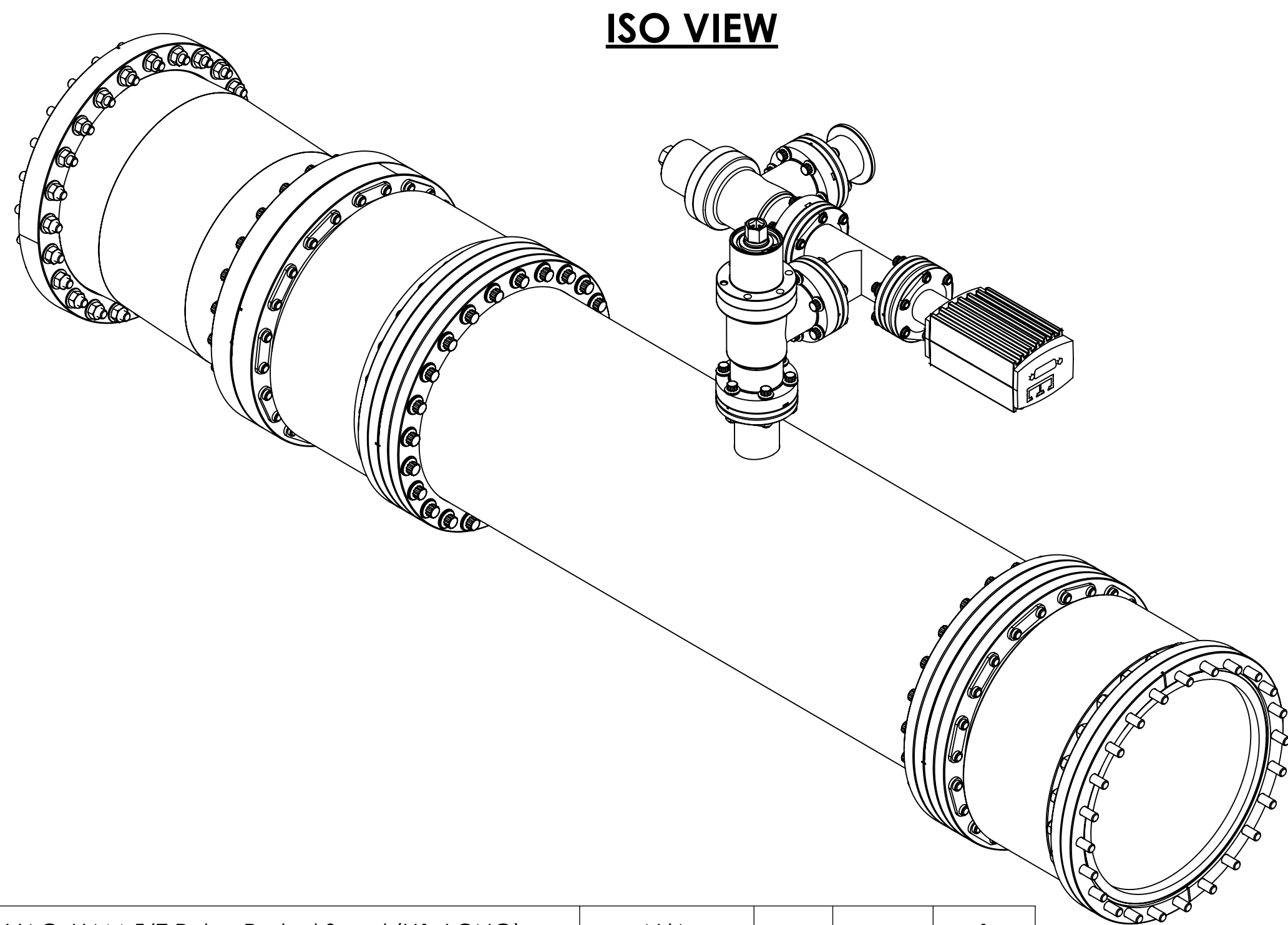
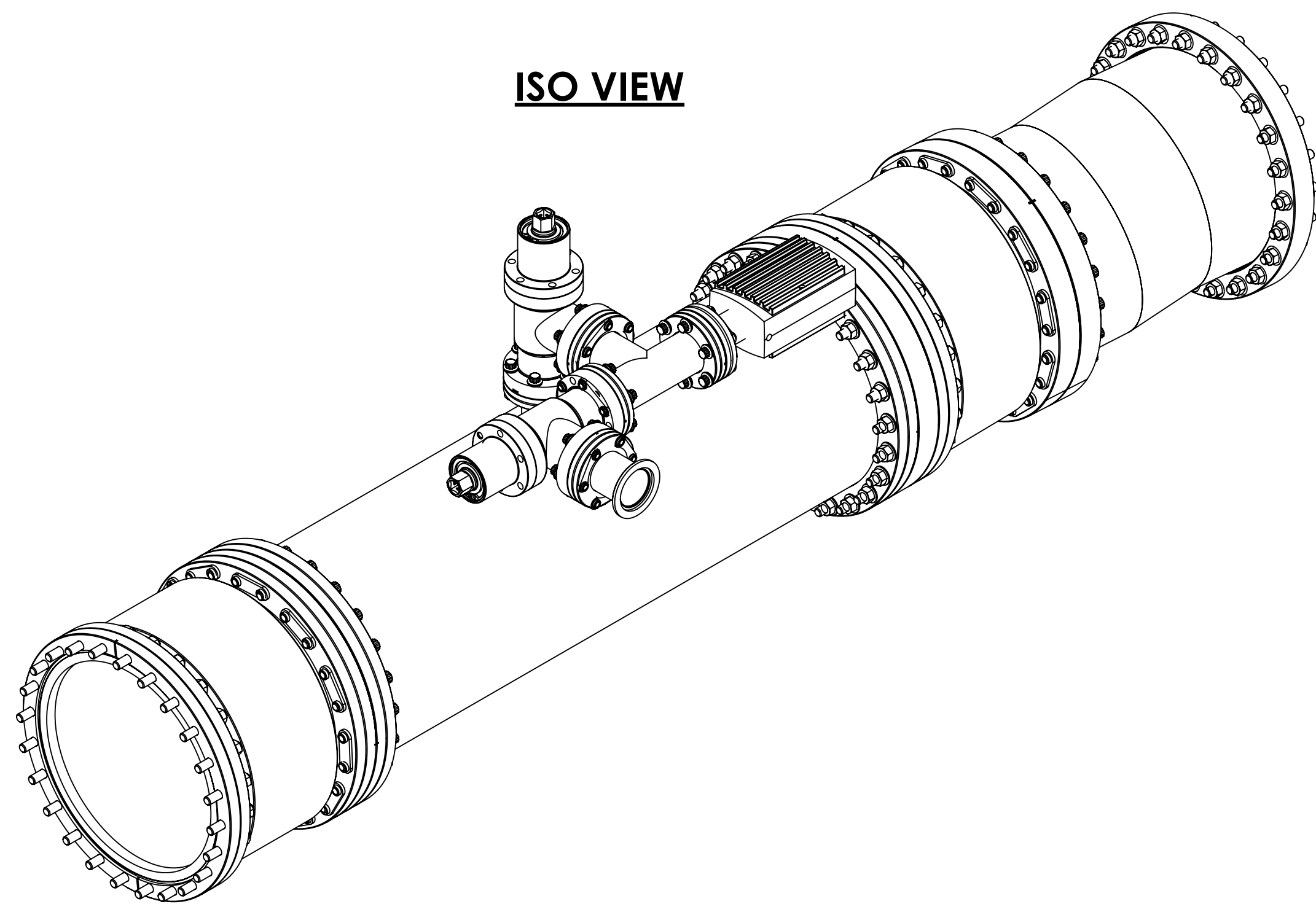


LLO (-01)

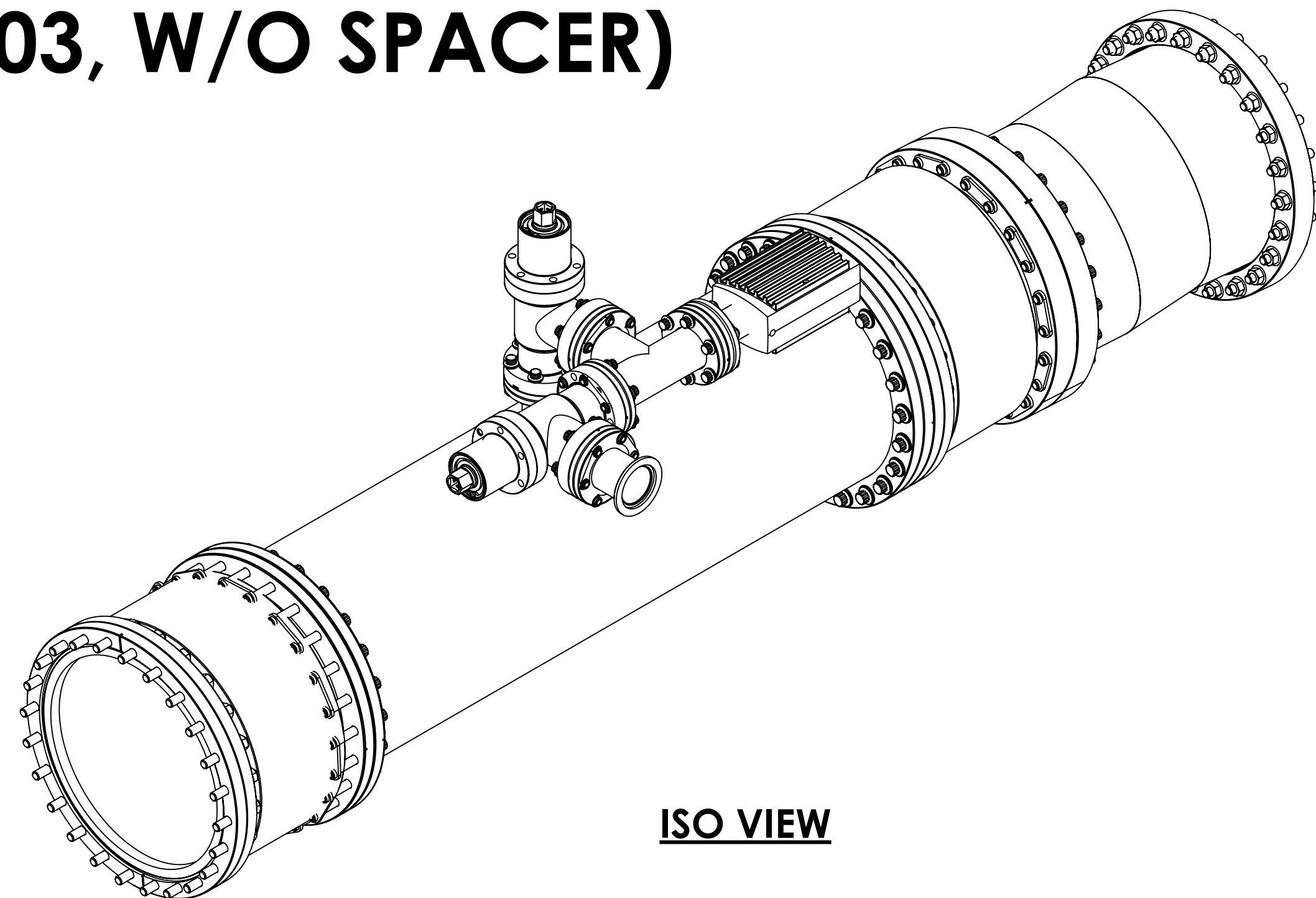


18	D2300402	A+, VAC, HAM 5/7 Relay Ported Spool (H1, LONG)	N/A	-	-	1
17	KNP-150-12 NORCAL OR EQ.	12 PT BOLTS SET, 1.25 LG. (24 PER PACK)	N/A	1	1	1
16	TBD	5/16-24 THREADED ROD, 4" LG.	18-8 SSTL	-	24	-
15	TFL-05-204 SPECIALTY FASTENER OR EQ.	12-POINT FLANGE-HEAD, 5/16-24, UNC-2A X 2.25 LONG	AISI 316 Stainless Steel Sheet (SS)	72	48	72
14	MS15795-812 OR EQ.	WASHER, FLAT, 5/16	300 SSTL	120	144	120
13	PN-1000	NUT PLATE 5/16-24	AISI Type 316L stainless steel	36	24	36
12	P104396 IDEAL VACUUM OR EQ.	Studs, 5/16-24 x 2.00 Inch Long, Silver Plated	18-8 Stainless Steel	48	48	48
11	N-3124 UC COMPONENTS OR EQ.	Nut, Hex, Non-Vented, 5/16-24	300 SSTL	48	96	48
9	P104749 IDEAL VAC. OR EQ.	Conflat Flange (CF) Bored Double-Sided, CF 10 inches, Bored 8 inches, Through Holes, SS	AISI 304	-	1	-
8	2FC-800-4 NOR- CAL	10" OD CF Flexible Coupling, 7" Free Length	AISI 304	2	2	-
7	AN-NW-40-275 NOR-CAL OR EQ.	NW-40 to 2.75" OD CF Straight Adapter Nipple	304 SSTL	1	1	1
6	353-593	Wide Range Vacuum Gauges, BCG450-SE ECAT, DN 40 CF-R	-	1	1	1
5	3T-150 NOR-CAL OR EQ.	2.75" OD CF TEE	304 SSTL	1	1	1
4	54132-GE02 VAT	all-metal right-angle valve, Series 54DN 40 (ID 1 ½")	-	2	2	2
3	D2100053-02	A+, VAC, Custom Spool, 8in tube OD x 10in CF (TYPE A), L1	AISI 304	1	-	-
2	D2100053-01	A+, VAC, Custom Spool, 8in tube OD x 10in CF (TYPE A), H1	AISI 304	-	1	1
1	D2300065	A+, VAC, HAM 5/7 Relay Ported Spool	N/A	1	1	-
ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	QTY. LLO	QTY. LHO W/ SPACER	QTY. LHO W/O SPACER
PARTS LIST						

LHO (-02, W/ SPACER)



LHO (-03, W/O SPACER)



2		1	
REV.	DATE	DCN #	DRAWING TREE #
v1	28 SEP 2021	-	-
v4	06 APR 2023	E2300027-x0	-
v5	06 NOV 2023	E2300414-x0	-

NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)				<div> CALIFORNIA INSTITUTE OF TECHNOLOGY MASSACHUSETTS INSTITUTE OF TECHNOLOGY</div>		PART NAME A+, VAC., HAM5/7 Relay Tube Assy.									
MATERIAL N/A				SYSTEM VE		SUB-SYSTEM VE		DESIGNER E.SANCHEZ	30 JUN 2021	SIZE D	DWG. NO. D2100534	REV. v5			
				NEXT ASSY D1800238, D1800241		DRAFTER E.SANCHEZ		28 SEP 2021		CHECKER SEE DCC		SCALE: 1:4		PROJECTION: <div></div>	
						APPROVAL SEE DCC		SEE DCC							
SHEET 1 OF 4															

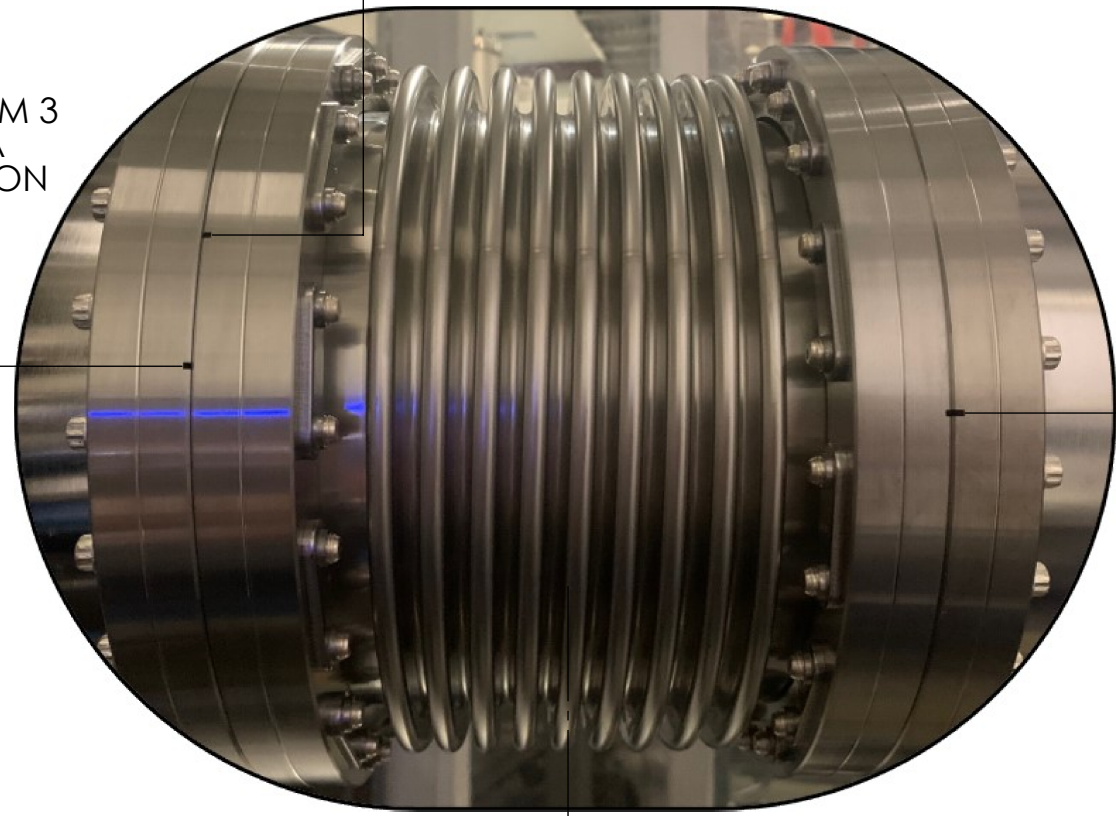
NON-ROTATABLE CF

ROTATABLE CF

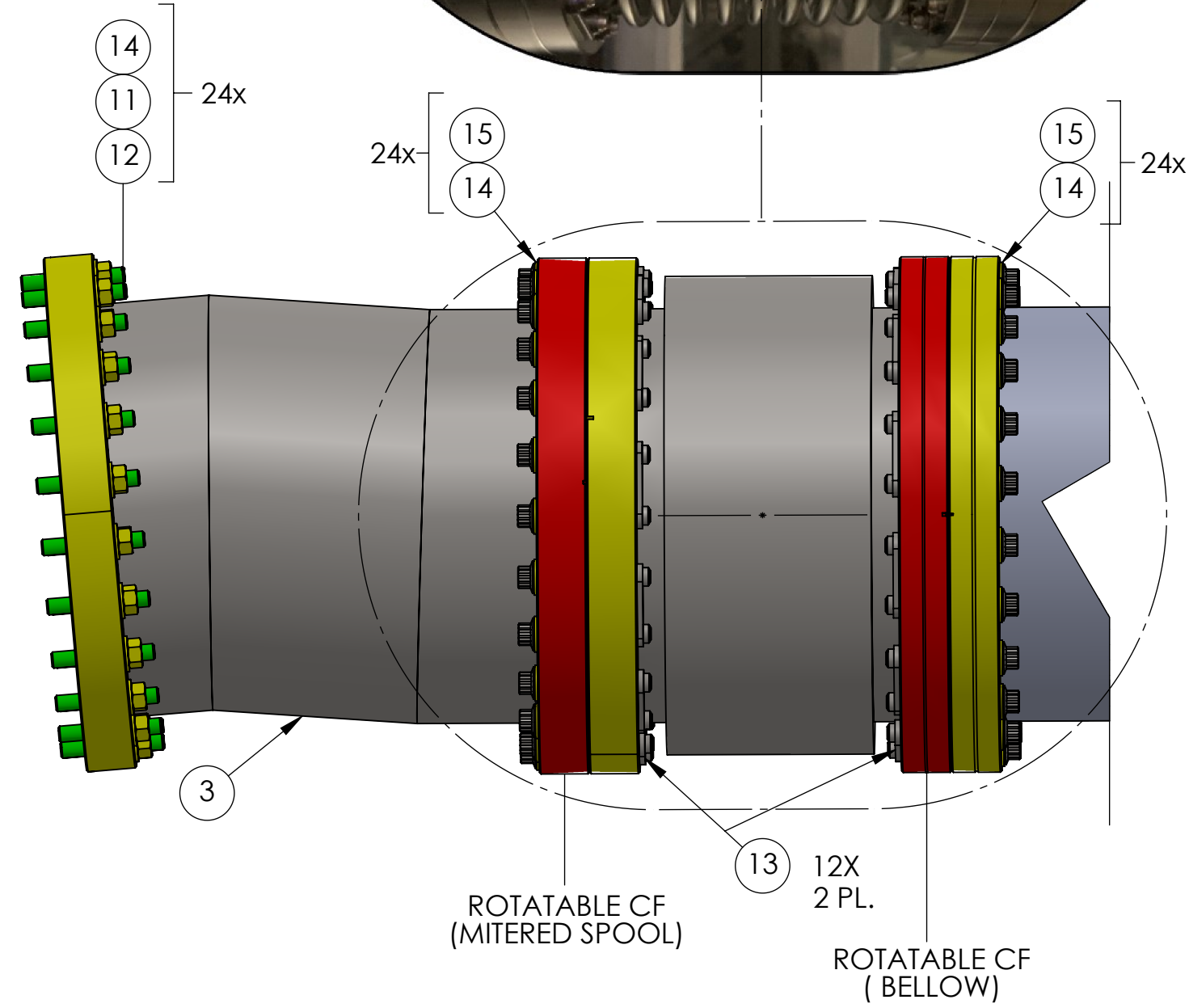
**- RELAY TUBE BELLOW DETAIL -
(AS SEEN FROM -Y SIDE)**

FLANGE LEAK PORT ON BELLOW'S FIXED FLANGE
ROTATED 22.5 DEGREES FROM 3 O'CLOCK POSITION IN
A CLOCKWISE (CW) DIRECTION

FLANGE LEAK PORT ON
MITERED SPOOL
ROTATABLE FLANGE
ROTATED 7.5 DEGREES FROM 3
O'CLOCK POSITION IN A
CLOCKWISE (CW) DIRECTION

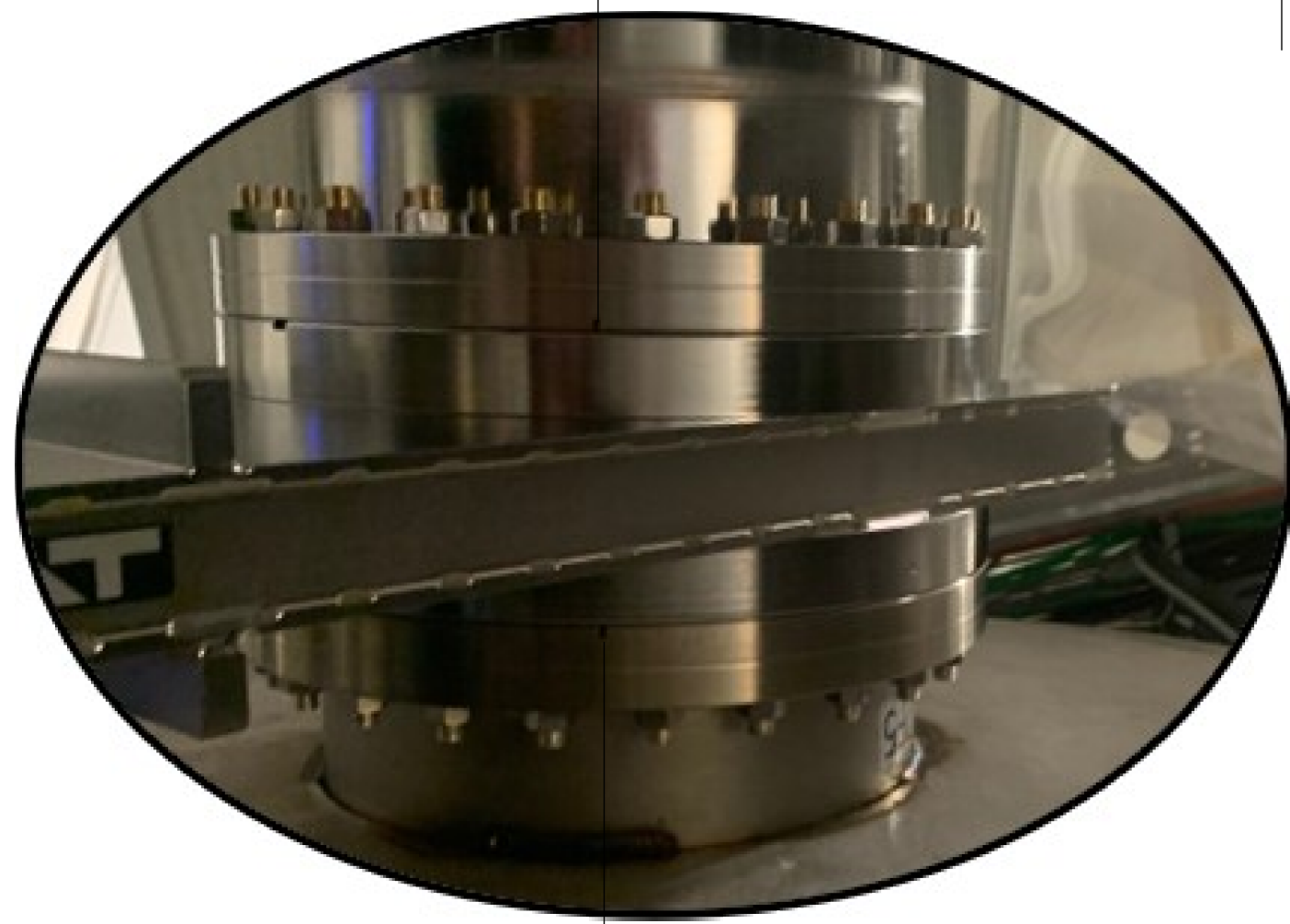


FLANGE LEAK PORTS ON BELLOW'S ROTATABLE FLANGE
AND PORTED SPOOL FIXED FLANGE
ALIGNED WITH COMMON CENTER LINE
AT 3 AND 9 O'CLOCK POSITIONS



ROTATABLE CF
(MITERED SPOOL)

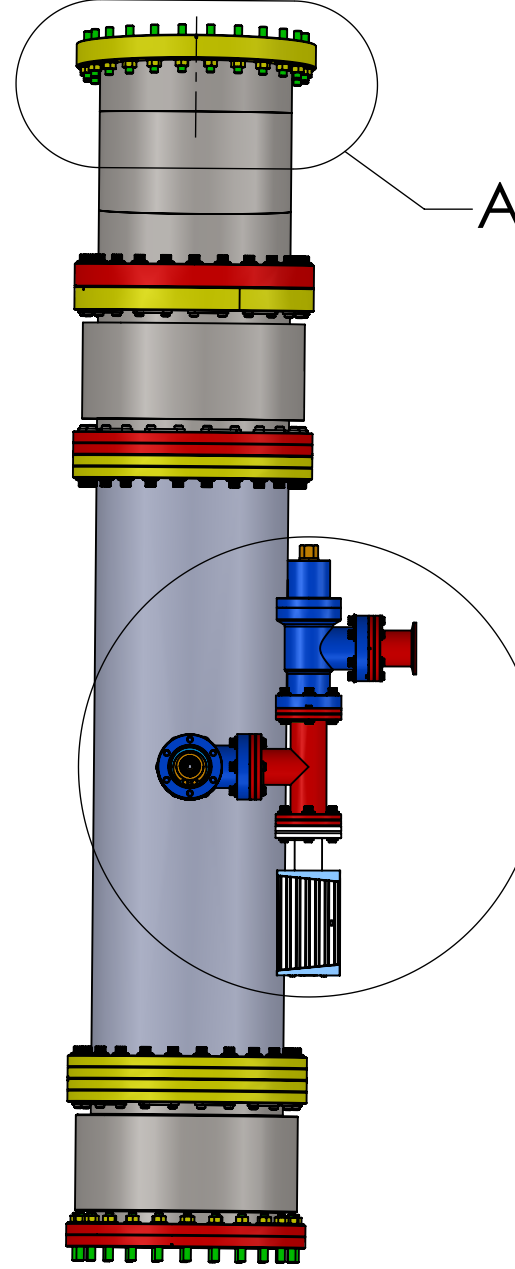
ROTATABLE CF
(BELLOW)



HAM5 NOZZLE CF LEAK PORT
CENTERED AT 12 O'CLOCK POSITION

**- HAM 5 -
DETAIL 'B'**

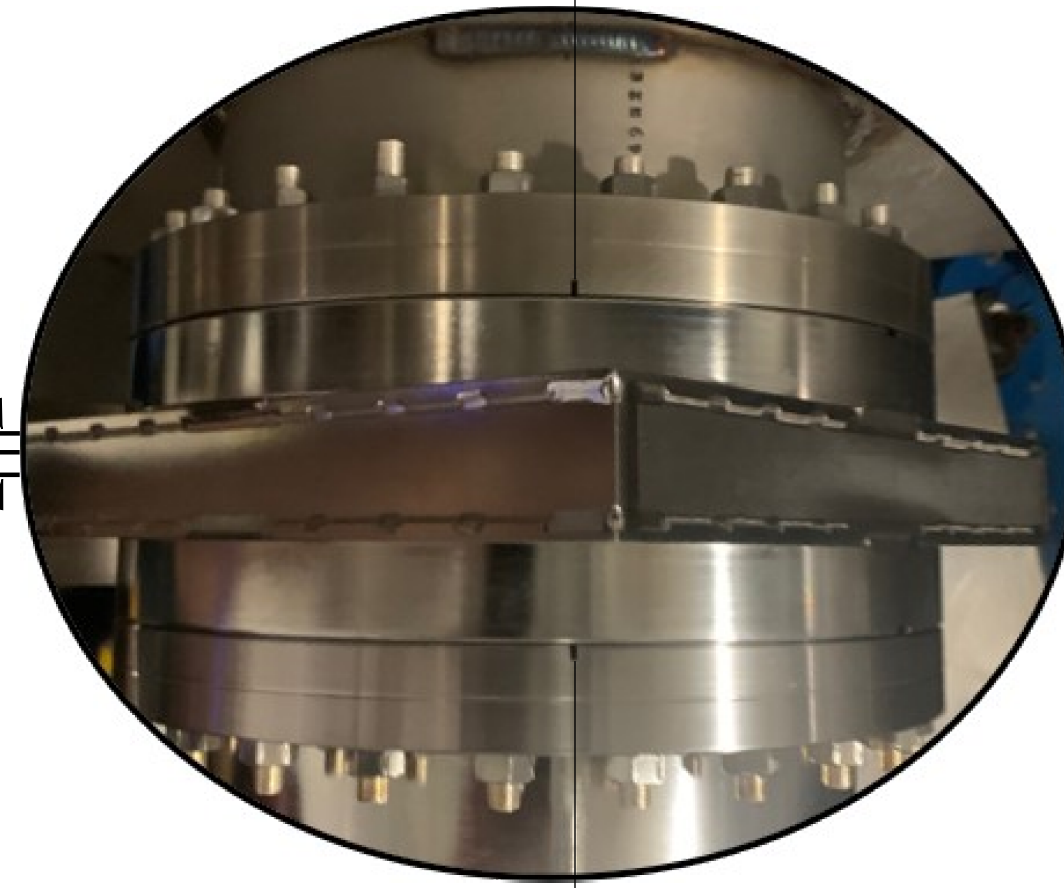
- HAM 5 -



+Z SIDE
(12 O'CLOCK)

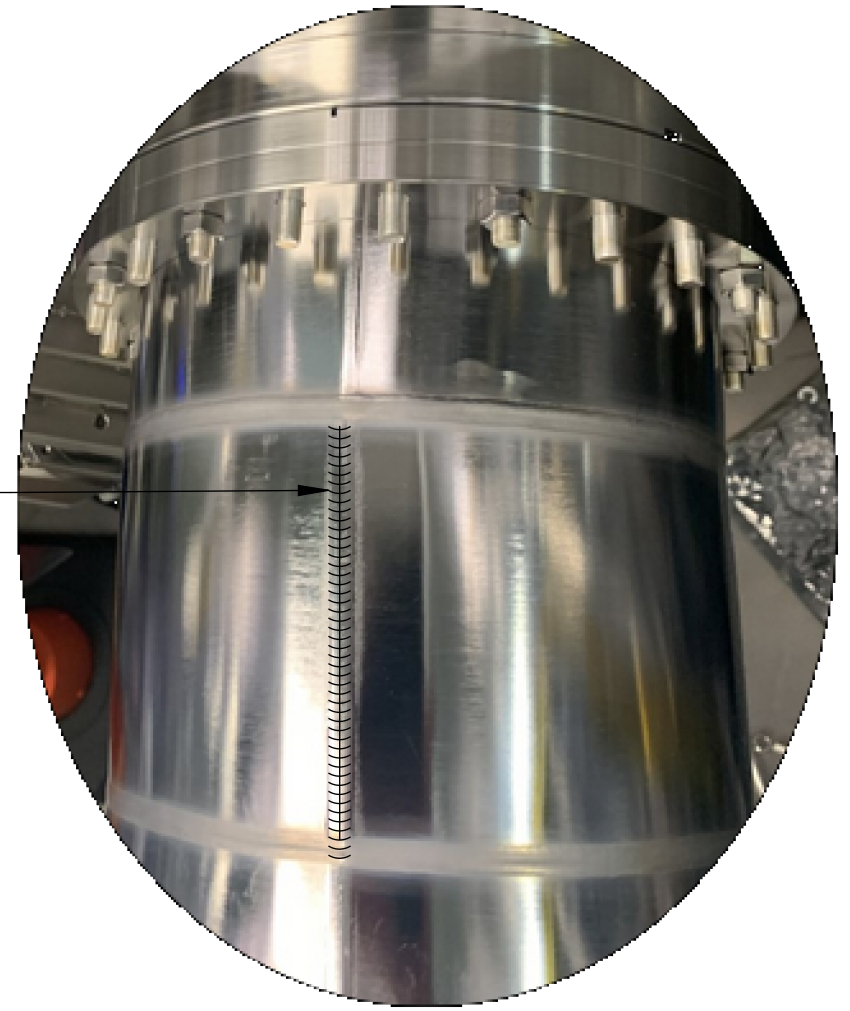
**- HAM 5 -
DETAIL 'A'**

HAM5 NOZZLE CF LEAK PORT
CENTERED AT 12 O'CLOCK POSITION

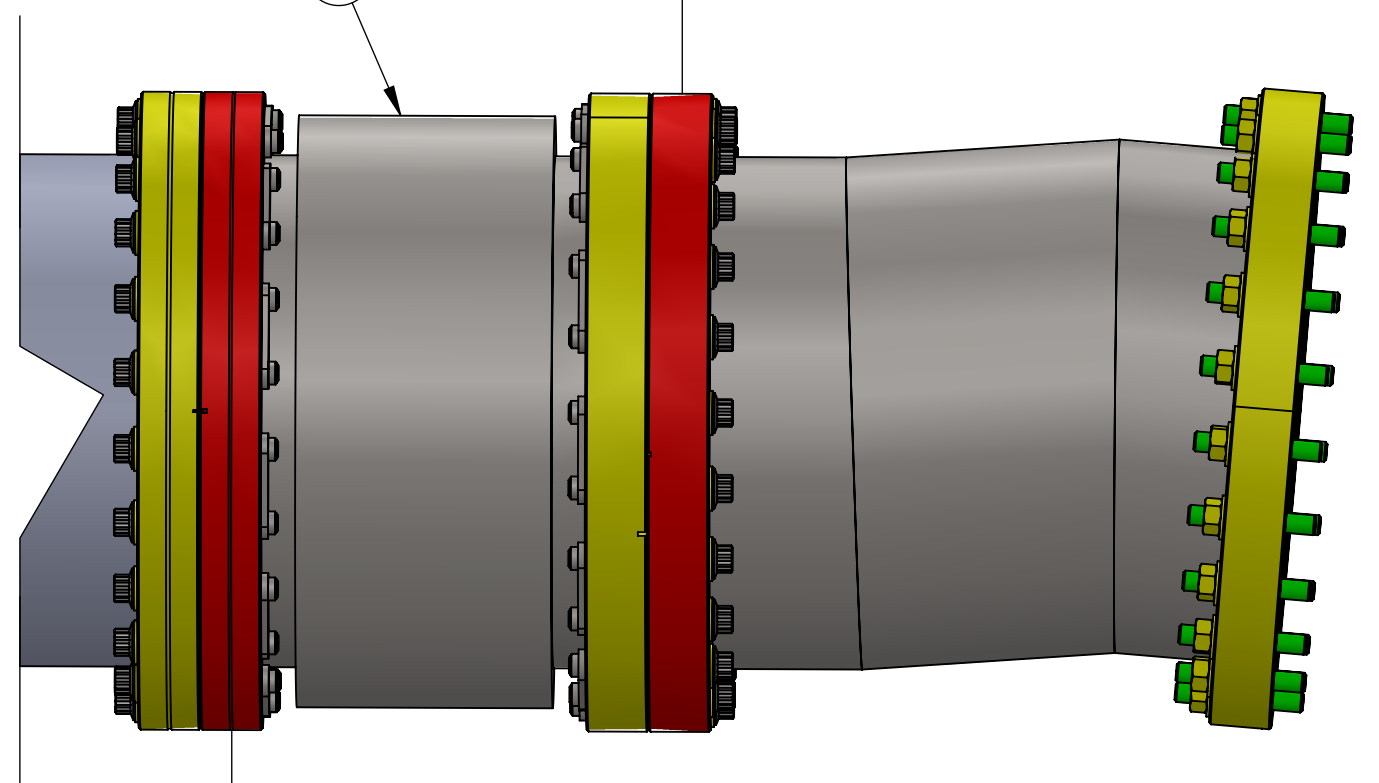


FLANGE LEAK PORT ON MITERED SPOOL
NON-ROTATABLE CF ALIGNED WITH LEAK PORT ON
HAM5 NOZZLE CF.

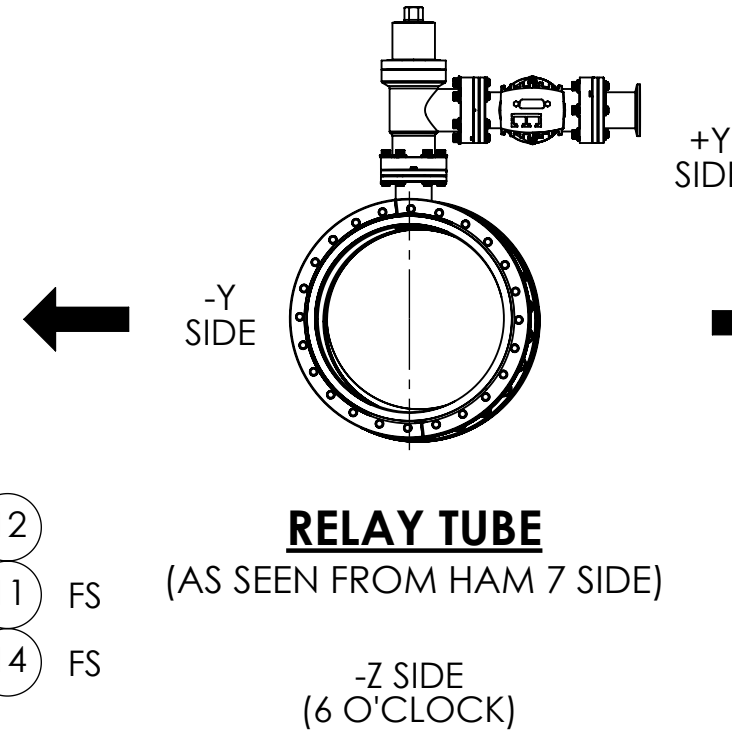
SEAM WELD OF
THE MITERED SPOOL
FACING UP, TOWARDS
12 O'CLOCK POSITION



ROTATABLE CF
(MITERED SPOOL)



ROTATABLE CF
(BELLOW)



-Y SIDE

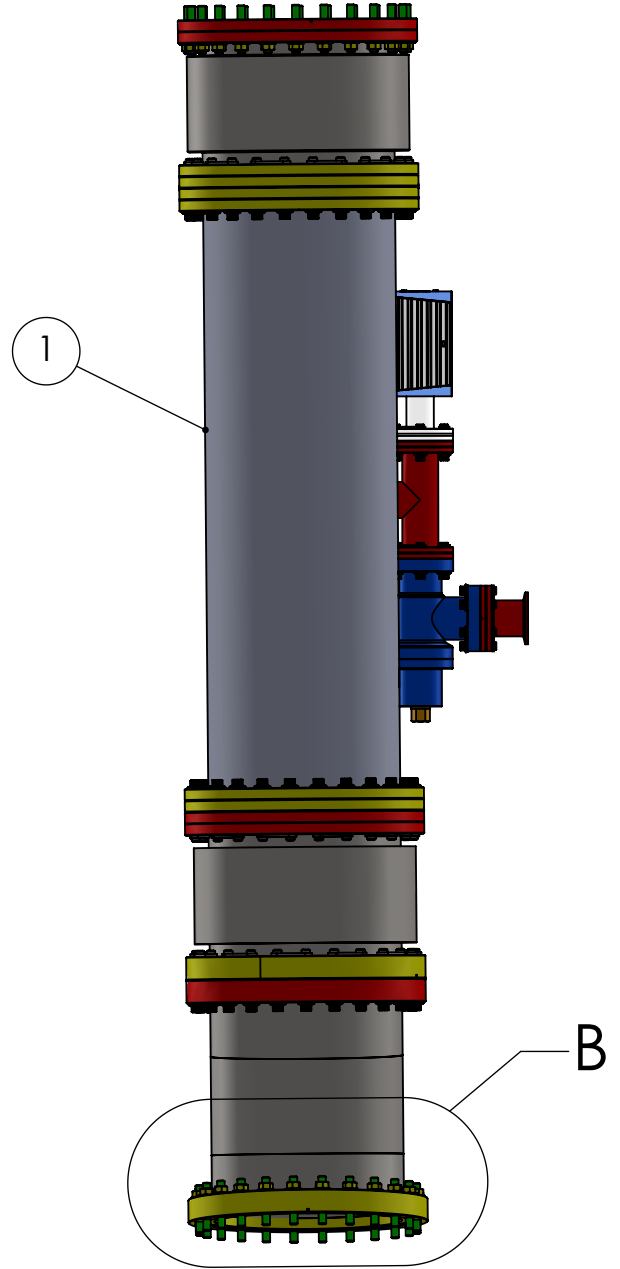
RELAY TUBE
(AS SEEN FROM HAM 7 SIDE)

-Z SIDE
(6 O'CLOCK)

+Y SIDE

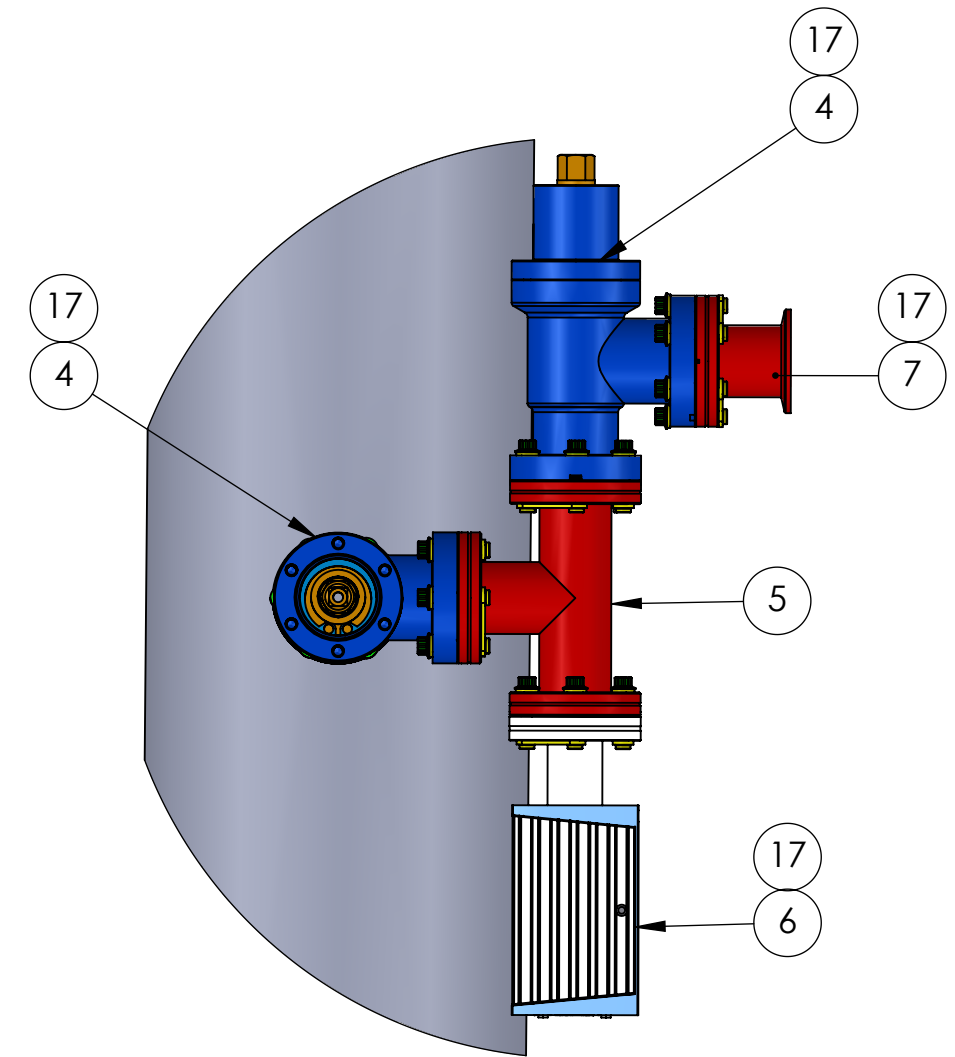
+ Y SIDE

13 12X 14 15 24x



- HAM 5 -

B



**DETAIL E
SCALE 1 : 4**

LLO, -01

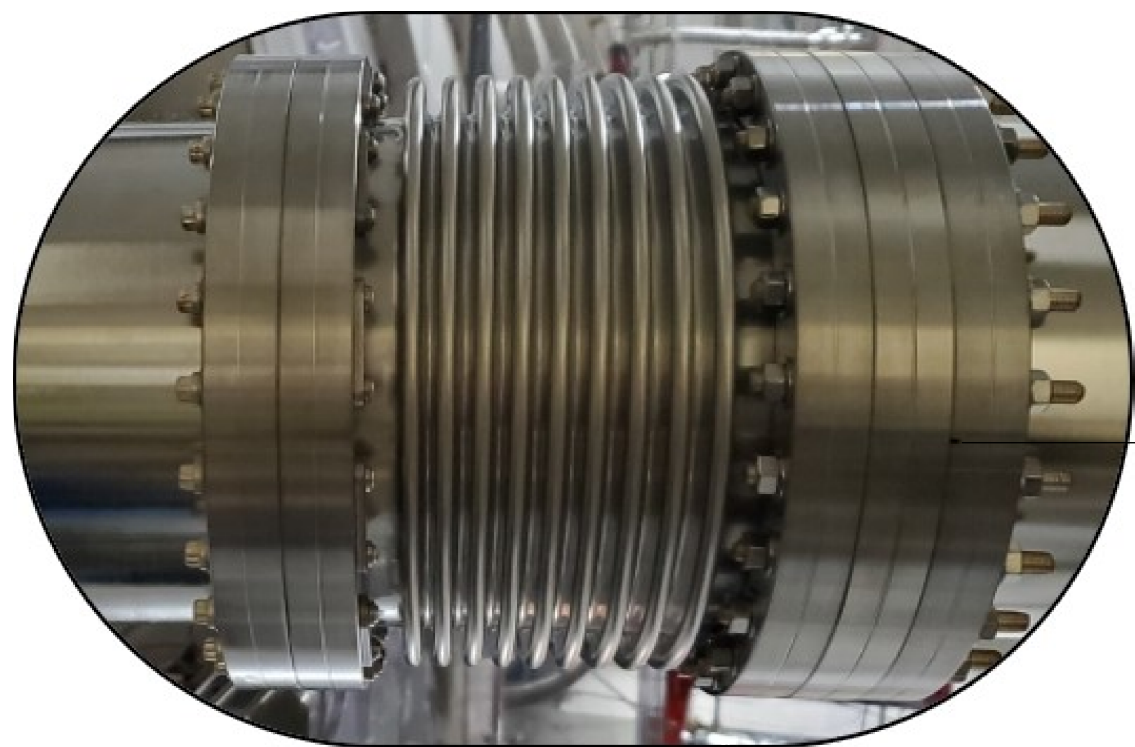
LIGO		CALIFORNIA INSTITUTE OF TECHNOLOGY MASSACHUSETTS INSTITUTE OF TECHNOLOGY	
SIZE	DWG. NO.	REV.	
D	D2100534	v5	
SCALE: 1:8	PROJECTION:	SHEET 2 OF 4	

LHO, -02 W/ SPACER

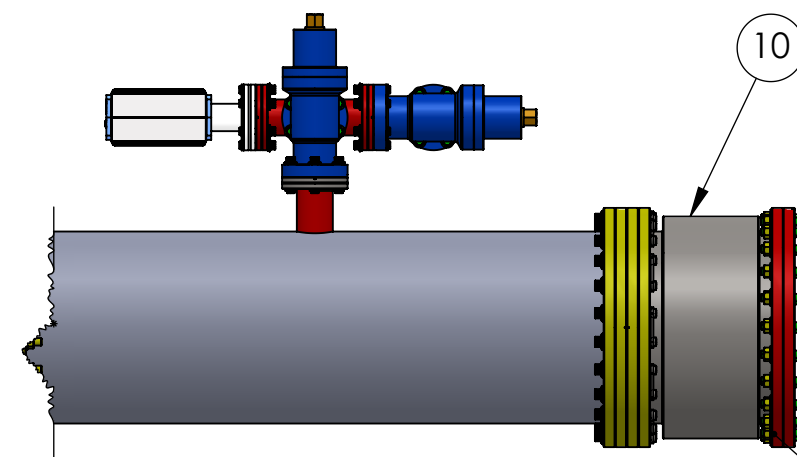
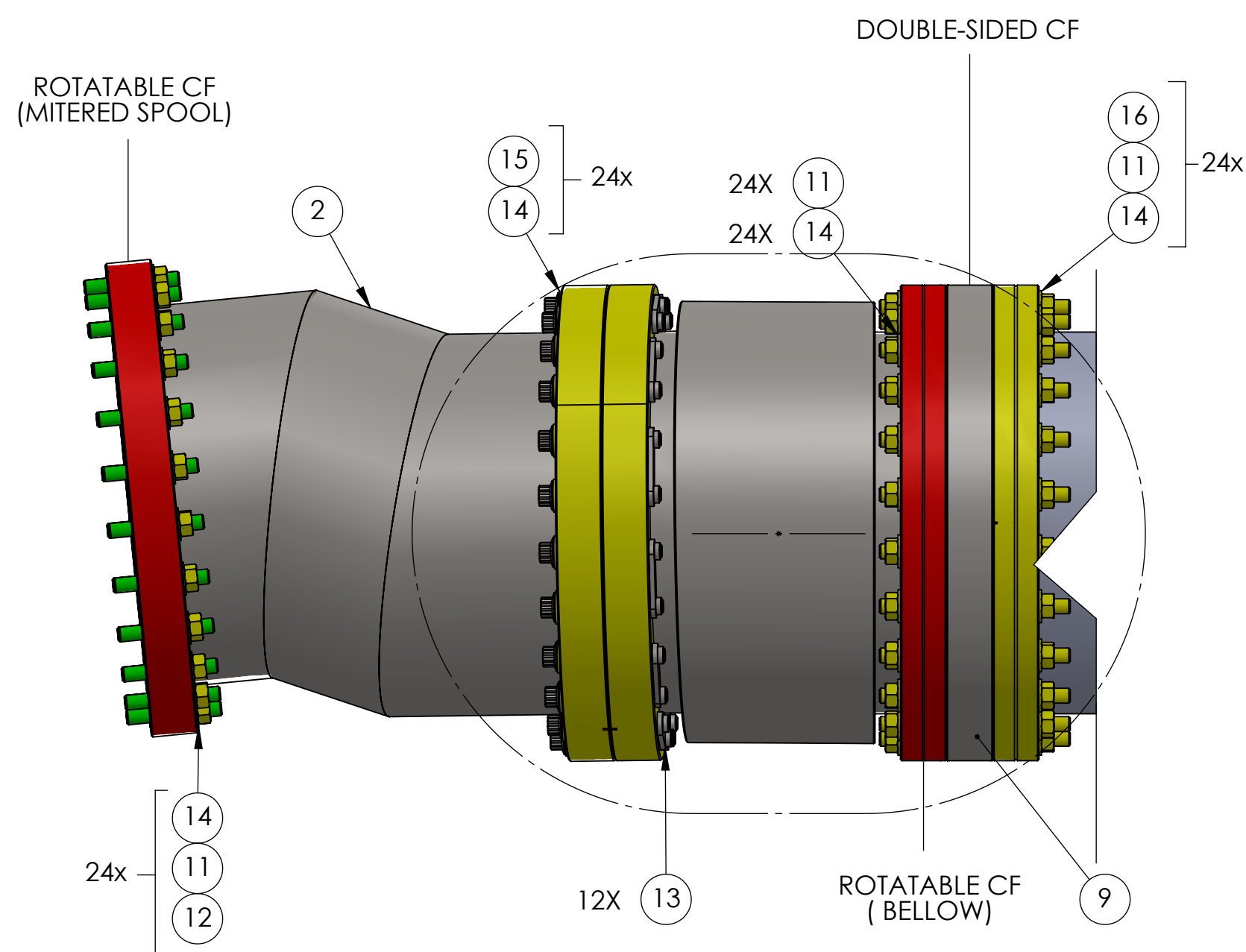
NON-ROTATABLE CF

ROTATABLE CF

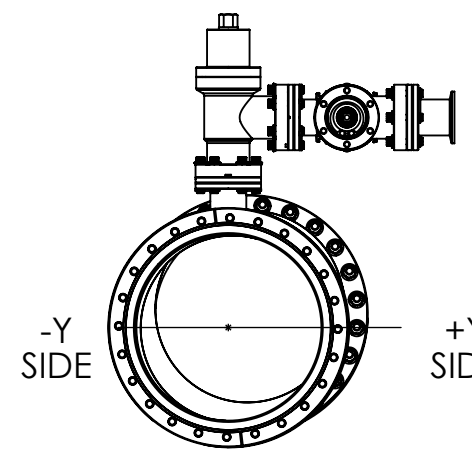
RELAY TUBE BELLOW DETAIL (AS SEEN FROM -Y SIDE)



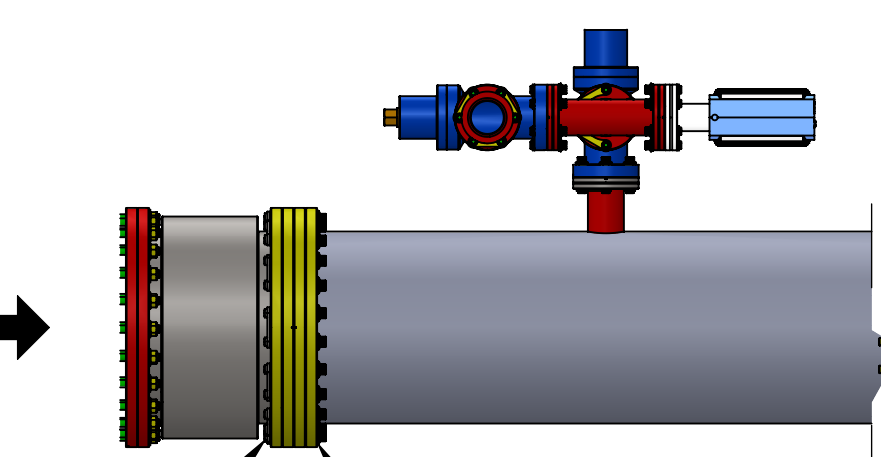
FLANGE LEAK PORTS ON PORTED SPOOL FIXED FLANGE
ALIGNED WITH COMMON CENTER LINE
AT 3 AND 9 O'CLOCK POSITIONS



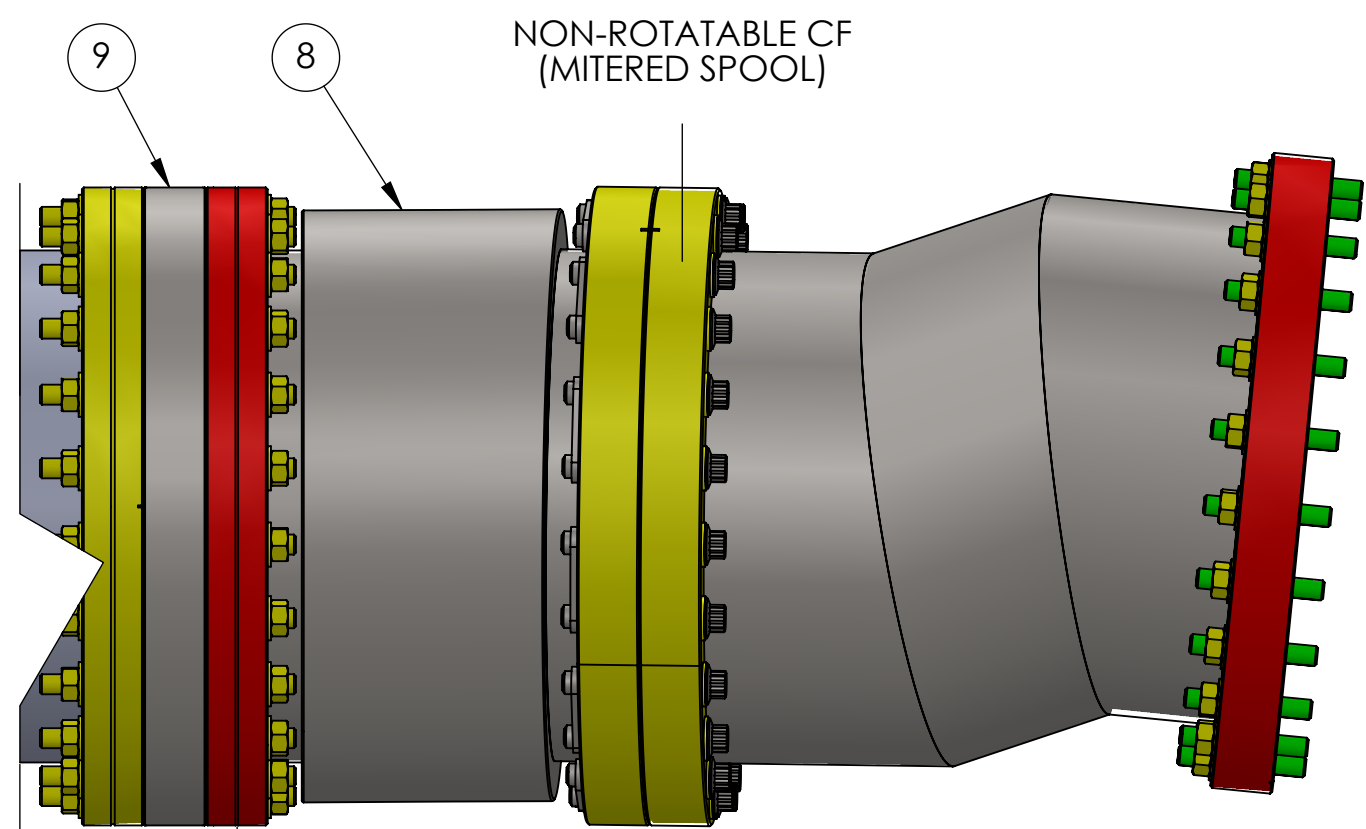
-Y SIDE



RELAY TUBE
(AS SEEN FROM HAM 7 SIDE)



+ Y SIDE



ROTATABLE CF
(BELLOW)

NON-ROTATABLE CF
(MITERED SPOOL)

FLANGE LEAK PORT ON BELLOW'S ROTATABLE FLANGE
AND DOUBLE-SIDED CF ALIGNED WITH
COMMON CENTER LINE AT 6 AND 12 O'CLOCK POSITION

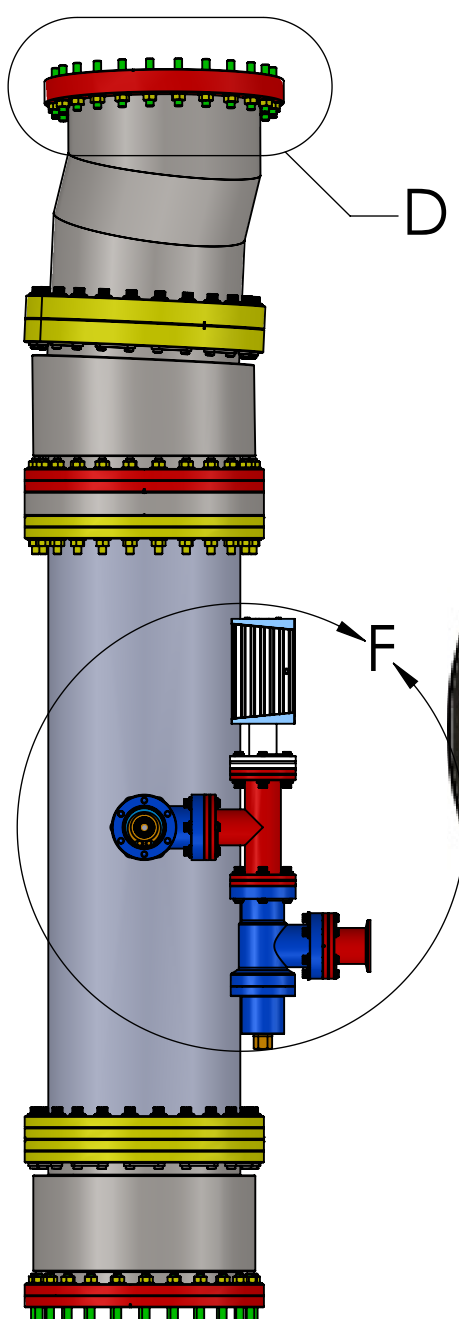
DOUBLE-SIDED CF

ROTATABLE CF
(BELLOW)

NON-ROTATABLE CF
(BELLOW)

FLANGE LEAK PORTS ON MITERED SPOOL NON-ROTATABLE FLANGE
AND BELLOW'S NON-ROTATABLE ROTATED 30 DEGREES FROM 6 O'CLOCK POSITION
IN A CLOCKWISE (CW) DIRECTION

- HAM 5 -



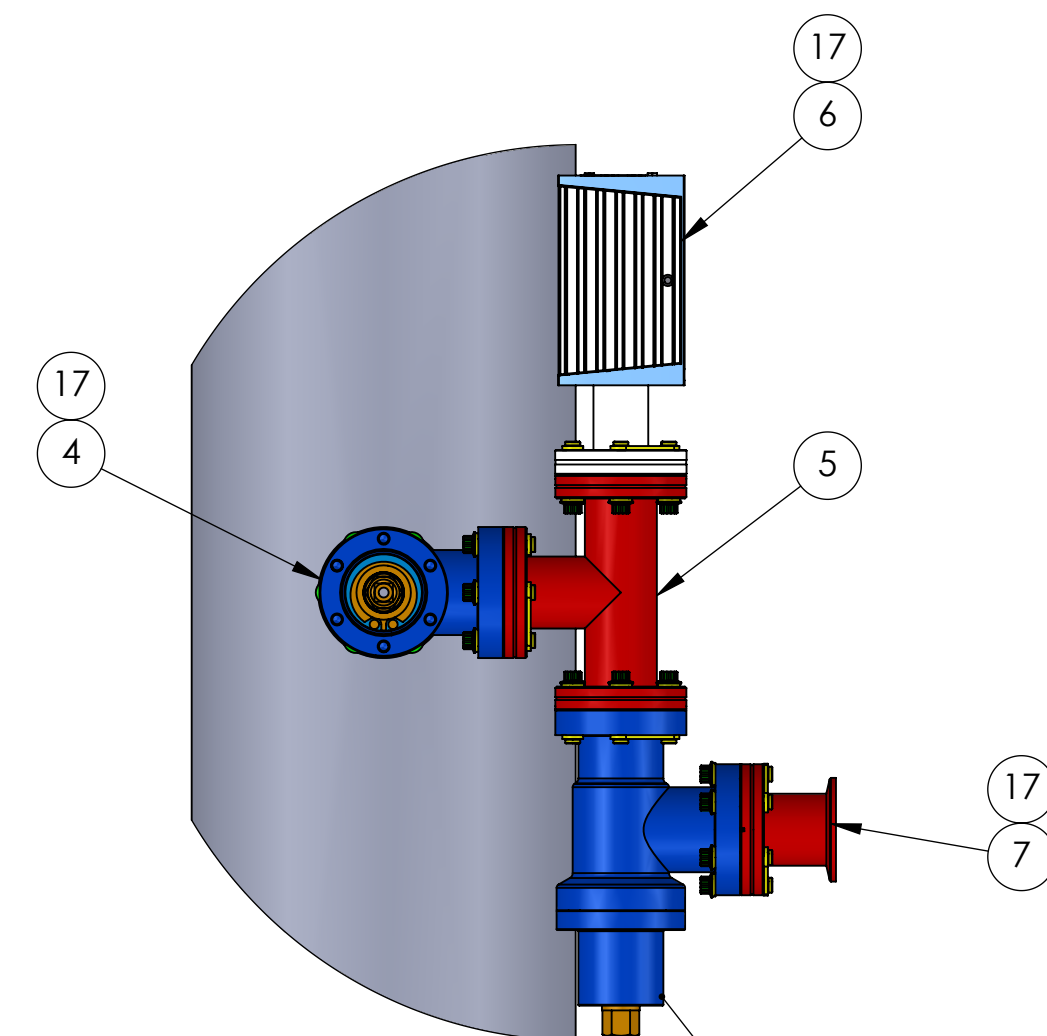
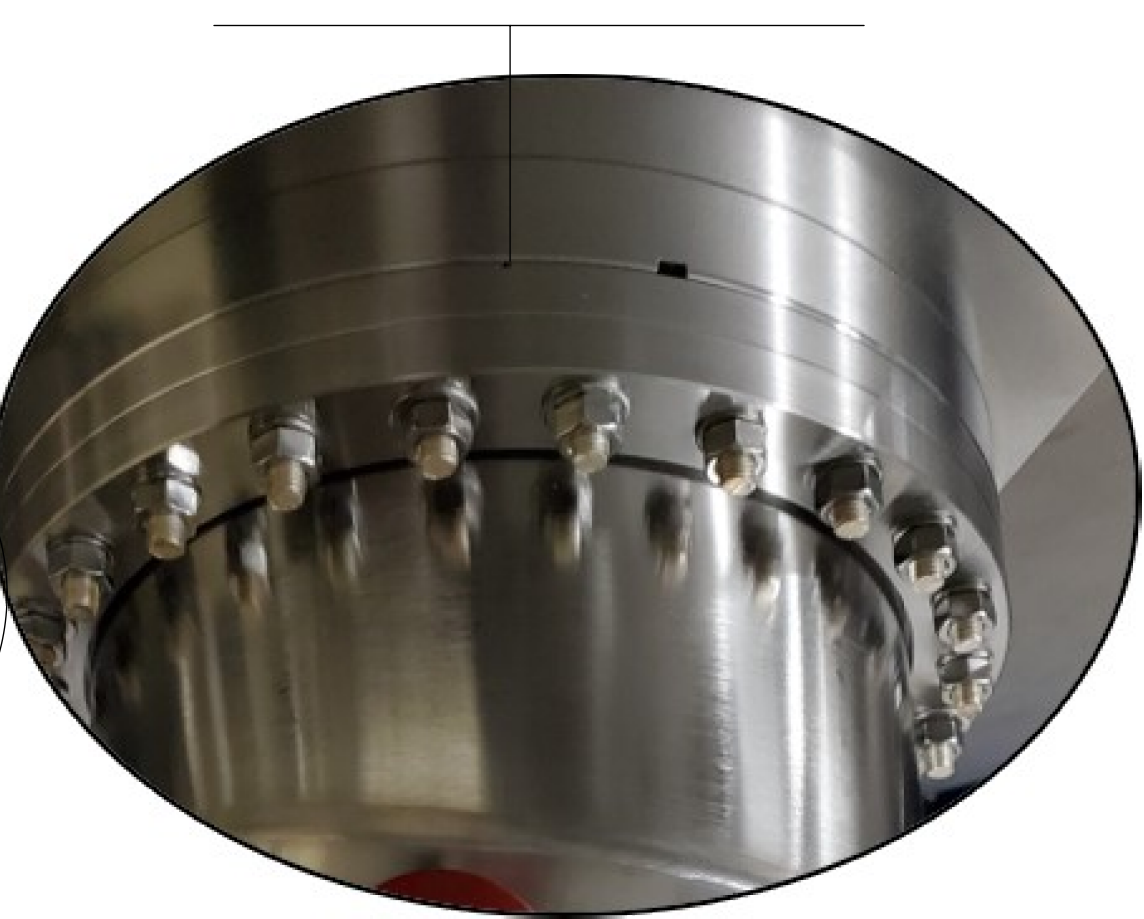
+Z SIDE
(12 O'CLOCK)

-Z SIDE
(6 O'CLOCK)

- HAM 5 -

- HAM 5 -
DETAIL 'D'

FLANGE LEAK PORTS ON BELLOW'S ROTATABLE FLANGE
ROTATED 15 DEGREES FROM 12 O'CLOCK POSITION
IN A COUNTERCLOCKWISE (CCW) DIRECTION

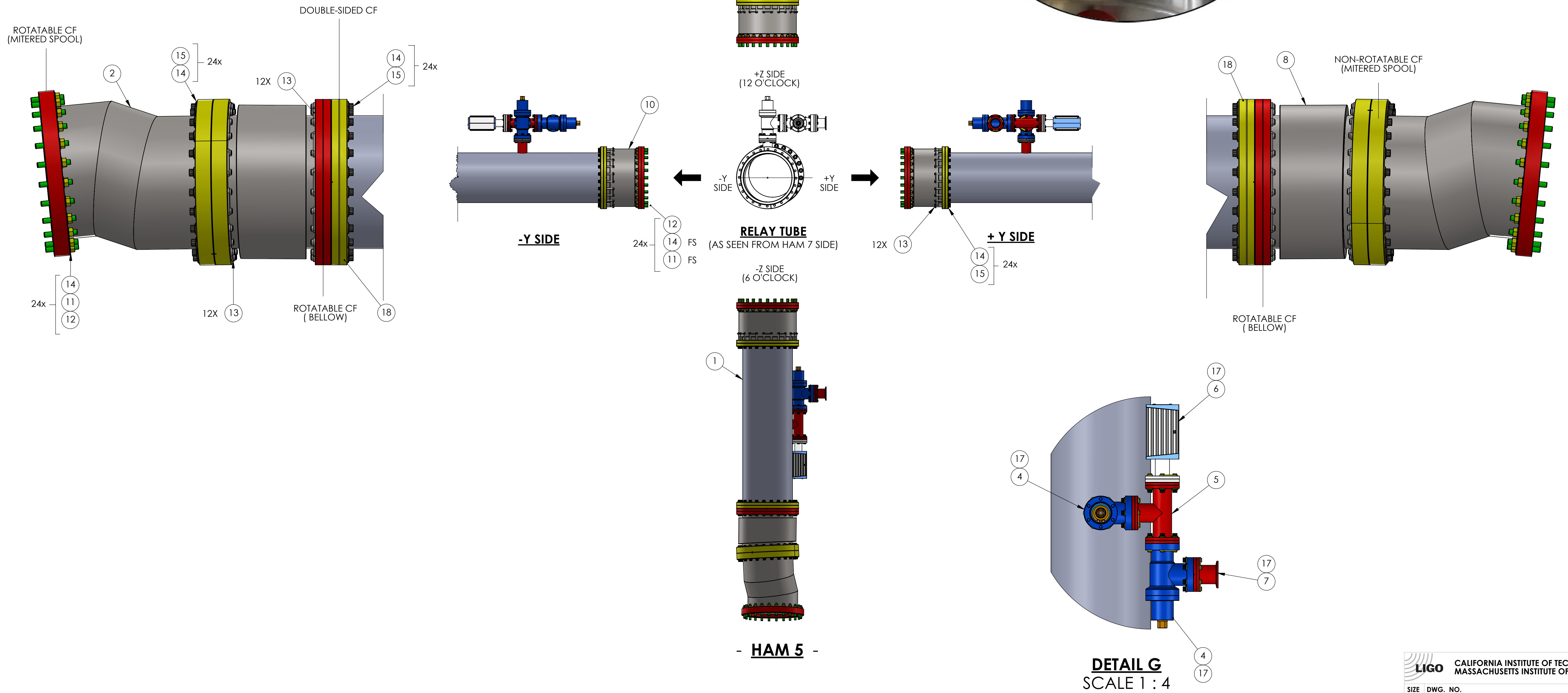


DETAIL F
SCALE 1 : 4

LIGO		CALIFORNIA INSTITUTE OF TECHNOLOGY MASSACHUSETTS INSTITUTE OF TECHNOLOGY	
SIZE	DWG. NO.	REV.	
D	D2100534	v5	
SCALE: 1:8	PROJECTION:	SHEET 3 OF 4	

LHO, -03 W/O SPACER

NON-ROTATABLE CF

 ROTATABLE CF

DETAIL G
SCALE 1 : 4