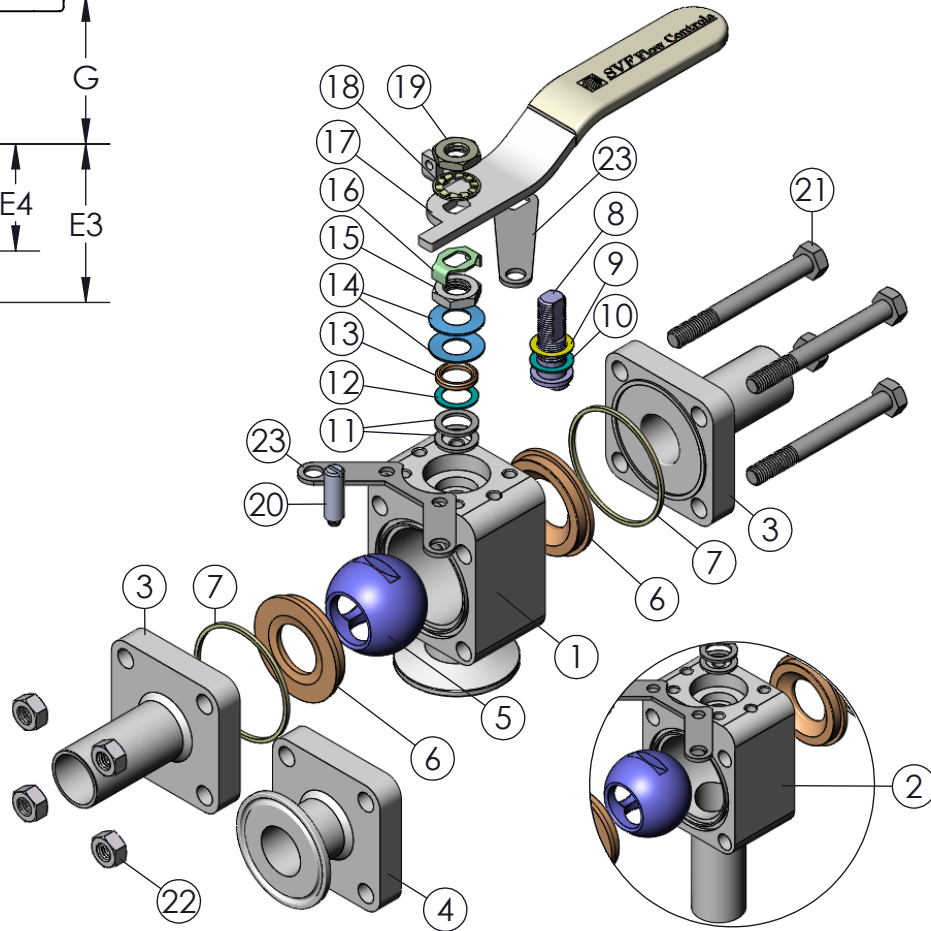
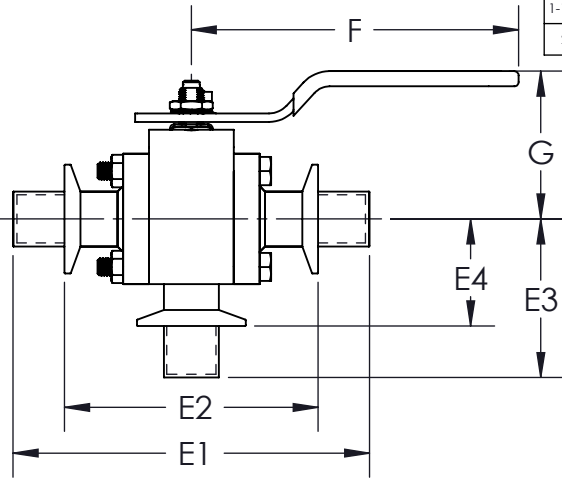
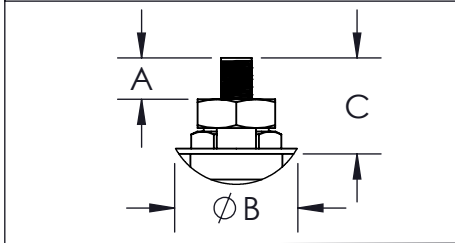


\* AT FULL DIFFERENTIAL PRESSURE FOR CLEAN FLUIDS WITH TFM1600 NON-CAVITY FILLED SEATS

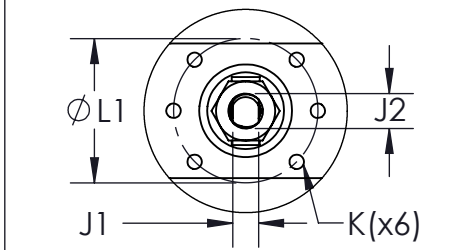
SIZE	A	øB	C	øD	E1	E2	E3	E4	F	G	J1	J2	K	øL1	øL2	W	ISO 5211	WEIGHT (lbs)	Cv	TORQUE* (in-lbf)	BODY BOLT SIZE	BODY NUT SIZE
1/2"	0.21 (5)	1.0 (25)	0.64 (16)	0.37 (9)	5.50 (140)	3.50 (89)	2.96 (75)	1.67 (42)	5.0 (127)	2.22 (56)	0.22 (6)	0.37 (9)	M5-0.8	1.42 (36)	N/A	0.065 (1.7)	F03	2	8	60	M6 - 1.0 X 45	M6-1.0P
3/4"	0.21 (5)	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"	0.33 (8)	1.2 (30)	0.72 (18)	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"	0.43 (11)	1.4 (36)	1.16 (29)	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	1.75 (44)	1.97 (50)	0.065 (1.7)	F05	8	192	200	M10-1.5 X 89	M10-1.5P
2"	0.43 (11)	1.4 (36)	1.16 (29)	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	1.75 (44)	1.97 (50)	0.065 (1.7)	F05	13	434	250	M12-1.75 X 107	M12-1.75P



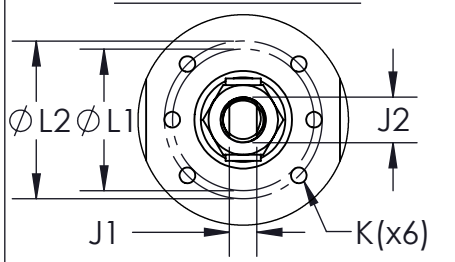
**TOPWORKS**



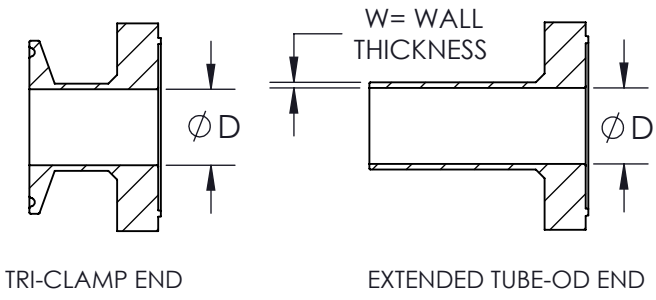
**SIZES 1/2" - 1":**



**SIZES 1-1/2" - 2":**



**END CONFIGURATIONS:**



**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 R<sub>a</sub> 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 MATERIAL)

ITEM NO.	DESCRIPTION	MATERIALS	QTY.
1	BODY (TRI-CLAMP PORT)	A182-F316L	1
2	BODY (ETO PORT)	A182-F316L	1
3	END (ETO)	A182-F316L	2
4	END (TRI-CLAMP)	A182-F316L	2
5	BALL	A182-F316L	1
6	SEAT	TFM1600 CAVITY-FILLED TFM1600	2
7	BODY SEAL	TFM1600	2
8	STEM	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 03/22/2018  
 APPROVED BY J.S. DATE 03/22/2018  
(FOR REF. ONLY IF NOT APPROVED)

PROJECTION THIRD ANGLE:

DESCRIPTION: 1/2" - 2" TSB7F 3-PIECE (BOTTOM PORT) CLEANFLOW HIGH PURITY FORGED BALL VALVE

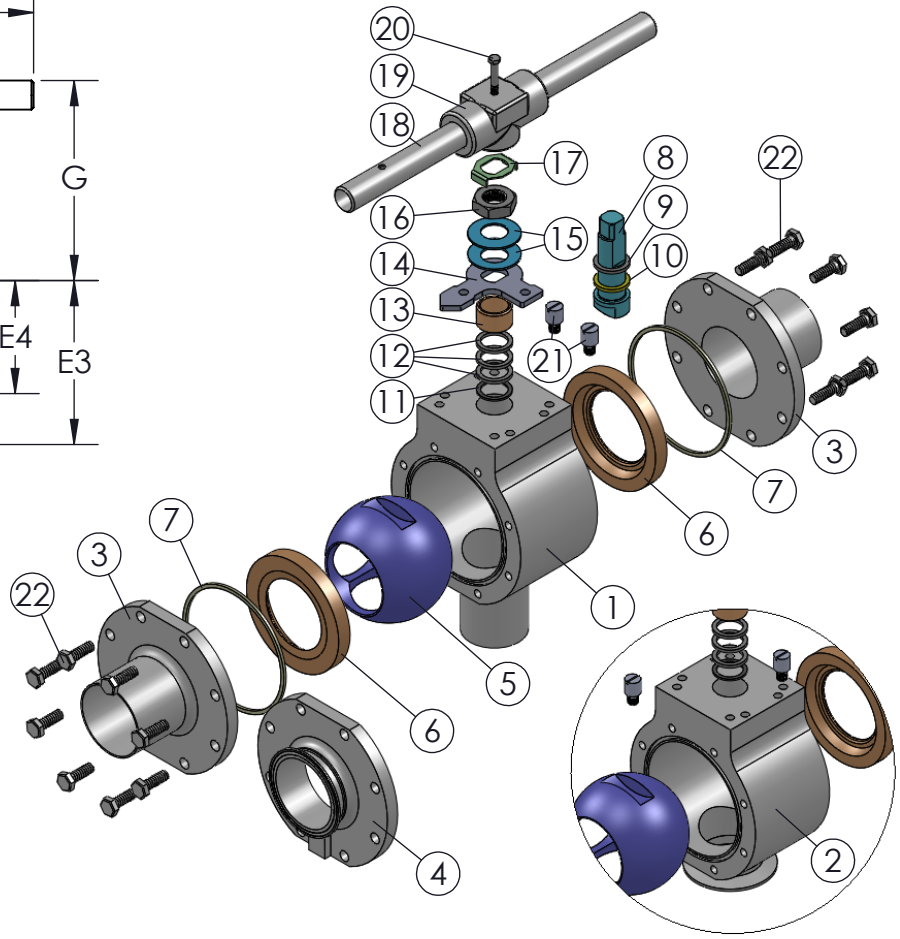
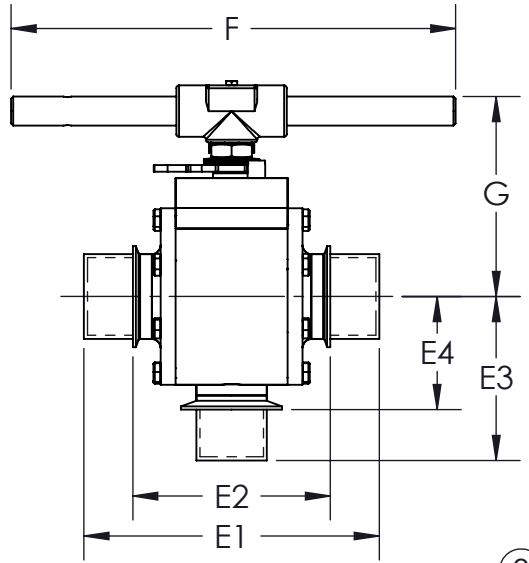
UNITS: INCH (MILLIMETERS) DATE: 03/22/2018 REV: B



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\* AT FULL DIFFERENTIAL PRESSURE FOR CLEAN FLUIDS WITH TFM1600 NON-CAVITY FILLED SEATS  
 \*\*REFER TO TSB7F DATA SHEET FOR BOTTOM PORT DIMENSIONS

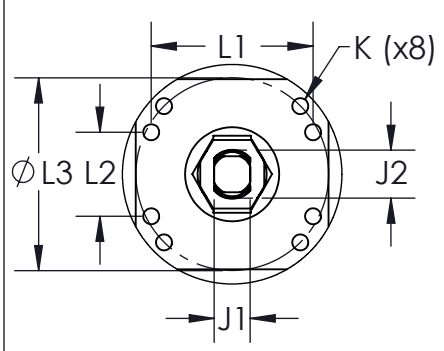
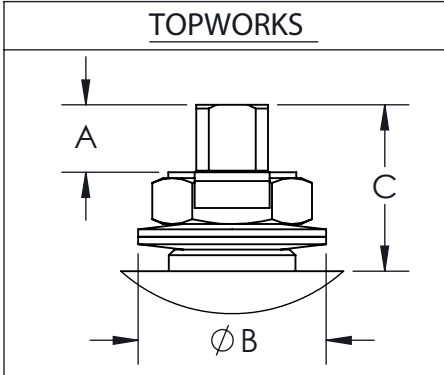
	A		B		C				D				E				F				G			
	SIZE	A	øB	C	øD	E1	E2	E3	E4	F	G	J1	J2	K	L1	L2	øL3	W	ISO 5211	WEIGHT (lbs)	Cv	TORQUE* (in-lb)	BODY BOLT SIZE	BODY NUT SIZE
1	2-1/2"	0.68 (17)	1.60 (41)	1.69 (43)	2.37 (60)	9.50 (241)	6.75 (171)	4.50 (114)	3.20 (81)	10.0 (254)	5.35 (136)	0.55 (14)	0.75 (19)	M8-1.25	2.76 (70)	1.26 (32)	2.76 (70)	0.065 (1.7)	F07	20	723	450	M10 - 1.5 X 30	N/A
	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)	14.0 (356)	6.55 (166)	0.75 (19)	0.75 (19)	M10-1.5	3.37 (86)	1.75 (44)	4.02 (102)	0.065 (1.7)	F10	37	1124	1300	M10 - 1.5 X 30	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)	22.0 (559)	7.14 (181)	0.75 (19)	0.75 (19)	M10-1.5	3.37 (86)	1.75 (44)	4.02 (102)	0.083 (2.1)	F10	53	2100	1400	M12 - 1.75 X 30	N/A



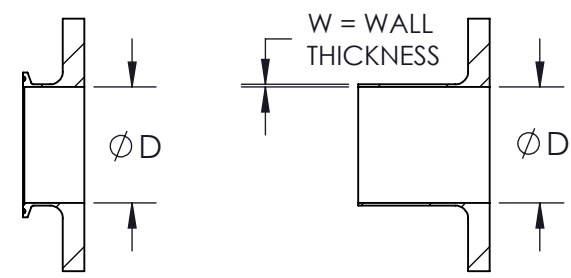
**PRODUCT INFORMATION:**  
 1. END CONNECTIONS AVAILABLE IN: TRI-CLAMP, EXTENDED TUBE-OD, TRI-CLAMP X EXTENDED TUBE-OD AND EXTENDED TUBE-OD X TRI-CLAMP  
 2. SERVICES INCLUDE: OXYGEN CLEANING, ELECTROPOLISH, HIGH CYCLE STEM KIT, AND VACUUM & SEARCHING GAS STEM KIT  
 3. SULFUR CONTENT OF 0.005-0.017% 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 MATERIAL)



**END CONFIGURATIONS:**



ITEM NO.	DESCRIPTION	MATERIALS	QTY.
1	BODY (ETO PORT)	A182-F316L	1
2	BODY (TRI-CLAMP PORT)	A182-F316L	1
3	ETO END	A182-F316L	2
4	TRI-CLAMP END	A182-F316L	2
5	BALL	A182-F316L	1
6	SEAT	TFM1600 CAVITY-FILLED TFM1600	2
7	BODY SEAL	TFM1600	2
8	STEM	A479-316L	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	JAM 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

DRAWN BY C.L.  
 CHECKED BY E.P.  
 APPROVED BY J.S.  
(FOR REF. ONLY IF NOT APPROVED)

DATE 06/23/2017  
 DATE 03/22/2018  
 DATE 03/22/2018

PROJECTION THIRD ANGLE

DESCRIPTION:  
 2-1/2" - 4" TSB7F 3-PIECE (BOTTOM PORT) CLEANFLOW HIGH PURITY FORGED BALL VALVE



UNITS: INCH (MILLIMETERS) DATE: 03/22/2018 REV: B