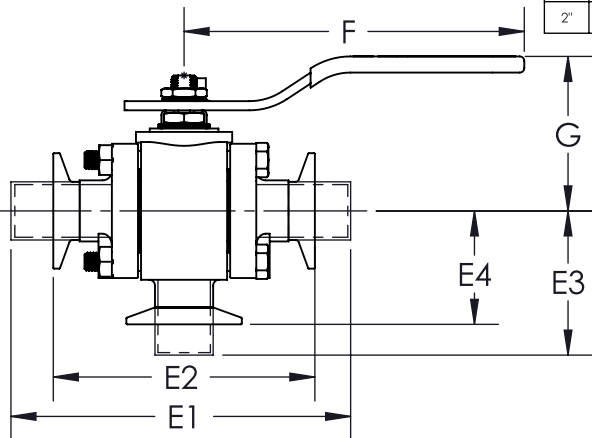
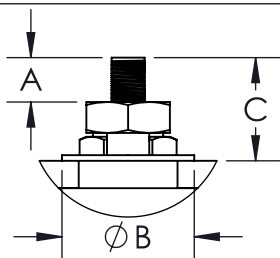


* AT FULL DIFFERENTIAL PRESSURE FOR CLEAN FLUIDS WITH TFM1600 NON-CAVITY FILLED SEATS

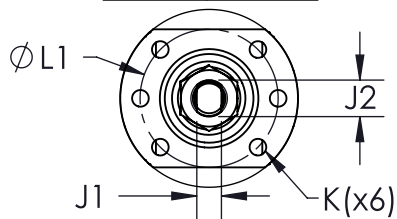
SIZE	A	øB	C	øD	E1	E2	E3	E4	F	G	J1	J2	K	øL1	øL2	W	ISO 5211	WEIGHT (lbs)	Cv	TORQUE* (in-lbf)	BODY BOLT SIZE	BODY NUT SIZE
1/2"	0.24 (6)	1.0 (25)	0.64 (16)	0.37 (9)	5.50 (140)	3.50 (89)	2.96 (75)	1.67 (42)	5.0 (127)	2.22 (56)	0.22 (6)	0.37 (9)	M5-0.8	1.42 (36)	N/A	0.065 (1.7)	F03	2	8	60	M6 - 1.0 X 45	M6-1.0P
3/4"	0.24 (6)	1.0 (25)	0.64 (16)	0.62 (16)	6.00 (152)	4.00 (102)	3.05 (77)	1.76 (45)	5.0 (127)	2.28 (58)	0.22 (6)	0.37 (9)	M5-0.8	1.42 (36)	N/A	0.065 (1.7)	F03	2	29	60	M6-1.0 X 53	M6-1.0P
1"	0.36 (9)	1.2 (30)	0.78 (20)	0.87 (22)	6.50 (165)	4.50 (114)	3.23 (82)	1.95 (50)	6.0 (152)	2.56 (65)	0.30 (8)	0.43 (11)	M5-0.8	1.65 (42)	N/A	0.065 (1.7)	F04	4	66	100	M8 - 1.25 X 72	M8-1.25P
1-1/2"	0.50 (13)	1.4 (36)	1.27 (32)	1.37 (35)	7.50 (191)	5.50 (140)	3.58 (91)	2.30 (58)	7.0 (178)	3.09 (78)	0.34 (9)	0.56 (14)	M6-1.0	1.77 (45)	1.97 (50)	0.065 (1.7)	F05	8	192	200	M10-1.5 X 89	M10-1.5P
2"	0.46 (12)	1.4 (36)	1.23 (31)	1.87 (47)	8.00 (203)	6.25 (159)	3.74 (95)	2.46 (62)	7.0 (178)	3.45 (88)	0.34 (9)	0.56 (14)	M6-1.0	1.77 (45)	1.97 (50)	0.065 (1.7)	F05	13	434	250	M12-1.75 X 107	M12-1.75P



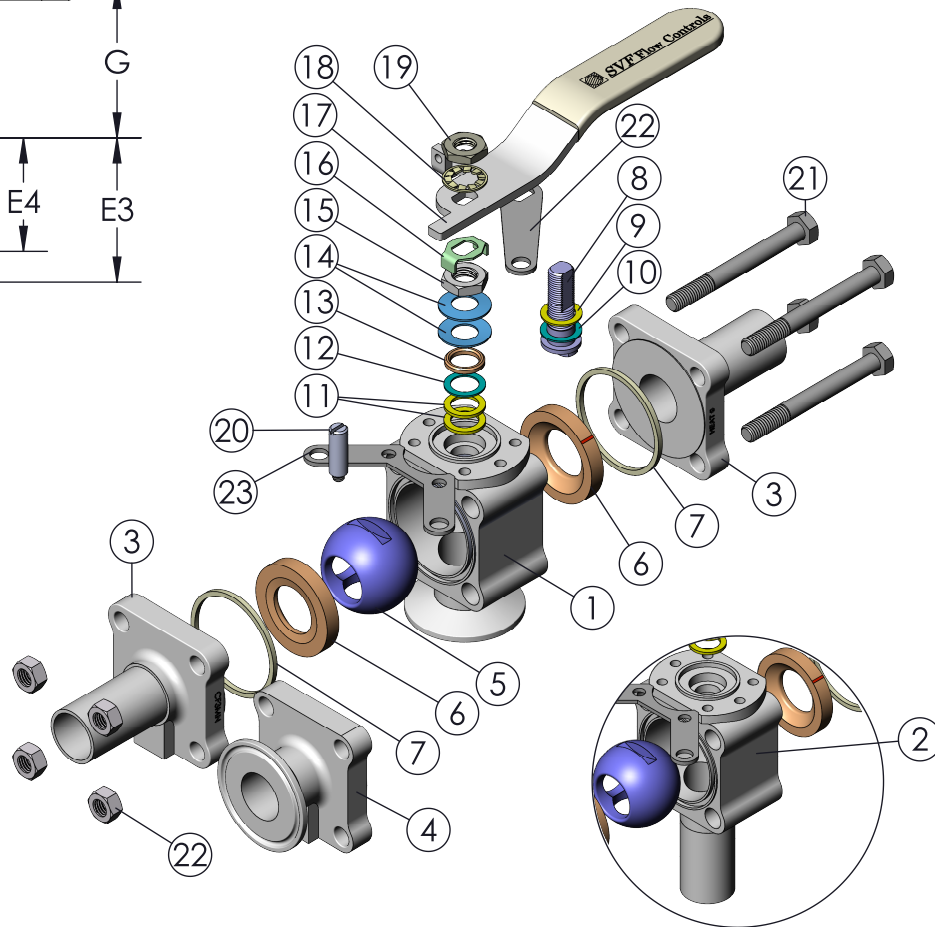
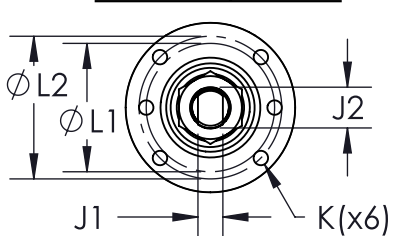
TOPWORKS



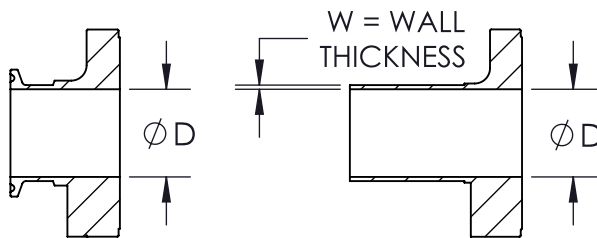
SIZES 1/2" - 1":



SIZES 1-1/2" - 2":



END CONFIGURATIONS:



TRI-CLAMP END

EXTENDED TUBE-OD END

PRODUCT INFORMATION:

1. END CONNECTIONS AVAILABLE IN: TRI-CLAMP, EXTENDED TUBE-OD, TRI-CLAMP X EXTENDED TUBE-OD AND EXTENDED TUBE-OD X TRI-CLAMP
2. SERVICES INCLUDE: OXYGEN CLEANING, ELECTROPOLISH, HIGH CYCLE STEM KIT, AND VACUUM & SEARCHING GAS STEM KIT
3. SULFUR CONTENT OF 0.005-0.017% FOR WELD ENDS
4. CONTROLLED DELTA FERRITE CHEMISTRY
5. INTERNAL SURFACE FINISH OF 20 Ra OR BETTER
6. ALL STAINLESS STEEL PASSIVATED
7. COMPLETE VALVE AUTOMATION

OPTIONS:

1. OVAL HANDLE
2. LOCKING DEVICE
3. ISO STEM EXTENSION
4. ANTI-STATIC DEVICE

APPLICABLE STANDARDS:

1. ASME BPE: HYGIENIC
2. ASME B16.34: DESIGN
3. API 598: INSPECTION AND TESTING
4. ISO 5211: MOUNTING
5. CGA G-4.1: CLEANING FOR OXYGEN SERVICE
6. USP CLASS VI, SECTIONS 87 & 88: CONFIRMATION OF COMPLIANCE (TFM1600/PTFE MATERIAL)

ITEM NO.	DESCRIPTION	MATERIALS	QTY.
1	BODY (TRI-CLAMP PORT)	A351-CF3MN	1
2	BODY (ETO PORT)	A351-CF3MN	1
3	END (ETO)	A351-CF3MN	2
4	END (TRI-CLAMP)	A351-CF3MN	2
5	3-WAY BALL (BL3 - 90°)	A351-CF3MN	1
6	SEAT	TFM1600 CAVITY-FILLED TFM1600	2
7	BODY SEAL	PTFE TFM1600	2
8	STEM	A351-CF3MN A479-316L	1
9	STEM THRUST WASHER	TFM1600	1
10	STEM THRUST WASHER	VIRGIN PEEK	1
11	STEM SEAL	TFM1600	2
12	STEM SEAL	VIRGIN PEEK	1
13	GLAND FOLLOWER	304 STAINLESS STEEL	1
14	BELLEVILLE WASHER	301 STAINLESS STEEL	2
15	JAM NUT	304 STAINLESS STEEL	1
16	LOCK TAB	304 STAINLESS STEEL	1
17	LEVER HANDLE	304 STAINLESS STEEL	1
18	SERRATED LOCK WASHER	304 STAINLESS STEEL	1
19	HANDLE NUT	304 STAINLESS STEEL	1
20	STOP PIN	304 STAINLESS STEEL	1
21	BODY BOLT	304 STAINLESS STEEL	4
22	BODY NUT	304 STAINLESS STEEL	4
23	LOCKING DEVICE (OPTIONAL)	304 STAINLESS STEEL	2

DRAWN BY E.P. DATE 04/04/2017
 CHECKED BY E.G. DATE 03/05/2019
 APPROVED BY J.S. DATE 03/05/2019
(FOR REF ONLY IF NOT APPROVED)

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PROJECTION THIRD ANGLE

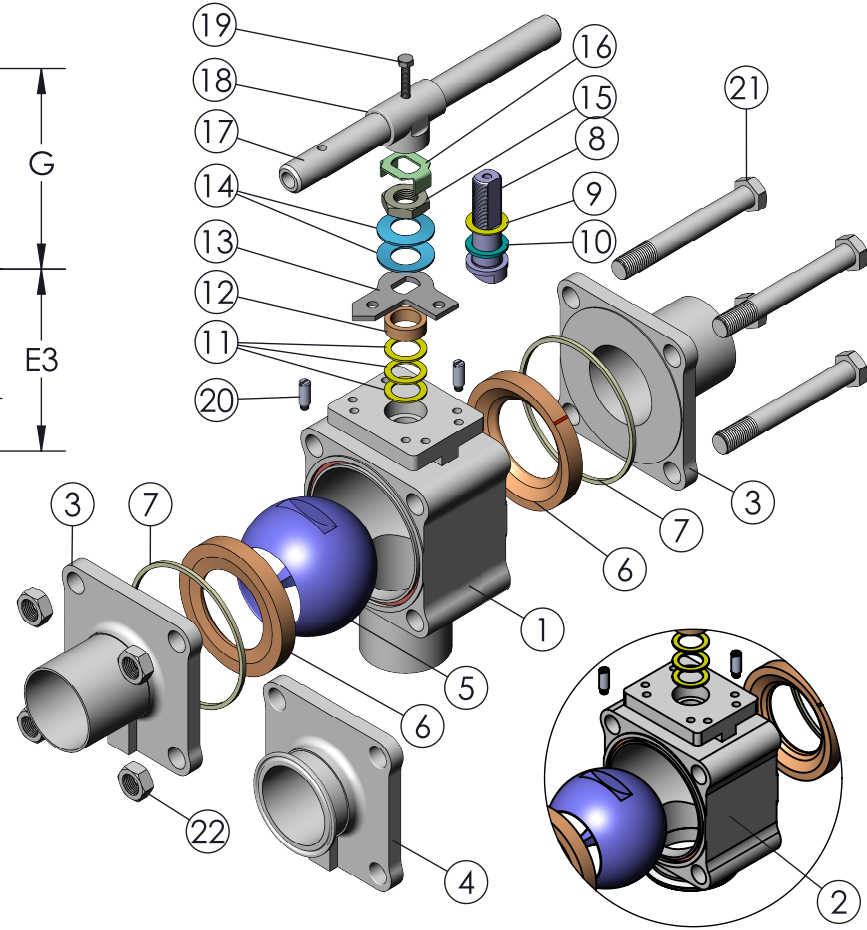
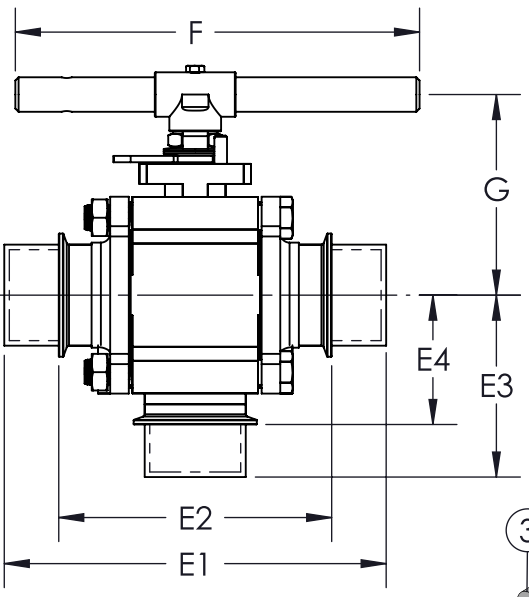


DESCRIPTION: 1/2" - 2" TSB7 3-PIECE (BOTTOM PORT) CLEANFLOW HIGH PURITY BALL VALVE

UNITS: INCH (MILLIMETERS) DATE: 03/05/2019 REV: C

* AT FULL DIFFERENTIAL PRESSURE FOR CLEAN FLUIDS WITH TFM1600 NON-CAVITY FILLED SEATS

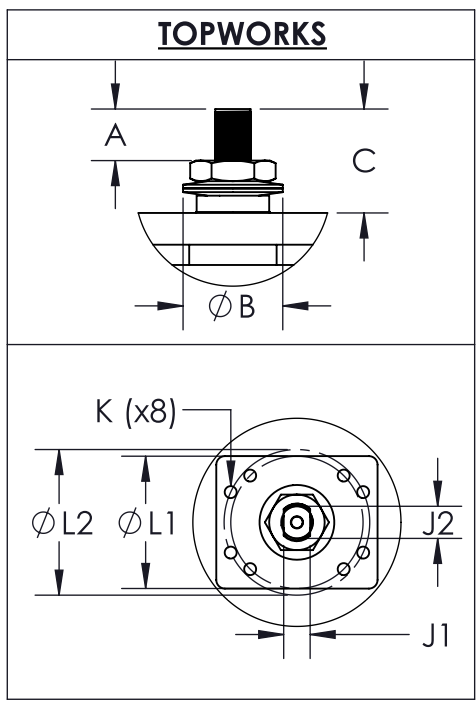
SIZE	A	øB	C	øD	E1	E2	E3	E4	F	G	J1	J2	K	øL1	øL2	W	ISO 5211	WEIGHT (lbs)	Cv	TORQUE* (in-lbf)	BODY BOLT SIZE	BODY NUT SIZE
2-1/2"	0.68 (17)	1.6 (41)	1.69 (43)	2.37 (60)	9.50 (241)	6.75 (171)	4.50 (114)	3.20 (81)	10.0 (254)	5.35 (136)	0.55 (14)	0.77 (20)	M8-1.25	2.76 (70)	3.03 (77)	0.065 (1.7)	F07	23	723	450	M16 - 2.0 X 123	M16-2.0P



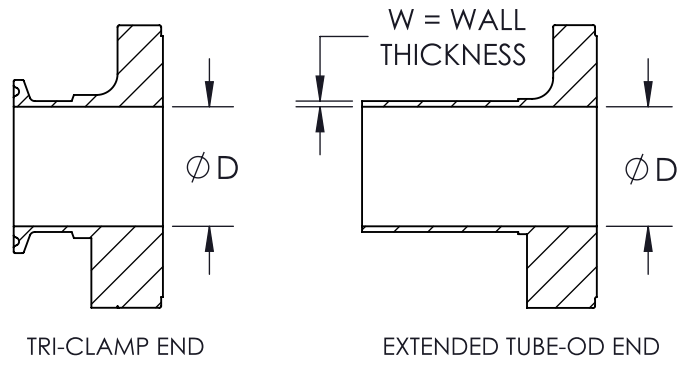
PRODUCT INFORMATION:
 1. END CONNECTIONS AVAILABLE IN: TRI-CLAMP, EXTENDED TUBE-OD, TRI-CLAMP X EXTENDED TUBE-OD AND EXTENDED TUBE-OD X TRI-CLAMP
 2. SERVICES INCLUDE: OXYGEN CLEANING, ELECTROPOLISH, HIGH CYCLE STEM KIT, AND VACUUM & SEARCHING GAS STEM KIT
 3. SULFUR CONTENT OF 0.005-0.017% FOR WELD ENDS
 4. CONTROLLED DELTA FERRITE CHEMISTRY
 5. INTERNAL SURFACE FINISH OF 20 Ra OR BETTER
 6. ALL STAINLESS STEEL PASSIVATED
 7. COMPLETE VALVE AUTOMATION

OPTIONS:
 1. OVAL HANDLE
 2. LOCKING DEVICE
 3. ISO STEM EXTENSION
 4. ANTI-STATIC DEVICE

APPLICABLE STANDARDS:
 1. ASME BPE: HYGIENIC
 2. ASME B1.6.34: DESIGN
 3. API 598: INSPECTION AND TESTING
 4. ISO 5211: MOUNTING
 5. CGA G-4.1: CLEANING FOR OXYGEN SERVICE
 6. USP CLASS VI, SECTIONS 87 & 88: CONFIRMATION OF COMPLIANCE (TFM1600/PTEF MATERIAL)



END CONFIGURATIONS:



ITEM NO.	DESCRIPTION	MATERIALS	QTY.
1	BODY (ETO PORT)	A351-CF3MN	1
2	BODY (TRI-CLAMP PORT)	A351-CF3MN	1
3	ETO END	A351-CF3MN	2
4	TRI-CLAMP END	A351-CF3MN	2
5	3-WAY BALL (BL3 - 90°)	A351-CF3MN	1
6	SEAT	TFM1600 CAVITY-FILLED TFM1600	2
7	BODY SEAL	PTFE TFM1600	2
8	STEM	A351-CF3MN A479-316L	1
9	STEM THRUST WASHER	TFM1600	1
10	STEM THRUST WASHER	VIRGIN PEEK	1
11	STEM SEAL	TFM1600	3
12	GLAND FOLLOWER	304 STAINLESS STEEL	1
13	STOP PLATE	304 STAINLESS STEEL	1
14	BELLEVILLE WASHER	301 STAINLESS STEEL	2
15	HANDLE NUT	304 STAINLESS STEEL	1
16	LOCK TAB	304 STAINLESS STEEL	1
17	WRENCH	304 STAINLESS STEEL	1
18	WRENCH BLOCK	304 STAINLESS STEEL	1
19	HANDLE BOLT	304 STAINLESS STEEL	1
20	STOP PIN	304 STAINLESS STEEL	2
21	BODY BOLT	304 STAINLESS STEEL	4
22	BODY NUT	304 STAINLESS STEEL	4

DRAWN BY C.L. DATE 06/28/2017
 CHECKED BY E.P. DATE 03/05/2019
 APPROVED BY J.S. DATE 03/05/2019
(FOR REF ONLY IF NOT APPROVED)

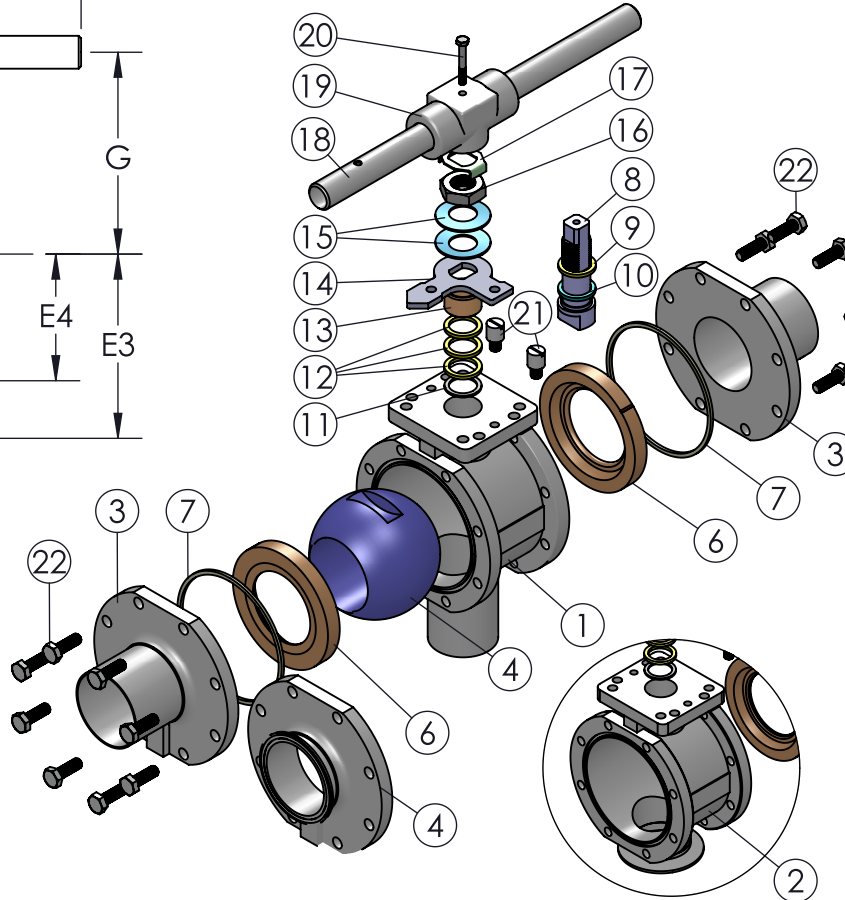
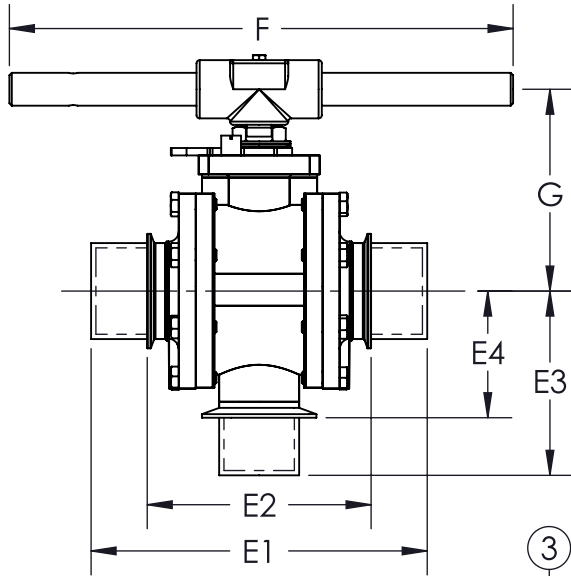
PROJECTION THIRD ANGLE:

DESCRIPTION:
 2-1/2" TSB7 3-PIECE (BOTTOM PORT) CLEANFLOW HIGH PURITY BALL VALVE
 UNITS: INCH (MILLIMETERS) DATE: 03/05/2019 REV: C



* AT FULL DIFFERENTIAL PRESSURE FOR CLEAN FLUIDS WITH TFM1600 NON-CAVITY FILLED SEATS
 ** REFER TO TSB7 DATA SHEET FOR BOTTOM PORT DIMENSIONS

SIZE	A	øB	C	øD	E1	E2	E3	E4	F	G	J1	J2	K1	K2	øL1	øL2	øL3	W	ISO 5211	WEIGHT (lbs)	Cv	TORQUE * (in-lbf)	BODY BOLT SIZE	BODY NUT SIZE
3"	0.78 (20)	1.90 (48)	1.85 (47)	2.87 (73)	10.50 (267)	7.00 (178)	5.80 (147)	4.00 (102)	14.00 (348)	6.55 (166)	0.75 (19)	N/A	M10-1.5	0.39 (10)	3.17 (81)	N/A	4.01 (102)	0.065 (1.7)	F10	31	1124	1300	M10-1.50x30	N/A
4"	0.78 (20)	1.90 (48)	1.85 (47)	3.83 (97)	12.50 (318)	8.50 (216)	7.00 (178)	5.00 (127)	22.00 (559)	7.14 (181)	0.75 (19)	N/A	M10-1.5	0.39 (10)	3.17 (81)	N/A	4.01 (102)	0.083 (2.1)	F10	46	2100	1400	M10-1.75x30	N/A



PRODUCT INFORMATION:

1. END CONNECTIONS AVAILABLE IN: TRI-CLAMP, EXTENDED TUBE-OD, TRI-CLAMP X EXTENDED TUBE-OD AND EXTENDED TUBE-OD X TRI-CLAMP
2. SERVICES INCLUDE: OXYGEN CLEANING, ELECTROPOLISH, HIGH CYCLE STEM KIT, AND VACUUM & SEARCHING GAS STEM KIT
3. SULFUR CONTENT OF 0.005-0.017% FOR WELD ENDS
4. CONTROLLED DELTA FERRITE CHEMISTRY
5. INTERNAL SURFACE FINISH OF 20 Ra OR BETTER
6. ALL STAINLESS STEEL PASSIVATED
7. LOCKING DEVICE IS A STANDARD COMPONENT
8. COMPLETE VALVE AUTOMATION

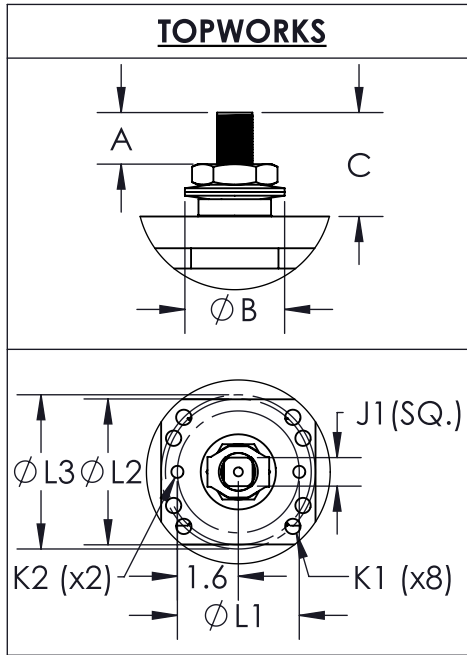
OPTIONS:

1. ISO STEM EXTENSION
2. ANTI-STATIC DEVICE

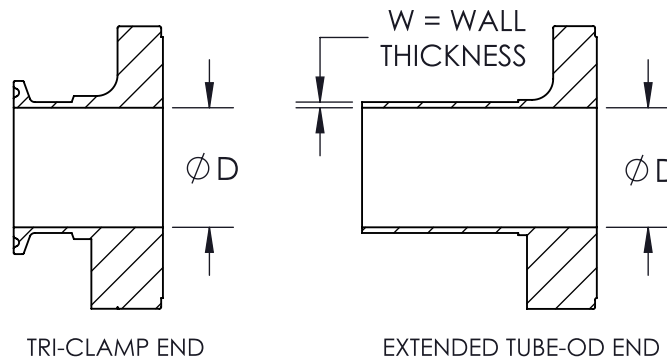
APPLICABLE STANDARDS:

1. ASME BPE: HYGIENIC
2. ASME B16.34: DESIGN
3. API 598: INSPECTION AND TESTING
4. ISO 5211: MOUNTING
5. CGA G-4.1: CLEANING FOR OXYGEN SERVICE
6. USP CLASS VI, SECTIONS 87 & 88: CONFIRMATION OF COMPLIANCE (TFM1600/PTFE MATERIAL)

ITEM NO.	DESCRIPTION	MATERIALS	QTY.
1	BODY (ETO PORT)	A351-CF3MN	1
2	BODY (TRI-CLAMP PORT)	A351-CF3MN	1
3	ETO END	A351-CF3MN	2
4	TRI-CLAMP END	A351-CF3MN	2
5	3-WAY BALL (BL3 - 90°)	A351-CF3MN	1
6	SEAT	TFM1600 CAVITY-FILLED TFM1600	2
7	BODY SEAL	PTFE TFM1600	2
8	STEM	A351-CF3MN A479-31.6L	1
9	STEM THRUST WASHER	TFM1600	1
10	STEM THRUST WASHER	VIRGIN PEEK	1
11	STEM LOCATION RING	316 STAINLESS STEEL	1
12	STEM SEAL	TFM1600	3
13	GLAND FOLLOWER	304 STAINLESS STEEL	1
14	STOP PLATE	304 STAINLESS STEEL	1
15	BELLEVILLE WASHER	301 STAINLESS STEEL	2
16	HANDLE NUT	304 STAINLESS STEEL	1
17	LOCK TAB	304 STAINLESS STEEL	1
18	WRENCH	304 STAINLESS STEEL	1
19	WRENCH BLOCK	304 STAINLESS STEEL	1
20	HANDLE BOLT	304 STAINLESS STEEL	1
21	STOP PIN	304 STAINLESS STEEL	2
22	BODY BOLT	304 STAINLESS STEEL	16



END CONFIGURATIONS:



DRAWN BY C.L.	DATE 06/29/2017
CHECKED BY E.P.	DATE 03/05/2019
APPROVED BY J.S.	DATE 03/05/2019
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PROJECTION THIRD ANGLE:	

OSVF FLOW CONTROLS

DESCRIPTION:
 3" & 4" TSB7 3-PIECE (BOTTOM PORT) CLEANFLOW HIGH PURITY BALL VALVE

UNITS: INCH (MILLIMETERS) DATE: 03/05/2019 REV: C