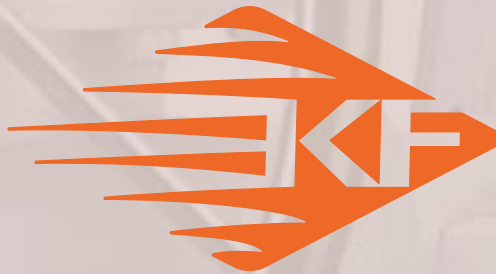


KF Global Ball Valves



KF Industries



Superior Fluid Control Products for the Petrochemical and Industrial Markets

A division of **CIRCOR** International, Inc.

Suzhou KF and CIRCOR's International Petrochemical Group

As globally sourced products were becoming more and more acceptable to the valve market, KF realized that to remain competitive and still offer quality products, it was prudent to develop an international manufacturing source in which we held ownership. Additionally, careful selection of independent inter-

national sources for valve products and materials has been accomplished. Having executed this strategic global sourcing plan, KF continues to offer competitively priced, high quality flow control products worthy of our hard-earned, historical reputation.

Contents

Specifications Conformance & Our Quality Commitment	3
Series FE O-Ring Style Floating Ball Valve	
General Design Features and Engineering Data	4
Component Parts	5
Part Number Codes	6
Dimensional Data	7-9
Series 1500 & 2500 Reduced Port Packed Style Floating Ball Valve	
General Design Features and Engineering Data	10
Component Parts	11
Part Number Codes	14
Dimensional Data	15
Series 1800 & 2800 Full Port Packed Style Floating Ball Valve	
General Design Features and Engineering Data	12
Component Parts	13
Part Number Codes	14
Dimensional Data	16-17
Series FAE Trunnion Mounted Ball Valve	
General Design Features and Engineering Data	18
Component Parts	19
Part Number Codes	20
Dimensional Data	21-22
Series TE Trunnion Mounted Ball Valve	
General Design Features and Engineering Data	23
Component Parts	24
Part Number Codes	25
Dimensional Data	26-29
Series M3 Trunnion Mounted Ball Valve	
General Design Features and Engineering Data	30
Component Parts	31-33
Part Number Codes	34
Dimensional Data	35-39
TopWorks & Stem Torque Data	40-41
Engineering Data	
Flow Coefficient (C_V), Operating Torque and Method of Calculating Flow	42-43



Specifications Conformance

KF global ball valves are designed, manufactured and tested in accordance with API, ANSI, ASME and B.S. requirements. The following list contains the most important applicable standards for ball valves. These valves may be produced in accordance with other international standards on request.

ANSI-American National Standard Institute

B 16.5	Steel pipe flanges and flanged fittings.
B 16.10	Face-to-face and end-to-end dimensions of ferrous valves.
B 16.25	Butt welding ends.
B 16.34	Steel valves-flanged and butt welding ends.

API-American Petroleum Institute

Spec. 6A	Specification for wellhead valves.
Spec. 6D	Specification for pipeline valves.
Spec. 6FA	Specification for fire testing of valves.
Std. 607	Fire test for soft seated quarter-turn valves.
Spec. Q1	Quality program.

BSI-British Standard Institute

BS 5351	Steel Ball Valves
BS 5750	Steel Ball Valves
BS 6755	Testing of Valves

Canadian Standard Association

CSA	Z245.15-01
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ISO 9001-International Organization for Standardization

ISO 9001	Quality systems-model for quality assurance in design, development, production, installation and servicing.
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MSS-Manufactures Standardization Society

SP-6	Standard finishes for contact faces of pipe flanges and connecting-end flanges of valves and fittings.
SP-25	Standard marking system for valves, fittings, flanges and unions.
SP-55	Quality standard for steel castings.

NACE-National Association of Corrosion Engineers

MR0175	Sulfide stress cracking resistant metallic materials for oil field equipment.
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Our Quality Commitment

To ensure Customer Satisfaction, KF establishes Quality as a priority and focuses on continual improvement through manufacturing its products right the first time.

We strive to continually improve our management system and processes to provide technologies that help customers worldwide use fluids safely and efficiently while improving everyday life.

Our mission is to create and deliver fluid control solutions by focusing the considerable talents of our employees to meet diverse customer and regulatory requirements worldwide.

Other additional non-destructive or destructive examination may be performed to customer requirements or specifications.



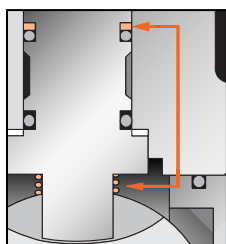
Series FE O-Ring Style Floating Ball Valves

The Series FE is a prime example of KF's superior engineering and manufacturing techniques at work. Featuring a two-piece bolted Carbon Steel or Stainless

Steel valve with flanged end connections available in sizes 1"FP thru 12"RP in class 150, 300, 600, API 6D and API 607 Fourth Edition.

General Design Features

- Blowout proof stem
- Stem journal lubrication fittings
- Weather seal to resist stem journal corrosion, abrasion and galling
- Various seat and seal options
- Integral locking device
- NACE Standard MR0175
- Manual handle is standard.
- Gear operator is standard starting at 6"FP class 300-8"RP class 150 and larger.
- A direct mount actuator pad in class 150 and 300.
- A firesafe design that provides metal-to-metal sealing upon destruction of seat with pressure assisted shutoff to prevent fire feeding leakage.
- CSA-Z245.15-01



Anti-Static Device

Carbon graphite packing provides continuity between the stem and body while a stainless steel spring provides anti-static continuity to the ball. Standard on class 150 and 300 valves, optional on class 600 valves.

Body & Trim Materials

Part	Material
Body/Adapter	WCB, LCC, CF8M
Ball/Stem	316
Seat	Delrin, PTFE, PEEK (HT4)

Pressure Rating (psig)

Material	ANSI Class 150	ANSI Class 300	ANSI Class 600
WCB, LCC	285	740	1480
CF8M	275	720	1440

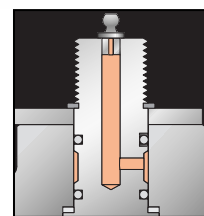
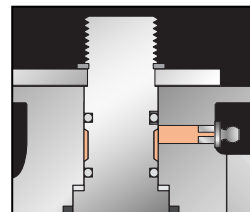
Low Temperature Limits

Body Material	°F	°C	Seat Material	°F	°C
WCB	-20	-29	Delrin	-50	-46
LCC	-50	-46	HT4 (PEEK)	-50	-46
CF8M	-50	-46	Teflon®	-50	-46

Seal Material	°F	°C
Viton®	-20	-29
HNBR	-40	-40

Stem Journal Lubrication

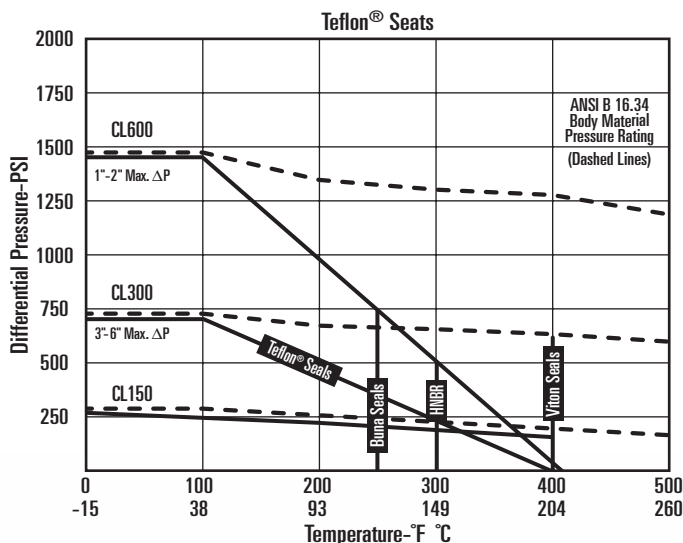
All Series FE valves incorporate external stem lubrication fitting. A vented weather seal allows for safe pressure relief in the event of excessive grease gun pressure.



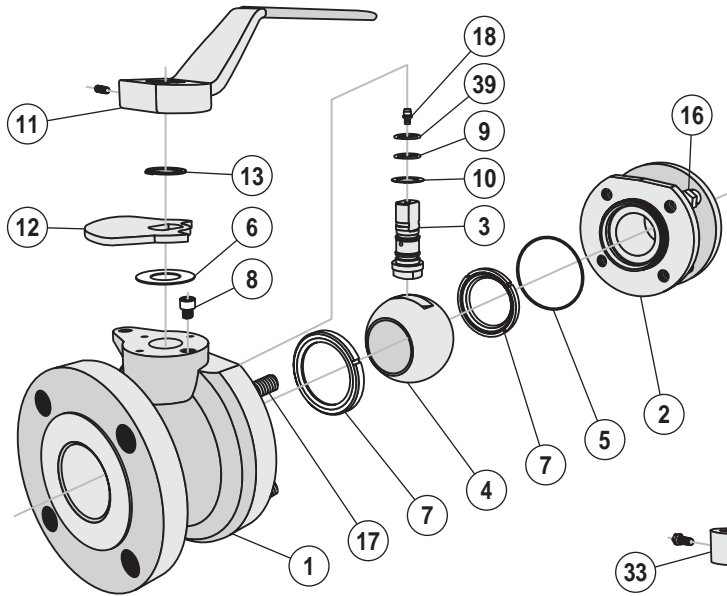
1" - 4"

6" - 12" & 4" Cl. 600

Pressure Temperature Chart (Teflon®)*



Series FE Component Parts

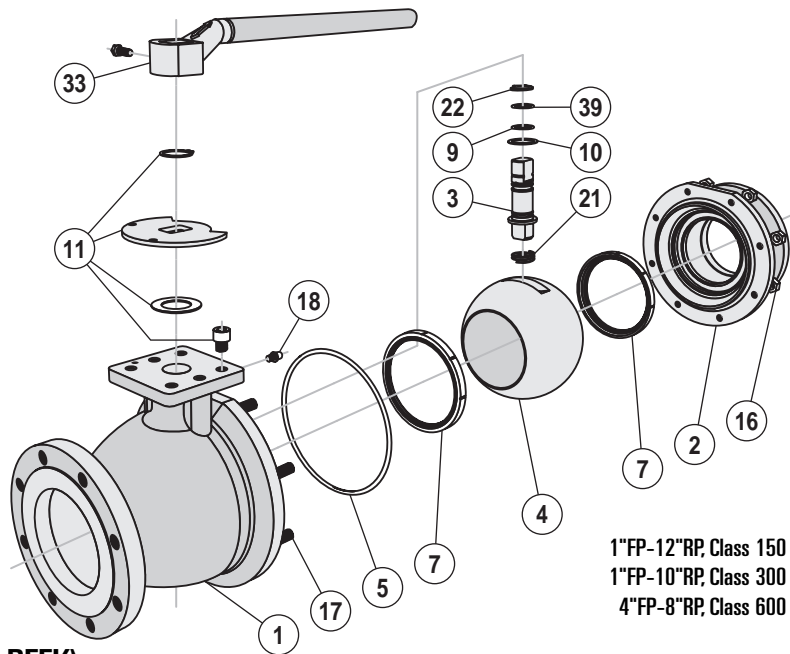


1"FP-4"RP, Class 600

Part No.	Description
11	Stop Plate Assembly (6"FP/8"RP)
12	Stop Plate (1"FP-6"RP)
13	Retainer (1"FP-6"RP)
16	Hex Nut
17	Stud
18	Lube Fitting
21	Anti-Static Device, Class 150/300 only
22	Hi-Temp Stem Packing, Class 150/300 only
33	Handle Assembly (6" bore Class 150)
39	Weather Seal

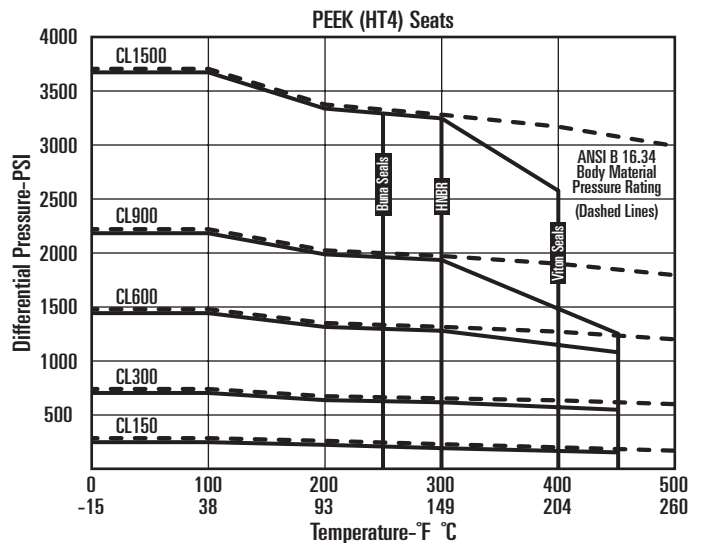
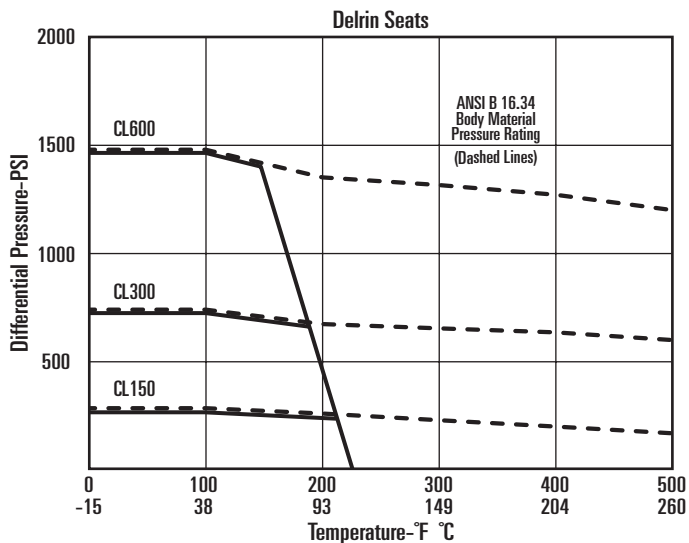
Parts List

Part No.	Description
1	Body
2	Adapter
3	Stem
4	Ball
5	Body Seal
6	Stem Bearing (1"FP-6"RP)
7	Seat
8	Stop Pin (1"FP-6"RP)
9	Stem Seal
10	Thrust Bearing
11	Handle Assembly (1"FP-6"RP)



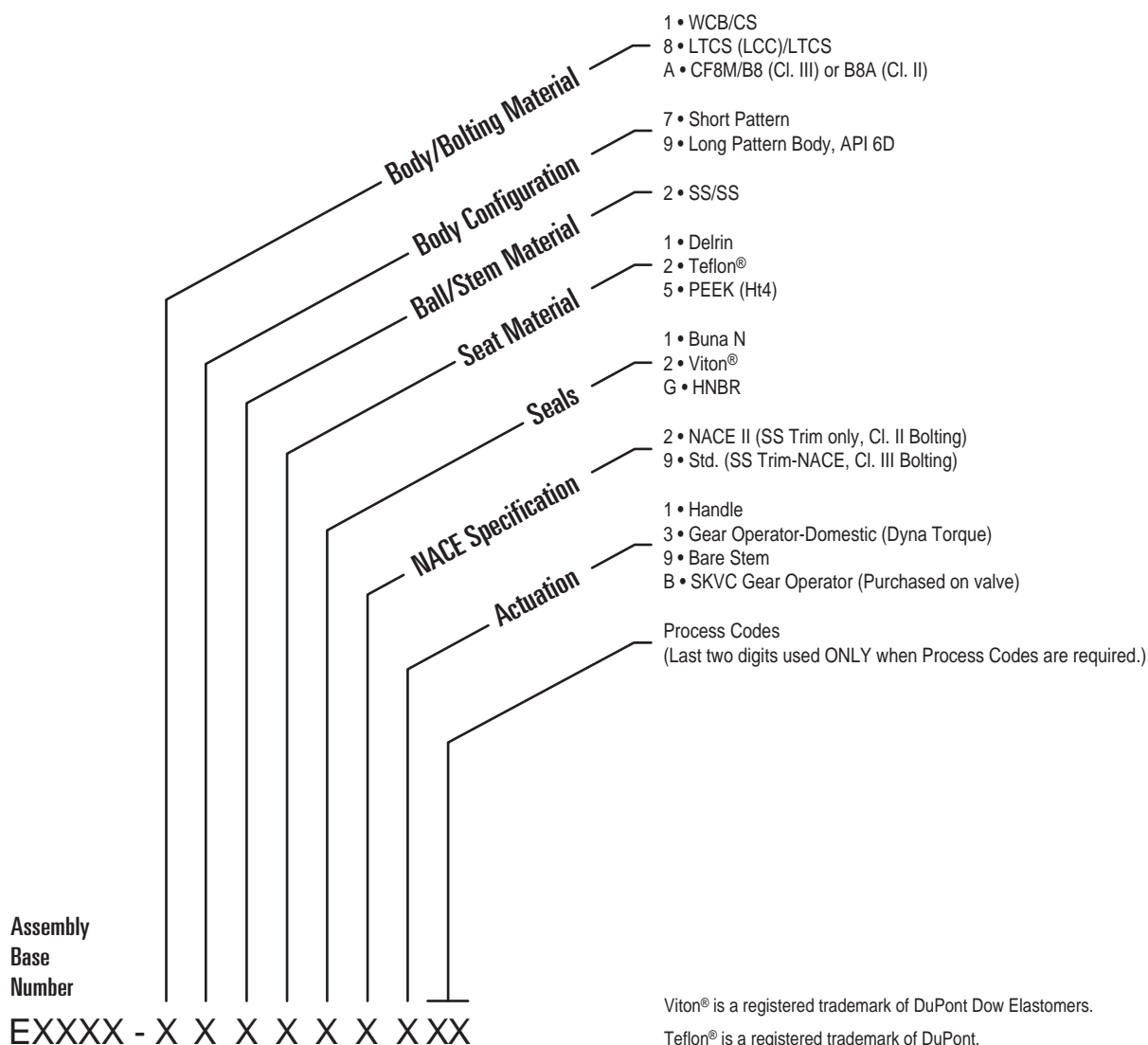
1"FP-12"RP, Class 150
1"FP-10"RP, Class 300
4"FP-8"RP, Class 600

Pressure Temperature Charts (Delrin and HT4 PEEK)



Series FE • Part Number Codes

Class 150, 300 and 600

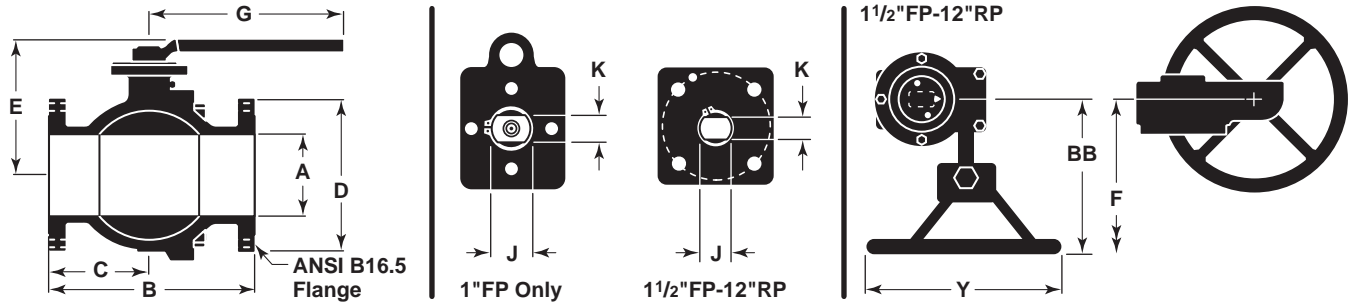


Series FE Assembly Base Numbers, 1"FP-12"RP

Class/End Connection	Size (In.)															
	1FP	1½FP	2RP	2FP	2½RP	3RP	3FP	4RP	4FP	6RP	6FP	8RP	8FP	10RP	10FP	12RP
150RF	E2147	E2149	E2150	E2151	E2152	E2153	E2154	E2155	E2156	E2157	E1720	E1721	E1722	E1723	E1752	E1753
300RF	E2297	E2299	E2300	E2301	E2302	E2303	E2304	E2305	E2306	E2307	E1724	E1725	E1726	E1727	—	—
600RF	E2597	E2599	E2600	E2601	E2602	E2603	E2604	E2605	E2606	E2618	E1728	E1729	—	—	—	—
600RTJ	E2607	E2609	E2610	E2611	E2612	E2613	E2614	E2615	E2616	E2617	E1730	E1731	—	—	—	—



Series FE Class 150 • Dimensional Data (in., mm)



Dimensional Data, 1"FP-12"RP, Class 150

Size (in.)	Dimension (in.)											
	A	B	C	D	E	F	G	J	K	Y	BB	Wt. /lbs w/handle
1FP	1	5	2 5/16	4 1/4	2 15/16	—	5 7/8	0.623/0.621	0.372/0.370	—	—	17
1 1/2FP	1.5	6 1/2	2 31/32	5	3 11/32	5 1/4	8 1/2	0.873/0.871	0.560/0.556	8	6.38	20.7
2RP	1.5	7	3 3/16	6	3 11/32	5 1/4	8 1/2	0.873/0.871	0.560/0.556	8	6.38	23.9
2FP	2	7	3 1/32	6	4 3/16	6 3/32	8 1/2	0.873/0.871	0.560/0.556	8	6.38	30.1
3RP	2	8	4	7 1/2	4 3/16	4 3/32	8 1/2	0.873/0.871	0.560/0.556	8	6.38	41.4
3FP	3	8	3 1/2	7 1/2	5 13/16	7 7/16	15	1.248/1.246	0.622/0.618	8	7	56.5
4RP	3	9	4 1/4	9	5 13/16	7 7/16	15	1.248/1.246	0.622/0.618	8	7	85.5
4FP	4	9	4	9	7 3/8	9 7/32	18	1.373/1.371	0.747/0.743	10	7 1/2	97.5
6RP	4	15 1/2*	7 3/4	11	7 3/8	9 7/32	18	1.373/1.371	0.747/0.743	10	7 1/2	134
6FP	6	15 1/2	7 3/4	11	11 1/8	11 1/8	30	1.557/1.552	1.065/1.061	11.8	12.63	219**
8RP	6	18*	9	13 1/2	11 1/8	11 1/8	30	1.557/1.552	1.065/1.061	15.7	12.63	268**
8FP	8	18	9	13 1/2	—	13 5/8	—	1.997/1.992	1.249/1.245	15.7	12.63	398**
10RP	8	21*	10 1/2	16	—	13 5/8	—	1.997/1.992	1.249/1.245	15.7	12.63	470**
10FP	10	21	10 1/2	16	—	14	—	2.497/2.492	1.749/1.745	23.6	14.63	580**
12RP	10	24*	12	19	—	14	—	2.497/2.492	1.749/1.745	23.6	14.63	680**

*Short pattern available upon request. Dimension B = 6"RP - 10 1/2" 10"RP - 13"
8"RP - 11 1/2" 12"RP - 14"

**Weight w/Gear Operator

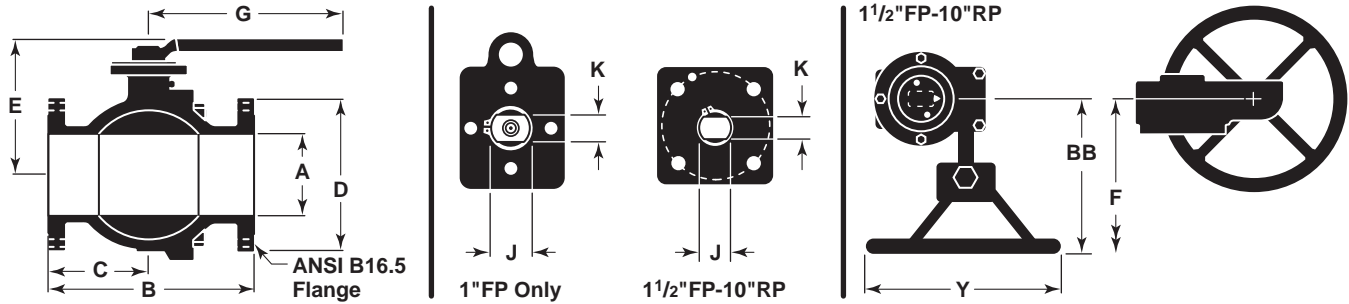
Size (in.)	Dimension (mm)											
	A	B	C	D	E	F	G	J	K	Y	BB	Wt. /kg w/handle
1FP	25.4	127	58.7	108	74.6	—	149.2	15.82/15.77	9.45/9.40	—	—	7.7
1 1/2FP	38.1	165	75.2	127	84.9	142.9	215.9	22.17/22.12	14.22/14.12	203.2	162	9.4
2RP	38.1	178	89.2	152.4	84.9	142.9	215.9	22.17/22.12	14.22/14.12	203.2	162	10.8
2FP	50.8	178	76.7	152.4	106.4	154	215.9	22.17/22.12	14.22/14.12	203.2	162	13.6
3RP	50.8	203	101.6	190.5	106.4	154	215.9	22.17/22.12	14.22/14.12	203.2	162	18.7
3FP	76.2	203	88.9	190.5	147.6	184.2	381	31.70/31.65	15.80/15.70	203.2	177.8	25.5
4RP	76.2	229	108.0	228.6	147.6	184.2	381	31.70/31.65	15.80/15.70	203.2	177.8	38.8
4FP	101.6	229	101.6	228.6	187.3	209.6	457.2	34.87/34.82	18.97/18.87	254	190.5	44.1
6RP	101.6	394*	197	279.4	187.3	209.6	457.2	34.87/34.82	18.97/18.87	254	190.5	61.0
6FP	152.4	394	197	279	282.6	283	762	39.55/39.42	27.05/26.95	300	321	99**
8RP	152.4	457*	229	343	282.6	283	762	39.55/39.42	27.05/26.95	400	321	121**
8FP	203.2	457	229	343	—	346	—	50.72/50.60	31.72/31.63	400	321	180**
10RP	203.2	533*	267	406	—	346	—	50.72/50.60	31.72/31.63	400	321	212**
10FP	254	533	267	406	—	356	—	63.42/63.30	44.42/44.33	600	372	262**
12RP	254	610*	305	483	—	356	—	63.42/63.30	44.42/44.33	600	372	307**

*Short pattern available upon request. Dimension B = 6"RP - 267mm 10"RP - 330.2mm
8"RP - 292.1mm 12"RP - 356mm

**Weight w/Gear Operator



Series FE Class 300 • Dimensional Data (in., mm)



Dimensional Data, 1"FP-10"RP, Class 300

Size (in.)	Dimension (in.)											
	A	B	C	D	E	F	G	J	K	Y	BB	Wt. /lbs w/handle
1FP	1	6 1/2	3 1/2	4 7/8	2 15/16	—	5 7/8	0.623/0.621	0.372/0.370	—	—	22
1 1/2FP	1.5	7 1/2	3 17/32	6 1/8	3 11/32	5 1/4	8 1/2	0.873/0.871	0.560/0.556	8	6.38	25.8
2RP	1.5	8 1/2	4 1/4	6 1/2	3 11/32	5 1/4	8 1/2	0.873/0.871	0.560/0.556	8	6.38	25.3
2FP	2	8 1/2	4 1/4	6 1/2	4 3/16	6 3/32	8 1/2	0.873/0.871	0.560/0.556	8	6.38	34.8
3RP	2	11 1/8	5 9/16	8 1/4	4 3/16	4 3/32	8 1/2	0.873/0.871	0.560/0.556	8	6.38	52.5
3FP	3	11 1/8	5 27/32	8 1/4	5 13/16	7 7/16	15	1.248/1.246	0.622/0.618	8	7	78.8
4RP	3	12	6	10	5 13/16	7 7/16	15	1.248/1.246	0.622/0.618	8	7	104.8
4FP	4	12	6	10	7 3/8	9 7/32	18	1.373/1.371	0.747/0.743	10	7 1/2	129.5
6RP	4	15 7/8	7 15/16	12 1/2	7 3/8	9 7/32	18	1.373/1.371	0.747/0.743	10	7 1/2	162.5
6FP	6	15 7/8	7 15/16	12 1/2	—	12 1/8	—	1.997/1.992	1.249/1.245	15.7	12.63	253**
8RP	6	19 3/4*	9 7/8	15	—	12 1/8	—	1.997/1.992	1.249/1.245	15.7	12.63	336**
8FP	8	19 3/4	9 7/8	15	—	15 1/2	—	2.497/2.492	1.749/1.745	23.6	14.63	524**
10RP	8	22 3/8*	11 3/16	17 1/2	—	15 1/2	—	2.497/2.492	1.749/1.745	23.6	14.63	615**

*Short pattern available upon request. Dimension B = 8"RP - 16 1/2"

10"RP - 18"

**Weight w/Gear Operator

Size (in.)	Dimension (mm)											
	A	B	C	D	E	F	G	J	K	Y	BB	Wt. /kg w/handle
1FP	25.4	165	88.9	124.0	74.6	—	149.2	15.82/15.77	9.45/9.40	—	—	9.9
1 1/2FP	38.1	191	89.7	155.7	84.9	142.9	215.9	22.17/22.12	14.22/14.12	203.2	162	11.7
2RP	38.1	216	108.0	165.1	84.9	142.9	215.9	22.17/22.12	14.22/14.12	203.2	162	11.4
2FP	50.8	216	108.0	165.1	106.4	154	215.9	22.17/22.12	14.22/14.12	203.2	162	15.7
3RP	50.8	283	141.2	209.6	106.4	154	215.9	22.17/22.12	14.22/14.12	203.2	162	23.7
3FP	76.2	283	147.8	209.6	147.6	184.2	381	31.70/31.65	15.80/15.70	203.2	177.8	35.6
4RP	76.2	305	152.4	254.0	147.6	184.2	381	31.70/31.65	15.80/15.70	203.2	177.8	47.4
4FP	101.6	305	152.4	254.0	187.3	209.6	457.2	34.87/34.82	18.97/18.87	254	190.5	58.5
6RP	101.6	403	201.7	317.5	187.3	209.6	457.2	34.87/34.82	18.97/18.87	254	190.5	73.5
6FP	152.4	403	202	318	—	308	—	50.72/50.60	31.72/31.63	400	321	114**
8RP	152.4	502*	251	381	—	308	—	50.72/50.60	31.72/31.63	400	321	152**
8FP	203.2	502*	251	381	—	394	—	63.42/63.30	44.42/44.33	600	372	237**
10RP	203.2	569*	284	445	—	394	—	63.42/63.30	44.42/44.33	600	372	278**

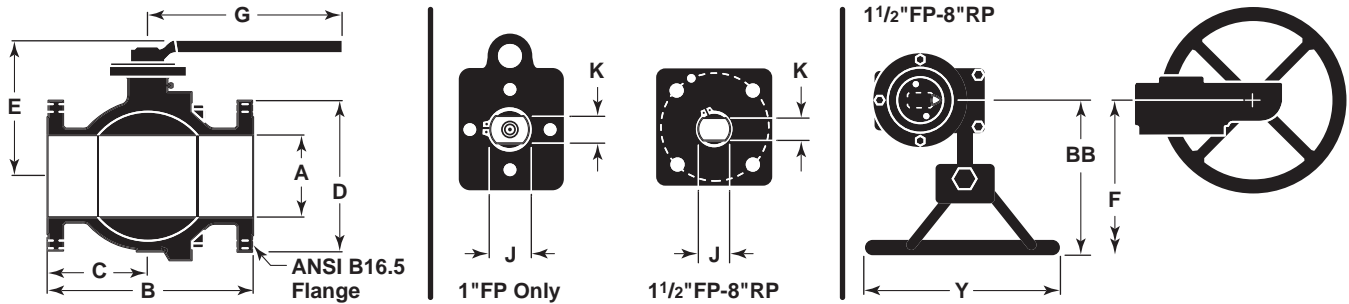
*Short pattern available upon request. Dimension B = 8"RP - 419.1 mm

10"RP - 457.2 mm

**Weight w/Gear Operator



Series FE Class 600 • Dimensional Data (in., mm)



Dimensional Data, 1"FP-8"RP, Class 600

Size (in.)	Dimension (in.)													Wt. /lbs w/handle
	A	B		C		D	E	F	G	J	K	Y	BB	
		RF	RTJ	RF	RTJ									
1FP	1	8 1/2	8 1/2	3 3/4	3 3/4	4 7/8	4 3/16	—	5 7/8	.623/.621	.372/.370	—	—	25
1 1/2FP	1 1/2	9 1/2	9 1/2	3 7/8	3 7/8	6 1/8	5 5/8	5 5/8	8 1/2	.873/.871	.560/.556	8	4 3/8	30.4
2RP	1 1/2	11 1/2	11 5/8	4 7/16	4 1/2	6 1/2	5 5/8	5 5/8	8 1/2	.860/.855	.559/.556	8	4 13/16	35
2FP	2	11 1/2	11 5/8	4 7/16	4 1/2	6 1/2	6 1/16	6 1/16	8 1/2	.860/.855	.559/.556	8	4 13/16	41.5
2 1/2RP	2	13	13 1/8	4 15/16	5	7 1/2	6 1/16	6 1/16	8 1/2	.860/.855	.559/.556	8	4 13/16	52.9
3RP	2	14	14 1/8	6	6 1/16	8 1/4	6 1/16	6 1/16	8 1/2	.860/.855	.559/.556	8	4 13/16	61.6
3FP	3	14	14 1/8	5 3/4	5 13/16	8 1/4	7 1/4	7 1/4	15	1.248/1.246	.622/.618	10	7	89.1
4RP	3	17	17 1/8	7 3/4	7 13/16	10 3/4	7 1/4	7 1/4	15	1.248/1.246	.622/.618	10	7	133.8
4FP	4	17	17 1/8	8 1/2	8 9/16	10 3/4	10 25/32	10 25/32	48	1.791/1.773	1.247/1.243	10	9 1/2	167
6RP	4	22	22 1/8	11	11 1/16	14	10 25/32	10 25/32	48	1.791/1.773	1.247/1.243	10	9 1/2	345
6FP	6	22	22 1/8	11	11 1/16	14	—	14 7/8	—	2.497/2.492	1.749/1.745	24	14 5/8	427*
8RP	6	26	26 1/8	13	13 1/16	16 1/2	—	14 7/8	—	2.497/2.492	1.749/1.745	24	14 5/8	672*

*Weight w/Gear Operator

Size (in.)	Dimension (mm)													Wt./kg w/handle
	A	B		C		D	E	F	G	J	K	Y	BB	
		RF	RTJ	RF	RTJ									
1FP	25.4	215.9	215.9	95.3	95.3	123.8	106.4	—	149.2	15.82/15.77	9.45/9.40	—	—	11.3
1 1/2FP	38.1	241.3	241.3	98.4	98.4	155.6	142.9	142.9	215.9	22.17/22.12	14.22/14.12	203	111	13.8
2RP	38.1	292.1	295.3	112.7	114.3	165.1	142.9	142.9	215.9	21.84/21.72	14.20/14.12	203	122	15.9
2FP	50.8	292.1	295.3	112.7	114.3	165.1	154.0	154.0	215.9	21.84/21.72	14.20/14.12	203	122	18.8
2 1/2RP	50.8	330.2	333.4	125.4	127.0	190.5	154.0	154.0	215.9	21.84/21.72	14.20/14.12	203	122	24.0
3RP	50.8	355.6	358.8	152.4	154.0	209.6	154.0	154.0	215.9	21.84/21.72	14.20/14.12	203	122	27.9
3FP	76.2	355.6	358.8	146.1	147.6	209.6	184.2	184.2	381.0	31.70/31.65	15.80/15.70	254	178	40.4
4RP	76.2	431.8	435.0	196.9	198.4	273.1	184.2	184.2	381.0	31.70/31.65	15.80/15.70	254	178	60.7
4FP	101.6	431.8	435.0	215.9	217.5	273.1	274.8	273.8	1219.2	45.49/45.03	31.67/31.57	254	241	75.7
6RP	101.6	558.8	562.0	279.4	281.0	355.6	274.8	273.8	1219.2	45.49/45.03	31.67/31.57	254	241	156
6FP	152.4	558.8	562.0	279.4	281.0	355.6	—	377.8	—	63.42/63.30	44.42/44.32	610	371	194*
8RP	152.4	660.4	663.6	330.2	331.8	419.1	—	377.8	—	63.42/63.30	44.42/44.32	610	371	305*

**Weight w/Gear Operator



Series 1500 & 2500 Reduced Port Packed Style Floating Ball Valves

Series 1500 & 2500 reduced port flanged end ball valves offer versatility, performance and reliability at an economical cost. These valves use an FDA food grade approved non-silicone lubricant to ease seat break in torque.

General Design Features

- ANSI Class 150 & 300
- 1 1/2" - 6" Unibody; 8" Split body
- WCB or CF8M construction
- 316 SS ball & stem
- Uniseal™ seats
- Firesafe to API 607, 4th Edition
- 4-bolt machined actuator mounting pad
- Lockable handle
- Full rated bi-directional dead end service
- NACE MR0175
- Graphite or Teflon® packing



Body & Trim Materials

Part	Material
Body/Adapter	WCB, CF8M
Ball/Stem	316
Seat	Uniseal™

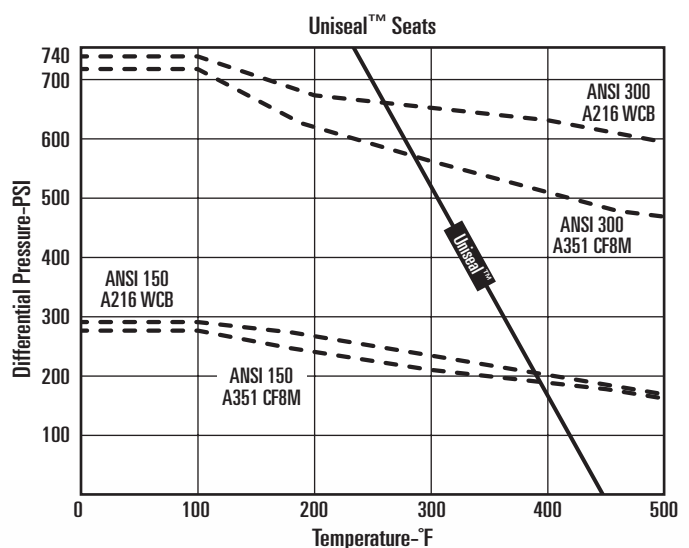
Pressure Rating (psig)

Material	ANSI Class 150	ANSI Class 300
CS (WCB)	285	740
SS (CF8M)	275	720

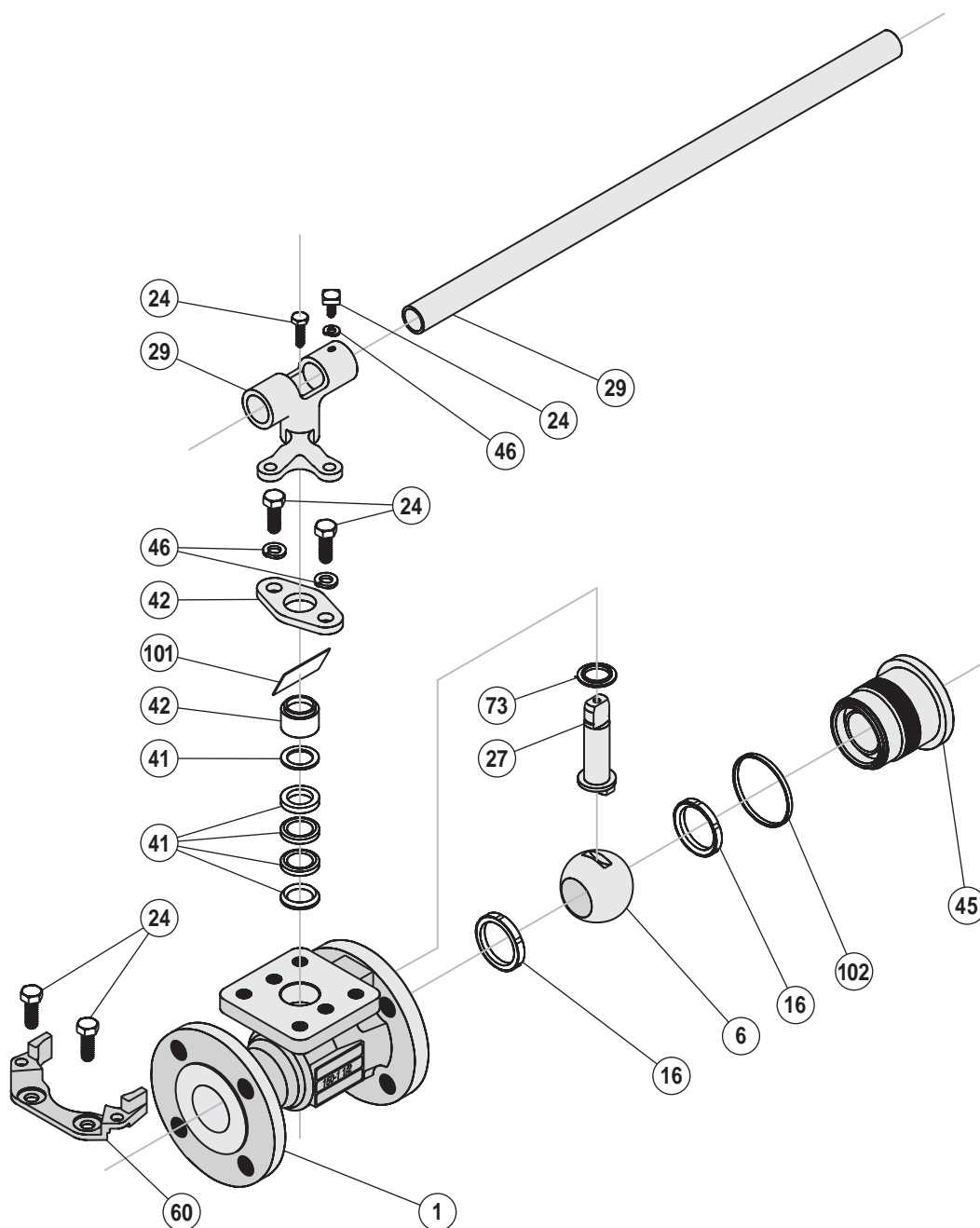
Low Temperature Limits

Material	°F	°C
WCB	-20	-29
CF8M	-50	-46

Pressure Temperature Chart



Series 1500 & 2500 Reduced Port Packed Style Floating Ball Valves Component Parts



Parts List

Part No.	Description
1	Body
6	Ball
16	Seat
24	Screw
27	Stem
29	Handle
41	Packing

Part No.	Description
42	Retainer
45	Seat Retainer
46	Washer
60	Locking Plate
73	Thrust Washer
101	Liner
102	Body Seal



Series 1800 & 2800 Full Port Packed Style Floating Ball Valves

Series 1800 full port flanged end ball valves offer full flow performance and reliability at an economical cost. The bolted body design facilitates ease of maintenance.

General Design Features

- ANSI Class 150 & 300
- 1" - 12" two-piece design
- WCB or CF8M construction
- 316 SS ball & stem
- Uniseal™ seats
- Firesafe API 607, 4th Edition
- 4-bolt machined actuator mounting pad
- Full rated bi-directional dead end service
- NACE MR0175
- Graphite or Teflon® packing



Body & Trim Materials

Part	Material
Body/Adapter	WCB, CF8M
Ball/Stem	316
Seat	Uniseal™

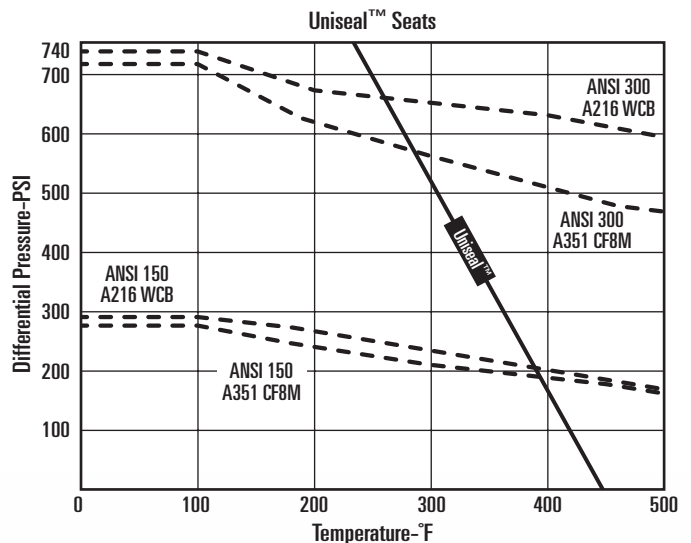
Pressure Rating (psig)

Material	ANSI Class 150	ANSI Class 300
CS (WCB)	285	740
SS (CF8M)	275	720

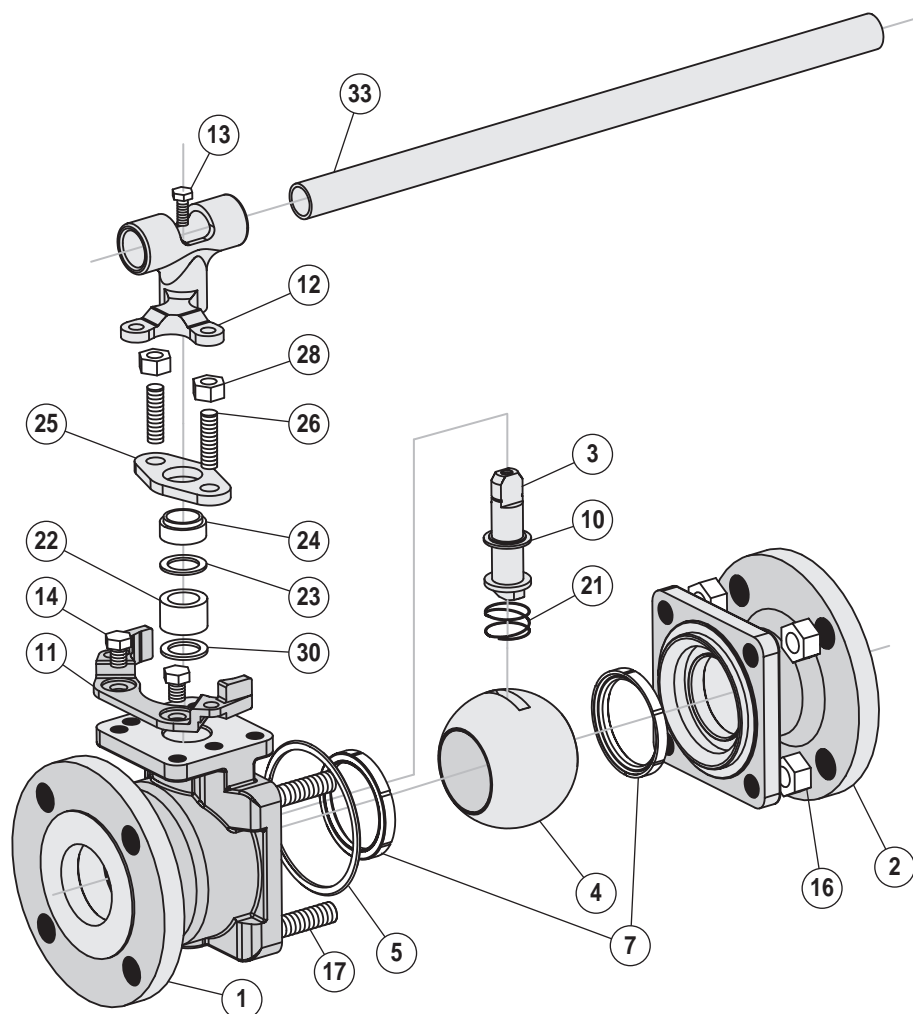
Low Temperature Limits

Material	°F	°C
WCB	-20	-29
CF8M	-50	-46

Pressure Temperature Chart



Series 1800 & 2800 Full Port Packed Style Floating Ball Valves Component Parts



Parts List

Part No.	Description
1	Body
2	Adapter
3	Stem
4	Ball
5	Body Gasket
7	Seat
10	Thrust Bearing
11	Lock Plate
12	T-Handle Hub
13	Hub Screw
14	Plate Screw
16	Hex Nut

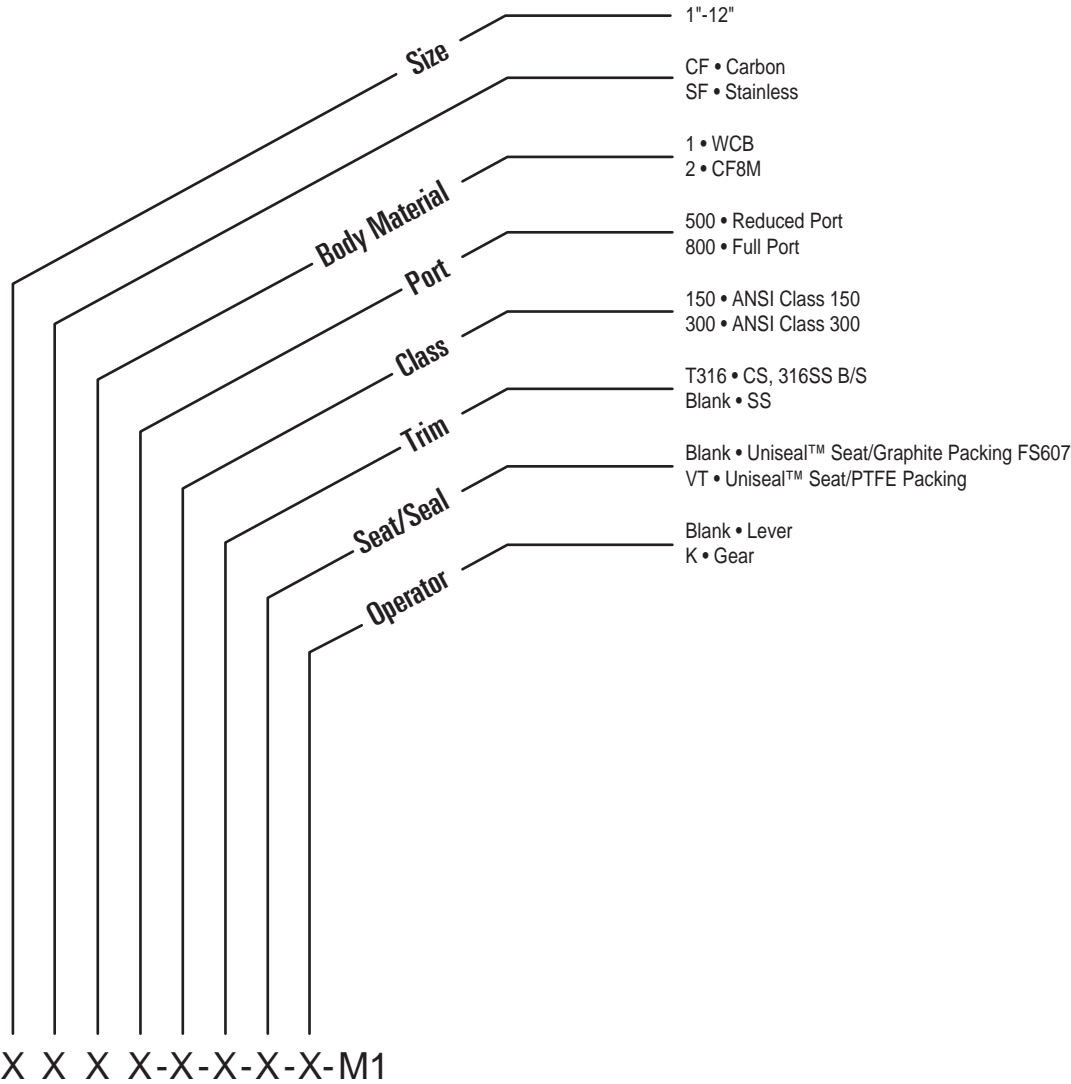
Part No.	Description
17	Stud
21	Ground Spring
22	Stem Packing
23	Ground Washer*
24	Packing Follower
25	Packing Retainer
26	Packing Stud
28	Packing Nut
30	Stem Washer**
33	Handle

*Not required with Grafoil packing in Firesafe valves.

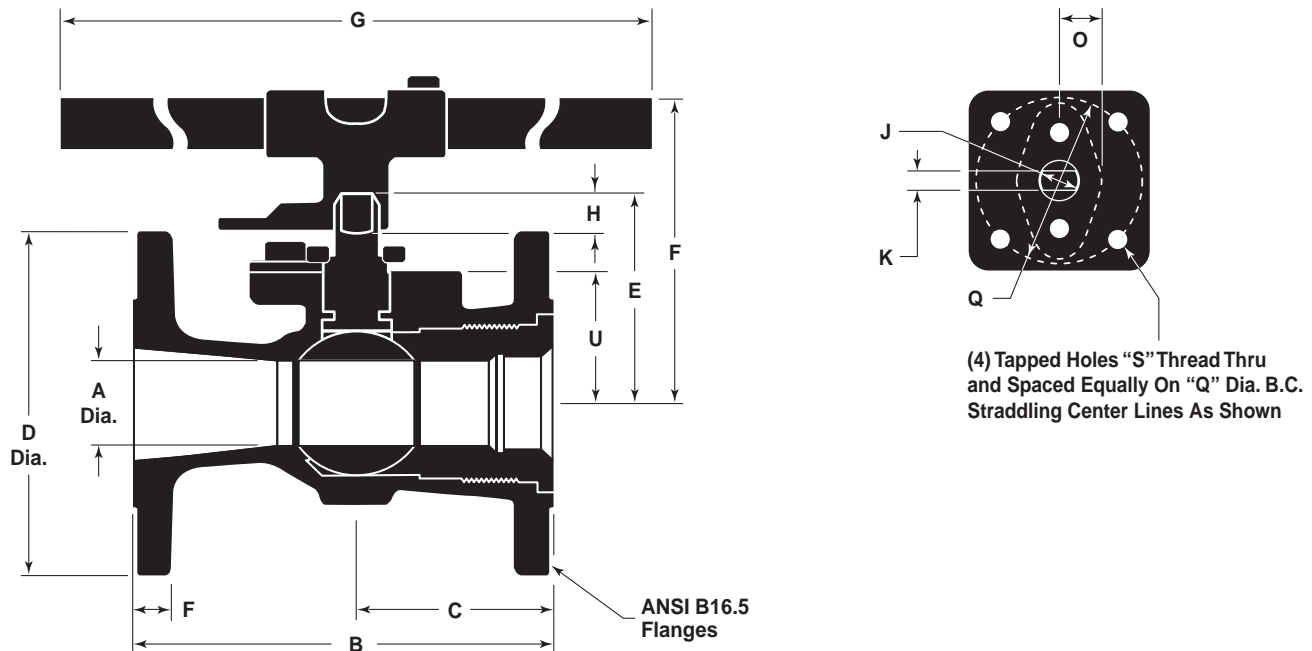
**Required in 2" and larger valves only.



Series 1500/2500 & 1800/2800 Packed Style Floating Ball Valves **Part Number Codes • 1"FP-12"FP, Class 150 & 300**



Series 1500 & 2500 Reduced Port Packed Style Floating Ball Valves Class 150 & 300 • Dimensional Data (in., mm)



Dimensional Data, 1 1/2"RP-6"RP, Class 150

Size (in.)	Dimension (in.)														
	A	B	C	D	E	F	G	H	J	K	O	Q	S	U	Wt./lbs
1 1/2	1.25	6.50	3.15	5.00	3.58	5.25	17	.70	.75	.373/.376	.81	3.25	3/8-16 UNC	2.26	12.8
2	1.50	7.00	3.27	6.00	3.69	5.36	17	.70	.75	.373/.376	.81	3.25	3/8-16 UNC	2.31	17.6
3	2.42	8.00	3.46	7.50	4.38	6.05	17	.70	.75	.373/.376	.81	3.25	3/8-16 UNC	3.06	31.5
4	3.00	9.00	4.10	9.00	6.75	8.83	22	1.38	1.06	.670/.674	1.36	4.13	3/8-16 UNC	4.43	54.2
6	4.50	10.50	5.25	11.00	8.56	10.55	22	1.44	1.34	.861/.865	1.36	4.41	1/2-13 UNC	6.02	137.0

Size (in.)	Dimension (mm)														
	A	B	C	D	E	F	G	H	J	K	O	Q	S	U	Wt./kg
1 1/2	31.8	165.1	80.0	127.0	90.9	133.4	431.8	17.8	19.1	9.48/9.55	20.6	82.6	3/8-16 UNC	57.4	5.8
2	38.1	177.8	83.1	152.4	93.7	136.1	431.8	17.8	19.1	9.48/9.55	20.6	82.6	3/8-16 UNC	58.7	8.0
3	61.5	203.2	87.9	190.5	111.3	153.7	431.8	17.8	19.1	9.48/9.55	20.6	82.6	3/8-16 UNC	77.7	14.3
4	76.2	228.6	104.1	228.6	171.5	224.3	558.8	35.1	26.9	17.02/17.12	34.5	104.9	3/8-16 UNC	112.5	24.6
6	114.3	266.7	133.4	279.4	217.4	268	558.8	36.6	34.0	21.87/21.97	34.5	112	1/2-13 UNC	152.9	62.1

Dimensional Data, 1 1/2"RP-4"RP, Class 300

Size (in.)	Dimension (in.)														
	A	B	C	D	E	F	G	H	J	K	O	Q	S	U	Wt./lbs
1 1/2	1.25	7.50	3.15	6.12	3.58	5.25	17	.70	.75	.373/.376	.81	3.25	3/8-16 UNC	2.26	20.0
2	1.50	8.50	3.27	6.50	3.69	5.36	17	.70	.75	.373/.376	.81	3.25	3/8-16 UNC	2.31	26.0
3	2.42	11.12	3.96	8.25	4.38	6.05	17	.70	.75	.373/.376	.81	3.25	3/8-16 UNC	3.06	46.0
4	3.00	12.00	4.10	10.00	6.75	8.83	22	1.38	1.06	.670/.674	1.36	4.13	3/8-16 UNC	4.43	70.0

Size (in.)	Dimension (mm)														
	A	B	C	D	E	F	G	H	J	K	O	Q	S	U	Wt./kg
1 1/2	31.8	190.5	80.0	155.4	90.9	133.4	431.8	17.8	19.1	9.48/9.55	20.6	82.6	3/8-16 UNC	57.4	9.1
2	38.1	215.9	83.1	165.1	93.7	136.1	431.8	17.8	19.1	9.48/9.55	20.6	82.6	3/8-16 UNC	58.7	11.8
3	61.5	282.4	87.9	209.6	111.3	153.7	431.8	17.8	19.1	9.48/9.55	20.6	82.6	3/8-16 UNC	77.7	20.9
4	76.2	304.8	104.1	254.0	171.5	224.3	558.8	35.1	26.9	17.02/17.12	34.5	104.9	3/8-16 UNC	112.5	31.8



1"FP thru 12"RP

ANSI B16.5 Flanges

Packing Retainer Removed for Clarity

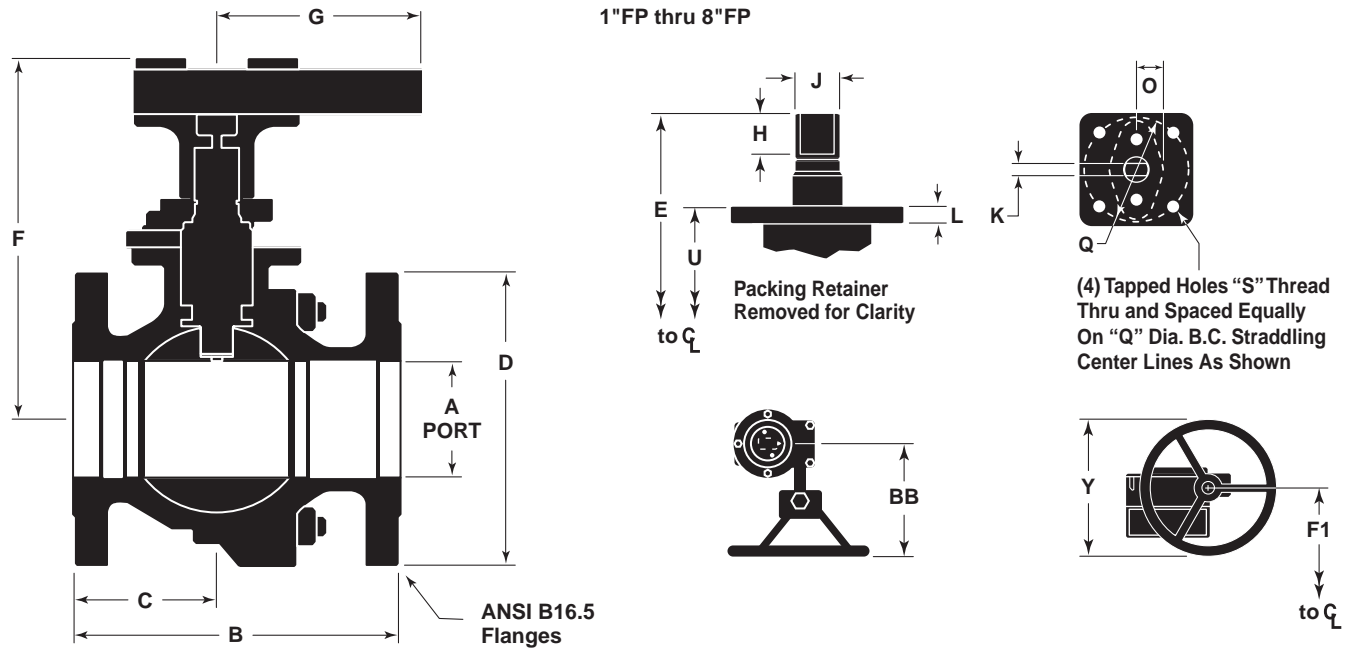
(4) Tapped Holes "S" Thread Thru and Spaced Equally On "Q" Dia. B.C. Straddling Center Lines As Shown

F1 to CL

Size (in.)	Dimension (in.)																		
	A	B	C	D	E	F	F1	G	H	J	K	L	O	Q	S	U	Y	BB	Wt./lbs
1FP	1.00	5.00	2.31	4.25	3.50	5.44	—	6.31	1.32	.623/.621	.372/.370	—	.56	1.25 Sq.	1/4-20 UNC	1.69	—	—	12.8
11/2FP	1.50	6.50	2.96	5.00	3.69	5.75	7.37	15.50	0.64	.746/.743	.376/.373	.38	.76	3.25	3/8-16 UNC	2.31	6.00	6.50	12.8
2FP	2.00	7.00	3.02	6.00	4.51	6.56	8.20	15.50	0.64	.746/.743	.376/.373	.44	.76	3.25	3/8-16 UNC	3.14	6.00	6.50	17.6
3FP	3.00	8.00	3.50	7.50	6.81	10.25	11.63	20.00	1.28	1.069/1.054	.674/.670	.44	1.36	4.13	3/8-16 UNC	4.43	6.00	6.50	31.5
4FP	4.00	9.00	4.00	9.00	8.40	11.00	13.08	20.00	1.28	1.339/1.334	.865/.861	.62	1.36	4.41	1/2-13 UNC	5.88	8.00	9.00	54.2
6FP	6.00	15.50	7.75	11.00	10.81	11.12	15.63	20.00	1.45	1.599/1.554	1.065/1.061	.75	1.36	5.13	5/8-11 UNC	8.00	8.00	9.50	137.0
8RP	6.00	11.50	5.13	11.00	10.81	11.12	15.63	20.00	1.45	1.599/1.554	1.065/1.061	.75	1.36	5.13	5/8-11 UNC	8.00	8.00	9.50	258.0
8FP	8.00	18.00	9.00	13.50	14.25	15.50	17.14	—	2.27	1.999/1.994	1.249/1.245	.75	1.58	5.13	5/8-11 UNC	9.64	12.00	9.50	434.0
10RP	8.00	21.00	10.50	16.00	14.25	15.50	17.14	—	2.27	1.999/1.994	1.249/1.245	.62	1.58	5.13	5/8-11 UNC	9.64	12.00	9.50	506.0
10FP	10.00	21.00	10.50	16.00	17.41	—	22.03	—	3.06	2.499/2.494	1.749/1.745	.62	2.10	6.75	3/4-10 UNC	11.91	16.00	11.50	623.0
12RP	10.00	24.00	12.00	19.00	17.38	—	—	—	—	2.499/2.494	1.747/1.743	.62	2.10	6.75	3/4-10 UNC	11.91	—	—	733.0

Size (in.)	Dimension (mm)																		
	A	B	C	D	E	F	F1	G	H	J	K	L	O	Q	S	U	Y	BB	Wt./kg
1FP	25	127	58.8	108	88.9	138.2	—	160.3	33.5	15.82/15.77	9.45/9.40	—	14.2	31.8 Sq.	1/4-20 UNC	42.9	—	—	5.8
1 1/2FP	38	165	75.2	127	93.7	146.1	187.2	394	16.3	18.95/18.87	9.55/9.48	9.6	19.3	82.6	3/8-16 UNC	58.7	152	165.1	5.8
2FP	51	178	76.7	152	115	166.6	208.3	394	16.3	18.95/18.87	9.55/9.48	11.2	19.3	82.6	3/8-16 UNC	79.8	152	165.1	8.0
3FP	76	203	89	191	173	260.4	295.4	508	32.5	27.15/26.77	17.11/17.02	11.2	34.5	104.9	3/8-16 UNC	112.5	152	165.1	14.3
4FP	102	229	102	229	213.4	279	332.2	508	32.5	34.01/33.88	21.97/21.87	15.7	34.5	102.1	1/2-13 UNC	149.4	203	229	24.6
6FP	152	394	196.9	279	274.6	282.5	397	508	36.8	39.59/39.48	27.05/26.95	.75	34.5	130.3	5/8-11 UNC	203	203	241.3	62.1
8RP	152	292.1	130.3	279	274.6	282.5	397	508	36.8	39.59/39.48	27.05/26.95	19.1	34.5	130.3	5/8-11 UNC	203	203	241.3	117.0
8FP	203	457	229	343	362.0	394	435.4	—	57.5	50.77/50.65	31.72/31.62	19.1	40.0	130.3	5/8-11 UNC	244.9	305	241.3	197.0
10RP	203	533	267	406	362.0	394	435.4	—	57.5	50.77/50.65	31.72/31.62	15.7	40.0	130.3	5/8-11 UNC	244.9	305	241.3	230.0
10FP	254	533	267	406	442.2	—	559.6	—	77.7	63.47/63.35	44.42/44.32	15.7	53.3	171.5	3/4-10 UNC	302.5	406	292.1	283.0
12RP	254	610	305	483	441.5	—	—	—	—	63.47/63.35	44.42/44.32	15.7	53.3	171.5	3/4-10 UNC	302.5	—	—	332.0

Series 1800 & 2800 Full Port Packed Style Floating Ball Valves Class 300 • Dimensional Data (in., mm)



Dimensional Data, 1"FP- 8"FP, Class 300

Size (in.)	Dimension (in.)																		Wt./lbs
	A	B	C	D	E	F	F1	G	H	J	K	L	O	Q	S	U	Y	BB	
1FP	1.00	6.50	3.50	4.88	3.50	5.44	—	6.31	1.32	.623/.621	.372/.370	—	.56	1.25 Sq.	1/4-20 UNC	1.69	—	—	12.8
1 1/2FP	1.50	7.50	3.53	6.13	3.69	5.75	7.37	15.50	.64	.746/.743	.376/.373	.38	.76	3.25	3/8-16 UNC	2.31	6.00	6.50	20.0
2FP	2.00	8.50	4.25	6.50	4.51	6.56	8.20	15.50	.64	.746/.743	.376/.373	.44	.76	3.25	3/8-16 UNC	3.14	6.00	6.50	26.0
3FP	3.00	11.13	5.82	8.25	6.81	10.25	11.63	20.00	1.28	1.069/1.054	.674/.670	.44	1.36	4.13	3/8-16 UNC	4.43	6.00	6.50	46.0
4FP	4.00	12.00	6.00	10.00	8.40	11.00	13.08	20.00	1.28	1.339/1.334	.865/.861	.62	1.36	4.41	1/2-13 UNC	5.88	8.00	9.00	70.0
6FP	6.00	15.88	7.94	12.50	12.75	14.00	15.63	48.00	2.27	1.999/1.994	1.249/1.245	.62	1.58	5.13	5/8-11 UNC	8.12	12.00	9.50	157.0
8FP	8.00	19.75	9.88	15.00	16.00	—	20.64	—	3.06	2.499/2.494	1.749/1.745	.62	2.10	6.75	3/4-10 UNC	10.52	16.00	11.50	567.0

Size (in.)	Dimension (mm)																		Wt./kg
	A	B	C	D	E	F	F1	G	H	J	K	L	O	Q	S	U	Y	BB	
1FP	25	165	89	124	89	138.2	—	160.3	33.5	15.82/15.77	9.45/9.40	—	14.2	31.75 Sq.	1/4-20 UNC	42.9	—	—	5.8
1 1/2FP	38	191	89.7	155.7	93.7	146.1	187.2	394	16.3	18.94/18.98	9.55/9.48	9.7	19.3	82.6	3/8-16 UNC	58.7	152	165.1	9.1
2FP	51	216	108.0	165	114.6	166.6	208.3	394	16.3	18.94/18.98	9.55/9.48	11.2	19.3	82.6	3/8-16 UNC	79.8	152	165.1	11.8
3FP	76	282.7	147.8	209.6	173	260.4	295.4	508	32.5	27.15/27.03	17.11/17.02	11.2	34.5	104.9	3/8-16 UNC	112.5	152	165.1	20.9
4FP	102	305	152	254	213.4	279	332.2	508	32.5	34.01/33.89	21.97/21.87	15.7	34.5	112	1/2-13 UNC	149.4	203	228.6	31.8
6FP	152	403.4	201.7	318	323.9	356	397	1219	57.7	50.77/50.65	31.72/31.62	15.7	40.0	130.3	5/8-11 UNC	203	203	241.3	71.2
8FP	203	502	251	381	362.0	394	524.3	—	77.7	63.47/63.35	44.42/44.32	15.7	53.3	171.5	3/4-10 UNC	267.2	406	292.1	257.0



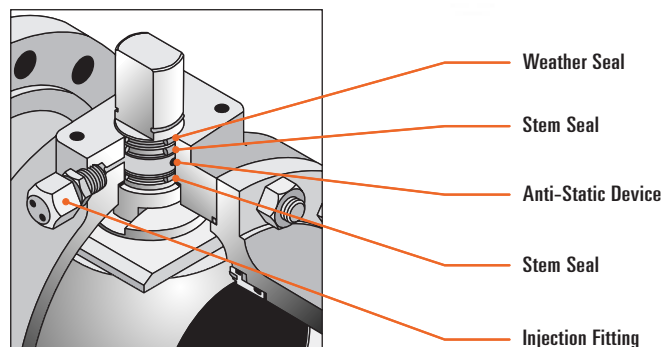
Series FAE Trunnion Mounted Ball Valves

This two-piece flanged end ball valve offers versatility and high performance. A trunnion ball and stem structure assures precise ball positioning. The standard FAE seats promote a low pressure seal, using wave spring force to load the metal seat carrier toward the ball. Because sealing

is effected at both ports when the valve is closed, the body cavity may be opened to atmosphere utilizing the provided bleed valve. This feature is suitable for Double Block and Bleed applications. Series FA valves are offered in 2"FP-12"FP, ANSI classes 150 and 300.

General Design Features

- Double block and bleed
- Anti-blowout stem
- Anti-static device
- Integral top works direct mounting pad
- Optional locking device
- Weatherseal O-ring protects stem journal from environment.
- 8" & larger valves are equipped with integral lifting lugs
- NACE MR0175
- API 6D, 607 and 6FA
- CSA - Z245.15-01



Body & Trim Materials

Part	Material
Body/Adapter	WCB, LCC, CF8M
Ball/Stem	316SS or CS+3 mil ENP
Seat	Devlon, TFE, HT4 (PEEK)

Pressure Rating (psig)

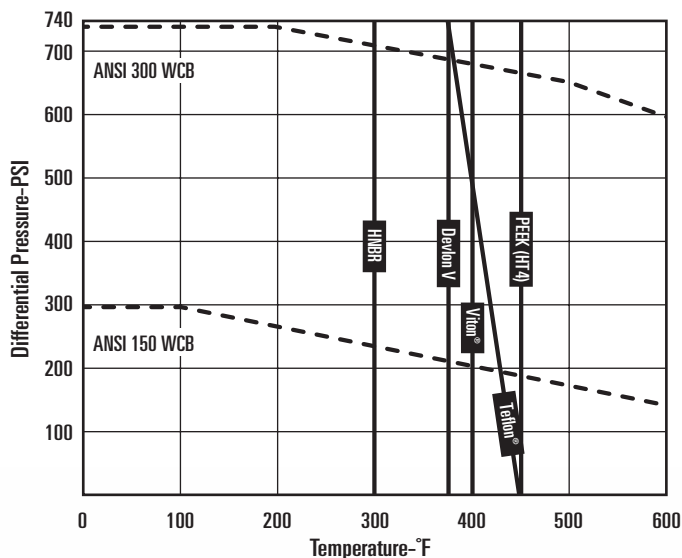
Material	ANSI Class 150	ANSI Class 300
WCB, LCC	285	740
CF8M	275	720

Low Temperature Limits

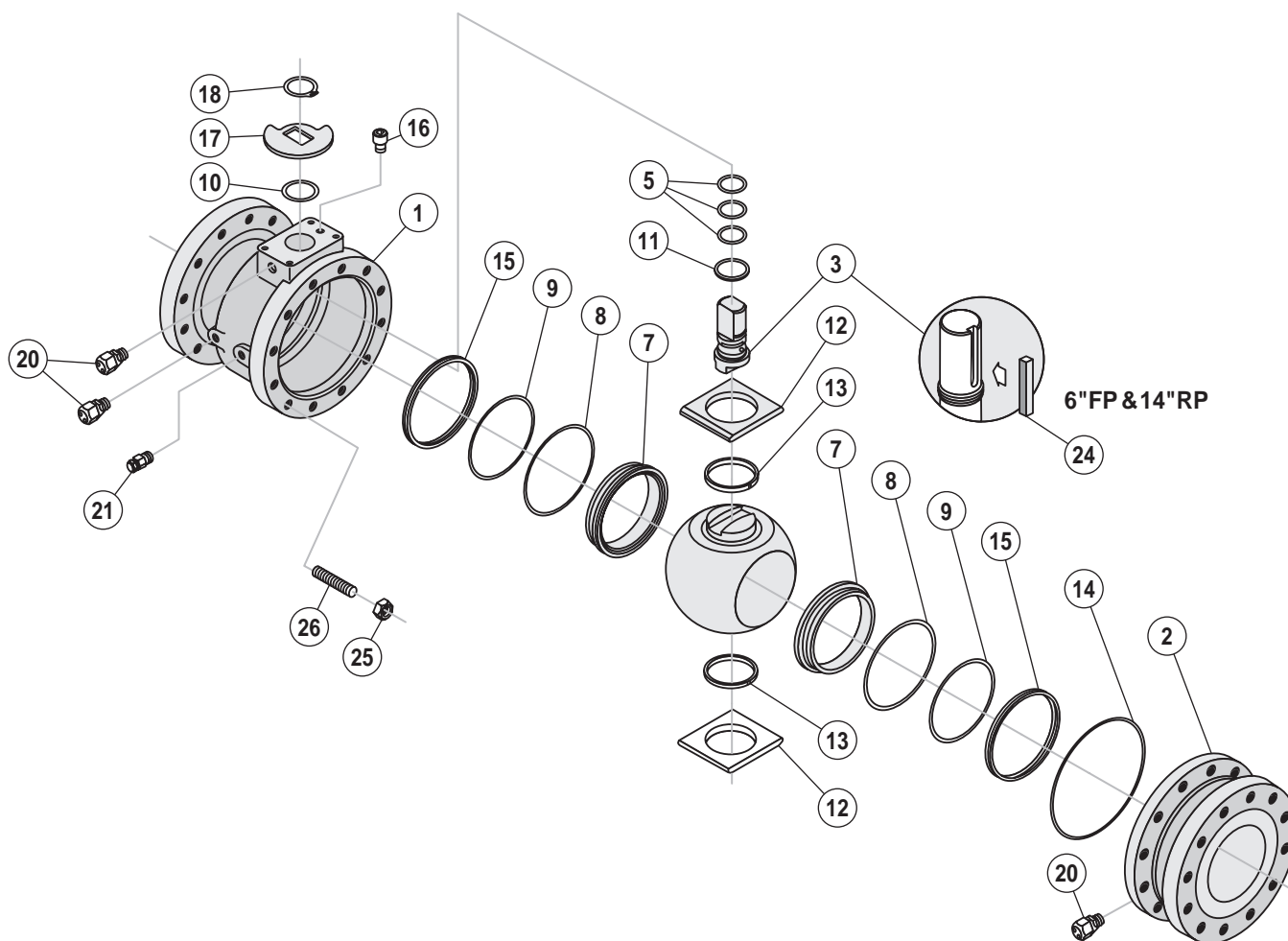
Body Material	°F	°C	Seat Material	°F	°C
WCB	-20	-29	Devlon V	-50	-46
LCC	-50	-46	HT4 (PEEK)	-50	-46
CF8M	-50	-46	Teflon®	-50	-46

Seal Material	°F	°C
Viton®	-20	-29
HNBR	-40	-40

Pressure Temperature Chart



Series FAE • Component Parts



Parts List

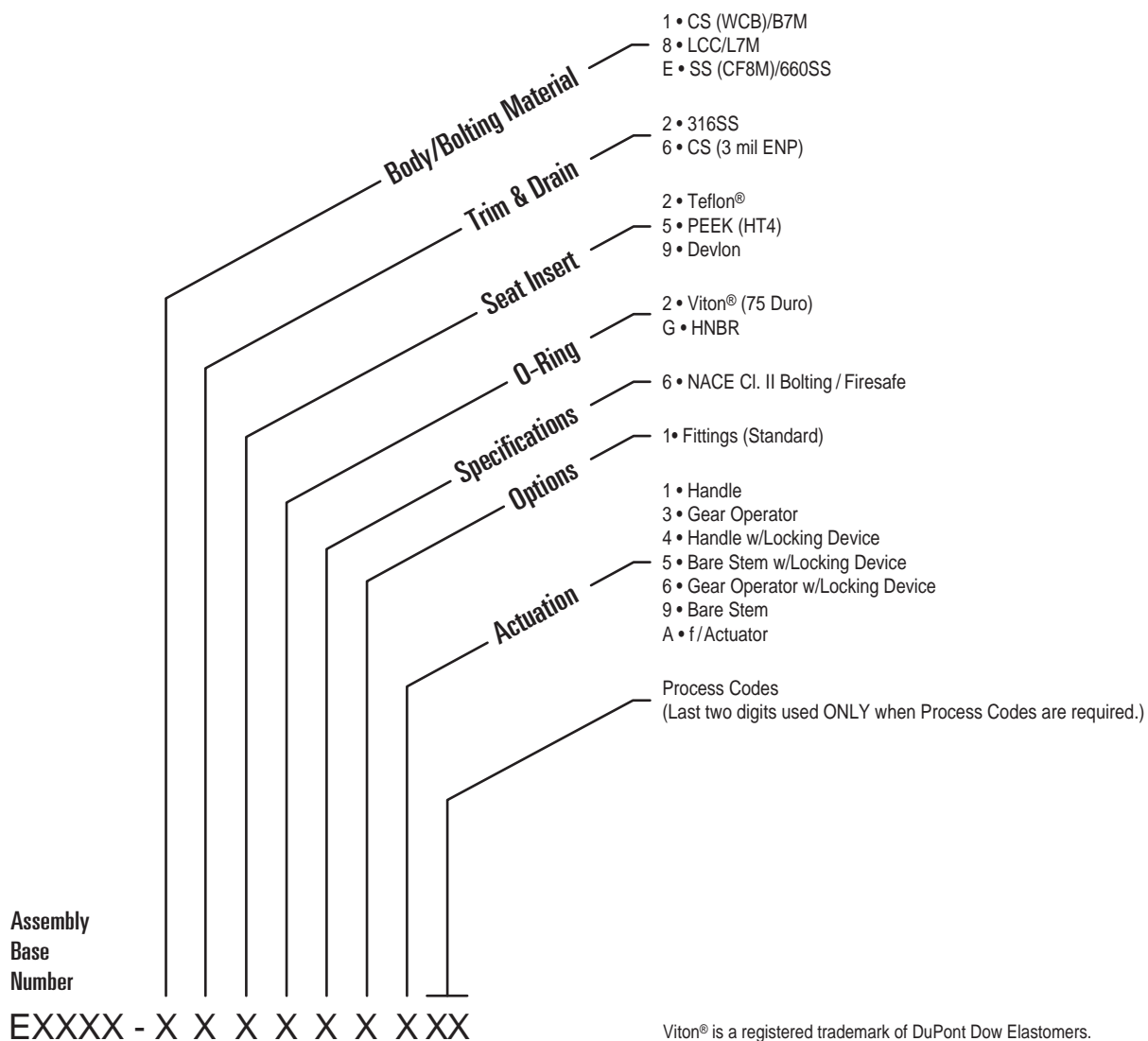
Part No.	Description
1	Body
2	Adapter
3	Stem Assembly
4	Ball
5	Stem Seal
7	Seat
8	Seat O-Ring
9	Seat Sub Seal
10	Stem Bearing
11	Thrust Bearing
12	Trunnion Support

Part No.	Description
13	Trunnion Bearing
14	Body Seal
15	Wave Spring
16	Stop Screw
17	Stop Plate
18	Retainer
20	Injection Fitting
21	Bleed Valve
24	Key, 10"FP thru 12"FP only
25	Hex Nut
26	Stud



Series FAE • Part Number Codes

2"FP-12"FP, Classes 150 & 300



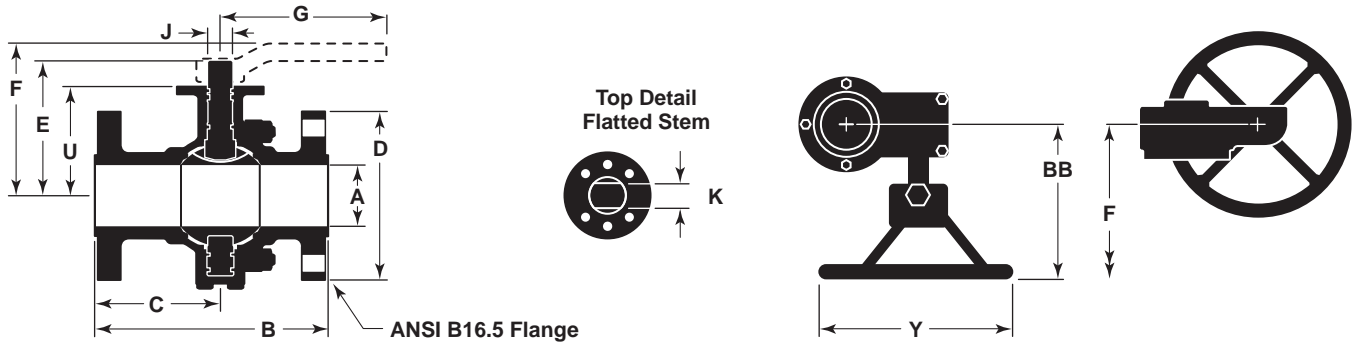
Series FAE Assembly Base Numbers, 2"FP-12"FP

Class/End Connection	Size (in.)												
	2FP	3RP	3FP	4RP	4FP	6RP	6FP	8RP	8FP	10RP	10FP	12RP	12FP
15ORF	E3758	E3759	E3760	E3761	E3762	E3763	E3764	E3765	E3766	E3767	E3768	E3769	E3770
30ORF	E3778	E3779	E3780	E3781	E3782	E3783	E3784	E3785	E3786	E3787	E3788	E3789	E3790

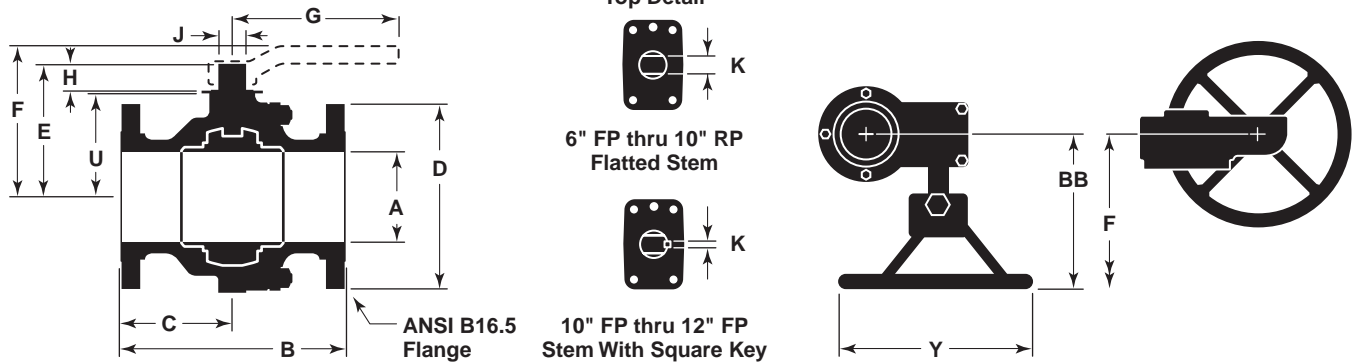


Series FAE Class 150 • Dimensional Data (in., mm)

2" FP thru 6" RP



6" FP thru 12" FP



Dimensional Data, 2"FP-6"RP, Class 150

Size (in.)	Dimension (in./mm)																									
	A		B		C		D		E		F				G		J		K		U		Y		BB	
											to hdl.		to hd. whl.													
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
2FP	2	50.8	7	178	3 1/8	79.4	6	152	4 15/16	125.4	*	*	*	*	8.5	216.9	0.873/	22.17/	0.558/	14.17/	3 7/8	98.4	*	*	*	*
3RP	2	50.8	8	203	4	102	7 1/2	191	4 15/16	125.4	*	*	*	*	8.5	216.9	0.867	22.02	0.554	14.08	3 7/8	98.4	*	*	*	*
3FP	3	76.2	8	203	3 7/8	98.4	7 1/2	191	6 5/8	168.3	*	*	*	*	15	381					5 3/8	136.3	*	*	*	*
4RP	3	76.2	9	229	4 1/2	114.3	9	229	6 5/8	168.3	8 1/4	209.6	6 1/2	165	15	381	1.246/	31.64/	0.748/	18.99/	5 3/8	136.3	7 21/32	194.2	7 3/16	182.6
4FP	4	101.6	9	229	4 1/2	114.3	9	229	7 7/16	188.9	9	228.6	7 5/16	185.7	15	381	1.240	31.50	0.744	18.90	6 3/16	157.2	7 7/8	200	7 3/16	—
6RP	4	101.6	15 1/2	394	5 1/4	133.3	11	279	7 7/16	188.9	9	228.6	7 5/16	185.7	15	381					6 3/16	157.2	8 17/32	216.3	7 3/16	—

*Consult Factory

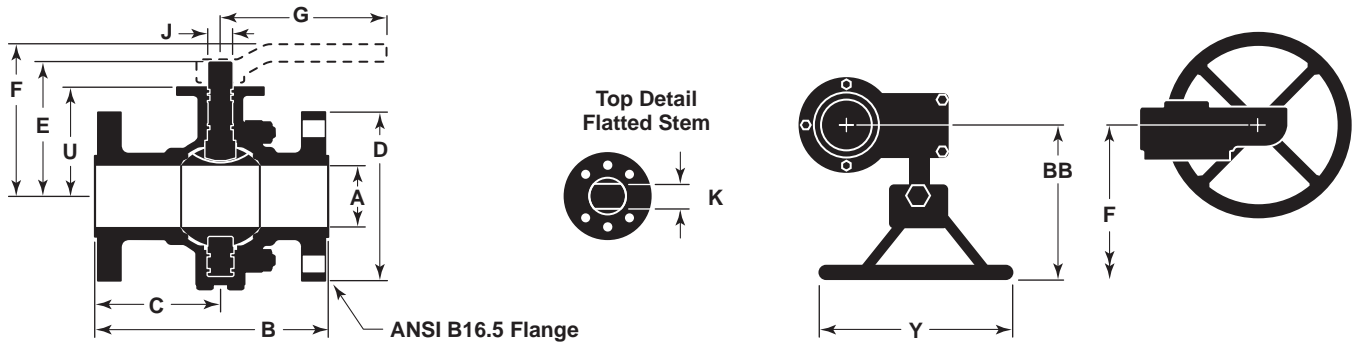
Dimensional Data, 6"FP-12"RP, Class 150

Size (in.)	Dimension (in./mm)																											
	A		B		C		D		E		F		G		H		J		K		U		Y		BB			
											to hdl.		to hd. whl.															
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm		
6FP	6	152	15 1/2	394	7 3/4	196.8	11	279	9 1/2	241	10 13/16	274.6	9 1/4	235.0	48	1219	2 3/32	53.2	1.999/	50.77/	1.249/	31.72/	7	177.8	11 13/16	300	8 1/4	209.6
8RP	6	152	18	457	9	229	13 1/2	342.9	9 1/2	241	10 13/16	274.6	9 1/4	235.0	48	1219	2 3/32	53.2	1.995	50.68	1.245	31.63	7	177.8	10 15/16	277.3	8 1/4	209.6
8FP	8	203	18	457	9	229	13 1/2	342.9	11 9/16	293.7	12 19/32	319.9	10 3/8	263.5	48 5/16	1227	2 3/8	60.3	2.499/	63.47/	1.749/	44.42/	8 3/4	222.3	15 3/4	400	11 15/16	303.2
10RP	8	203	21	533	10 1/2	267	16	406	11 9/16	293.7	12 19/32	319.9	10 3/8	263.5	48 5/16	1227	2 3/8	60.3	2.495	63.37	1.745	44.33	8 3/4	222.3	13 15/16	337.8	11 15/16	303.2
10FP	10	254	21	533	10 1/2	267	16	406	14 5/16	363.6	—	—	10 3/8	339.7	—	—	3 3/16	81.0					11 1/4	285.8	23 5/8	600	14 5/8	371.5
12RP	10	254	24	610	12	305	19	483	14 5/16	363.6	—	—	13 3/8	339.7	—	—	3 3/16	81.0	2.874/	72.99/	3/4#	19.1*	11 1/4	285.8	14 11/16	372.7	14 5/8	371.5
12FP	12	305	24	610	12	305	19	483	15 11/16	398.5	—	—	14 3/4	374.7	—	—	3 3/16	81.0	2.871/	72.93	sq.	19.1	12 5/8	320.7	—	—	14 5/8	371.5

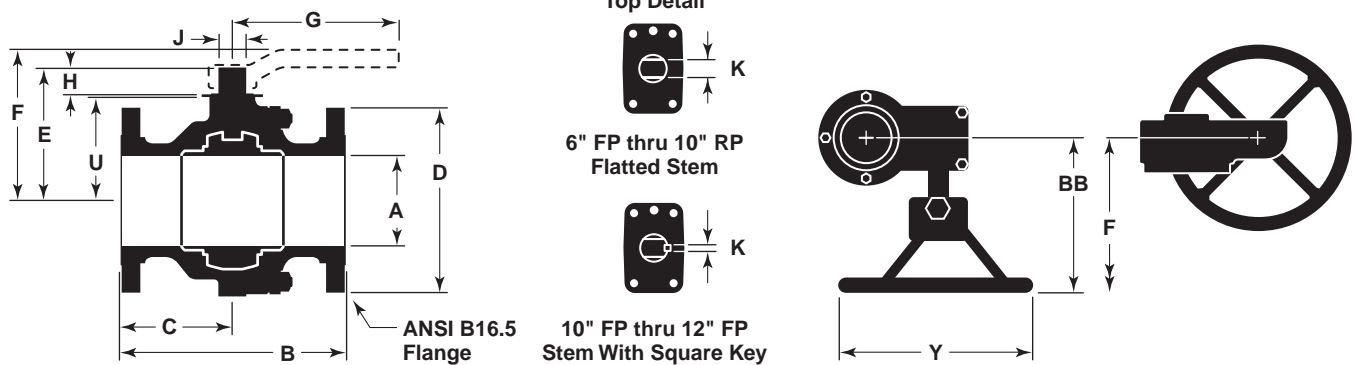


Series FAE Class 300 • Dimensional Data (in., mm)

2" FP thru 6" RP



6" FP thru 12" FP



Dimensional Data, 2"FP-6"RP, Class 300

Size (in.)	Dimension (in./mm)																									
	A		B		C		D		E		F				G		J		K		U		Y		BB	
											to hdl.		to hd. whl.													
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
2FP	2	50.8	8 1/2	216.0	4 1/4	108.0	6 1/2	165	4 15/16	125.4	*	*	*	*	8.5	216.9	0.873/	22.17/	0.558/	14.17/	37/8	98.4	*	*	*	*
3RP	2	50.8	11 1/8	282.6	5 9/16	141.3	8 1/4	209.6	4 15/16	125.4	*	*	*	*	8.5	216.9	0.867	22.02	0.554	14.08	37/8	98.4	*	*	*	*
3FP	3	76.2	11 1/8	282.6	6	152	8 1/4	209.6	6 5/8	168.3	*	*	*	*	15	381					5 3/8	136.3	*	*	*	*
4RP	3	76.2	12	305	6	152	10	254	6 5/8	168.3	8 1/4	209.6	6 1/2	165	15	381	1.246/	31.64/	0.748/	18.99/	5 3/8	136.3	7 21/32	194.2	7 3/16	182.6
4FP	4	101.6	12	305	6	152	10	254	7 7/16	188.9	9	228.6	7 5/16	185.7	15	381	1.240	31.50	0.744	18.90	6 3/16	157.2	7 7/8	200	7 3/16	—
6RP	4	101.6	15 7/8	403	7 15/16	201.6	12 1/2	317.5	7 7/16	188.9	9	228.6	7 5/16	185.7	15	381					6 3/16	157.2	8 17/32	216.3	7 3/16	—

*Consult Factory

Dimensional Data, 6"FP-12"RP, Class 300

Size (in.)	Dimension (in./mm)																											
	A		B		C		D		E		F				G		H		J		K		U		Y		BB	
											to hdl.		to hd. whl.															
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
6FP	6	152	15 7/8	403.2	7 15/16	201.6	12 1/2	317.5	9 1/2	241	10 13/16	274.6	9 1/4	235.0	48	1219	2 3/32	53.2	1.999/	50.77/	1.249/	31.72/	7	177.8	11 13/16	300	8 3/8	213
8RP	6	152	19 3/4	501.6	9 7/8	250.8	15	381	9 1/2	241	10 13/16	274.6	9 1/4	235.0	48	1219	2 3/32	53.2	1.995	50.68	1.245	31.63	7	177.8	10 15/16	277.3	8 3/8	213
8FP	8	203	19 3/4	501.6	9 7/8	250.8	15	381	11 9/16	293.7	12 19/32	319.9	10 3/8	263.5	48 5/16	1227	2 3/8	60.3	2.499/	63.47/	1.749/	44.42/	8 3/4	222.3	15 3/4	400	11 5/16	303.2
10RP	8	203	22 3/8	568.3	11 3/16	284.2	17 1/2	444.5	11 9/16	293.7	12 19/32	319.9	10 3/8	263.5	48 5/16	1227	2 3/8	60.3	2.495	63.37	1.745	44.33	8 3/4	222.3	13 15/16	337.8	11 5/16	303.2
10FP	10	254	22 3/8	568.3	11 3/16	284.2	17 1/2	444.5	14 5/16	363.6	—	—	13 3/8	339.7	—	—	3 3/16	81.0	2.874/	72.99/	3/4#	19.1*	11 1/4	285.8	23 5/8	600	14 5/8	371.5
12RP	10	254	25 1/2	647.7	12 3/4	323.9	20 1/2	521	14 5/16	363.6	—	—	13 3/8	339.7	—	—	3 3/16	81.0	2.874/	72.99/	3/4#	19.1*	11 1/4	285.8	14 11/16	372.7	14 5/8	371.5
12FP	12	305	25 1/2	647.7	12 3/4	323.9	20 1/2	521	15 11/16	398.5	—	—	14 3/4	374.7	—	—	3 3/16	81.0	2.871	72.93	sq.	19.1	12 5/8	320.7	—	—	14 5/8	371.5



Series TE Trunnion Mounted Ball Valves

This top entry valve with a one-piece trunnion supported ball conforms to API specifications 6A, 6D and ANSI 16.34. Standard Devlon seats are retained in metal holders which are spring-loaded against the ball for low pressure, firesafe sealing. HT4 seats for high temperature applications are among

the options available. Standard features of the Series TE ball valve include double block and bleed design, lube and sealant injection fittings, double trunnion seals and inline accessibility for service. Series TE valves are offered in 1 1/2"FP-12"FP, ANSI class 600 and 900.

General Design Features

- One-piece flanged top-entry trunnion design
- One-piece ball and stem with trunnion design
- Double block and bleed
- One-piece ball and stem assures precise positioning
- Anti blowout trunnion stem design
- Two sets of O-rings plus firesafe packing prevents leakage
- Corrosion resistant low friction bearings
- Inconel wave springs provide upstream and downstream sealing
- Sealant injection fittings for emergency stem or seat sealing
- Inline repairable due to patented seat retainer design
- Minimized torque required to open and close valve
- Anti-static grounding between ball, stem and body
- Integral top works direct mounting pad
- 8" & larger valves are equipped with lifting lugs
- ANSI B16.34
- API 6D, 607 and 6FA
- NACE MR0175
- CSA - Z245.15-01

Body & Trim Materials

Part	Material
Body/Adapter	WCB, LCC, CF8M
Ball/Stem	316SS or CS+3 mil ENP
Seat	Devlon, TFE, HT4 (PEEK)

Pressure Rating (psig)

Material	ANSI Class 600	ANSI Class 900
WCB, LCC	1480	2220
CF8M	1440	2160

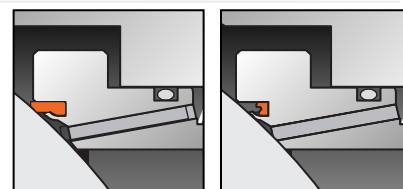
Low Temperature Limits

Body Material	°F	°C	Seat Material	°F	°C
WCB	-20	-29	Devlon V	-50	-46
LCC	-50	-46	HT4 (PEEK)	-50	-46
CF8M	-50	-46	Teflon®	-50	-46
			Seal Material	°F	°C
			Viton®	-20	-29
			HNBR	-40	-40

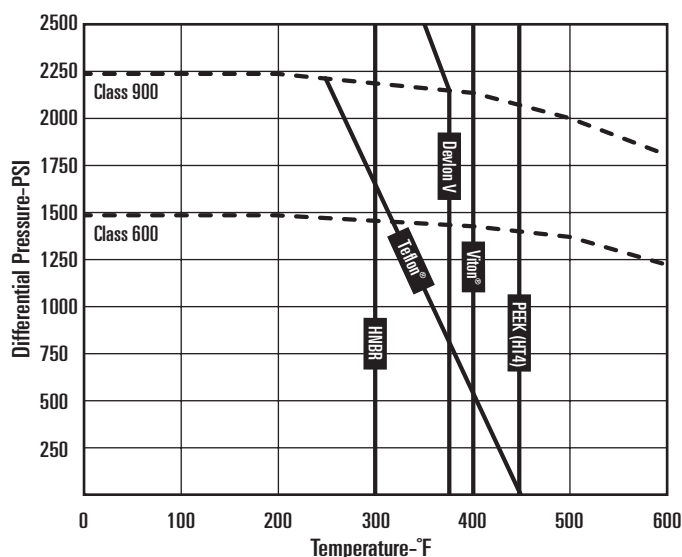


Firesafe Function

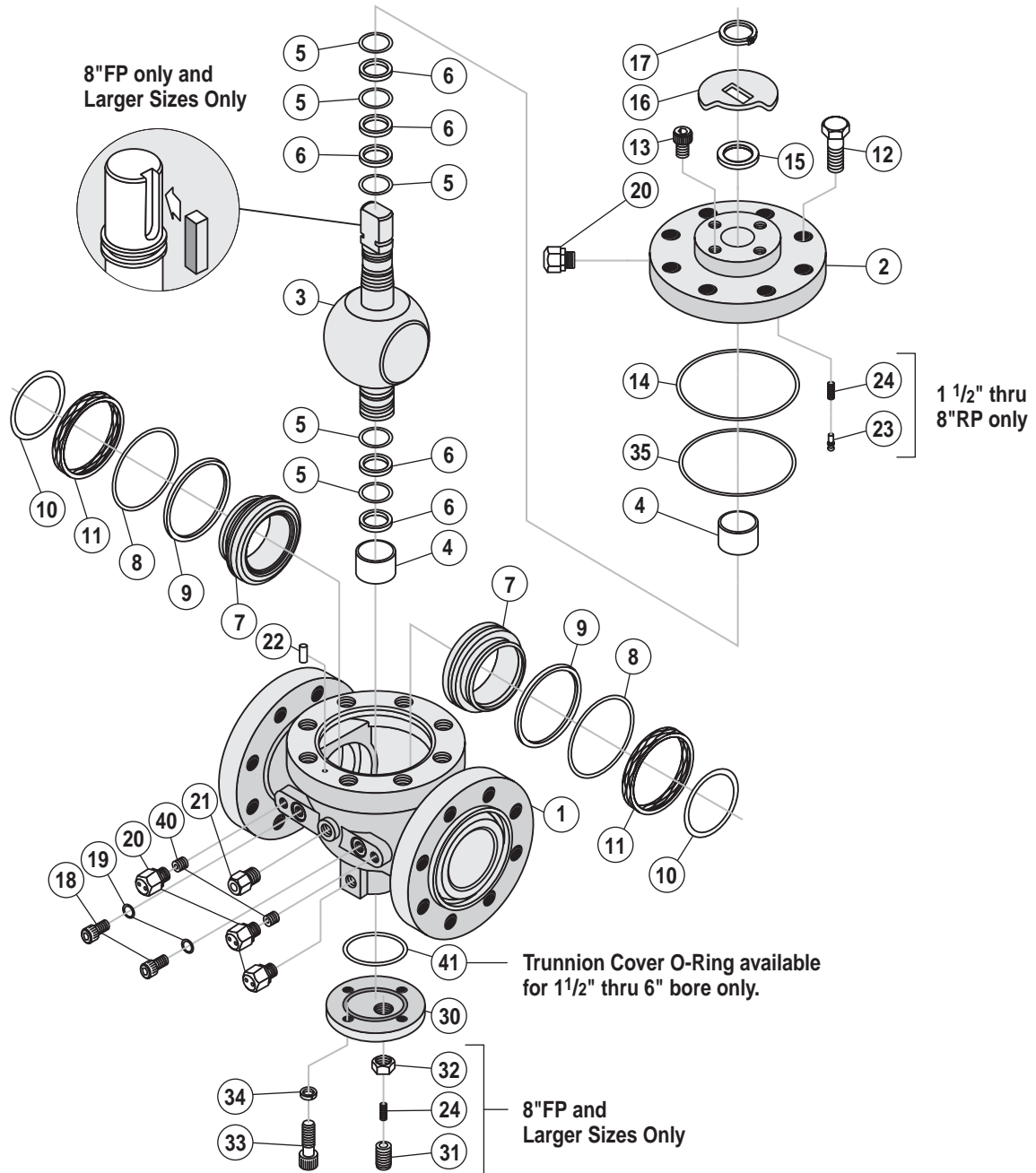
In case of fire and seat construction damage, firesafe requirements are accomplished with automatic metal-to-metal positive sealing.



Pressure Temperature Chart



Series TE • Component Parts



Parts List

Part No.	Description
1	Body
2	Bonnet
3	Ball/Stem
4	Trunnion Bearing
5	Stem Seal
6	Stem Back-up Ring
7	Seat
8	Seat O-Ring
9	Seat Back-up Ring

Part No.	Description
10	Seat Sub Seal
11	Wave Spring
12	Bonnet Cap Screw
13*	Stop Screw
14	Bonnet Seal
15*	Stem Bearing
16*	Stop Plate
17*	Retainer
18	Retract. Port Screw

Part No.	Description
19	Retract. Port Seal
20	Injection Fitting
21	Bleed Valve
22	Bonnet Align. Pin
23*	Grounding Plunger
24	Grounding Spring
29	Key
30	Thrust Plate
31	Thrust Adjust. Screw

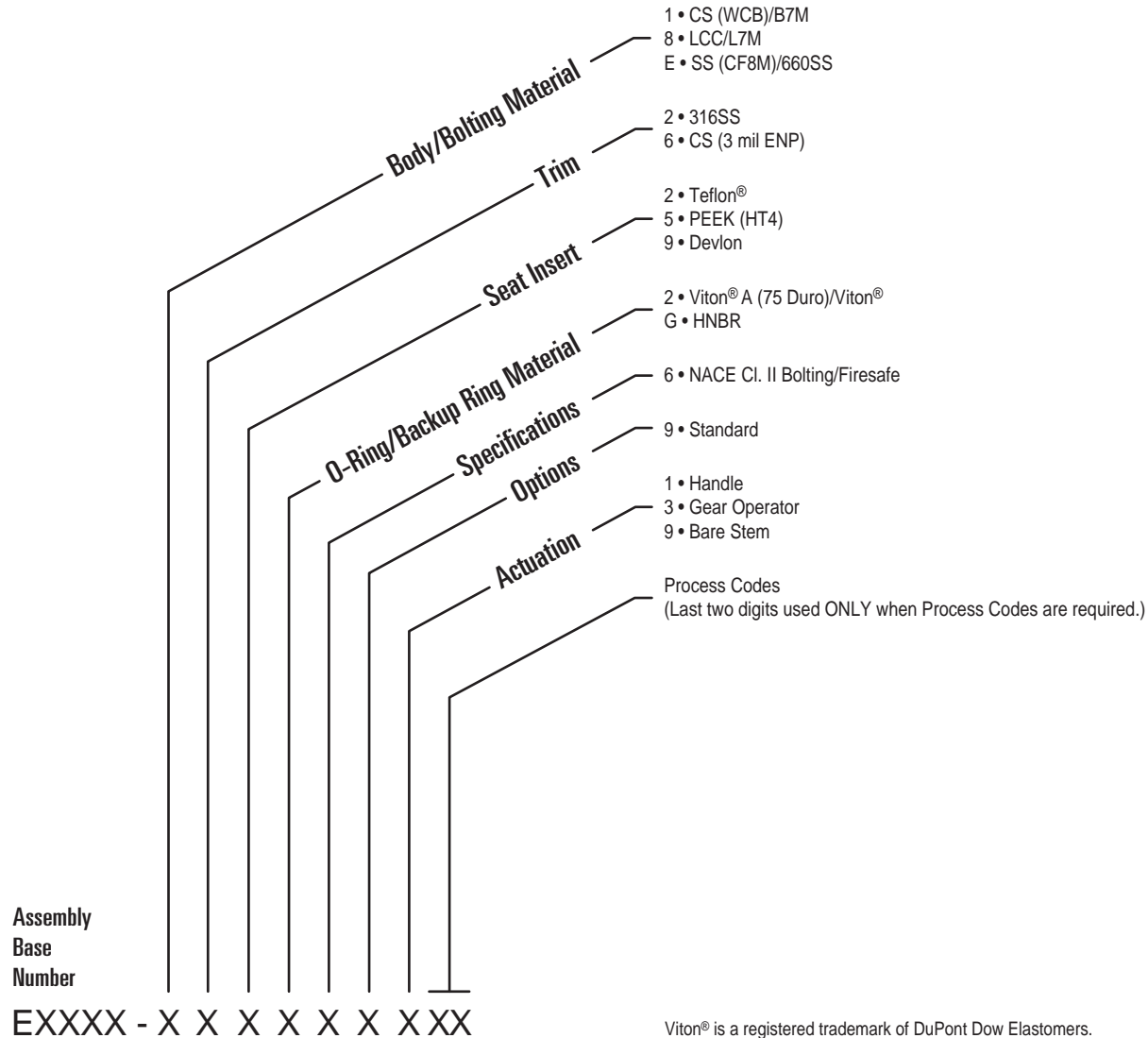
Part No.	Description
32	Jam Nut
33	Thrust Plate Bolt
34	Lock washer
35	Bonnet Primary Seal
40	Internal Ball Check
41	Trunnion Cover O-Ring

*Not used in 8"FP and larger assemblies.



Series TE • Part Number Codes

1 1/2"FP-12"FP, Classes 600 & 900



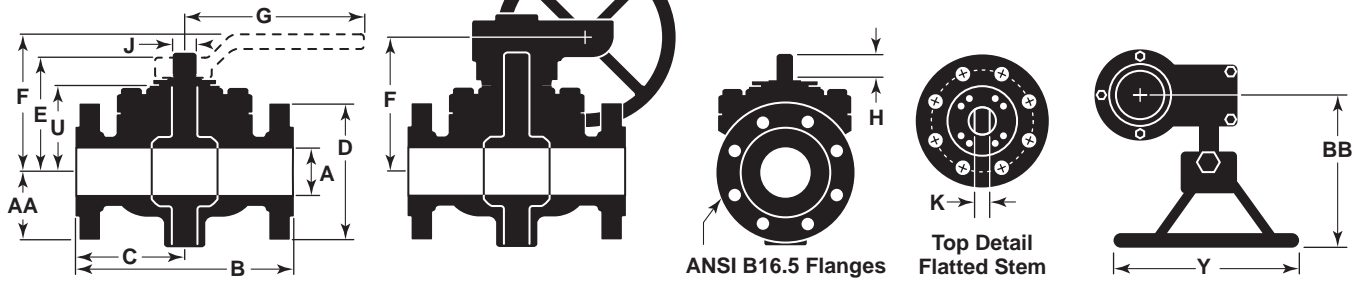
Series TE Assembly Base Numbers, 1 1/2"FP-12"FP

Class/End Connection	Size (In.)													
	1 1/2FP	2FP	3RP	3FP	4RP	4FP	6RP	6FP	8RP	8FP	10RP	10FP	12RP	12FP
600RF	E2463	E2486	E2487	E2488	E2489	E2490	E2491	E2492	E2493	E2494	E2495	E2496	E2497	E2498
600RTJ	E2504	E2506	E2507	E2508	E2509	E2510	E2511	E2512	E2513	E2514	E2515	E2516	E2517	E2518
900RF	E2732	E2734	E2735	E2736	E2737	E2738	E2739	E2740	E2741	E2742	E2743	E2744	E2745	E2746
900RTJ	E2771	E2773	E2774	E2775	E2776	E2777	E2778	E2779	E2780	E2781	E2782	E2783	E2784	E2785

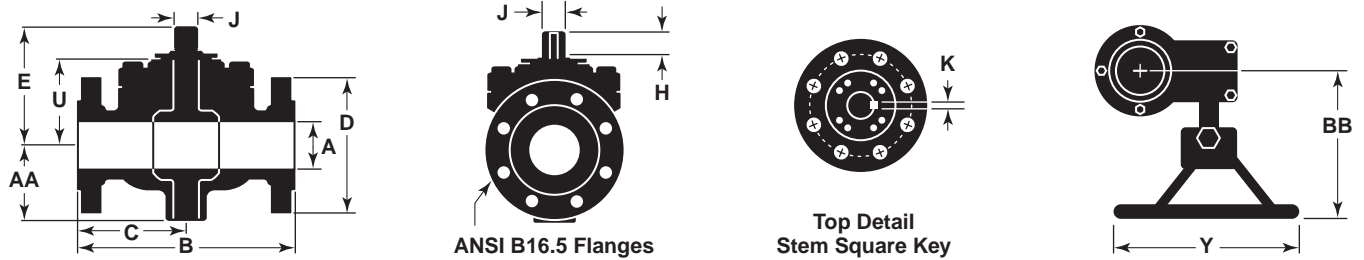


Series TE Class 600 • Dimensional Data (in.)

1 1/2" FP thru 8" RP CL. 600 and 900



8" FP thru 12" FP CL. 600 and 900



Dimensional Data, 1 1/2"FP-8"RP, Class 600

Size (in.)	Dimension (in.)																
	A	B		C		D	E	F		G	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ			to hdl.	to hd.whl.								
1.5FP	1.7	9 1/2	9 1/2	4 3/4	4 3/4	6 1/8	4 3/8	6 1/16	—	8 1/2	29/32	0.873/ 0.870	0.560/ 0.556	3 3/16	*	2 7/8	*
2FP	2 1/6	11 1/2	11 5/8	5 3/4	5 13/16	6 1/2	6 1/2	7 19/32	6	22	1 3/16	1.124/ 1.120	0.749/ 0.744	4 7/8	*	4 7/8	*
3RP	2 1/6	14	14 1/8	7	7 1/16	8 1/4	6 1/2	7 19/32	6	22	1 3/16			4 7/8	*	4 7/8	*
3FP	3 1/8	14	14 1/8	7	7 1/16	8 1/4	7 5/8	8 19/32	6 7/8	30	1 11/16	1.499/ 1.495	0.999/ 0.994	5 1/2	*	5 3/4	*
4RP	3 1/8	17	17 1/8	8 1/2	8 9/16	10 3/4	7 5/8	8 19/32	6 7/8	30	1 11/16			5 1/2	*	5 3/4	*
4FP	4 1/16	17	17 1/8	8 1/2	8 9/16	10 3/4	9 1/2	10 19/32	8 15/32	48	1 31/32	1.999/ 1.995	1.249/ 1.245	7 3/32	11 13/16	6 1/2	8 1/4
6RP	4 1/16	22	22 1/8	11	11 1/16	14	9 1/2	10 19/32	8 15/32	48	1 31/32			7 3/32	8 5/8	6 1/2	8 1/4
6FP	6	22	22 1/8	11	11 1/16	14	11 7/16	12 7/16	10 7/16	48	2 13/32	2.499/ 2.495	1.749/ 1.745	8 9/16	15 3/4	8 5/16	11 15/16
8RP	6	26	26 1/8	13	13 1/16	16 1/2	11 7/16	12 7/16	10 7/16	48	2 13/32			8 9/16	10 3/4	8 5/16	11 15/16

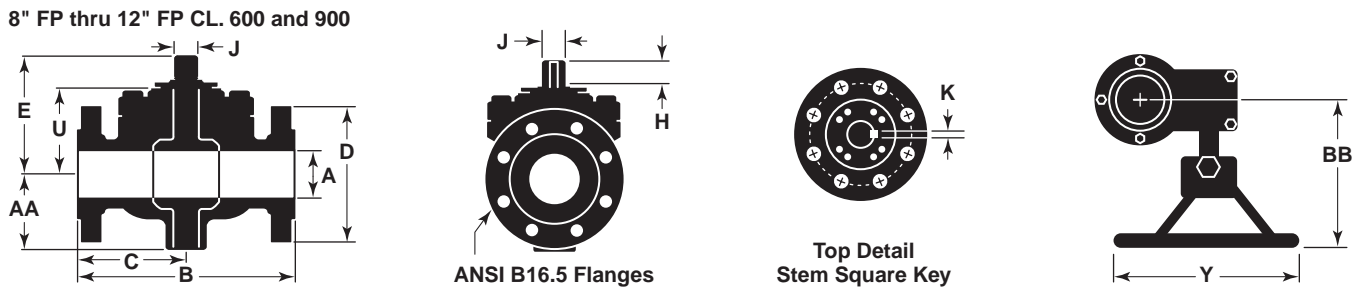
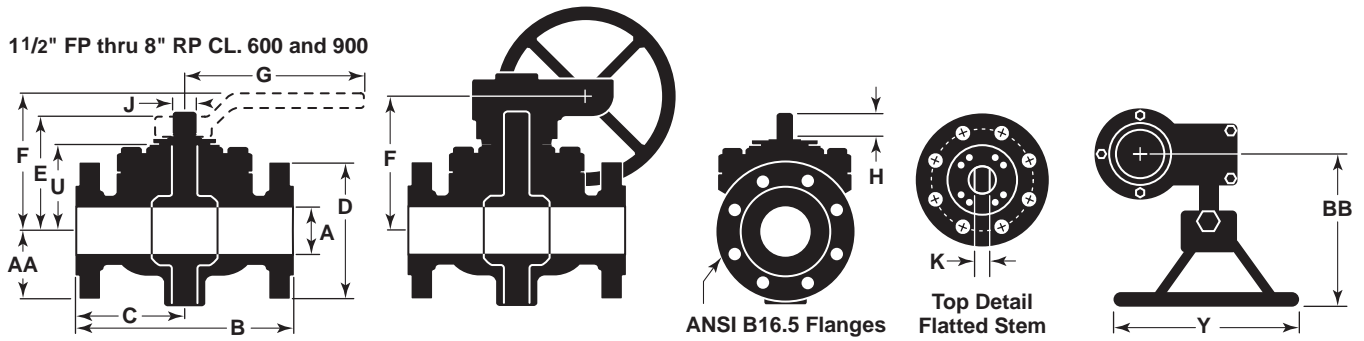
*Consult Factory

Dimensional Data, 8"FP-12"FP, Class 600

Size (in.)	Dimension (in.)												
	A	B		C		D	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ								
8FP	8	26	26 1/8	13	13 1/16	16 1/2	3 1/8	2.874/2.871	3/4 sq.	11 1/4	23 5/8	10 1/8	14 5/8
10RP	8	31	31 1/8	15 1/2	15 9/16	20	3 1/8	2.874/2.871	3/4 sq.	11 1/4	13 5/16	10 1/8	14 5/8
10FP	10	31	31 1/8	15 1/2	15 9/16	20	3 11/16	3.249/3.246	7/8 sq.	12 15/16	15	11 7/8	17 3/16
12RP	10	33	33 1/8	16 1/2	16 9/16	22	3 11/16	3.249/3.246	7/8 sq.	12 15/16	15	11 7/8	17 3/16
12FP	12	33	33 1/8	16 1/2	16 9/16	22	4 1/4	3.999/3.997	1 sq.	15 1/8	17 7/8	14 1/2	18 3/8



Series TE Class 600 • Dimensional Data (mm)



Dimensional Data, 1 1/2"FP-8"RP, Class 600

Size (in.)	Dimension (mm)																
	A	B		C		D	E	F		G	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ			to hdl.	to hd.whl.								
1.5FP	43.2	241.3	241.3	120.65	120.65	155.58	111.13	153.99	—	215.9	23.02	22.17/ 22.10	14.22/ 14.13	81.0	*	73.0	*
2FP	52.39	292.1	295.28	146.05	147.64	165.1	165.1	192.88	152.4	558.8	30.16	28.54/ 28.45	19.02/ 18.90	123.8	*	123.8	*
3RP	52.39	355.6	358.78	177.8	179.39	209.55	165.1	192.88	152.4	558.8	30.16			123.8	*	123.8	*
3FP	79.38	355.6	358.78	177.8	179.39	209.55	193.68	218.28	174.63	762	42.86	38.07/ 37.98	25.37/ 25.25	139.7	*	146.1	*
4RP	79.38	431.8	435.0	215.9	217.49	273.05	193.68	218.28	174.63	762	42.86			139.7	*	146.1	*
4FP	103.19	431.8	435.0	215.9	217.49	273.05	241.3	269.08	215.11	1219.2	50.00	50.77/ 50.68	31.72/ 31.62	180.2	300	165.1	209.6
6RP	103.19	558.8	561.98	279.4	280.99	355.6	241.3	269.08	215.11	1219.2	50.00			180.2	218.70	165.1	209.6
6FP	152.4	558.8	561.98	279.4	280.99	355.6	290.51	315.91	265.11	1219.2	61.12	63.47/ 63.38	44.42/ 44.32	217.5	400	211.1	303.2
8RP	152.4	660.4	663.58	330.2	331.79	419.1	290.51	315.91	265.11	1219.2	61.12			217.5	272.50	211.1	303.2

*Consult Factory

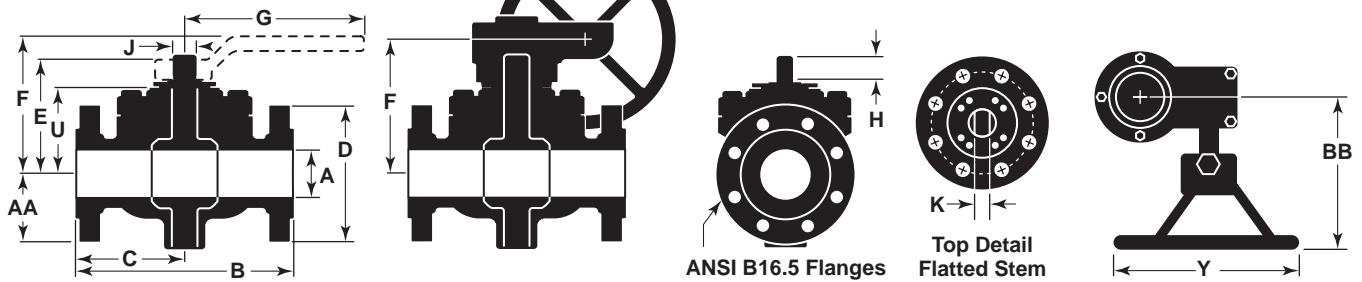
Dimensional Data, 8"FP-12"FP, Class 600

Size (in.)	Dimension (mm)												
	A	B		C		D	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ								
8FP	203.2	660.4	663.6	330.2	331.8	419.1	79.4	73.00/72.92	19.1*19.1	285.8	600	257.2	371.5
10RP	203.2	787.4	790.6	393.7	395.3	508.0	79.4	73.00/72.92	19.1*19.1	285.8	337.80	257.2	371.5
10FP	254.0	787.4	790.6	393.7	395.3	508.0	93.7	82.52/82.45	22.2*22.2	328.5	380.50	301.6	436.6
12RP	254.0	838.2	841.4	419.1	420.7	558.8	93.7	82.52/82.45	22.2*22.2	328.5	380.50	301.6	436.6
12FP	304.8	838.2	841.4	419.1	420.7	558.8	108.0	101.57/101.53	25.4*25.4	384.2	454.20	368.3	466.7

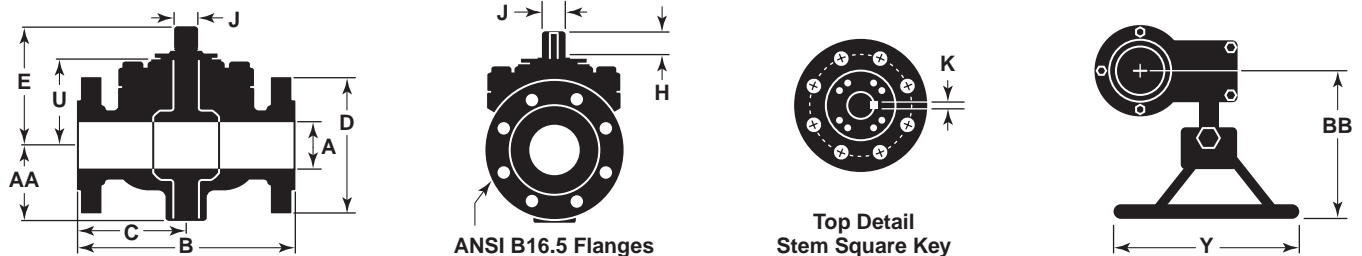


Series TE Class 900 • Dimensional Data (in.)

1 1/2" FP thru 8" RP CL. 600 and 900



8" FP thru 12" FP CL. 600 and 900



Dimensional Data, 1 1/2"FP-8"RP, Class 900

Size (in.)	Dimension (in.)																
	A	B		C		D	E	F		G	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ			to hdl.	to hd.whl.								
1.5FP	1.7	12	12	6	6	7	4 ³ / ₈	6 ¹ / ₁₆	—	8 ¹ / ₂	29/32	0.873/ 0.870	0.560/ 0.556	3 ³ / ₁₆	*	2 ⁷ / ₈	*
2FP	2 ¹ / ₆	14 ¹ / ₂	14 ⁵ / ₈	7 ¹ / ₄	7 ⁵ / ₁₆	8 ¹ / ₂	6 ¹ / ₂	7 ¹⁹ / ₃₂	6	22	1 ³ / ₁₆	1.124/ 1.120	0.749/ 0.744	4 ⁷ / ₈	*	5	*
3RP	2 ¹ / ₆	15	15 ¹ / ₈	7 ¹ / ₂	7 ⁹ / ₁₆	9 ¹ / ₂	6 ¹ / ₂	7 ¹⁹ / ₃₂	6	22	1 ³ / ₁₆			4 ⁷ / ₈	*	5	*
3FP	3 ¹ / ₈	15	15 ¹ / ₈	7 ¹ / ₂	7 ⁹ / ₁₆	9 ¹ / ₂	7 ⁵ / ₈	8 ²⁵ / ₃₂	7 ¹ / ₁₆	30	1 ¹ / ₂	1.499/ 1.495	0.999/ 0.994	5 ¹¹ / ₁₆	*	5 ¹³ / ₁₆	*
4RP	3 ¹ / ₈	18	18 ¹ / ₈	9	9 ¹ / ₁₆	11 ¹ / ₂	7 ⁵ / ₈	8 ²⁵ / ₃₂	7 ¹ / ₁₆	30	1 ¹ / ₂			5 ¹¹ / ₁₆	*	5 ¹³ / ₁₆	*
4FP	4 ¹ / ₁₆	18	18 ¹ / ₈	9	9 ¹ / ₁₆	11 ¹ / ₂	9 ¹ / ₂	10 ¹⁹ / ₃₂	8 ¹⁵ / ₃₂	48	1 ³¹ / ₃₂	1.999/ 1.995	1.249/ 1.245	7 ³ / ₃₂	11 ¹³ / ₁₆	6 ³ / ₄	8 ¹ / ₄
6RP	4 ¹ / ₁₆	24	24 ¹ / ₈	12	12 ¹ / ₁₆	15	9 ¹ / ₂	10 ¹⁹ / ₃₂	8 ¹⁵ / ₃₂	48	1 ³¹ / ₃₂	2.499/ 2.495	1.749/ 1.745	7 ³ / ₃₂	8 ⁵ / ₈	6 ³ / ₄	8 ¹ / ₄
6FP	6	24	24 ¹ / ₈	12	12 ¹ / ₁₆	15	11 ⁷ / ₁₆	12 ¹¹ / ₁₆	10 ⁷ / ₁₆	48	2 ⁵ / ₃₂			8 ¹³ / ₁₆	11	8 ⁵ / ₈	11 ¹⁵ / ₁₆
8RP	6	29	29 ¹ / ₈	14 ¹ / ₂	14 ⁹ / ₁₆	18 ¹ / ₂	11 ⁷ / ₁₆	12 ¹¹ / ₁₆	10 ⁷ / ₁₆	48	2 ⁵ / ₃₂			8 ¹³ / ₁₆	11	8 ⁵ / ₈	11 ¹⁵ / ₁₆

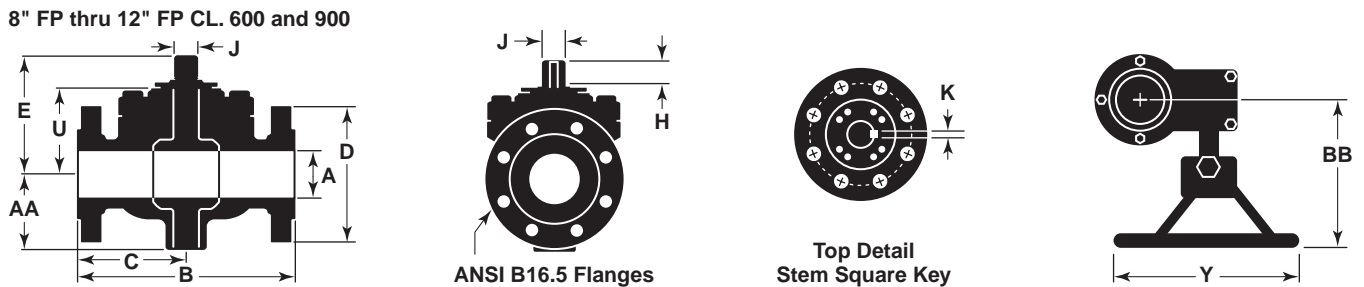
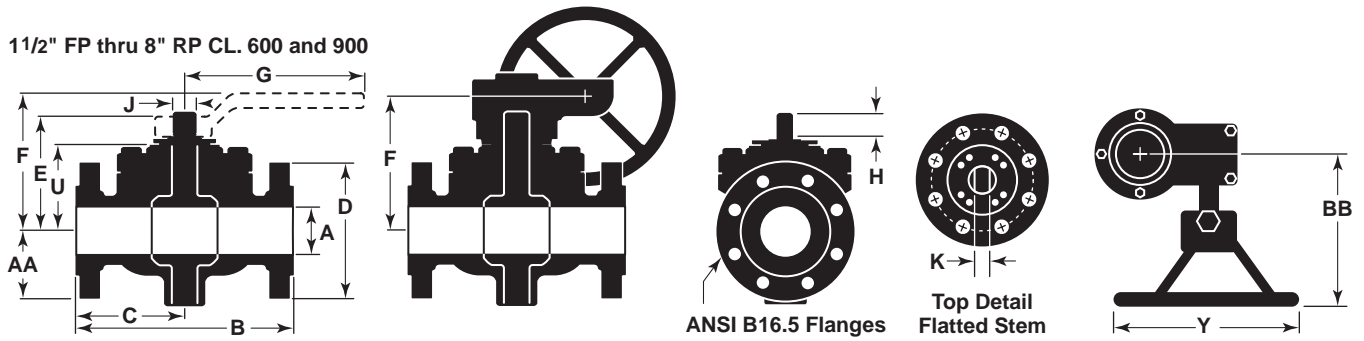
*Consult Factory

Dimensional Data, 8"FP-12"FP, Class 900

Size (in.)	Dimension (in.)												
	A	B		C		D	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ								
8FP	8	29	29 1/8	14 1/2	14 9/16	18 1/2	3 1/8	2.874/2.871	3/4 sq.	11 1/4	27 9/16	10 3/32	15 7/8
10RP	8	33	33 1/8	16 1/2	16 9/16	21 1/2	3 1/8	2.874/2.871	3/4 sq.	11 1/4	27 9/16	10 3/32	15 7/8
10FP	10	33	33 1/8	16 1/2	16 9/16	21 1/2	3 11/16	3.249/3.246	7/8 sq.	12 15/16	19 11/16	11 7/8	18 3/8
12RP	10	38	38 1/8	19	19 1/16	24	3 11/16	3.249/3.246	7/8 sq.	12 15/16	15 11/16	11 7/8	18 3/8
12FP	12	38	38 1/8	19	19 1/16	24	4 1/4	3.997/3.994	1 sq.	15 1/8	27 9/16	14 1/2	20 5/8



Series TE Class 900 • Dimensional Data (mm)



Dimensional Data, 1 1/2"FP-8"RP, Class 900

Size (in.)	Dimension (mm)																
	A	B		C		D	E	F		G	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ			to hdl.	to hd.whl.								
1.5FP	43.2	305	304.8	152	152	178	111.13	153.99	—	215.9	23.02	22.17/ 22.10	14.22/ 14.13	81.0	*	73.0	*
2FP	52.39	368	371.5	184	185.6	216	165.1	192.88	152.4	558.8	30.16	28.54/ 28.45	19.02/ 18.90	123.8	*	127	*
3RP	52.39	381	384.2	191	192.6	241	165.1	192.88	152.4	558.8	30.16			123.8	*	127	*
3FP	79.38	381	384.2	191	192.6	241	193.68	223.0	179.4	762	38.1	38.07/ 37.89	25.37/ 25.25	144.5	*	147.6	*
4RP	79.38	457	460.4	229	230.6	292	193.68	223.0	179.4	762	38.1			144.5	*	147.6	*
4FP	103.19	457	460.4	229	230.6	292	241.3	269.08	215.11	1219.2	50.00	50.77/ 50.68	31.72/ 31.62	180.2	300	171.5	209.6
6RP	103.19	610	612.8	305	306.6	381	241.3	269.08	215.11	1219.2	50.00			180.2	218.70	171.5	209.6
6FP	152.4	610	612.8	305	306.6	381	290.51	322.3	265.11	1219.2	54.8	63.47/ 63.38	44.42/ 44.32	223.8	278.80	219.1	303.2
8RP	152.4	737	739.8	368	369.6	470	290.51	322.3	265.11	1219.2	54.8			223.8	278.80	219.1	303.2

*Consult Factory

Dimensional Data, 8"FP-12"FP, Class 900

Size (in.)	Dimension (mm)												
	A	B		C		D	H	J	K	U	Y	AA	BB
		RF	RTJ	RF	RTJ								
8FP	203.2	737	739.8	368	369.9	470	79.4	73.00/72.92	19.1*19.1	285.8	700	256.4	403.2
10RP	203.2	838	841.4	419	420.7	546	79.4	73.00/72.92	19.1*19.1	285.8	700	256.4	403.2
10FP	254.0	838	841.4	419	420.7	546	93.7	82.52/82.45	22.2*22.2	328.6	500	301.6	466.7
12RP	254.0	965	968.4	483	484.2	610	93.7	82.52/82.45	22.2*22.2	328.6	398.50	301.6	466.7
12FP	304.8	965	968.4	483	484.2	610	108.0	101.52/101.45	25.4*25.4	384.2	700	368.3	523.9



Series M3 Trunnion Mounted Ball Valves

A large trunnion design ensures central positioning under the highest working pressure. Independent floating spring loaded seats provide a tight seal even at low differential pressures. Service and maintenance is simplified with a bolted body design incorporating

double O-rings or a combination of O-rings and gaskets, suitable for buried or above ground installation. Series M3 valves are offered in 2"FP-24"FP, ANSI classes 150, 300 and 600, 2"FP-16"FP class 900 and 2"FP-12"FP, class 1500.*

*Consult factory for sizes not shown.

General Design Features

- Three-piece body design
- Double block and bleed
- Trunnion supported design reduces operating torque
- Anti-static device for grounding of the ball, stem and body
- Two sets of O-rings plus firesafe stem packing prevents leakage
- Corrosion resistant low friction bearings
- Inconel seat springs
- Sealant injection fittings for emergency stem or seal sealing
- Direct mount top works pad for actuator or gear operator
- API Spec Q1 6A, 6D, 6FA and 607
- ASME Section III Div. 1-NCA 4000
- BS 5351, 5750 and 6755
- ISO 9001/9002
- CSA-Z245.15-01
- 8" & larger valves are equipped with lifting lugs
- Locking device (lock not included)
- NACE MR0175
- Anti-blowout trunnion stem design



Body & Trim Materials

Part	Material
Body/Adapter	A105, LF2, F316SS
Ball/Stem	F316SS or CS-3 mil ENP
Seat	Devlon, Teflon®, PEEK (HT4)

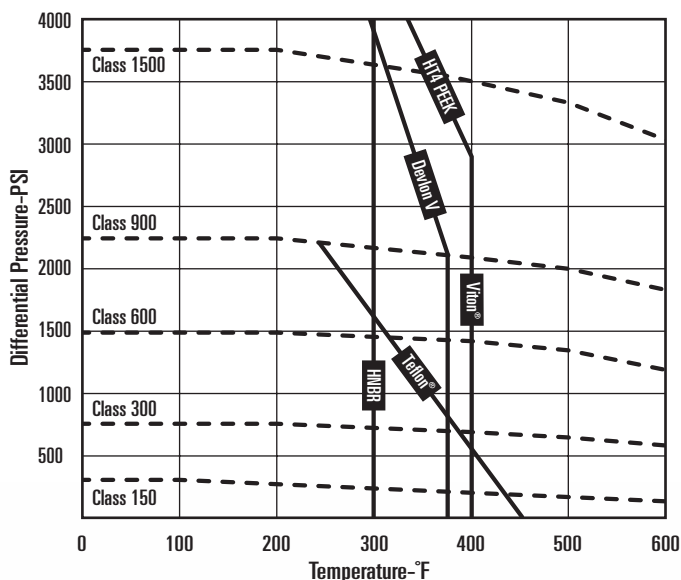
Pressure Rating (psig)

Material	ANSI Cl. 150	ANSI Cl. 300	ANSI Cl. 600	ANSI Cl. 900	ANSI Cl. 1500
A105, LF2	285	740	1480	2220	3705
F316	275	720	1440	2160	3600

Low Temperature Limits

Body Material	°F	°C	Seat Material	°F	°C
A105	-20	-29	Devlon V	-50	-46
LF2	-50	-46	HT4 (PEEK)	-50	-46
F316	-50	-46	Teflon®	-50	-46
			Seal Material	°F	°C
			Viton®	-20	-29
			HNBR	-40	-40

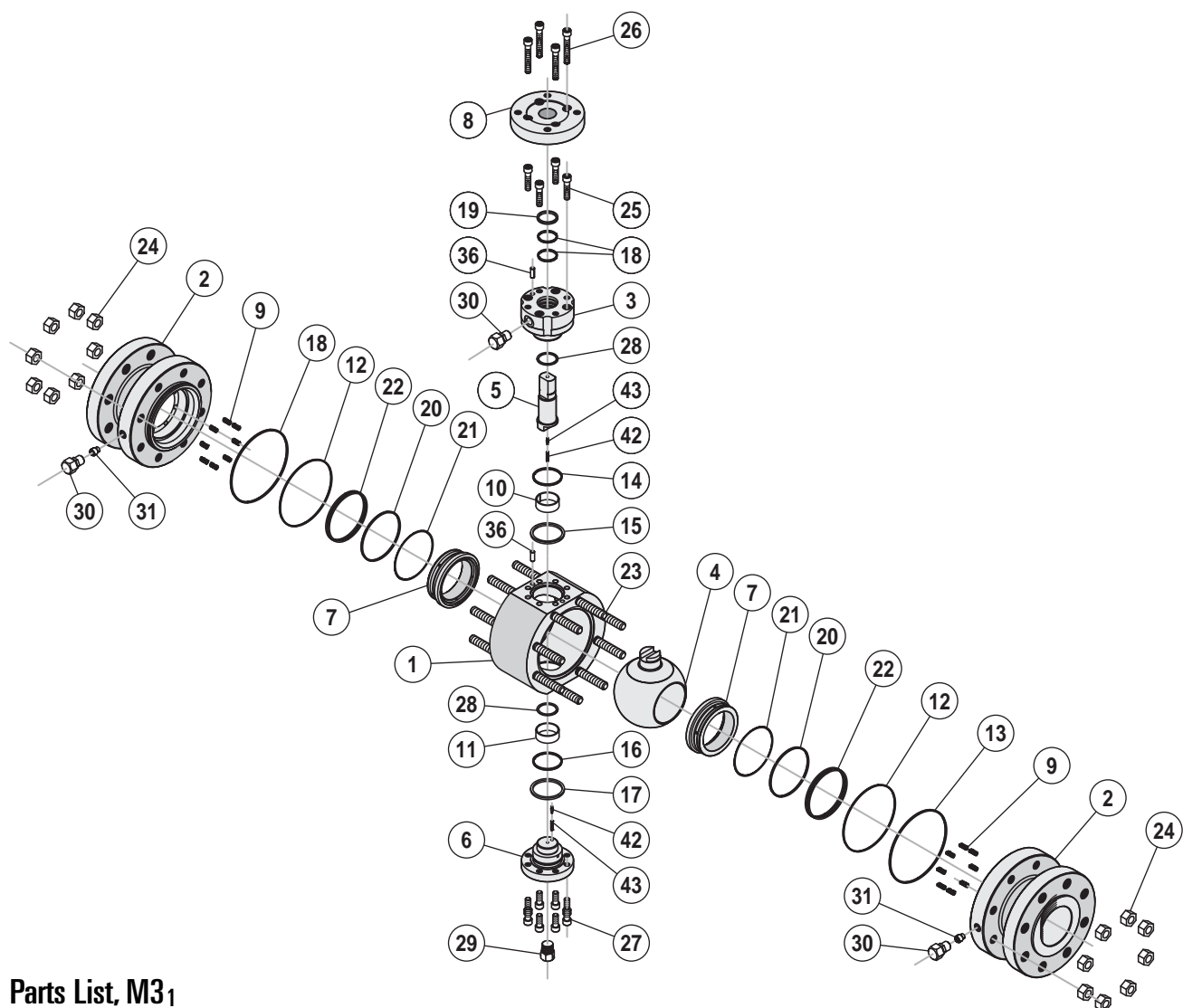
Pressure Temperature Chart**



**Teflon® not offered for Class 1500.



Series M3₁ • Component Parts • 2", 3" & 4" (All Classes)



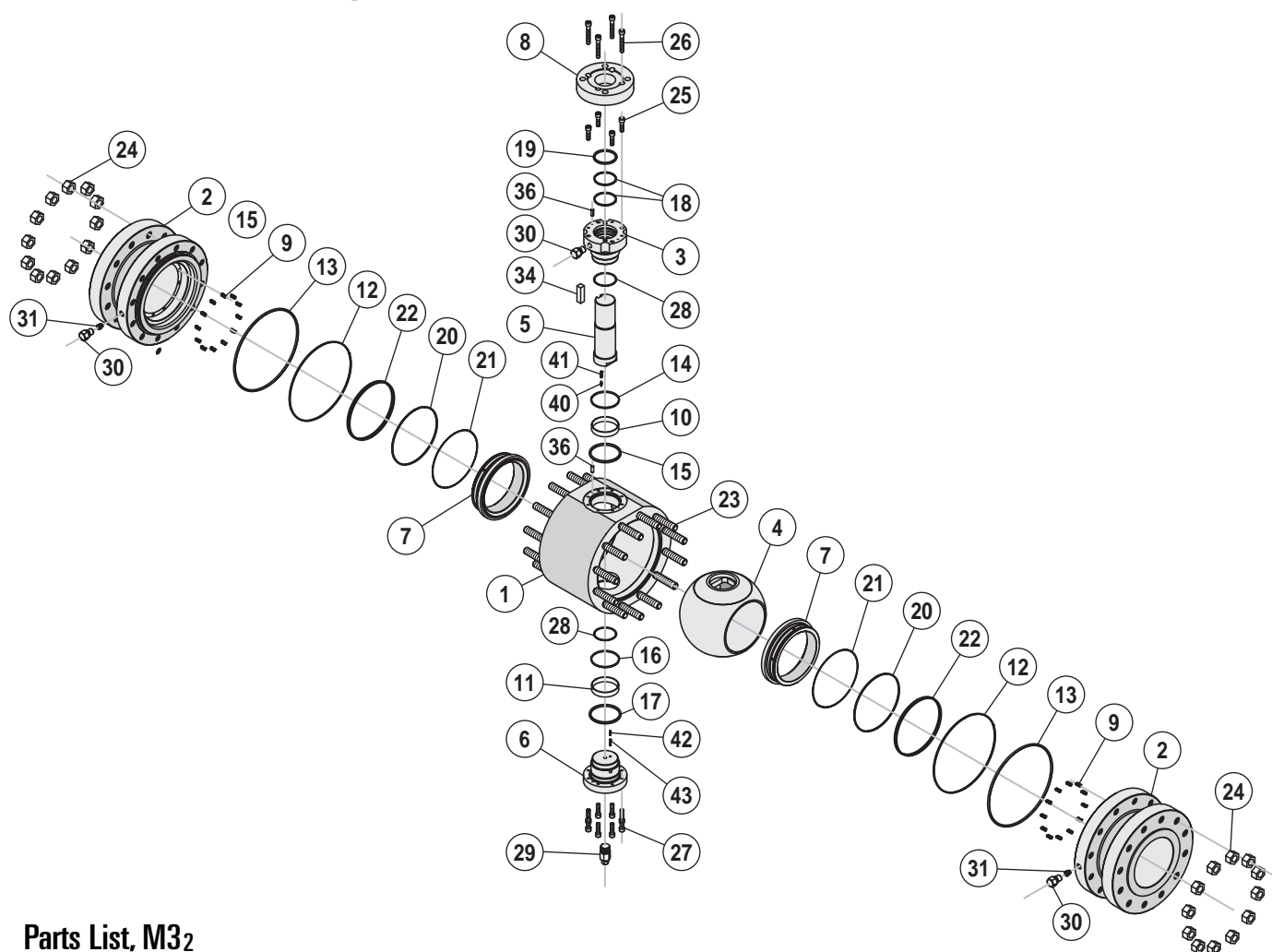
Parts List, M3₁

Part No.	Description
1	Body
2	Adapter
3	Bonnet
4	Ball
5	Stem
6	Lower Trunnion
7	Seat Assembly
8	Top Cover
9	Seat Springs
10	Stem Bearing
11	Lower Trunnion Bearing
12	Adapter Primary Seal
13	Adapter Sub-Seal
14	Bonnet Primary Seal
15	Bonnet Sub-Seal
16	Lower Trunnion Primary Seal
17	Lower Trunnion Sub-Seal
18	Stem Seal

Part No.	Description
19	Stem Sub-Seal
20	Seat Seal
21	Seat Seal Backup
22	Seat Sub-Seal
23	Stud, Body
24	Nut, Body
25	Cap Screw, Bonnet
26	Cap Screw, Top Cover
27	Cap Screw, Lower Trunnion
28	Thrust Bearing
29	Bleed/Drain Valve
30	Injection Fitting
31	Ball Check
32	Drain Plug
34	Key
36	Alignment Pin, Bonnet
42	Anti-Static Pin
43	Anti-Static Spring



Series M3₂ • Component Parts • 6"-12" (Class 150, 300 & 600)



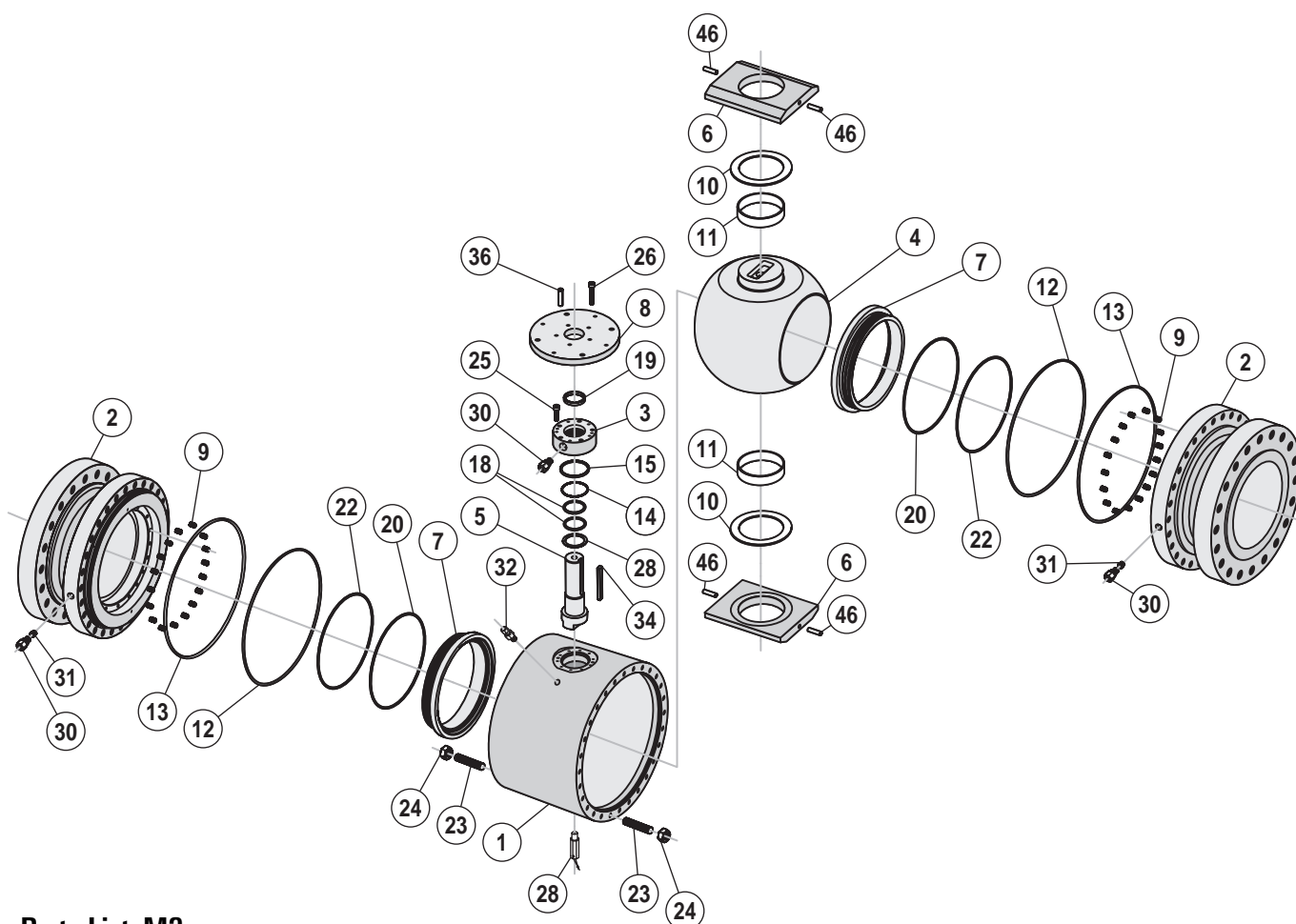
Parts List, M3₂

Part No.	Description
1	Body
2	Adapter
3	Bonnet
4	Ball
5	Stem
6	Lower Trunnion
7	Seat Assembly
8	Top Cover
9	Seat Springs
10	Stem Bearing
11	Lower Trunnion Bearing
12	Adapter Primary Seal
13	Adapter Sub-Seal
14	Bonnet Primary Seal
15	Bonnet Sub-Seal
16	Lower Trunnion Primary Seal
17	Lower Trunnion Sub-Seal
18	Stem Seal

Part No.	Description
19	Stem Sub-Seal
20	Seat Seal
21	Seat Seal Backup
22	Seat Sub-Seal
23	Stud, Body
24	Nut, Body
25	Cap Screw, Bonnet
26	Cap Screw, Top Cover
27	Cap Screw, Lower Trunnion
28	Thrust Bearing
29	Bleed/Drain Valve
30	Injection Fitting
31	Ball Check
32	Drain Plug
34	Key
36	Alignment Pin, Bonnet
42	Anti-Static Pin
43	Anti-Static Spring



Series M3₃ • Component Parts • 6"-12" (Class 900 & 1500) 14" & Larger (All Classes)



Parts List, M3₃

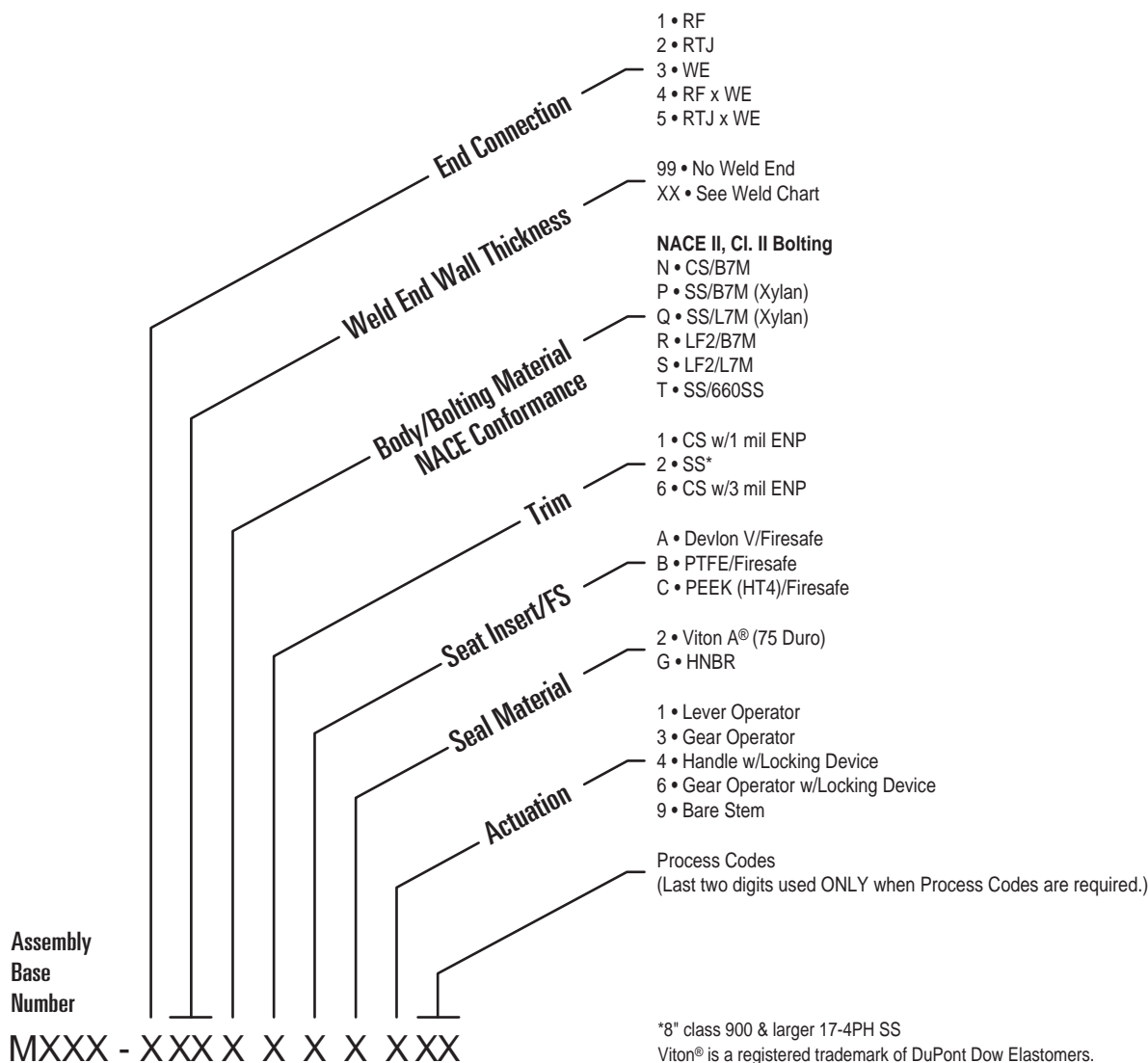
Part No.	Description
1	Body
2	Adapter
3	Bonnet
4	Ball
5	Stem
6	Trunnion Block
7	Seat Assembly
8	Top Cover
9	Seat Springs
10	Stem Bearing
11	Lower Trunnion Bearing
12	Adapter Primary Seal
13	Adapter Sub-Seal
14	Bonnet Primary Seal
15	Bonnet Sub-Seal
16	Lower Trunnion Primary Seal
17	Lower Trunnion Sub-Seal

Part No.	Description
18	Stem Seal
19	Stem Sub-Seal
20	Seat Seal
21	Seat Seal Backup
22	Seat Sub-Seal
23	Stud, Body
24	Nut, Body
25	Cap Screw, Bonnet
26	Cap Screw, Top Cover
28	Thrust Bearing
29	Bleed/Drain Valve
30	Injection Fitting
31	Ball Check
32	Drain Plug
34	Key
36	Alignment Pin, Bonnet
46	Trunnion Block Pin



Series M3 • Part Number Codes

2"FP-24"FP, Classes 150, 300, 600, 900 & 1500



Series M3 Assembly Base Numbers, 2"FP-24"FP**

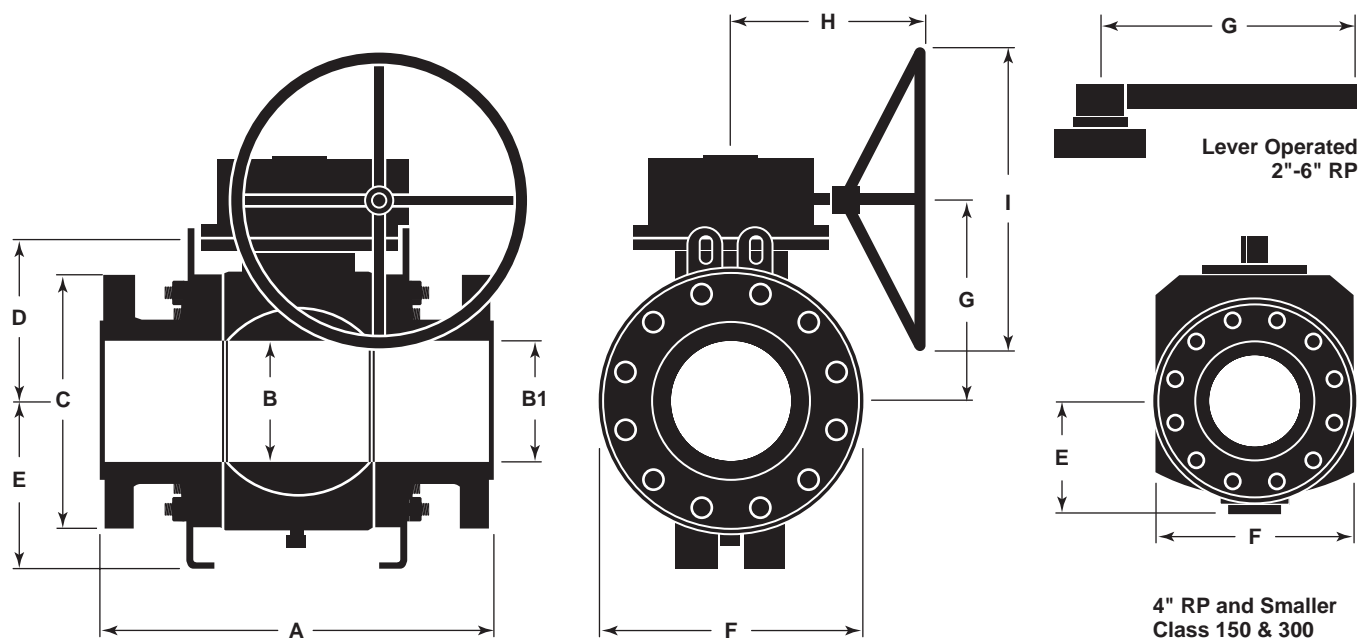
Class	Size (In.)											
	2FP	3RP	3FP	4RP	4FP	6RP	6FP	8RP	8FP	10RP	10FP	12RP
150	M111	M112	M113	M114	M115	M116	M117	M118	M119	M120	M121	M122
300	M211	M212	M213	M214	M215	M216	M217	M218	M219	M220	M221	M222
600	M311	M312	M313	M314	M315	M316	M317	M318	M319	M320	M321	M322
900	M411	M412	M413	M414	M415	M416	M417	M418	M419	M420	M421	M422
1500	M511	M512	M513	M514	M515	M516	M517	M518	M519	M520	M521	M522

Class	Size (In.)										
	12FP	14RP	14FP	16RP	16FP	18RP	18FP	20RP	20FP	24RP	24FP
150	M123	M124	M125	M126	M127	M128	M129	M130	M131	M134	M135
300	M223	M224	M225	M226	M227	M228	M229	M230	M231	M234	M235
600	M323	M324	M325	M326	M327	M328	M329	M330	M331	M334	M335
900	M423	M424	M425	M426	M427	M428	M429	M430	M431	M434	M435
1500	M523										

**Consult factory for sizes not shown.



Series M3 Class 150 • Dimensional Data (in., mm)

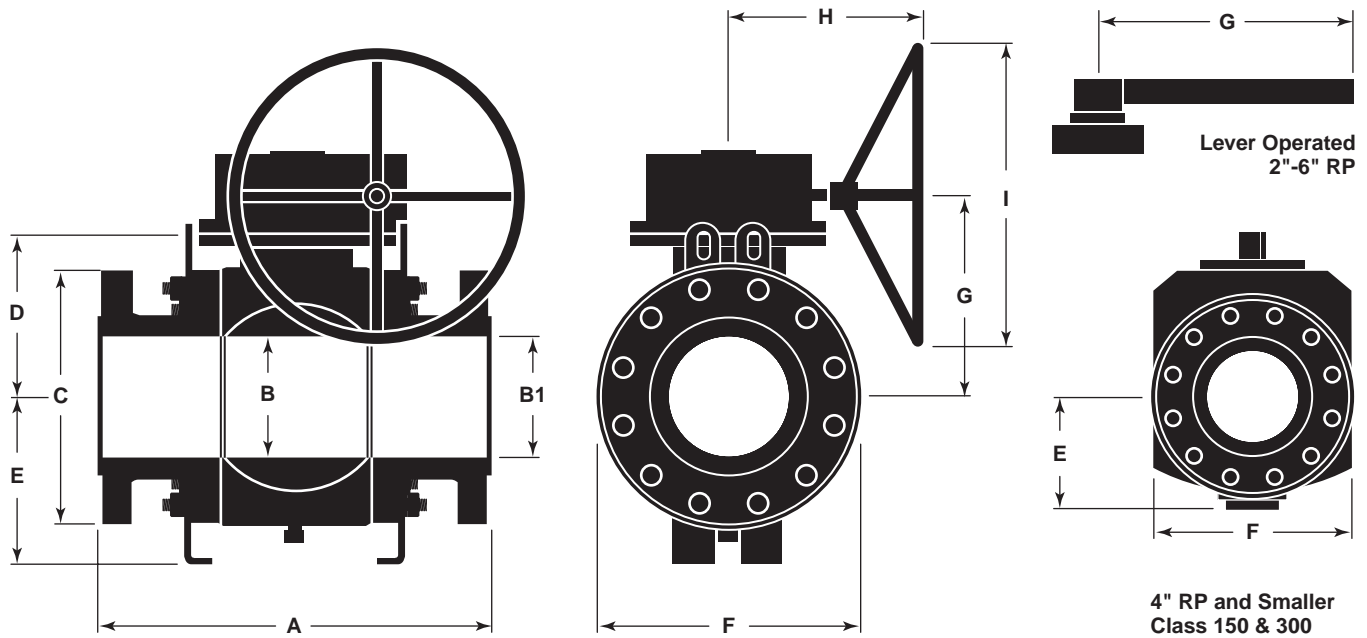


Dimensional Data, 2"FP-24"FP, Class 150

Size (in.)	Dimension (in./mm)																							
	A						B		B1		C		D		E		F		G		H		I	
	RF		RTJ		WE		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm		
inches	mm	inches	mm	inches	mm																			
2	7	178	7.5	190	8.5	216	2	51	2	50	6	152.4	4.252	108	3.071	78	4.961	126	8.054	216	—	—	—	—
3 x 2	8	203	8.5	216	11.125	283	2	51	3	76.2	7.5	190.5	4.252	108	3.071	78	4.961	126	8.054	216	—	—	—	—
3	8	203	8.5	216	11.125	283	3	76.2	3	76.2	7.5	190.5	6.004	152.5	4.961	146	7.244	184	15	381	—	—	—	—
4 x 3	9	229	9.5	241	12	305	3	76.2	4	101.6	9	228.6	6.004	152.5	4.961	146	7.244	184	15	381	—	—	—	—
4	9	229	9.5	241	12	305	4	101.6	4	101.6	9	228.6	7.48	190	5.433	158	10.433	265	9.409	239	9.055	230	7.874	200
6 x 4	15.5	394	16	406	18	457	4	101.6	6	152.4	11	279.4	7.48	190	5.433	158	10.433	265	9.409	239	9.055	230	7.874	200
6	15.5	394	16	406	18	457	6	152.4	6	152.4	11	279.4	9.055	230	6.89	195	12.559	319	10.571	268.5	14.173	360	19.685	500
8 x 6	18	457	18.5	470	20.5	521	6	152.4	8	203.2	13.5	342.9	9.055	230	6.89	195	12.559	319	10.571	268.5	14.173	360	19.685	500
8	18	457	18.5	470	20.5	521	7.992	203	8	203.2	13.5	342.9	11.378	289	11.319	287.5	16.339	415	13.543	344	14.173	360	19.685	500
10 x 8	21	533	21.5	546	22	559	7.992	203	10	254	16	406.4	11.378	289	11.319	287.5	16.339	415	13.543	344	14.173	360	19.685	500
10	21	533	21.5	546	22	559	10	254	10	254	16	406.4	12.48	317	12.992	330	19.685	500	10.591	369	14.173	360	19.685	500
12 x 10	24	610	24.5	622	25	635	10	254	12	304.8	19	482.6	12.48	317	12.992	330	19.685	500	10.591	369	14.173	360	19.685	500
12	24	610	24.5	622	25	635	12	304.8	12	304.8	19	482.6	15.11	383.8	15.551	395	23.228	590	17.165	436	17.323	440	27.559	700
14 x 12	27	686	27.5	698	30	762	12	304.8	13.268	337	21	533.4	15.11	383.8	15.551	395	23.228	590	17.165	436	17.323	440	27.559	700
16 x 12	30	762	30.5	775	33	838	12	304.8	15.25	387	23.5	596.9	15.11	383.8	15.551	395	23.228	590	17.165	436	17.323	440	27.559	700
14	27	686	27.5	698	30	762	13.268	337	13.268	337	21	533.4	15.748	400	16.496	419	25.118	638	17.795	452	17.323	440	27.559	700
16	30	762	30.5	775	33	838	15.25	387.4	15.25	387	23.5	596.9	16.654	423	16.823	427.3	27.953	710	19.409	493	18.11	460	27.559	700
20 x 16	36	914	36.5	927	39	991	15.25	387.4	19.252	489	27.5	698.5	16.654	423	16.823	427.3	27.953	710	19.409	493	18.11	460	27.559	700
18	34	864	34.5	876	36	914	17.244	438	17.244	438	25	635	19.094	485	21.102	536	31.89	810	21.85	555	22.638	575	27.559	700
20	36	914	36.5	927	39	991	19.252	489	19.252	489	27.5	698.5	21.142	537	18.366	466.5	34.055	865	24.331	618	22.638	575	27.559	700
24 x 20	42	1067	42.5	1080	45	1143	19.252	489	23.268	591	32	812.8	21.142	537	18.366	466.5	34.055	865	24.331	618	22.638	575	27.559	700
24	42	1067	42.5	1080	45	1143	23.268	591	23.268	591	32	812.8	24.252	616	23.563	598.5	40.354	1025	27.756	705	22.795	579	27.559	700



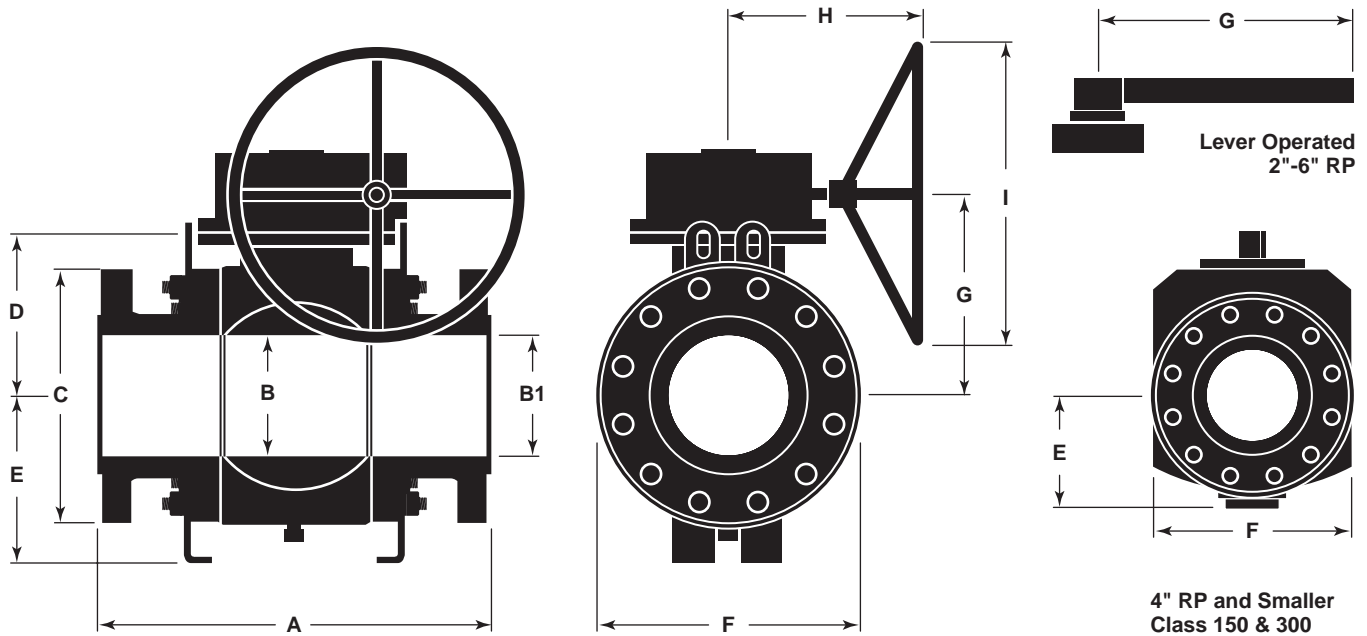
Series M3 Class 300 • Dimensional Data (in., mm)



Dimensional Data, 2"FP-24"FP, Class 300

Size (in.)	Dimension (in./mm)																							
	A						B		B1		C		D		E		F		G		H		I	
	RF inches	mm	RTJ inches	mm	WE inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
2	8 1/2	216	9 1/8	232	8 1/2	216	2	51	2	50.8	6.496	165	4.252	108	3.071	78	4.961	126	8.504	216	—	—	—	—
3x2	11 1/8	283	11 3/4	298	11 1/8	283	2	51	3	76.2	8.268	210	4.252	108	3.071	78	4.961	126	8.504	216	—	—	—	—
3	11 1/8	283	11 3/4	298	11 1/8	283	3	76.2	3	76.2	8.268	210	6.004	152.5	5.748	146	7.244	184	15	381	—	—	—	—
4x3	12	305	12 5/8	321	12	305	3	76.2	4	101.6	10	254	6.004	152.5	5.748	146	7.244	184	15	381	—	—	—	—
4	12	305	12 5/8	321	12	305	4	101.6	4	101.6	10	254	7.677	195	6.22	158	10.433	265	9.409	239	9.055	230	7.874	200
6x4	15 7/8	403	16 1/2	419	18	457	4	101.6	6	152.4	12.52	318	7.677	195	6.22	158	10.433	265	9.409	239	9.055	230	7.874	200
6	15 7/8	403	16 1/2	419	18	457	6	152.4	6	152.4	12.52	318	9.055	230	7.677	195	12.559	319	10.571	268.5	14.173	360	19.685	500
8x6	19 3/4	501.6	20 3/8	517	20 1/2	521	6	152.4	8	203.2	15	381	9.055	230	7.677	195	12.559	319	10.571	268.5	14.173	360	19.685	500
8	19 3/4	501.6	20 3/8	517	20 1/2	521	8	203	8	203.2	15	381	11.378	289	13.78	350	16.339	415	13.543	344	13.386	340	27.559	700
10x8	22 3/8	568	23	584	22	559	8	203	10	254	17.52	445	11.378	289	13.78	350	16.339	415	13.543	344	13.386	340	27.559	700
10	22 3/8	568	23	584	22	559	10	254	10	254	17.52	445	12.717	323	12.992	330	19.882	505	14.528	369	14.173	360	19.685	500
12x10	25 1/2	648	26 1/8	664	25	635	10	254	12	304.8	20.5	520.7	12.717	323	12.992	330	19.882	505	14.528	369	14.173	360	19.685	500
12	25 1/2	648	26 1/8	664	25	635	12	304.8	12	304.8	20.5	520.7	15.618	396.7	15.551	395	24.213	615	17.165	436	17.323	440	27.559	700
14x12	30	762	30 5/8	778	30	762	12	304.8	13.268	337	22.992	584	15.618	396.7	15.551	395	24.213	615	17.165	436	17.323	440	27.559	700
16x12	33	838	33 5/8	854	33	838	12	304.8	15.252	387.4	25.512	648	15.618	396.7	15.551	395	24.213	615	17.165	436	17.323	440	27.559	700
14	30	762	30 5/8	778	30	762	13.268	337	13.268	337	22.992	584	15.748	400	16.496	419	25.118	638	17.795	452	17.323	440	27.559	700
16	33	738	33 5/8	854	33	838	15.252	387.4	15.252	387.4	25.512	648	16.654	423	16.823	427.3	27.953	710	19.409	493	18.11	460	27.559	700
20x16	39	991	39 3/4	991	39	1010	15.252	387.4	19.252	489	30.512	775	16.654	423	16.823	427.3	27.953	710	19.409	493	18.11	460	27.559	700
18	36	914	36 5/8	914	36	930	17.244	438	17.244	438	27.992	711	19.213	488	21.102	536	32.283	820	21.85	555	22.638	575	27.559	700
20	39	991	39 3/4	991	39	1010	19.252	489	19.252	489	30.512	775	21.339	542	18.366	466.5	34.409	874	24.331	618	22.638	575	27.559	700
24x20	45	1143	43 7/8	1143	45	1165	19.252	489	26.268	591	35.984	914	21.339	542	18.366	466.5	34.409	874	24.331	618	22.638	575	27.559	700
24	45	1143	43 7/8	1143	45	1165	23.268	591	26.268	591	35.984	914	24.567	624	23.563	598.5	40.945	1040	27.756	705	22.795	575	27.559	700

Series M3 Class 600 • Dimensional Data (in., mm)

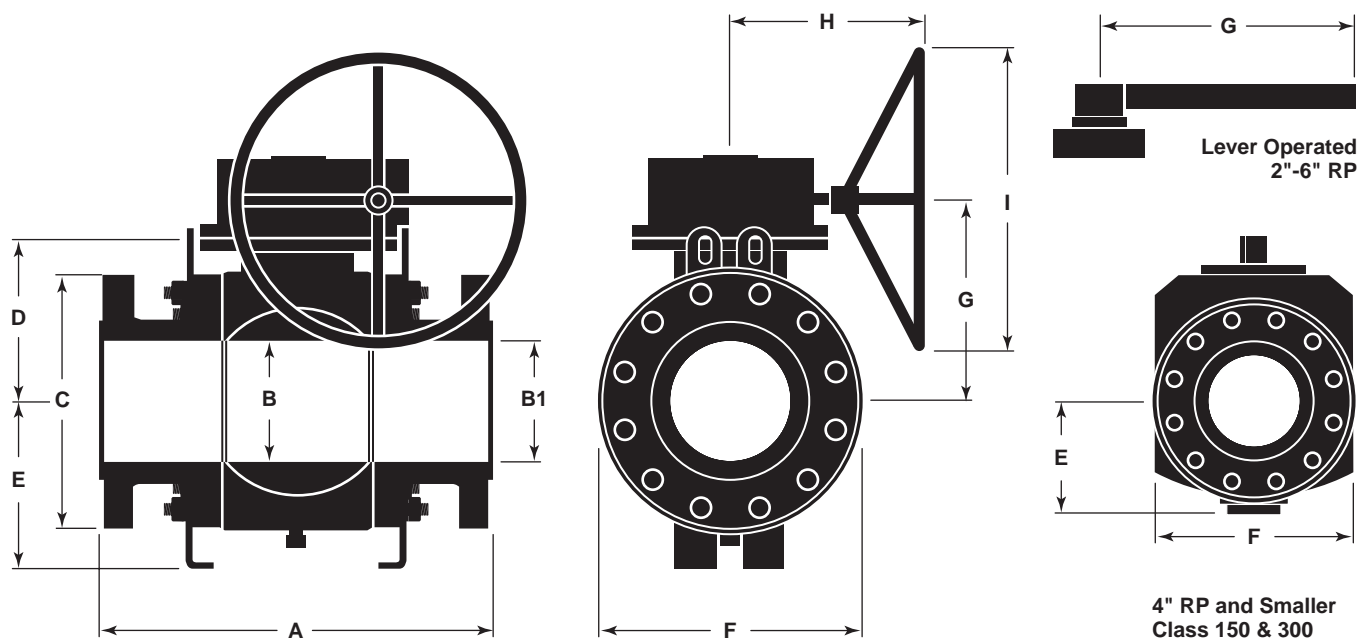


Dimensional Data, 2"FP-24"FP, Class 600

Size (in.)	Dimension (in./mm)																							
	A						B		B1		C		D		E		F		G		H		I	
	RF	RTJ	WE																					
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
2	11.496	292	11.625	295	11.496	292	2	51	2	51	6.496	165	6.102	155	4.134	105	6.496	165	23.622	600	—	—	—	—
3x2	14.016	356	14.125	359	14.016	356	2	51	3	76.2	8.268	210	6.102	155	4.134	105	6.496	165	23.622	600	—	—	—	—
3	14.016	356	14.125	359	14.016	356	3	76.2	3	76.2	8.268	210	6.693	170	5.315	135	9.016	229	27.559	700	—	—	—	—
4x3	17.008	432	17.125	435	17.008	432	3	76.2	4	101.6	10.748	273	6.693	170	5.315	135	9.016	229	27.559	700	—	—	—	—
4	17.008	432	17.125	435	17.008	432	4	101.6	4	101.6	10.748	273	7.756	197	6.142	156	10.394	264	39.37	1000	—	—	—	—
6x4	22.008	559	22.125	562	22.008	559	4	101.6	6	152.4	14.016	356	7.756	197	6.142	156	10.394	264	39.37	1000	—	—	—	—
6	22.008	559	22.125	562	22.008	559	6	152.4	6	152.4	14.016	356	9.055	230	7.677	195	12.559	319	8.268	210	13.386	340	19.685	500
8x6	25.984	660	26.125	664	25.984	660	6	152.4	8	203.2	16.496	419	9.055	230	7.677	195	12.559	319	8.268	210	13.386	340	19.685	500
8	25.984	660	26.125	664	25.984	660	8	203	8	203.2	16.496	419	11.437	290.5	11.654	296	17.008	432	13.484	342.5	13.386	340	27.559	700
10x8	30.984	787	31.125	791	30.984	787	8	203	10	254	20	508	11.437	290.5	11.654	296	17.008	432	13.484	342.5	13.386	340	27.559	700
10	30.984	787	31.125	791	30.984	787	10	254	10	254	20	508	9.921	252	13.346	339	20.394	518	11.89	302	21.457	545	27.756	705
12x10	32.992	838	33.125	841	32.992	838	10	254	12	304.8	22.008	559	9.921	252	13.346	339	20.394	518	11.89	302	21.457	545	27.756	705
12	32.992	838	33.125	841	32.992	838	12	304.8	12	304.8	22.008	559	15.945	405	16.181	411	24.488	622	19.134	486	21.457	545	27.559	700
14x12	35	889	35.125	892	35	889	12	304.8	13.268	337	23.74	603	15.945	405	16.181	411	24.488	622	19.134	486	21.457	545	27.559	700
16x12	39.016	991	39.125	994	39.016	991	12	304.8	15.252	387.4	27.008	686	15.945	405	16.181	411	24.488	622	19.134	486	21.457	545	27.559	700
14	35	889	35.125	892	35	889	13.268	337	13.268	337	23.74	603	15.748	400	16.496	419	25.118	638	18.701	475	22.638	575	27.559	700
16	39.016	991	39.125	994	39.016	991	15.252	387.4	15.252	387.4	27.008	686	17.441	443	18.425	468	28.937	735	20.63	524	22.638	575	27.559	700
20x16	47.008	1194	47.25	1200	47.008	1194	15.252	387.4	19.252	489	32.087	815	17.441	443	18.425	468	28.937	735	20.63	524	22.638	575	27.559	700
18	42.992	1092	43.125	1095	42.992	1092	17.244	438	17.244	438	29.252	746	19.606	498	20.827	529	33.071	840	23.11	587	22.785	579	27.559	700
20	47.008	1194	47.25	1200	47.008	1194	19.252	489	19.252	489	32.087	815	22.244	565	21.457	545	36.22	920	26.969	685	26.378	670	27.559	700
24x20	55	1397	55.375	1407	55	1397	19.252	489	23.268	591	37.008	940	22.244	565	21.457	545	36.22	920	26.969	685	26.378	670	27.559	700
24	55	1397	55.375	1407	55	1397	23.268	591	23.268	591	37.008	940	28.858	733	23.819	605	41.732	1060	—	—	—	—	—	—



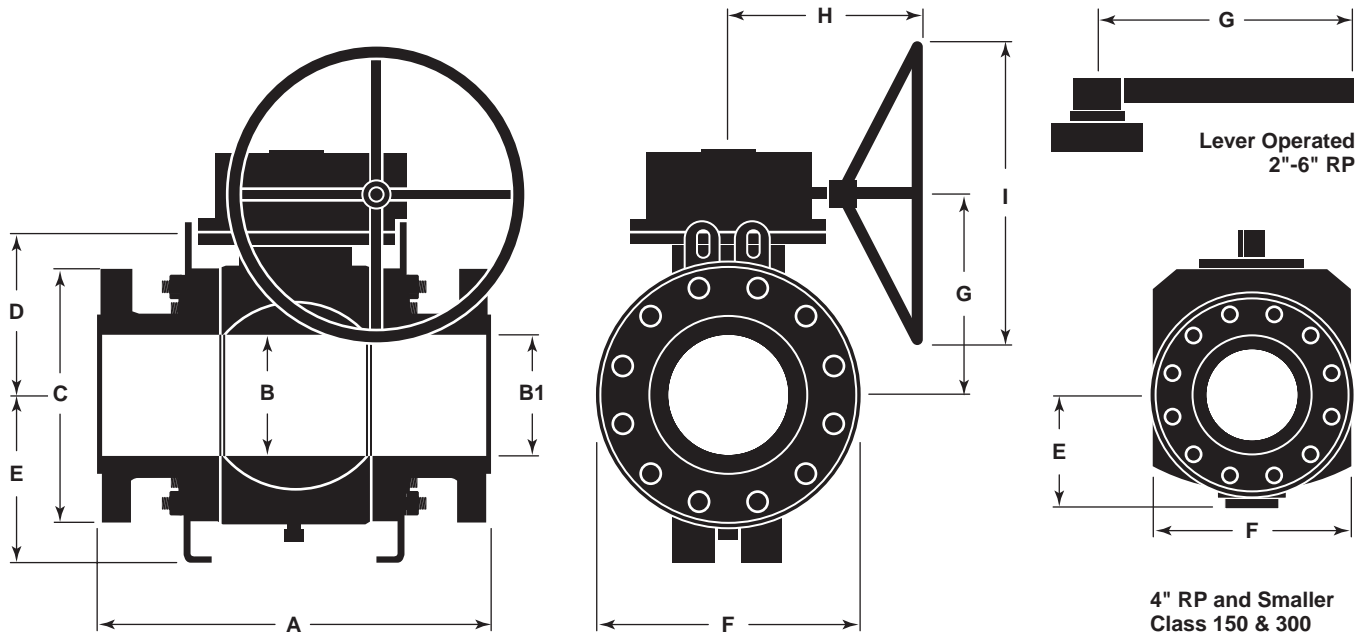
Series M3 Class 900 • Dimensional Data (in., mm)



Dimensional Data, 2"FP-16"FP, Class 900

Size (in.)	Dimension (in./mm)																							
	A						B		B1		C		D		E		F		G		H		I	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
2	14.488	368	14.606	371	14.488	368	2	50.8	2	50.8	8.5	215.9	5.846	148.5	4.528	115	7.283	185	23.622	600	—	—	—	—
3x2	15	381	15.118	384	15	381	2	50.8	3	76.2	9.5	241.3	5.846	148.5	4.528	115	7.283	185	23.622	600	—	—	—	—
3	15	381	15.118	384	15	381	3	76.2	3	76.2	9.5	241.3	7.047	179	5.63	143	9.331	237	27.559	700	—	—	—	—
4x3	17.992	457	18.11	460	17.992	457	3	76.2	4.067	101.6	11.5	292.1	7.047	179	5.63	143	9.331	237	27.559	700	—	—	—	—
4	17.992	457	18.11	460	17.992	457	4.067	103.3	4.067	103.3	11.5	292.1	8.504	216	6.693	170	11.339	288	39.37	1000	—	—	—	—
6x4	24.016	610	24.134	613	24.016	610	4.067	103.3	6	152.4	15	381	8.504	216	6.693	170	11.339	288	39.37	1000	—	—	—	—
6	24.016	610	24.134	613	24.016	610	6	152.4	8	152.4	15	381	10.039	255	10.236	260	14.173	360	12.087	307	14.646	372	27.559	700
8x6	29.016	737	29.134	740	29.016	737	6	152.4	8	203.2	18.504	470	10.039	255	10.236	260	14.173	360	12.087	307	14.646	372	27.559	700
8	29.016	737	29.134	740	29.016	737	8	203.2	8	203.2	18.504	470	11.654	296	11.811	300	17.323	440	13.701	348	21.457	545	27.559	700
10x8	32.992	838	33.11	841	32.992	838	8	203.2	10	254	21.496	546	11.654	296	11.811	300	17.323	440	13.701	348	21.457	545	27.559	700
10	32.992	838	33.11	841	32.992	838	10	254	10	254	21.496	546	13.465	342	13.622	346	20.945	532	16.417	417	17.323	440	27.559	700
12x10	37.992	965	38.11	968	37.992	965	10	254	12	304.8	24.016	610	13.465	342	13.622	346	20.945	532	16.417	417	17.323	440	27.559	700
12	37.992	965	38.11	968	37.992	965	12	304.8	12	304.8	24.016	610	16.378	416	15.748	400	25.394	645	19.567	497	22.638	575	27.559	700
14x12	40.512	1029	40.866	1038	40.512	1029	12	304.8	12.756	324	25.276	642	16.378	416	15.748	400	25.394	645	19.567	497	22.638	575	27.559	700
16x12	44.488	1130	44.882	1140	44.488	1130	12	304.8	14.752	374.7	27.756	705	16.378	416	15.748	400	25.394	645	19.567	497	22.638	575	27.559	700
14	40.512	1029	40.866	1038	40.512	1029	12.756	324	12.756	324	25.276	642	16.89	429	16.535	420	26.85	682	20.394	518	22.638	575	27.559	700
16	44.488	1130	44.882	1140	44.488	1130	14.752	374.7	14.752	374.7	27.756	705	19.488	495	18.898	480	31.496	800	23.031	585	22.795	579	27.559	700

Series M3 Class 1500 • Dimensional Data (in., mm)

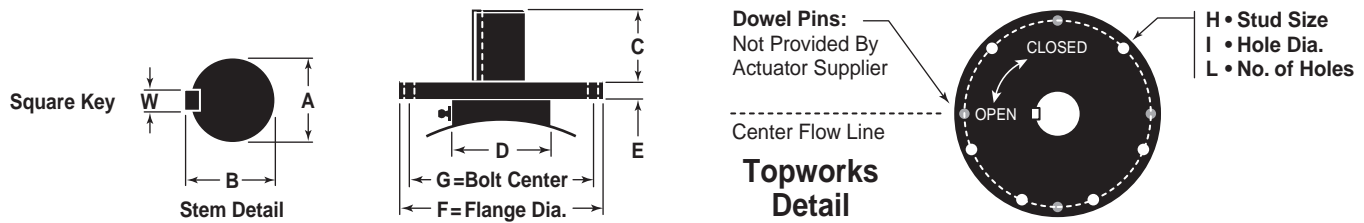


Dimensional Data, 2"FP-12"FP, Class 1500

Size (in.)	Dimension (in./mm)																							
	A						B		B1		C		D		E		F		G		H		I	
	RF		RTJ		WE																			
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
2	14 1/4	368	14 5/8	371	14 1/4	368	2	50.8	2	50.8	8.5	215.9	6.811	173	5.236	133	8.425	214	21.969	558	—	—	—	—
3x2	18 1/2	470	18 5/8	473	18 1/2	470	2	50.8	3	76.2	10.5	266.7	6.811	173	5.236	133	8.425	214	21.969	558	—	—	—	—
3	18 1/2	470	18 5/8	473	18 1/2	470	3	76.2	3	76.2	10.5	266.7	8.622	219	7.047	179	11.811	300	11.811	300	14.173	360	19.685	500
4x3	21 1/2	546	21 5/8	549	21 1/2	546	3	76.2	4.067	103.3	12.244	311	8.622	219	7.047	179	11.811	300	11.811	300	14.173	360	19.685	500
4	21 1/2	546	21 5/8	549	21 1/2	546	4.067	103.3	4.067	103.3	12.244	311	9.232	234.5	7.52	191	12.992	330	10.748	273	13.386	340	27.559	700
6x4	27 3/4	705	28	711	27 3/4	705	4.067	103.3	5.748	146	15.512	394	9.232	234.5	7.52	191	12.992	330	10.748	273	13.386	340	27.559	700
6	27 3/4	705	28	711	27 3/4	705	5.748	146	5.748	146	15.512	394	11.339	288	11.417	290	16.535	420	13.386	340	21.457	545	27.559	700
8x6	32 3/4	832	33 1/8	841	32 3/4	832	5.748	146	7.638	194	19.016	483	11.339	288	11.417	290	16.535	420	13.386	340	21.457	545	27.559	700
8	32 3/4	832	33 1/8	841	32 3/4	832	7.638	194	7.638	194	19.016	483	13.661	347	14.528	369	21.181	538	16.417	417	22.638	575	27.559	700
10x8	39	991	39 3/8	1000	39	991	7.638	194	9.488	241	23.031	585	13.661	347	14.528	369	21.181	538	16.417	417	22.638	575	27.559	700
10	39	991	39 3/8	1000	39	991	9.488	241	9.488	241	23.031	585	16.181	411	16.811	427	25.709	653	19.37	492	22.638	575	27.559	700
12x10	44 1/2	1130	45 1/8	1146	44 1/2	1130	9.488	241	11.378	289	26.496	673	16.181	411	16.811	427	25.709	653	19.37	492	22.638	575	27.559	700
12	44 1/2	1130	45 1/8	1146	44 1/2	1130	11.378	289	11.378	289	26.496	673	19.134	486	19.291	490	30.709	780	22.638	575	22.795	579	27.559	700



Series M3 Topworks & Stem Torque Data (in.)



Valve Size (in.)	ANSI Class	A	B	C	D	E	F	G	H Stud Size	I Hole Dia.	L No. of Holes	W	Max. Stem Shear Torque ft.-lbs.	Break Torque in.-lbs.	Torque Expressions (1) for P ≤ 2160 PSI in.-lbs. (2) (3)
2	150	0.87	0.556	1.142	—	0.394	4.126	—	—	—	—	—	134.6	820	0.409*P+708.20
2	300	0.87	0.556	1.142	—	0.394	4.126	—	—	—	—	—	134.6	1003	0.409*P+708.20
2	600	0.819	0.556	1.315	3.74	0.709	5.039	—	—	—	—	—	134.3	1297	0.409*P+708.20
2	900	0.819	0.556	1.346	3.858	0.709	5.039	—	—	—	—	—	134.8	1592	0.409*P+708.20
2	1500	1.102	0.744	2.13	8.071	0.394	5.197	—	—	—	—	—	305.8	2181	0.409*P+708.20
3	150	1.233	0.746	1.319	—	0.63	4.331	—	—	—	—	—	335.8	2032	1.758*P+1548.75
3	300	1.233	0.746	1.319	—	0.63	4.331	—	—	—	—	—	335.8	2815	1.758*P+1548.75
3	600	1.378	0.992	1.984	4.409	0.787	5.906	—	—	—	—	—	404.8	4080	1.758*P+1548.75
3	900	1.378	0.992	1.984	5.118	0.945	6.693	—	—	—	—	—	629.9	5346	1.758*P+1548.75
3	1500	1.491	0.991	1.957	4.921	0.394	6.693	—	—	—	—	—	725.8	7878	1.758*P+1548.75
4	150	1.233	0.746	2.008	4.134	0.787	5.709	—	—	—	—	—	347	3248	2.319*P+2610.75
4	300	1.233	0.746	1.811	4.134	0.984	5.906	4.921	1/2	0.551	4	—	347	4280	2.319*P+2610.75
4	600	1.495	0.994	1.878	5	1.024	6.614	—	—	—	—	—	724.8	5950	2.319*P+2610.75
4	900	1.495	0.994	1.681	5	1.22	6.89	5.512	5/8	0.65	4	—	728.2	7620	2.319*P+2610.75
4	1500	1.772	1.245	2.402	5.906	1.22	8.268	6.496	3/4	0.827	4	—	1337.1	10959	2.319*P+2610.75
6	150	1.99	1.245	2.079	4.921	1.299	6.89	5.512	5/8	0.689	4	—	1623.7	5607	7.446*P+3559.47
6	300	1.99	1.245	2.079	4.921	1.299	6.89	5.512	5/8	0.689	4	—	1623.7	8921	7.446*P+3559.47
6	600	1.99	1.245	2.354	4.921	1.299	6.89	5.512	5/8	0.689	4	—	1623.7	14282	7.446*P+3559.47
6	900	1.99	1.245	1.988	4.921	1.378	8.268	6.496	3/4	0.787	4	—	1695.3	19643	7.446*P+3559.47
6	1500	2.491	1.741	2.717	6.496	1.181	11.811	6.496	3/4	0.827	4	—	3722	30365	7.446*P+3559.47
8	150	2.495	1.743	2.398	6.299	1.732	8.268	6.496	3/4	0.827	4	—	3713.2	8728	11.535*P+5556.03
8	300	2.495	1.743	2.398	6.299	1.732	8.268	6.496	3/4	0.827	4	—	3713.2	13861	11.535*P+5556.03
8	600	2.87	3.194	3.571	6.299	1.732	8.268	6.496	3/4	0.815	4	0.75	7455.9	22166	11.535*P+5556.03
8	900	2.87	3.194	3.78	6.496	1.575	11.811	10	5/8	0.669	8	0.75	7460.4	30472	11.535*P+5556.03
8	1500	2.87	3.194	3.299	6.496	1.575	11.811	10	5/8	0.669	8	0.75	7460.4	47082	11.535*P+5556.03
10	150	2.87	3.199	3.083	3.89	0.984	11.811	10	5/8	0.709	8	0.75	7450.4	11687	14.402*P+7726.94
10	300	2.87	3.199	3.083	6.89	0.984	11.811	10	5/8	0.709	8	0.75	7450.4	18098	14.402*P+7726.94
10	600	3.24	3.623	3.583	6.89	0.984	11.3	10	5/8	0.709	8	0.875	10631.1	28465	14.402*P+7726.94
10	900	3.24	3.623	3.976	7.087	1.26	11.811	10	5/8	0.669	8	0.875	10631.1	38852	14.402*P+7726.94
10	1500	3.24	3.623	3.78	7.087	1.457	11.811	10	5/8	0.669	8	0.875	10631.1	59560	14.402*P+7726.94
12	150	3.24	3.618	3.642	8.567	1.201	11.811	10	5/8	0.709	8	0.875	10631.1	14636	16.6*P+10071.30
12	300	3.24	3.618	3.642	8.567	1.201	11.811	10	5/8	0.709	8	0.875	10631.1	22023	16.6*P+10071.30
12	600	3.992	4.429	3.713	8.504	1.319	12	10	5/8	0.709	8	1	20314.5	33975	16.6*P+10071.30
12	900	3.992	4.429	4.213	9.055	1.732	13.78	11.732	3/4	0.787	8	1	20314.5	45927	16.6*P+10071.30
12	1500	3.992	4.429	4.213	9.449	1.811	13.78	11.732	3/4	0.787	8	1	20314.5	69831	16.6*P+10071.30
14	150	2.87	3.194	4.311	8.071	1.3	11.811	10	5/8	0.709	8	0.75	7443.7	24717	28.32*P+16929.17
14	300	2.87	3.194	4.311	8.071	1.3	11.811	10	5/8	0.709	8	0.75	7443.7	37320	28.32*P+16929.17
14	600	2.87	3.623	3.602	8.071	1.3	13.78	11.732	3/4	0.866	8	0.875	10631.1	57710	28.32*P+16929.17
16	150	3.24	3.623	3.859	8.228	1.299	11.811	10	5/8	0.709	8	0.875	10631.1	33226	37.48*P+22919.73
16	300	3.24	3.623	3.839	8.228	1.299	11.811	10	5/8	0.709	8	0.875	10631.1	49905	37.48*P+22919.73
16	600	4.33	4.752	4.114	9.055	1.299	13.228	10	3/4	0.866	8	1	26103	76891	37.48*P+22919.73
16	900	4.33	4.752	4.252	9.134	1	13.228	11.732	3/4	0.787	8	1	26103	103876	37.48*P+22919.73
18	150	4.33	4.752	3.996	9.055	1.299	11.811	11.732	3/4	0.866	8	1	26103	45035	62.74*P+27781.92
18	300	4.33	4.752	3.996	9.055	1.299	11.811	11.732	3/4	0.866	8	1	26103	72955	62.74*P+27781.92
18	600	4.33	4.752	3.996	9.055	1.299	13.78	11.732	3/4	0.866	8	1	26103	118127	62.74*P+27781.92
20	150	4.33	4.752	4.528	9.252	1.575	13.386	11.732	3/4	0.866	8	1	26103	56690	91.86*P+31428.12
20	300	4.33	4.752	4.449	9.252	1.575	13.386	11.732	3/4	0.866	8	1	26103	97567	91.86*P+31428.12
20	600	4.33	4.752	4.37	9.843	1	13.78	11.732	3/4	0.866	8	1	26103	163706	91.86*P+31428.12
24	150	4.33	4.752	4.429	9.252	1.339	13.78	11.732	3/4	0.866	8	1	26103	108815	141.23*P+69976.95
24	300	4.33	4.752	4.429	9.252	1.339	13.78	11.732	3/4	0.866	8	1	26103	171663	141.23*P+69976.95
24	600	4.724	5.217	4.331	11.024	2.362	18.7	15.984	1 1/8	1.22	8	1	35488.8	273348	141.23*P+69976.95

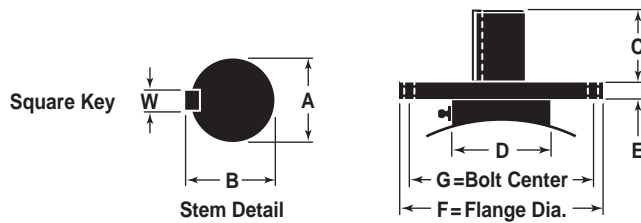
Note: (1) Torque at maximum differential pressure are tabulated
(2) Torques expressions are suggested for other differential pressure
(3) Differential pressure "P" in torque expressions is in PSI

Pressure ratings are according to API 6D

Class 150 P = 275 Class 900 P = 2160
Class 300 P = 720 Class 1500 P = 3600
Class 600 P = 1440



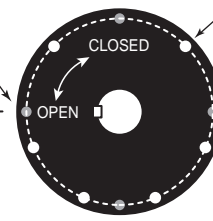
Series M3 Topworks (mm) & Stem Torque Data (Nm)



Dowel Pins:
Not Provided By
Actuator Supplier

Center Flow Line

**Topworks
Detail**



H • Stud Size
I • Hole Dia.
L • No. of Holes

Valve Size (in.)	ANSI Class	A	B	C	D	E	F	G	H Stud Size	I Hole Dia.	L No. of Holes	W	Max. Stem Shear Torque Nm	Break Torque Nm	Torque Expressions (1) for P ≤ 2160 PSI in.-lbs. (2) (3)
2	150	22.1	14.12	29	—	10	104.8	—	—	—	—	—	182.5	92.6	6.702*P+80.022
2	300	22.1	14.12	29	—	10	104.8	—	—	—	—	—	182.5	113.3	6.702*P+80.022
2	600	20.79	14.12	33.4	95	18	128	—	—	—	—	—	182.1	146.5	6.702*P+80.022
2	900	20.79	14.12	34.2	98	18	128	—	—	—	—	—	182.8	179.9	6.702*P+80.022
2	1500	28	18.91	54.1	107	10	132	—	—	—	—	—	414.6	246.4	6.702*P+80.022
3	150	31.32	18.95	33.5	—	16	110	—	—	—	—	—	455.3	229.6	28.808*P+175
3	300	31.32	18.95	33.5	—	16	110	—	—	—	—	—	455.3	318.1	28.808*P+175
3	600	35	25.2	50.4	112	20	150	—	—	—	—	—	548.8	460.9	28.808*P+175
3	900	35	25.2	50.4	130	24	170	—	—	—	—	—	854	604	28.808*P+175
3	1500	37.86	25.16	49.7	125	10	170	—	—	—	—	—	984	890	28.808*P+175
4	150	31.32	18.95	51	105	20	145	—	—	—	—	—	470.5	366.9	38.001*P+295
4	300	31.32	18.95	46	105	25	150	125	1/2	14	4	—	470.5	483.6	38.001*P+295
4	600	37.98	25.26	47.7	127	26	168	—	—	—	—	—	982.7	672.3	38.001*P+295
4	900	37.98	25.26	42.7	127	31	175	140	5/8	16.5	4	—	987.3	860.9	38.001*P+295
4	1500	45	31.63	61	150	31	210	165	3/4	21	4	—	1812.9	1238.2	38.001*P+295
6	150	50.55	31.63	52.8	125	33	175	140	5/8	17.5	4	—	2201.4	633.5	122.018*P+402.2
6	300	50.55	31.63	52.8	125	33	175	140	5/8	17.5	4	—	2201.4	1007.9	122.018*P+402.2
6	600	50.55	31.63	58.8	125	33	175	140	5/8	17.5	4	—	2201.4	1613.6	122.018*P+402.2
6	900	50.55	31.63	50.5	125	35	210	165	3/4	20	4	—	2298.5	2219.4	122.018*P+402.2
6	1500	63.28	44.22	69	160	30	300	165	3/4	21	4	—	5046.4	3430.8	122.018*P+402.2
8	150	63.37	44.28	60.9	160	44	210	165	3/4	21	4	—	5034.4	986.1	189.024*P+627.8
8	300	63.37	44.28	60.9	160	44	210	165	3/4	21	4	—	5034.4	1566.1	189.024*P+627.8
8	600	72.9	81.13	90.7	160	44	210	165	3/4	20.7	4	19.05	10108.8	2504.4	189.024*P+627.8
8	900	72.9	81.13	96	165	40	300	254	5/8	17	8	19.05	10114.9	3442.9	189.024*P+627.8
8	1500	72.9	81.13	83.8	165	40	300	254	5/8	17	8	19.05	10114.9	5319.6	189.024*P+627.8
10	150	72.9	81.25	78.3	175	25	300	254	5/8	18	8	19.05	10101.4	1320.5	236.006*P+873.101
10	300	72.9	81.25	78.3	175	25	300	254	5/8	18	8	19.05	10101.4	1566.1	236.006*P+873.101
10	600	82.3	92.03	91	175	25	287	254	5/8	18	8	22.23	14413.8	2504.4	236.006*P+873.101
10	900	82.3	92.03	101	180	32	300	254	5/8	17	8	22.23	14413.8	3442.9	236.006*P+873.101
10	1500	82.3	92.03	96	190	37	300	254	5/8	17	8	22.23	14413.8	5319.6	236.006*P+873.101
12	150	82.3	91.9	92.5	217.6	30.5	300	254	5/8	18	8	22.23	14413.8	1653.6	272.024*P+1138
12	300	82.3	91.9	92.5	217.6	30.5	300	254	5/8	18	8	22.23	14413.8	2488.3	272.024*P+1138
12	600	101.4	112.5	94.3	216	33.5	304.8	254	5/8	18	8	25.4	27542.8	3838.7	272.024*P+1138
12	900	101.4	112.5	107	230	44	350	298	3/4	20	8	25.4	27542.8	5189.1	272.024*P+1138
12	1500	101.4	112.5	107	240	46	350	298	3/4	20	8	25.4	27542.8	7889.8	272.024*P+1138
14	150	72.91	81.13	109.5	205	33	300	254	5/8	18	8	19.05	10092.3	2792.6	464.080*P+1912.901
14	300	72.91	81.13	109.5	205	33	300	254	5/8	18	8	19.05	10092.3	4216.6	464.080*P+1912.901
14	600	72.91	92.03	91.5	205	33	350	298	3/4	22	8	22.23	14413.8	6520.4	464.080*P+1912.901
16	150	82.3	92.03	97.5	209	33	300	254	5/8	18	8	22.23	14413.8	3754	614.185*P+2589.8
16	300	82.3	92.03	97.5	209	33	300	254	5/8	18	8	22.23	14413.8	5638.5	614.185*P+2589.8
16	600	110	120.7	104.5	230	33	336	298	3/4	22	8	25.4	35390.9	8687.5	614.185*P+2589.8
16	900	110	120.7	108	232	25.4	336	298	3/4	20	8	25.4	35390.9	11736.4	614.185*P+2589.8
18	150	110	120.7	101.5	230	33	300	298	3/4	22	8	25.4	35390.9	5088.3	1028.12*P+3139.2
18	300	110	120.7	101.5	230	33	300	298	3/4	22	8	25.4	35390.9	8242.8	1028.12*P+3139.2
18	600	110	120.7	101.5	230	33	350	298	3/4	22	8	25.4	35390.9	13346.6	1028.12*P+3139.2
20	150	110	120.7	115	235	40	340	298	3/4	22	8	25.4	35390.9	6405.1	1505.31*P+3551.2
20	300	110	120.7	113	235	40	340	298	3/4	22	8	25.4	35390.9	11023.6	1505.31*P+3551.2
20	600	110	120.7	111	250	25.4	350	298	3/4	22	8	25.4	35390.9	18490	1505.31*P+3551.2
24	150	110	120.7	112.5	235	34	350	298	3/4	22	8	25.4	35390.9	12294.4	2314.336*P+7907
24	300	110	120.7	112.5	235	34	350	298	3/4	22	8	25.4	35390.9	19395.3	2314.336*P+7907
24	600	120	132.5	110	280	60	475	406	1 1/8	31	8	25.4	48116.4	30880	2314.336*P+7907

Note: (1) Torque at maximum differential pressure are tabulated
(2) Torques expressions are suggested for other differential pressure
(3) Differential pressure "P" in torque expressions is in PSI

Pressure ratings are according to API 6D
Class 150 P = 275 Class 900 P = 2160
Class 300 P = 720 Class 1500 P = 3600
Class 600 P = 1440



Flow Coefficient (C_v) and Operating Torque

Series FE Ball Valve

Size (In.)	Cv Value			Operating Torque (In.-Lbs.)		
	285 psi	740 psi	1480 psi	285 psi	740 psi	1480 psi
1FP	95	95	93	300	360	600
1 1/2FP	308	308	308	540	720	900
2RP	140	140	140	540	720	900
2FP	500	420	365	600	960	1200
3RP	220	210	185	600	960	1200
3FP	1390	1050	1000	1320	2160	2700
4RP	630	600	570	1320	2160	2700
4FP	2550	2000	1800	2160	3600	5280
6RP	925	910	900	2160	3600	5280
6FP	5249	5186	4600	5500	12,000	27,000
8RP	2500	2498	2235	5500	12,000	27,000
8FP	10,750	10,262	—	12,000	27,000	—
10RP	5000	4990	—	12,000	27,000	—
10FP	17,775	17,220	—	23,000	55,000	—
12RP	8400	8390	—	23,000	—	—

Series FAE Ball Valve

Size (In.)	Cv Value		Operating Torque (In.-Lbs.)	
	285 psi	740 psi	285 psi	740 psi
2FP	500	420	360	600
3RP	220	210	360	600
3FP	1390	1050	750	1356
4RP	630	600	750	1356
4FP	2550	2000	1360	1650
6RP	925	910	1360	1650
6FP	5249	5186	3175	5712
8RP	2500	2498	3175	5712
8FP	10,750	10,262	6445	10,900
10RP	5000	4990	6445	10,900
10FP	17,775	17,220	10,130	17,875
12RP	8400	8390	10,130	17,875
12FP	26,750	25,952	17,625	27,473

Series M3 Ball Valve

Size (In.)	Cv Value				
	285 psi	740 psi	1480 psi	2220 psi	3705 psi
2	500	420	350	320	330
3 x 2	220	210	190	185	187
3	1390	1050	1000	910	830
4 x 3	630	600	560	505	510
4	2550	2000	1850	1760	1660
6 x 4	925	910	800	730	742
6	5249	5186	4400	4300	4167
8 x 6	2500	2498	2150	2010	2033
8	10,750	10,262	8450	8400	8013
10 x 8	5000	4990	4500	4160	4051
10	17,775	17,220	14,250	14,160	13,309
12 x 10	8400	8390	8000	7300	7117
12	26,750	25,950	22,790	21,230	17,073
14 x 12	14,080	14,040	13,990	13,920	14,180
16 x 12	9030	9020	9010	9000	
14	32,600	30,900	28,600	26,600	24,276
16 x 14	14,780	14,750	14,720	14,690	14,247
16	44,700	42,600	39,250	36,600	33,215
20 x 16	14,870	14,860	14,850	14,830	14,795
18	57,825	56,225	57,410	48,665	43,402
20	74,775	71,800	65,463	62,239	55,931
24 x 20	26,768	26,755	25,698	26,659	—
22	91,789	88,537	81,305	—	—
24	113,284	109,414	98,963	93,993	83,926



Flow Coefficient (C_v) and Operating Torque

Series TE Ball Valve

Size (In.)	Cv Value		Operating Torque (In.-Lbs.)	
	1480 psi	2220 psi	1480 psi	2220 psi
2RP	135	125	690	1025
2FP	350	320	840	1200
3RP	190	185	840	1200
3FP	1000	910	1800	2250
4RP	560	505	1800	2250
4FP	1850	1760	4000	5150
6RP	800	730	4000	5150
6FP	4400	4300	8900	11,500
8RP	2150	2010	8900	11,500
8FP	8450	8400	14,500	24,000
10RP	4500	4160	14,500	24,000
10FP	17,250	14,160	29,000	48,200
12RP	80,000	7300	29,000	48,200
12FP	21,250	21,230	451,000	70,000

Series 1500/2500 Ball Valve

Size (In.)	Cv Value	Operating Torque (In.-Lbs.)
1 1/2 RP	90	180
2 RP	125	240
3 RP	430	520
4 RP	600	600
6 RP	1010	1440

Series 1800/2800 Ball Valve

Size (In.)	C _v Value	Operating Torque (In.-Lbs.)	
		285 psi	740 psi
1 FP	95	180	180
1 1/2 FP	265	280	280
2 FP	470	440	500
3 FP	1240	600	1000
4 FP	2470	1440	2500
6 FP	5249	5000	7000
8 RP	2500	5000	7000
8 FP	10,750	12,000	27,000
10 RP	5000	12,000	—
10 FP	17,775	30,000	—
12 RP	8400	30,000	—

Method of Calculating Flow

The Flow Coefficient “C_v” of a valve is the flow rate of water (gallons/minute) through a fully opened valve, with a pressure drop of 1 psi across the valve. To find the flow of liquid through valve from the C_v, use the following formulas:

Liquid Flow

QL = flow rate of liquid (gal./min.)

ΔP = differential pressure across the valve (psi)

G = specific gravity of liquid (for water, G=1)

$$QL = C_v \sqrt{\frac{\Delta P}{G}}$$

Gas Flow

Qg = flow rate of gas (CFH at STP)

P2 = outlet pressure (psia)

g = Specific gravity of gas (for air, g=1.000)

$$Qg = 61 C_v \sqrt{\frac{P_2 \Delta P}{g}}$$

For non-critical flow

$$\left\{ \frac{\Delta P}{P_2} < 1.0 \right\}$$



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