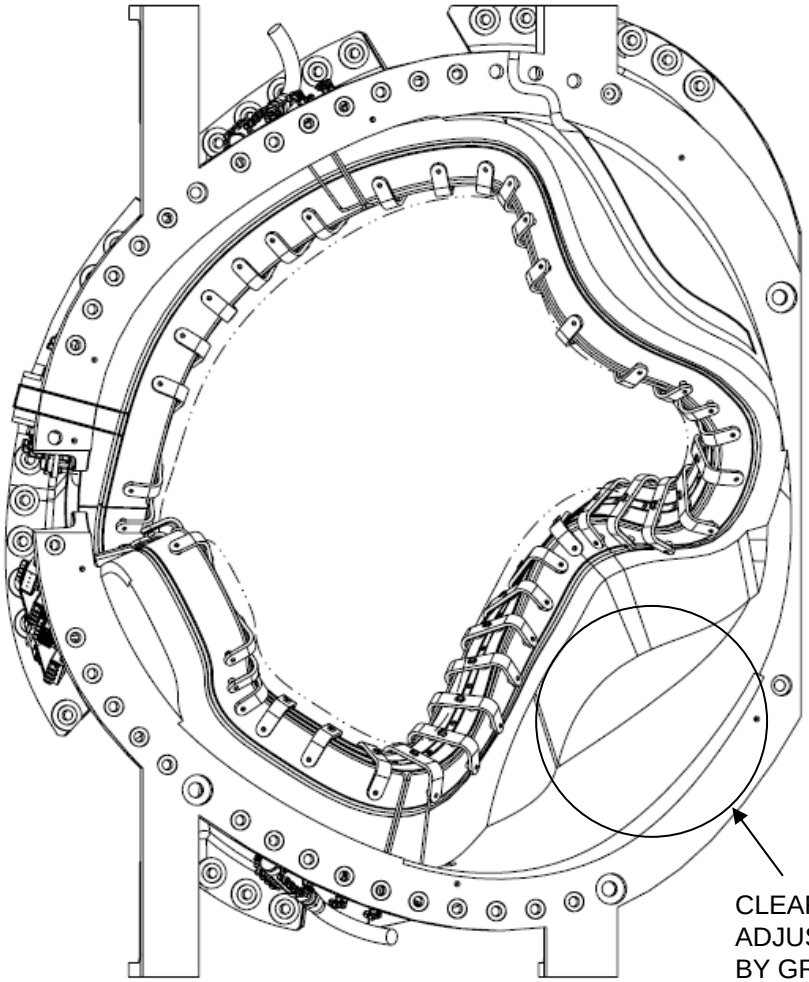
COIL TO COIL INTERFACE B-C



COIL TO COIL INTERFACE C-C

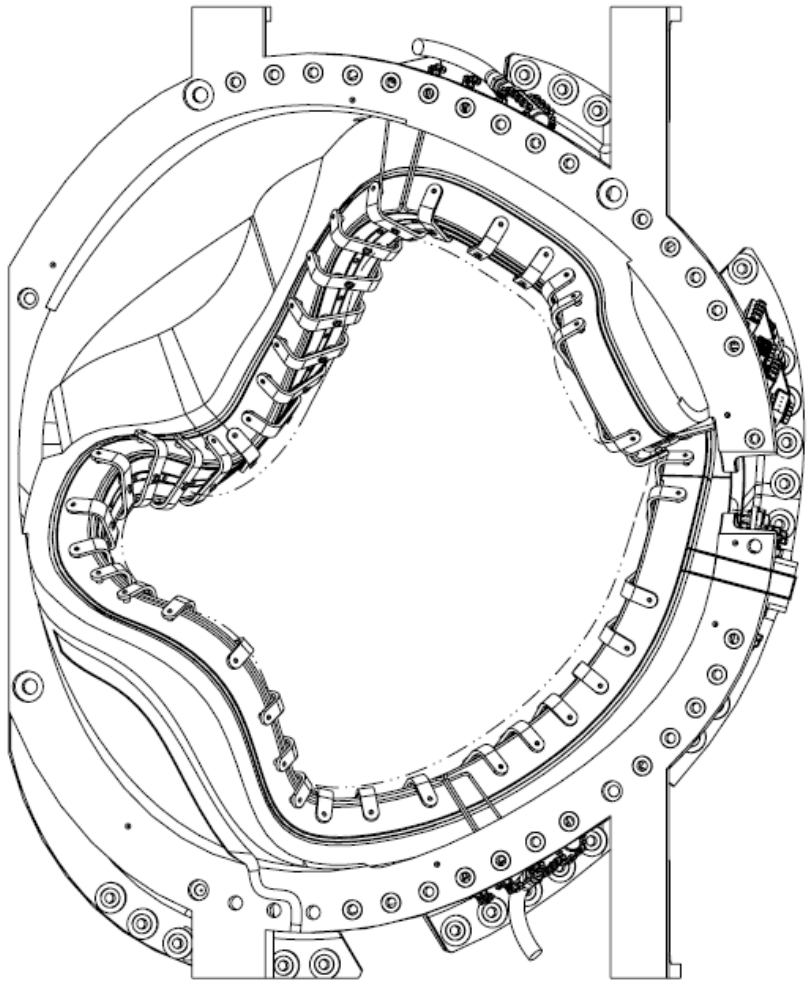


COIL TO COIL INTERFACE C-C



CLEARANCE
ADJUSTED
BY GRINDING

TYPE-C SIDE-B
(FLANGE DATUM-E)



TYPE-C SIDE-B
(FLANGE DATUM-E)

Conclusion

Top-level drawings are proceeding:

- Goal is to document a reasonably accurate layout
- Very time consuming, need to simplify
- Interface hardware detail is minimal for rev-0