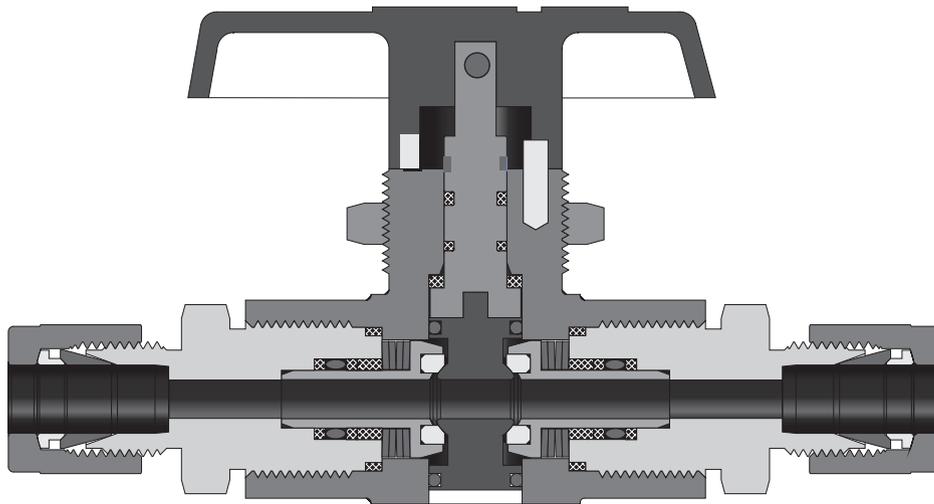


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Trunnion High Pressure Ball Valves



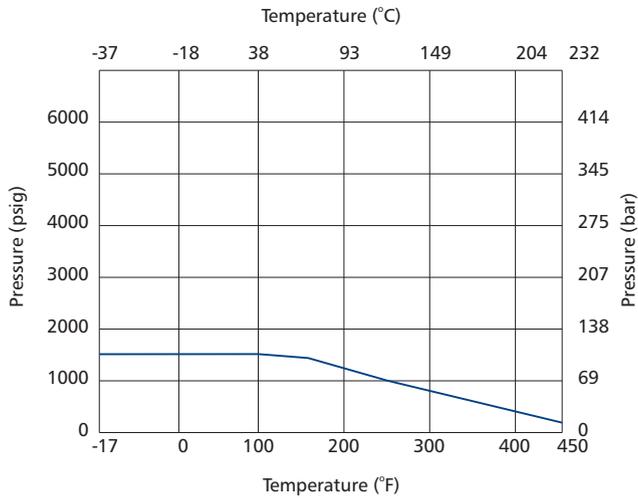
47 and 47H Series

- Compact, maximum-flow design.
- Low operating torque.
- Heavy-duty handle indicates flow direction.
- Bottom-loaded stem:
 - Prevents stem blowout
 - Enhances system safety
- Trunnion-style ball:
 - Prevents ball blowout
 - Contributes to low operating torque.
- Spring-loaded seats:
 - Provide leak-tight integrity in both low- and high-pressure systems
 - Contribute to low operating torque
 - Ceduce seat wear from pressure surges
- Straight and 3-way flow patterns.
- Stainless steel and alloy 400 steel body materials can be selected.
- 47 series pressures up to 6000 psig (413 bar).
47H series pressures up to 10 000 psig (689 bar).
- Temperatures up to 450°F (232°C) with PEEK seat;
- Every valve is 100% factory tested with nitrogen.
- Pressures up to 6000 psig (413 bar).
- Temperatures up to 450° F (232° C) with PTFE packing;

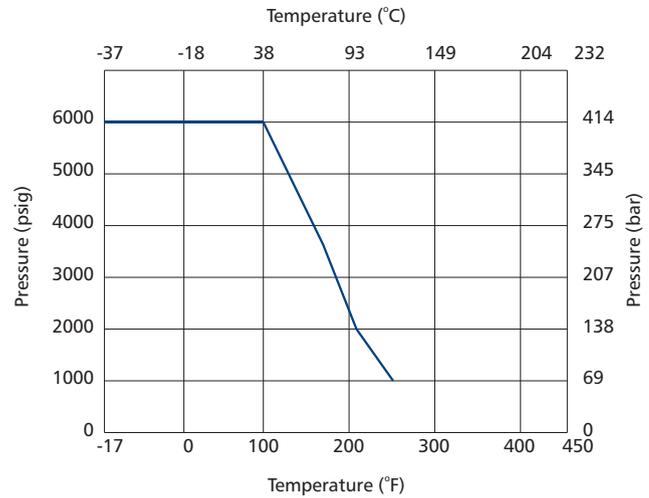
Pressure vs. Temperature

02

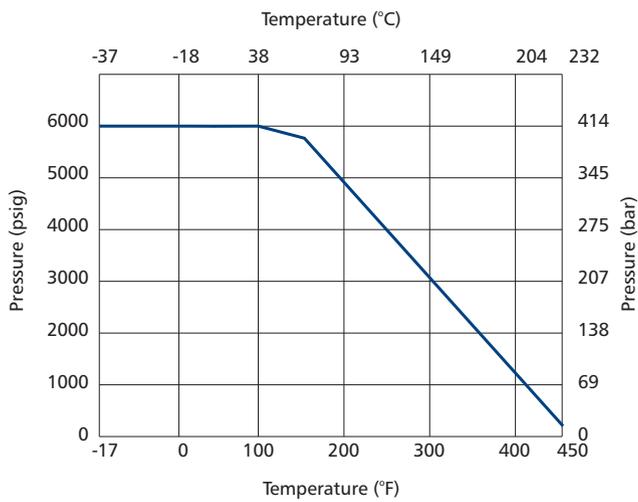
47 Series with PTFE Seat



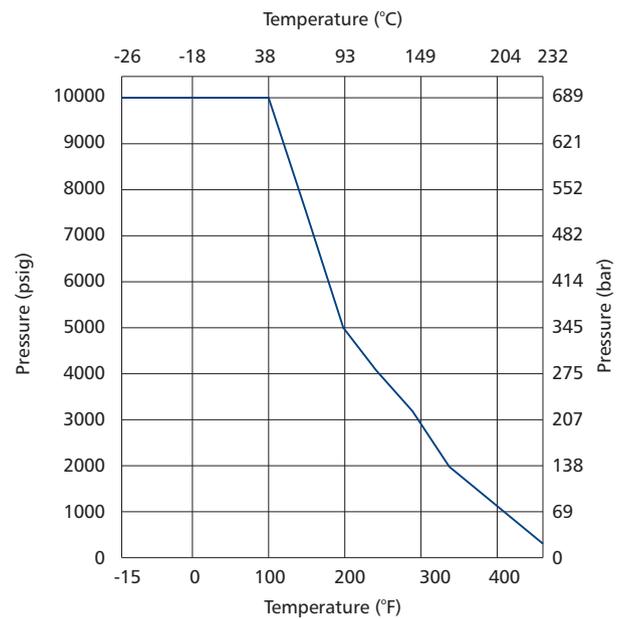
47 Series with PCTFE Seat



47 Series with PEEK Seat



47H Series with PEEK Seat



1. Graphs are for 2-way valves only
2. Maximum working pressure for 3-way valves:
 - 6000 psig: connection 1 as inlet, connection 2 and connection 3 as outlet
 - 3000 psig: connection 2 and connection 3 as inlet, connection 1 as outlet

Flow Data at 70°F (20°C)

47 Series 2-way

0.187" (4.75 mm) orifice, 1.2 Cv

Inlet Pressure psig (bar)	Pressure Drop (Δp) psig (bar)	Air Flow std ft ³ /min (std L/min)	Water Flow U.S. gal/min (L/min)
1000 (69)	10 (0.69)	14 (334)	3.5 (13)
3000 (207)	50 (3.45)	30 (834)	7.5 (28)
6000 (414)	100 (6.89)	60 (1670)	11.0 (41)

47 Series 3-way

0.187" (4.75 mm) orifice, 0.75 Cv

Inlet Pressure psig (bar)	Pressure Drop (Δp) psig (bar)	Air Flow std ft ³ /min (std L/min)	Water Flow U.S. gal/min (L/min)
1000 (69)	10 (0.69)	10 (275)	3.0 (11)
3000 (207)	50 (3.45)	23 (630)	7.0 (26)
6000 (414)	100 (6.89)	42 (1150)	9.5 (35)

47H Series 2-way

0.187" (4.75 mm) orifice, 1.2 Cv

Inlet Pressure psig (bar)	Pressure Drop (Δp) psig (bar)	Air Flow std ft ³ /min (std L/min)	Water Flow U.S. gal/min (L/min)
1000 (69)	150 (10.3)	90 (2550)	15 (56)
6000 (414)	600 (41.4)	345 (9660)	30 (111)
10000 (689)	1000 (68.9)	560 (15680)	40 (148)

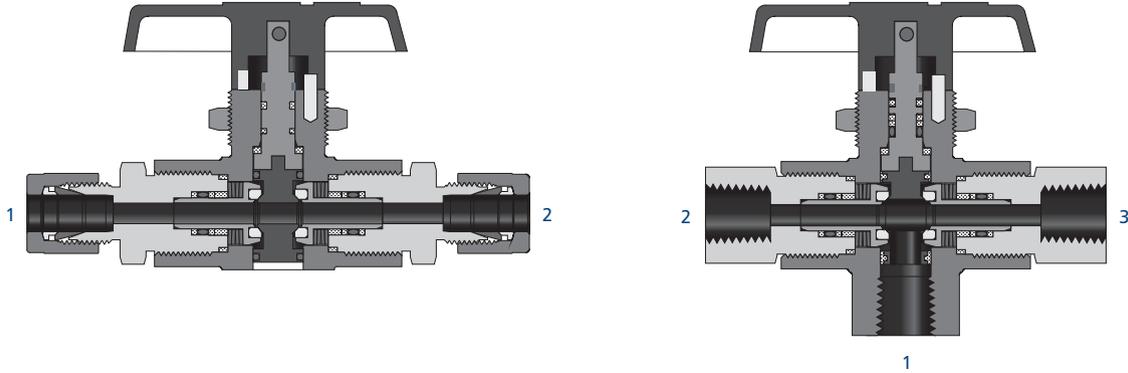
47H Series 3-way

0.187" (4.75 mm) orifice, 0.75 Cv

Inlet Pressure psig (bar)	Pressure Drop (Δp) psig (bar)	Air Flow std ft ³ /min (std L/min)	Water Flow U.S. gal/min (L/min)
1000 (69)	150 (10.3)	55 (1540)	10 (37.0)
6000 (414)	600 (41.4)	200 (5600)	20 (74.0)
10000 (689)	1000 (68.9)	330 (9240)	25 (92.5)

Standard Materials of Construction

47 Series

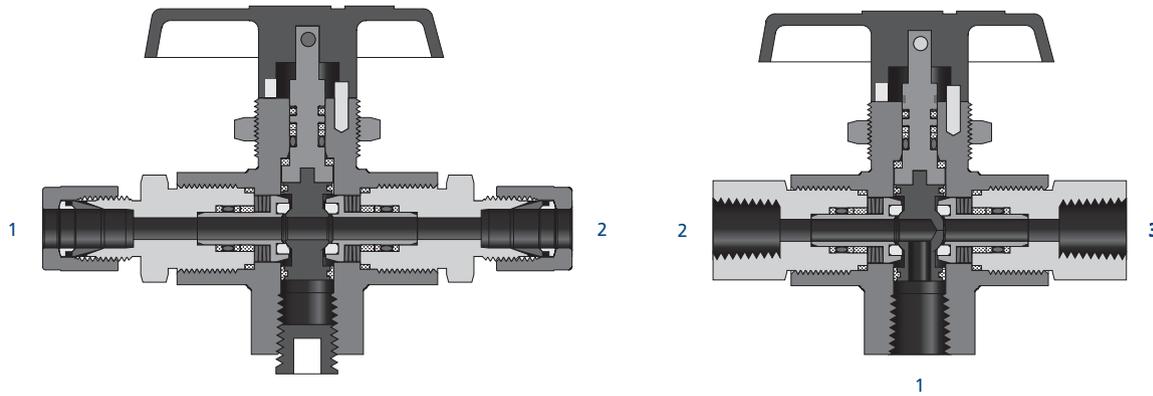


Item	Component	Valve Body Material			
		316 Stainless Steel		Alloy 400	
		2-way	3-way	2-way	3-way
		Material Grade/ASTM Specification			
1	Handle	Nylon or aluminium			
2	Panel Nut	316 SS/B783			
3	Body	316 SS/A479		Alloy 400/B164	
4	End Connector	316 SS/A479		Alloy R-405/B164	
5	Seat Retainer Guide	Reinforced PTFE			
6	Seat Retainer O-ring	Fluorocarbon FKM			
7	Seat Carrier Guide	316 SS/A276		Alloy R-405/B164	
8	End Connector Seal	PTFE/D1710			
9	Trunnion Bearing	Fluorocarbon FKM	PEEK	Fluorocarbon FKM	PEEK
10	Ball	316 SS/A276	S21800/A276	Alloy R-405/B164	
11	Seat Spring	Alloy X-750/AMS 5542			
12	Seat Retainer	316 SS/A276		Alloy R-405/B164	
13	Seat	PTFE or PEEK or PCTFE			
14	Stem	316 SS/A276		Alloy R-405/B164	
15	Stem Washer	Reinforced PTFE	PEEK	Reinforced PTFE	PEEK
16	Stem O-ring	—	Fluorocarbon FKM	—	Fluorocarbon FKM
17	Primary Stem Backup Ring	PTFE/D1710			
18	Pin	Stainless Steel			
19	Set Screw	S17400 SS			
20	Secondary Stem Backup Ring	—	PEEK	—	PEEK
	Lubricants	Molybdenum and Tungsten disulfide and Fluorinated-based			

1. Ball trunnions are PTFE coated in 47 series 2-way valve.

2. Other materials are available upon request, refer to the ordering information.

47H Series



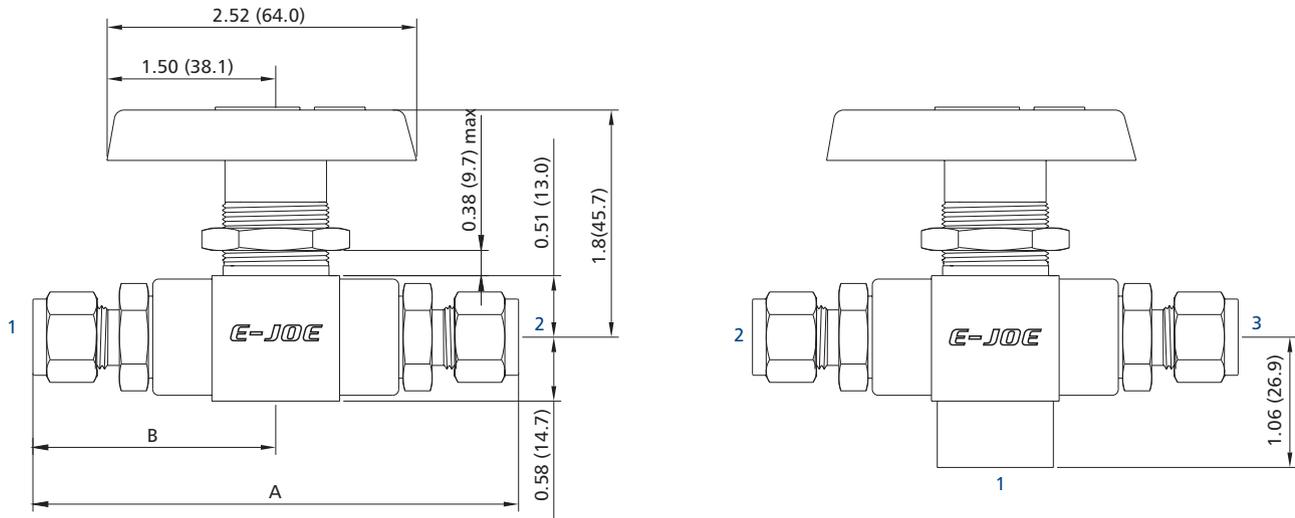
Item	Component	2-way	3-way
		Material Grade/ASTM Specification	
1	Handle	Nylon or aluminium	
2	Panel Nut	316 SS/B783	
3	Body	316 SS/A479	
4	End Connector	316 SS/A479	
5	Seat Retainer Guide	Reinforced PTFE	
6	Seat Retainer O-ring	Fluorocarbon FKM	
7	Seat Carrier Guide	316 SS/A276	
8	End Connector Seal	PTFE/D1710	
9	Trunnion Bearing	Fluorocarbon FKM	
10	Plug	316 SS/A276	
11	Ball	S21800/A276	
12	Seat Spring	Alloy X-750/AMS 5542	
13	Seat Retainer	316 SS/A276	
14	Seat	PEEK	
15	Stem	316 SS/A276	
16	Stem Washer	PEEK	
17	Stem O-ring	Fluorocarbon FKM	
18	Stem Back-up Ring	PTFE/D1710	
19	Pin	304 SS	
20	Set Screw	S17400/A564	
21	Stem Backup Ring	PEEK	
Lubricants		Molybdenum and Tungsten disulfide and Fluorinated-based	

1. Ball trunnions are Xylan® coated in 47H series 2-way valve.

2. Other materials are available upon request, refer to the ordering information.

Dimensions

Dimensions in inches (millimeters), are for reference only and are subject to change.



2-way Valve

Basic Ordering Number		Connection Size		Cv	Dimension, in. (mm)		Panel Hole Drill in. (mm)
47 Series	47H Series	Connection 1	Connection 2		A	B	
□ □ 47-FN2	□ □ 47H-FN2	1/8 Female NPT	1/8 Female NPT	1.2	2.94 (74.7)	1.47 (37.3)	29/32 (23.0)
□ □ 47-FN4	□ □ 47H-FN4	1/4 Female NPT	1/4 Female NPT		3.93 (99.8)	1.97 (50.0)	
□ □ 47-FN8	□ □ 47H-FN8	1/2 Female NPT	1/2 Female NPT		4.25 (108.0)	2.13 (54.1)	
□ □ 47-FX4	□ □ 47H-FX4	1/4" E-JOE	1/4" E-JOE		4.14 (105.2)	2.07 (52.6)	
□ □ 47-FX6	□ □ 47H-FX6	3/8" E-JOE	3/8" E-JOE		4.39 (111.5)	2.19 (55.6)	
□ □ 47-FX8	□ □ 47H-FX8	1/2" E-JOE	1/2" E-JOE		4.60 (116.8)	2.30 (58.4)	
□ □ 47-MX6	□ □ 47H-MX6	6 mm E-JOE	6 mm E-JOE		4.14 (105.2)	2.07 (52.6)	
□ □ 47-MX8	□ □ 47H-MX8	8 mm E-JOE	8 mm E-JOE		4.15 (105.4)	2.07 (52.6)	
□ □ 47-MX10	□ □ 47H-MX10	10 mm E-JOE	10 mm E-JOE		4.41 (112.0)	2.20 (55.9)	
□ □ 47-MX12	□ □ 47H-MX12	12 mm E-JOE	12 mm E-JOE		4.60 (116.8)	2.30 (58.4)	

3-way Valve

Basic Ordering Number		Connection Size			Cv	Dimension, in. (mm)		Panel Hole Drill in. (mm)
47 Series	47H Series	Connection 1	Connection 2	Connection 3		A	B	
□ □ 47-FN2-3	□ □ 47H-FN2-3	1/4 Female NPT	1/8 Female NPT	1/8 Female NPT	0.75	2.94 (74.7)	1.47 (37.3)	29/32 (23.0)
□ □ 47-FN4-3	□ □ 47H-FN4-3		1/4 Female NPT	1/4 Female NPT		3.93 (99.8)	1.97 (50.0)	
□ □ 47-FX4-3	□ □ 47H-FX4-3		1/4" E-JOE	1/4" E-JOE		4.14 (105.2)	2.07 (52.6)	
□ □ 47-FX6-3	□ □ 47H-FX6-3		3/8" E-JOE	3/8" E-JOE		4.39 (111.5)	2.19 (55.6)	
□ □ 47-FX8-3	□ □ 47H-FX8-3		1/2" E-JOE	1/2" E-JOE		4.60 (116.8)	2.30 (58.4)	
□ □ 47-MX6-3	□ □ 47H-MX6-3		6 mm E-JOE	6 mm E-JOE		4.14 (105.2)	2.07 (52.6)	
□ □ 47-MX8-3	□ □ 47H-MX8-3		8 mm E-JOE	8 mm E-JOE		4.15 (105.4)	2.07 (52.6)	
□ □ 47-MX10-3	□ □ 47H-MX10-3		10 mm E-JOE	10 mm E-JOE		4.41 (112.0)	2.20 (55.9)	
□ □ 47-MX12-3	□ □ 47H-MX12-3		12 mm E-JOE	12 mm E-JOE		4.60 (116.8)	2.30 (58.4)	

Service Option Low-temperature Service

Trunnion ball valves for low-temperature service, with a temperature rating of -40°F to 200°F (-40°C to 93°C) are available. Low-temperature valves have low-temperature Buna C O-rings. All other materials and ratings are the same as those of standard valves. To order a valve for low-temperature service, add the suffix L to the end of the part number.
Example: SS47-FX4-P-L

47 Series Pressure - temperature Ratings

Material	316 SS		Alloy 400	
Seat Material	PCTFE PEEK	PTFE	PCTFE PEEK	PTFE
Temperature, °F (°C)	Working Pressure, psig (bar)			
-40 to 100 (-40 to 37)	6000 (414)	1500 (103)	5000 (345)	1500 (103)
100 to 200 (37 to 93)	See Pressure vs. Temperature			

47H Series Pressure - temperature Ratings

Material	316 SS				
End Connection	FN2, FN4 FX4, MX6	MX10	FX6 MX8	FX8	MX12
Temperature, °F (°C)	Working Pressure, psig (bar)				
-40 to 100 (-40 to 37)	10000 (690)	8400 (578)	7500 (516)	6700 (461)	6600 (454)
100 to 200 (37 to 93)	See Pressure vs. Temperature				

47 and 47H Series How to Order

A Body Material	B Valve Series	C Inlet Type	D Inlet Size	E Inlet Type	F Inlet Size	G Orifice Size
SS	47	FN	8	FX	6	10
H Seat Material	I Packing Material	J Handle/Actuator	K NACE MR0175			
P	O	EA	SG			

A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
S1:	321 SS
91:	F91
92:	F92
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276

B	Valve Series
47:	47 Series Ball Valves
47H:	47H Series Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
FX	Fractional Tube Fitting
MX	Metric Tube Fitting

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm

H	Seat Material
Standard with Virgin PTFE	
K	PCTFE
P	PEEK

J	Handle/Actuator
Standard with Black Nylon Handle	
PA	Pneumatic Actuator
EA	Electric Actuator

I	Working Temperature
Normal Temperature	
L	Low Temperature (as low as -40°F)

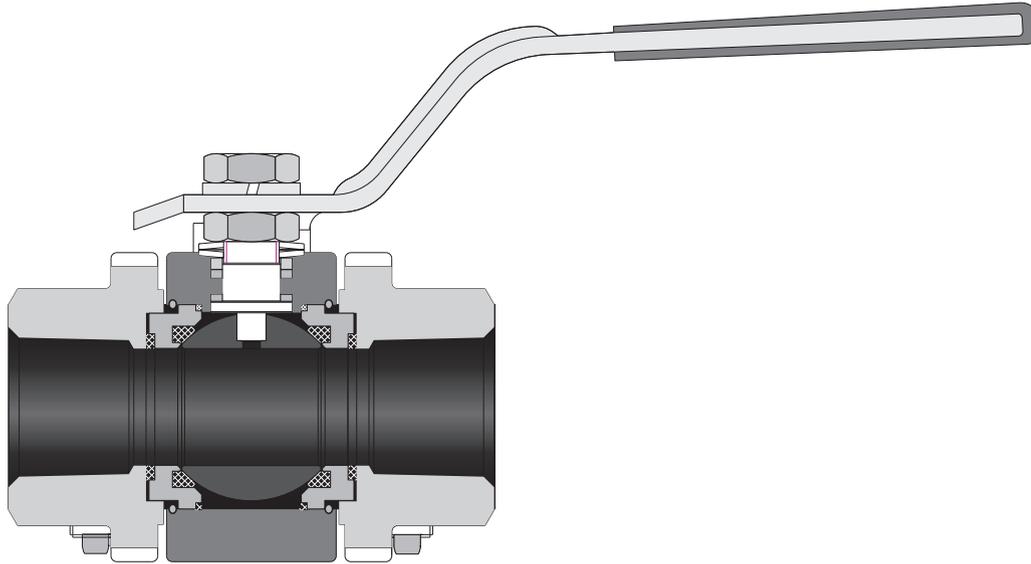
I	Flow Pattern
Standard is 2-Way	
3	3-Way

K	NACE MR0175
Standard with no NACE applicable	
SG	With NACE MR0175

Remark:

- Standard thread pitch for metric threads are as follows:
 - M10 and below: 1 mm
 - M12 to M24: 1.5 mm
 - M27 and above: 2 mm
 Standard thread pitch should be ignored in the ordering number, others should be specified.

3-Piece Thread-loaded Seat Patent Design Ball Valves

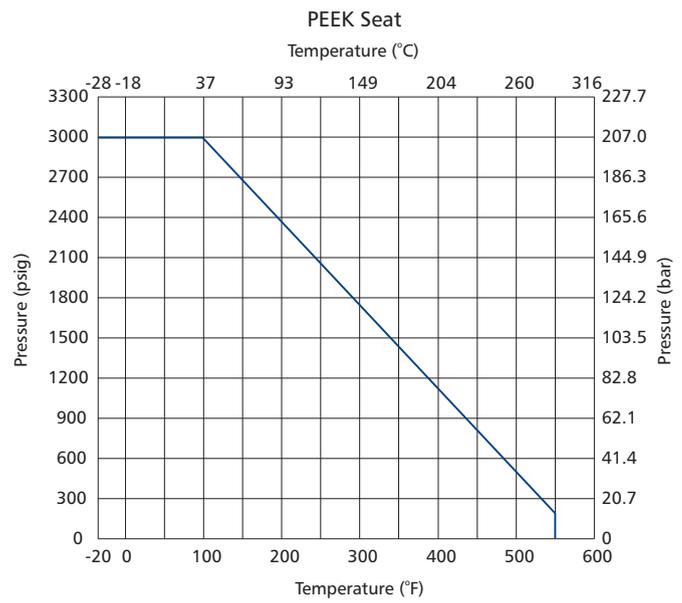
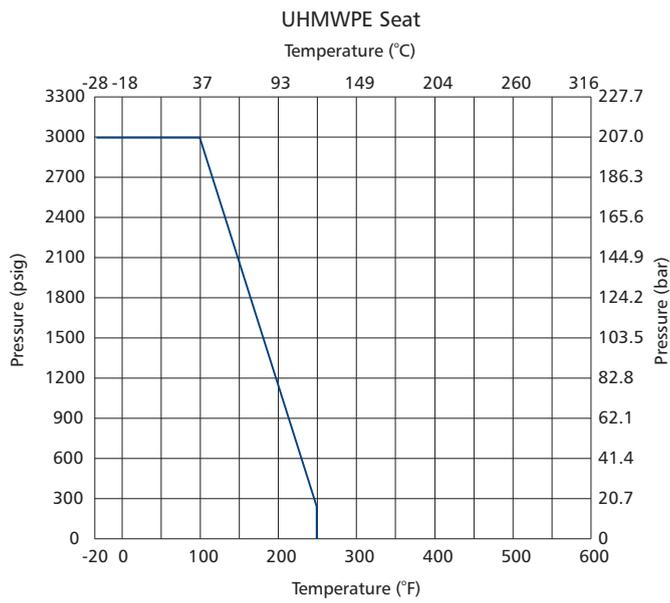
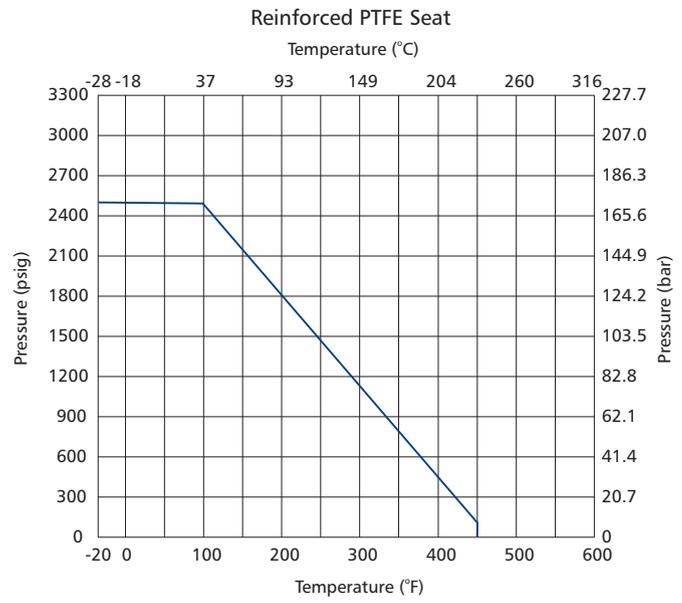
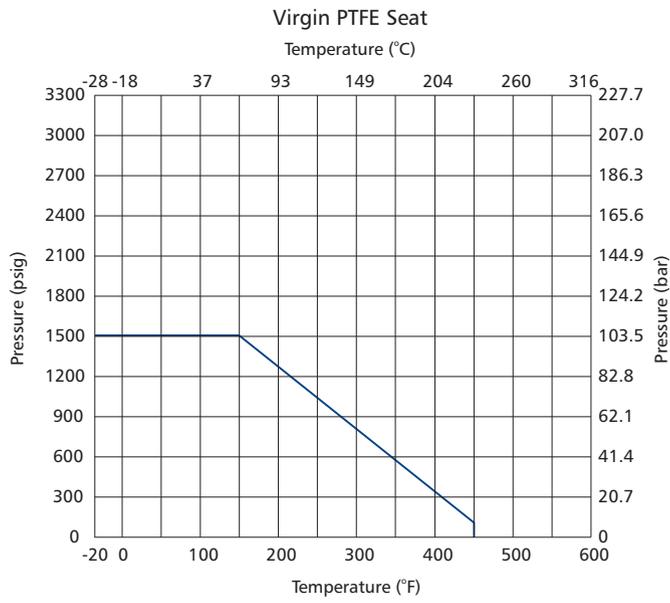


44 Series

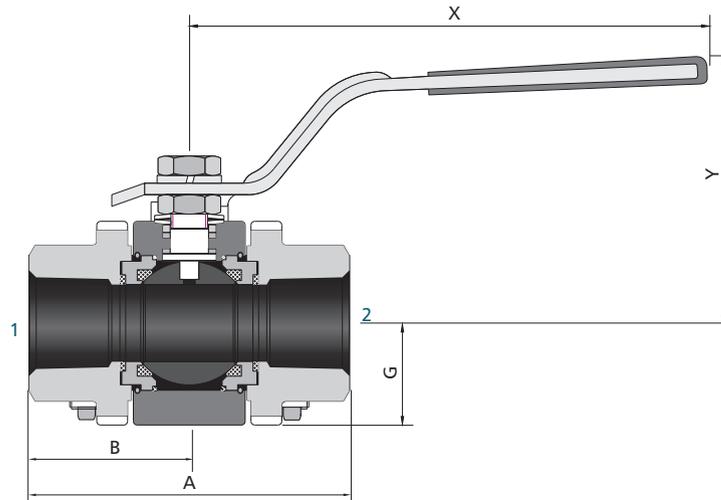
- 44 series ball valves stem springs compensate for changes in pressure and temperature, and wear.
- High-strength stem bearings provide smooth actuation, eliminate galling between valve stem and body, resist wear.
- Bottom-loaded stem prevents stem blowout and enhances system safety.
- Quarter-turn actuation.
- Wide selection of seat materials.
- Optional vent porting.
- Stainless steel, carbon steel, brass, and special alloys.
- Variety of end connections in 1/8 to 2 in . and 6 to 25 mm sizes.
- Pneumatic and electric actuators are available.
- Pressures up to 3000 psig (207 bar).
- Patent-pending two thread-loaded seat design.
- Suitable for sour gas service; materials are selected in accordance with NACE MR0175/ISO 15156.
- Every valve is 100% factory tested with nitrogen.

Pressure vs. Temperature

10



Standard Materials of Construction



Item	Component	Valve Body Material			
		CF8M/ A351	CF3M/ A351	CF8/ A351	CF3/ A351
1	Stem Nut	Gr. 8M/A194			
2	Handle	CF8/A351 (with vinyl sleeve)			
3	Grounding Spring	304 SS/A313			
4	Gland	316 SS/A276 or 304 SS/A276			
5	Packing Support	316 SS/A276 or 304 SS/A276			
6	Top Packing	PTFE/D1710 or Reinforced PTFE or PEEK			
7	Bottom Packing	PTFE/D1710 or Reinforced PTFE or PEEK			
8	Body Bolt	Gr. B8M/A193			
9	Stem Spring	316 SS/A240			
10	Stem	316 SS/A276 or 316 SS/A479			
11	Stop Bolt	304 SS/A479			
12	Body	CF8M/A351	CF3M/A351	CF8/A351	CF3/A351
13	Ball	316 SS/A276 or 316 SS/A479			
14	Seat	PTFE/D1710 or Reinforced PTFE or PEEK or UHMWPE/D4020			
15	Coned-disc Spring	316 SS/A240			
16	Flange Seal	PTFE/D1710 or O-ring or Graphite			
17	Flange	CF8M/A351	CF3M/A351	CF8/A351	CF3/A351
18	Gasket	304 SS			
19	Nut	Gr. 8M/A194			
20	Handle Lock	304 SS/A240			
	Lubricants	Silicone-based and PTTE-based			

Other materials available upon request.

Dimensions

Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)					
	Connection 1	Connection 2/3			A	B	G	J	X	Y
□□44-FX4-5	1/4" E-JOE	1/4" E-JOE	0.188 (4.8)	1.2	3.17 (80.5)	1.59 (40.4)	0.68 (17.3)	1.35 (34.3)	2.37 (60.2)	1.66 (42.2)
□□44-MX6-5	6 mm E-JOE	6 mm E-JOE								
□□44-MX8-5	8 mm E-JOE	8 mm E-JOE								
□□44-TS4-5	1/4" TS	1/4" TS								
□□44-MTS6-5	3/8" MTS	3/8" MTS								
□□44-PB4-5	1/4 PB	1/4 PB								
□□44-FN2-7	1/8 Female NPT	1/8 Female NPT	0.281 (7.1)	3.8	2.16 (54.9)	1.08 (27.4)	0.68 (17.3)	1.35 (34.6)	2.37 (60.2)	1.66 (42.2)
□□44-FR2-7	1/8 Female BSPT	1/8 Female BSPT								
□□44-FP2-7	1/8 Female BSPP	1/8 Female BSPP								
□□44-FN4-7	1/4 Female NPT	1/4 Female NPT								
□□44-FR4-7	1/4 Female BSPT	1/4 Female BSPT								
□□44-FP4-7	1/4 Female BSPP	1/4 Female BSPP								
□□44-FX5-7	5/16" E-JOE	5/16" E-JOE								
□□44-FX6-7	3/8" E-JOE	3/8" E-JOE								
□□44-MX10-7	10 mm E-JOE	10 mm E-JOE								
□□44-TS6-7	3/8" TS	3/8" TS								
□□44-PB6-7	3/8 PB	3/8 PB								
□□44-FX8-10	1/2" E-JOE	1/2" E-JOE	0.406 (10.3)	7.5	4.04 (102.6)	2.02 (51.3)	0.89 (22.6)	1.78 (45.2)	4.50 (114.0)	2.35 (59.7)
□□44-MX12-10	12 mm E-JOE	12 mm E-JOE	0.375 (9.5)							
□□44-TS8-10	1/2" TS	1/2" TS	0.411 (10.4)							
□□44-FN6-10	3/8 Female NPT	3/8 Female NPT	0.516 (13.1)	12	2.70 (68.6)	1.35 (34.3)	0.89 (22.6)	1.78 (45.2)	4.50 (114.0)	2.35 (59.7)
□□44-FR6-13	3/8 Female BSPT	3/8 Female BSPT								
□□44-FP6-13	3/8 Female BSPP	3/8 Female BSPP								
□□44-FN8-13	1/2 Female NPT	1/2 Female NPT								
□□44-FR8-13	1/2 Female BSPT	1/2 Female BSPT								
□□44-FP8-13	1/2 Female BSPP	1/2 Female BSPP								
□□44-FX12-13	3/4" E-JOE	3/4" E-JOE		13.6	4.04 (102.6)	2.02 (51.3)	0.89 (22.6)	1.78 (45.2)	4.50 (114.0)	2.35 (59.7)
□□44-MX16-13	16 mm E-JOE	16 mm E-JOE								
□□44-MX18-13	18 mm E-JOE	18 mm E-JOE								
□□44-TS12-13	3/4" TS	3/4" TS		15	2.70 (68.6)	1.34 (34.0)	0.89 (22.6)	1.78 (45.2)	4.50 (114.0)	2.35 (59.7)
□□44-PS8-13	1/2 PS	1/2 PS								
□□44-PB8-13	1/2 PB	1/2 PB								

Dimensions

Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)					
	Connection 1	Connection 2/3			A	B	G	J	X	Y
□□44-PB12-13	3/4 PB	3/4 PB	0.516 (13.1)	13.6	2.69 (68.3)	1.34 (34.0)	0.89 (22.6)	1.78 (45.2)	4.50 (114.0)	2.35 (59.7)
□□44-FN12-22	3/4 Female NPT	3/4 Female NPT	0.875 (22.2)	31.0	3.59 (91.2)	1.80 (45.7)	1.25 (31.8)	2.50 (63.5)	6.00 (152.0)	2.94 (74.7)
□□44-FR12-22	3/4 Female BSPT	3/4 Female BSPT								
□□44-FP12-22	3/4 Female BSPP	3/4 Female BSPP								
□□44-FN16-22	1 Female NPT	1 Female NPT		38.0	4.45 (113.0)	2.23 (56.6)				
□□44-FR16-22	1 Female BSPT	1 Female BSPT								
□□44-FP16-22	1 Female BSPP	1 Female BSPP								
□□44-FX16-22	1" E-JOE	1" E-JOE		40.0	5.36 (136.0)	2.68 (68.0)				
□□44-FX20-22	1 1/4" E-JOE	1 1/4" E-JOE			6.34 (161.0)	3.17 (80.5)				
□□44-MX25-22	25 mm E-JOE	25 mm E-JOE		40.0	5.36 (136.0)	2.68 (68.0)				
□□44-MX28-22	28 mm E-JOE	28 mm E-JOE			6.14 (156.0)	3.07 (78.0)				
□□44-TS16-22	1" TS	1" TS			3.59 (91.2)	1.80 (45.7)				
□□44-MTS25-22	25 mm MTS	25 mm MTS		38.0	3.59 (91.2)	1.80 (45.7)				
□□44-PS12-22	3/4 PS	3/4 PS		36.0						
□□44-PS16-22	1 PS	1 PS		42.0						
□□44-PB12-22	3/4 PB	3/4 PB		36.0	3.46 (87.9)	1.73 (43.9)				
□□44-PB16-22	1 PB	1 PB	40.0							
□□44-TS20-29	1 1/4" TS	1 1/4" TS	1.125 (28.6)	80.0	4.39 (112.0)	2.19 (55.6)	1.53 (38.9)	3.06 (77.7)	9.14 (232.0)	4.03 (102.0)
□□44-PB20-29	1 1/4 PB	1 1/4 PB			4.57 (116.0)	2.28 (57.9)				
□□44-FN20-32	1 1/4 Female NPT	1 1/4 Female NPT	1.25 (31.8)	100.0	4.39 (112.0)	2.19 (55.6)	1.53 (38.9)	3.06 (77.7)	9.14 (232.0)	4.03 (102.0)
□□44-FN24-32	1 1/2 Female NPT	1 1/2 Female NPT								
□□44-TS24-32	1 1/2" TS	1 1/2" TS								
□□44-PS20-32	1 1/4 PS	1 1/4 PS		90.0	4.50 (114.3)	2.25 (57.2)				
□□44-PS24-32	1 1/2 PS	1 1/2 PS		100.0	4.57 (116.0)	2.28 (57.9)				
□□44-PB24-32	1 1/2 PB	1 1/2 PB			4.57 (116.0)	2.29 (58.0)				
□□44-FN32-38	2 Female NPT	2 Female NPT	1.5 (38.1)	130.0	4.94 (125.4)	2.47 (62.7)	1.74 (44.2)	3.47 (88.1)	9.14 (232.0)	4.16 (106.0)
□□44-FR32-38	2 Female BSPT	2 Female BSPT								
□□44-TS32-38	2" TS	2" TS								
□□44-PS32-38	2 PS	2 PS					1.70 (43.2)	3.47 (86.6)		
□□44-PB32-38	2 PB	2 PB					5.09 (129.0)	2.55 (64.8)		

44 Series How to Order

A	B	C	D	E	F	G
Body Material	Valve Series	Inlet Type	Inlet Size	Inlet Type	Inlet Size	Orifice Size
SS	44	FN	8	FX	6	10
H	I	J	K			
Seat Material	Packing Material	Handle/Actuator	NACE MR0175			
P	O	EA	SG			

A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
S1:	321 SS
91:	F91
92:	F92
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276
B:	Brass
CS:	Carbon Steel

B	Valve Series
44:	44 Series Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
TS	Fractional Tube Socket Weld
MTS	Metric Tube Socket Weld
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
PS	Pipe Socket Weld
PB	Pipe Butt Weld
FX	Fractional Tube Fitting
MX	Metric Tube Fitting
UFB	Nut + Gasket + Fractional Bulge Nipple
UMB	Nut + Gasket + Metric Bulge Nipple

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm
14	14 mm or M14 x 1.5
16	1" or 16 mm
18	18 mm
20	1 1/4" or 20 mm or M20 x 1.5
22	22 mm or M22 x 1.5
24	M24 x 1.5
25	25 mm
27	M27 x 2
28	28 mm
32	2" or 32 mm

G	Orifice Size
5:	0.19" (4.8 mm)
7:	0.28" (7.1 mm)
10:	0.41" (10.4 mm)
13:	0.52" (13.1 mm)
22:	0.88" (22.2 mm)
29:	1.13" (28.6 mm)
32:	1.25" (31.8 mm)
38:	1.5" (38.1 mm)

H	Seat Material
Standard with Virgin PTFE	
R	Reinforced PTFE
P	PEEK

I	Packing Material
Standard with Reinforced PTFE	
G	Graphite
O	O-Ring

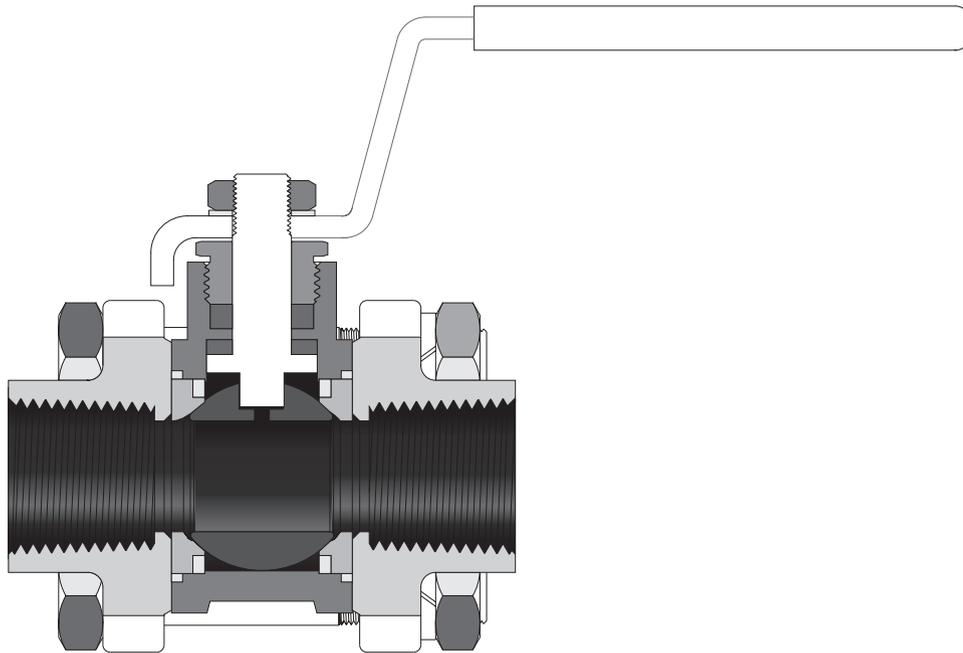
J	Handle/Actuator
Standard with Balck Nylon Handle	
PA	Pneumatic Actuator
EA	Electric Actuator

K	NACE MR0175
Standard with no NACE applicable	
SG	With NACE MR0175

Remark:

- Standard thread pitch for metric threads are as follows:
M10 and below: 1 mm
M12 to M20: 1.5 mm
Standard thread pitch should be ignored in the ordering number, others should be specified.

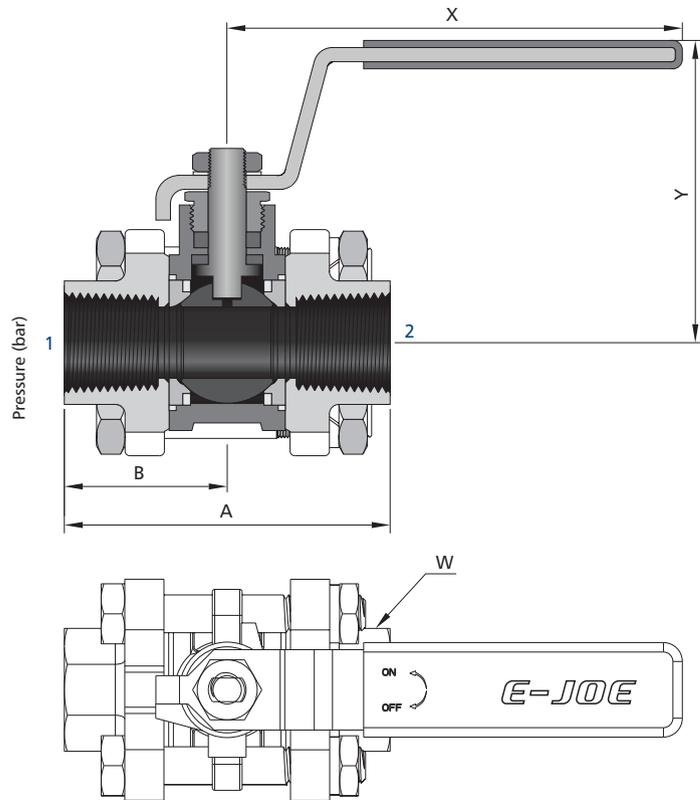
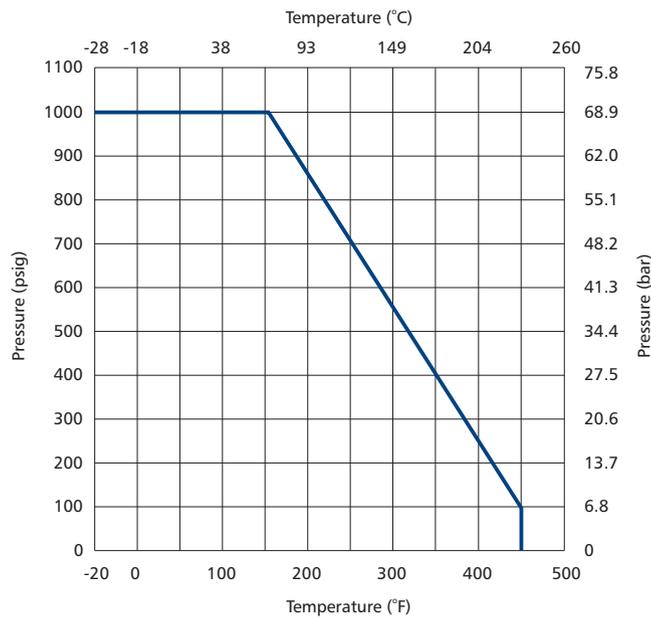
3-piece General Pressure Ball Valves



45 Series

- 45 series ball valves are for use in 3-piece casting valve body.
- Free floating ball design allows for seat wear compensation. Ultra low internal volume.
- Self-compensating stem seal.
- Blow out resistant stem.
- Fully enclosed body bolting.
- Four bolt construction.
- Pneumatic and electric actuation options.
- Stainless steel and other alloy steel body materials can be selected.
- 45 series standard pressures up to 1000 psig (68.9 bar).
- Temperatures up to 450° F (232° C) with PTFE packing;
- End connections:
 - 1/8" to 3" thread
 - 1/8" to 3" pipe butt or socket weld
 - 1/2" to 2" and 12 mm to 50 mm tube butt or socket weld
 - 1/2" to 2" and 12 mm to 50 mm tube butt or socket weld
 - 1/2" to 2" and 12 mm to 38 mm tube fitting
 - 1/2" to 4" flange
- Orifice sizes: 4.8 mm to 76 mm
- Suitable for sour gas service; materials are selected in accordance with NACE MR0175/ISO 15156.
- Every valve is 100% factory tested with nitrogen.

Pressure vs. Temperature



Standard Materials of Construction

Item	Component	Valve Body Material			
		CF8M/ A351	CF3M/ A351	CF8/ A351	CF3/ A351
1	Stem Nut	Gr. 8M/A194			
2	Gasket	304 SS			
3	Handle	CF8/A351 (with vinyl sleeve)			
4	Gland	316 SS/A276 or 304 SS/A276			
5	Stem Packing	PTFE/D1710			
6	Stem	316 SS/A276			
7	Stem Bearing	PTFE/D1710			
8	Body	CF8M/A351	CF3M/A351	CF8/A351	CF3/A351
9	Body Bolt	Gr. B8M/A193			
10	Ball	316 SS/A276			
11	Support Ring	316 SS/A276			
12	Seat	PTFE/D1710			
13	Flange Seal	PTFE/D1710			
14	Flange	CF8M/A351	CF3M/A351	CF8/A351	CF3/A351
15	Gasket	304 SS			
16	Nut	Gr. 8M/A194			
Lubricants		Silicone-based and PTFE-based			

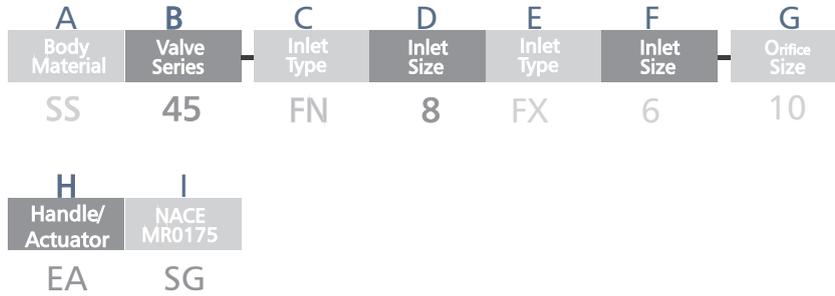
Dimensions

Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)				
	Connection 1	Connection 2			A	B	W	X	Y
□□45-FN2-5	1/8 Female NPT	1/8 Female NPT	0.188 (4.8)	1.2	2.57 (65.2)	1.28 (32.6)			
□□45-FP2-5	1/8 Female BSPP	1/8 Female BSPP							
□□45-PB4-5	1/4 PB	1/4 PB							
□□45-FX4-5	1/4" E-JOE	1/4" E-JOE							
□□45-MX6-5	6 mm E-JOE	6 mm E-JOE							
□□45-MX8-5	8 mm E-JOE	8 mm E-JOE							
□□45-FN4-7	1/4 Female NPT	1/4 Female NPT	0.281 (7.1)	3.8	2.57 (65.2)	1.28 (32.6)	0.93 (23.5)	3.94 (100.0)	2.15 (54.7)
□□45-FP4-7	1/4 Female BSPP	1/4 Female BSPP							
□□45-PS4-7	1/4 PS	1/4 PS							
□□45-PB6-7	3/8 PB	3/8 PB							
□□45-FX6-7	3/8" E-JOE	3/8" E-JOE							
□□45-MX10-7	10 mm E-JOE	10 mm E-JOE							
□□45-FX8-11	1/2" E-JOE	1/2" E-JOE	0.417 (10.6)	7.5	4.04 (103.0)	2.02 (51.3)			
□□45-MX12-11	12 mm E-JOE	12 mm E-JOE							
□□45-MX14-11	14 mm E-JOE	14 mm E-JOE							
□□45-FN6-13	3/8 Female NPT	3/8 Female NPT	0.50 (12.7)	11.3	2.57 (65.2)	1.28 (32.6)	0.88 (22.3)	3.94 (100.0)	2.26 (57.5)
□□45-FP6-13	3/8 Female BSPP	3/8 Female BSPP							
□□45-PS6-13	3/8 PS	3/8 PS							
□□45-PB8-13	1/2 PB	1/2 PB							
□□45-FX10-13	5/8" E-JOE	5/8" E-JOE							
□□45-MX16-13	16 mm E-JOE	16 mm E-JOE							
□□45-FN8-15	1/2 Female NPT	1/2 Female NPT	0.591 (15.0)	13.0	2.74 (69.5)	1.37 (34.8)	1.06 (27.0)		
□□45-FP8-15	1/2 Female BSPP	1/2 Female BSPP							
□□45-PS8-15	1/2 PS	1/2 PS							
□□45-MTB22-15	22 mm MTB	22 mm MTB							
□□45-TS12-15	3/4" TS	3/4" TS							
□□45-MTS18-15	18 mm MTS	18 mm MTS							
□□45-FX12-15	3/4" E-JOE	3/4" E-JOE							
□□45-MX18-15	18 mm E-JOE	18 mm E-JOE							
□□45-MX20-15	20 mm E-JOE	20 mm E-JOE							
□□45-FN12-20	3/4 Female NPT	3/4 Female NPT	0.787 (20.0)	50.0	3.15 (80.0)	1.57 (40.0)	1.34 (34.0)	5.08 (129.0)	2.48 (63.0)
□□45-FP12-20	3/4 Female BSPP	3/4 Female BSPP							

Dimensions

Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)				
	Connection 1	Connection 2			A	B	W	X	Y
□□45-PB12-20	3/4 PB	3/4 PB	0.787 (20.0)	50.0	3.15 (80.0)	1.57 (40.0)	1.34 (34.0)	5.08 (129.0)	2.48 (63.0)
□□45-PS12-20	3/4 PS	3/4 PS							
□□45-TS16-20	1" TS	1" TS							
□□45-MTB25-20	25 mm MTB	25 mm MTB			5.36 (136.0)	2.68 (68.1)			
□□45-MTS25-20	25 mm MTS	25 mm MTS							
□□45-FX16-20	1" E-JOE	1" E-JOE							
□□45-MX22-20	22 mm E-JOE	22 mm E-JOE							
□□45-MX25-20	25 mm E-JOE	25 mm E-JOE			7.59 (193.0)	3.79 (96.3)			
□□45-MX28-20	28 mm E-JOE	28 mm E-JOE							
□□45-FN16-25	1 Female NPT	1 Female NPT							
□□45-FP16-25	1 Female BSPP	1 Female BSPP	0.984 (25.0)	93.0	3.54 (90.0)	1.77 (45.0)	1.63 (41.3)	6.14 (156.0)	2.97 (75.5)
□□45-PS16-25	1 PS	1 PS							
□□45-PB16-25	1 PB	1 PB							
□□45-FX20-25	1 1/4" E-JOE	1 1/4" E-JOE							
□□45-FN20-32	1 1/4 Female NPT	1 1/4 Female NPT	1.260 (32.0)	110.0	4.33 (110.0)	2.17 (55.0)	1.94 (49.2)	6.14 (156.0)	3.19 (81.0)
□□45-FP20-32	1 1/4 Female BSPP	1 1/4 Female BSPP							
□□45-PB20-32	1 1/4 PB	1 1/4 PB							
□□45-FN24-38	1 1/2 Female NPT	1 1/2 Female NPT	1.50 (38.0)	130.0	4.72 (120.0)	2.36 (60.0)	2.24 (57.0)	7.19 (182.5)	3.70 (94.0)
□□45-FP24-38	1 1/2 Female BSPP	1 1/2 Female BSPP							
□□45-PB24-38	1 1/2 PB	1 1/2 PB							
□□45-FN32-50	2 Female NPT	2 Female NPT	1.97 (50.0)	270.0	5.51 (140.0)	2.75 (70.0)	2.76 (70.0)	7.19 (182.5)	4.11 (104.5)
□□45-FP32-50	2 Female BSPP	2 Female BSPP							
□□45-PB32-50	2 PB	2 PB							
□□45-FN40-64	2 1/2 Female NPT	2 1/2 Female NPT	2.50 (63.5)	350.0	7.28 (185.0)	3.64 (92.5)	3.39 (86.0)	9.92 (252.0)	5.16 (131.0)
□□45-FP40-64	2 1/2 Female BSPP	2 1/2 Female BSPP							
□□45-PB40-64	2 1/2 PB	2 1/2 PB							
□□45-FN48-76	3 Female NPT	3 Female NPT	2.99 (76.0)	500.0	8.07 (205.0)	4.04 (102.5)	3.98 (101.0)	9.92 (252.0)	5.47 (139.0)
□□45-FP48-76	3 Female BSPP	3 Female BSPP							
□□45-PB48-76	3 PB	3 PB			8.66 (220.0)	4.33 (110.0)			

45 Series How to Order



A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
S1:	321 SS
91:	F91
92:	F92
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276
CS:	Carbon Steel

B	Valve Series
45:	45 Series Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
TS	Fractional Tube Socket Weld
MTS	Metric Tube Socket Weld
TB	Fractional Tube Butt Weld
MTB	Metric Tube Butt Weld
PS	Pipe Socket Weld
PB	Pipe Butt Weld
FX	Fractional Tube Fitting
MX	Metric Tube Fitting

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm
14	14 mm or M14 x 1.5
16	1" or 16 mm
18	18 mm
20	1 1/4" or 20 mm or M20 x 1.5
22	22 mm or M22 x 1.5
24	M24 x 1.5
25	25 mm
27	M27 x 2
28	28 mm
32	2" or 32 mm
36	2 1/4" or M36 x 2 mm
40	2 1/2" or M40 x 2 mm
48	3" or M48 x 2 mm

G	Orifice Size
5:	0.19" (4.8 mm)
7:	0.28" (7.1 mm)
10:	0.41" (10.4 mm)
15:	0.59" (15.0 mm)
20:	0.79" (20.0 mm)
25:	0.98" (25.0 mm)
32:	1.26" (32.0 mm)
38:	1.5" (38.1 mm)
50:	2" (50.8 mm)
64:	2.5" (63.5 mm)
76:	3" (76 mm)

H Handle/Actuator

Standard with Balck Nylon Handle

PA	Pneumatic Actuator
EA	Electric Actuator

I NACE MR0175

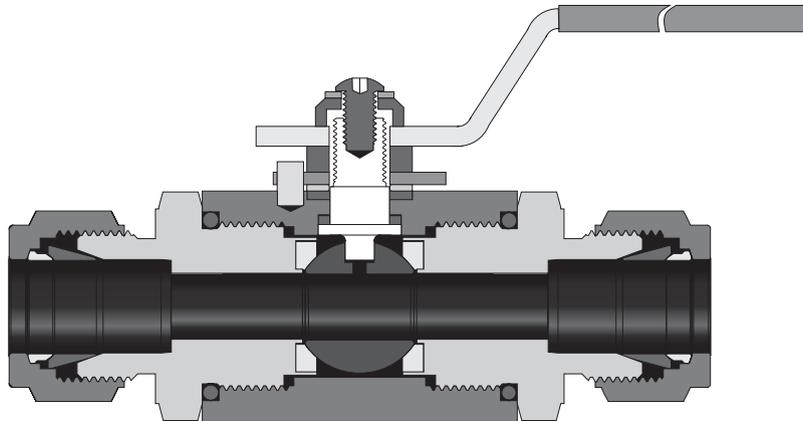
Standard with no NACE applicable

SG	With NACE MR0175
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Remark:

- Standard thread pitch for metric threads are as follows:
M10 and below: 1 mm
M12 to M20: 1.5 mm
Standard thread pitch should be ignored in the ordering number, others should be specified.

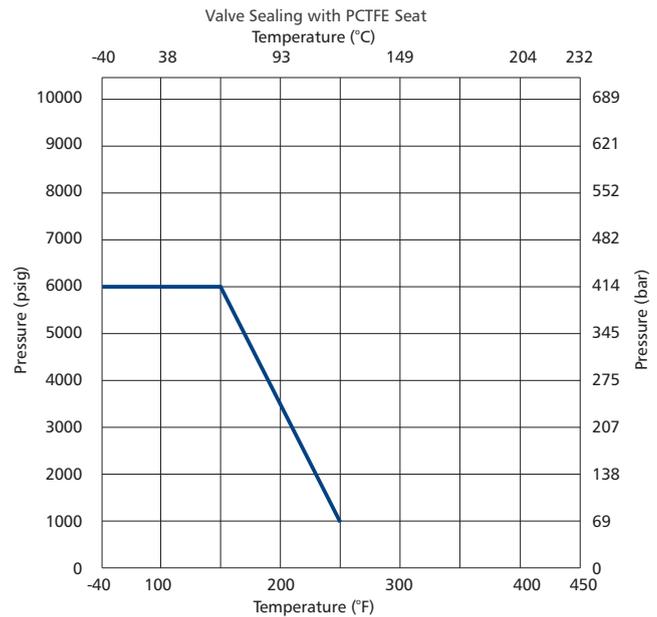
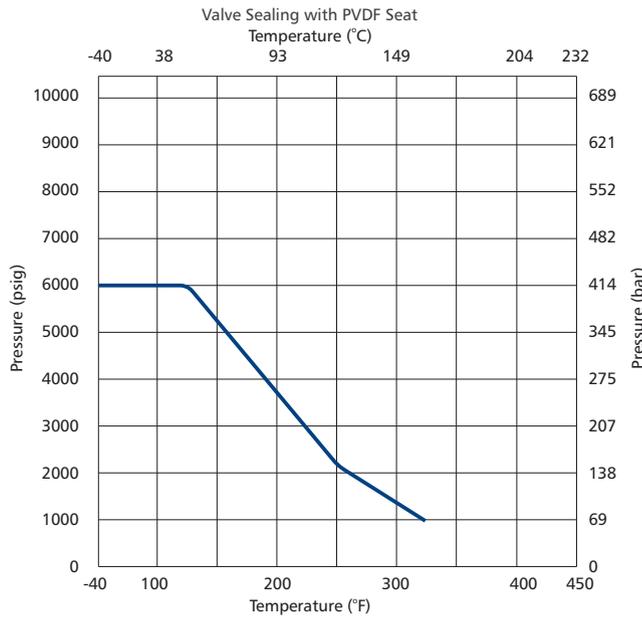
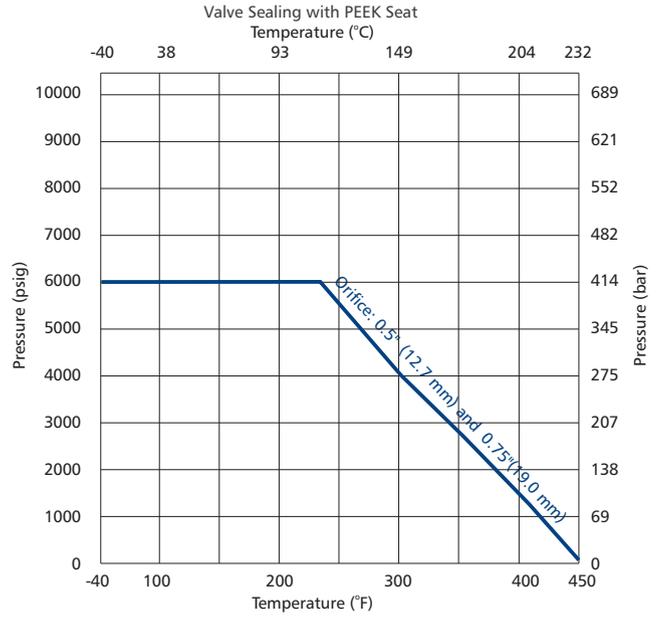
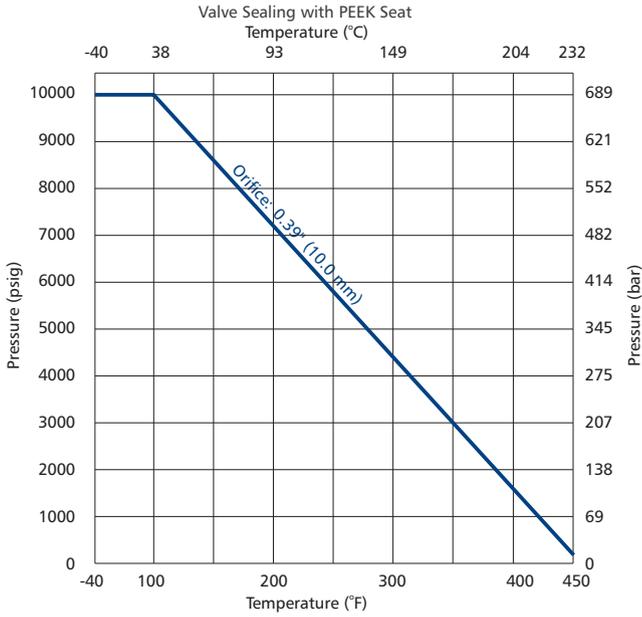
Bar Stock Ball Valves



42 Series

- Blowout proof design with internally loaded stem.
- Handle indicates the flow direction.
- Positive stop with a robust stop pin.
- High flow rate with maximum orifice.
- Various flow control with side and bottom inlet port on 3-way diverter valves.
- Valves are designed to control fluids in full open or full closed position.
- Valves that have not been actuated for a period of time may have a higher initial actuation torque.
- Valves must be in open position during system test not to damage the valve seat.
- Optional pneumatic and electric actuator.
- Standard maximum pressures:
Stainless steel: 6000 psig (413 bar).
High pressure up to 10 000 psig (689 bar).
- Temperatures up to 450°F (232°C);
- Suitable for sour gas service; materials are selected in accordance with NACE MR0175/ISO 15156.
- Every valve is 100% factory tested with nitrogen.

Pressure vs. Temperature

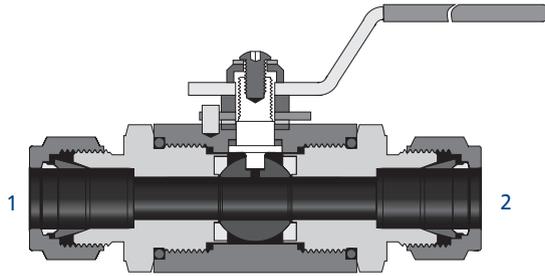


Temperature Ranges

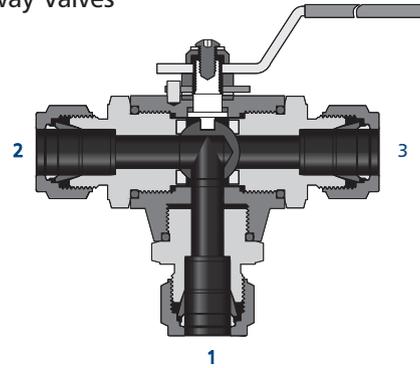
Packing Materials	Temperature Range °F (°C)
PTFE	-40 to 450 (-40 to 232)
Buna-N	-40 to 250 (-40 to 121)
Fluorocarbon FKM	-10 to 400 (-23 to 204)
Neoprene	-40 to 250 (-40 to 121)

Standard Materials of Construction

2-way Valves



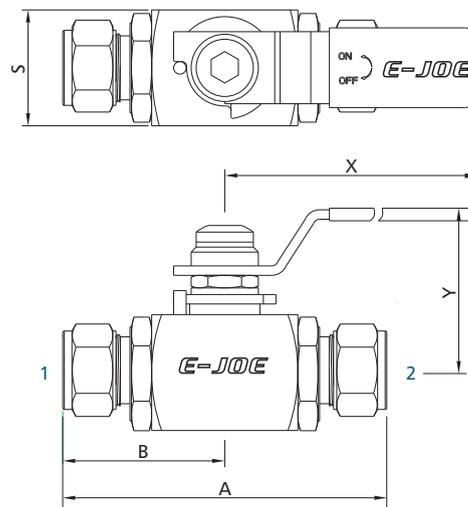
3-way Valves



Item	Component	Body Material	
		316 SS	Alloy 400
1	End Connector	316 SS/A276	Alloy 400/B164
2	Stop Pin	Stainless steel	
3	Spring Washer	316 SS/A276	
4	Bolt	Stainless steel	
5	Cover	316 SS/A276	
6	Stem	316 SS/A276	
7	Handle	Stainless steel with vinyl cover	
8	Stem Nut	Stainless steel	
9	Stop Block	316 SS/A240	
10	Stem Washer	316 SS/A276	
11	Stem Packing	PTFE or fluorocarbon FKM or neoprene or buna N	
12	Body	316 SS/A479	Alloy 400/B164
13	Seat	PVDF or PCTFE or PEEK	
14	Ball	316 SS/A479	Alloy R- 405/B164
15	End Seal	PTFE or fluorocarbon FKM or neoprene or buna N	

Dimensions

2-way Valves



Dimensions

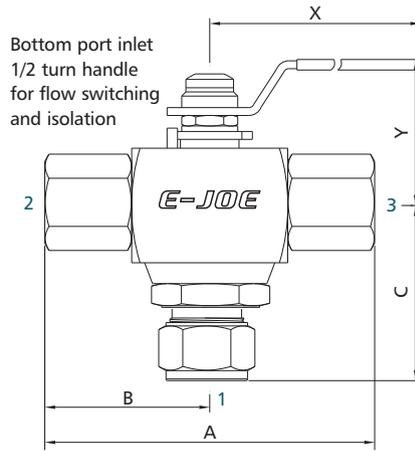
Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)								
	Connection 1	Connection 2			A	B	X	Y	S				
□ □ 42-MX6-10	6 mm E-JOE	6 mm E-JOE	0.39 (10.0)	1.2	3.54 (90.0)	1.77 (45.0)	5.12 (130.0)	1.73 (44.0)	1.30 (32.0)				
□ □ 42-MX8-10	8 mm E-JOE	8 mm E-JOE			3.60 (91.6)	1.80 (45.8)							
□ □ 42-MX10-10	10 mm E-JOE	10 mm E-JOE		3.7	3.70 (94.0)	1.85 (47.0)							
□ □ 42-MX12-10	12 mm E-JOE	12 mm E-JOE		7.5	4.33 (110.0)	2.16 (55.0)							
□ □ 42-MX14-10	14 mm E-JOE	14 mm E-JOE											
□ □ 42-FX4-10	1/4" E-JOE	1/4" E-JOE		1.2	3.78 (96.0)	1.89 (48.0)							
□ □ 42-FX6-10	3/8" E-JOE	3/8" E-JOE		3.7	4.04 (102.5)	2.02 (51.3)							
□ □ 42-FX8-10	1/2" E-JOE	1/2" E-JOE		7.5	4.33 (110.0)	2.16 (55.0)							
□ □ 42-FN4-10	1/4 Female NPT	1/4 Female NPT			2.91 (74.0)	1.45 (37.0)							
□ □ 42-FN6-10	3/8 Female NPT	3/8 Female NPT			3.03 (77.0)	1.51 (38.5)							
□ □ 42-FN8-10	1/2 Female NPT	1/2 Female NPT		3.7	3.35 (85.0)	1.67 (42.5)							
□ □ 42-N4-10	1/4 Male NPT	1/4 Male NPT			3.76 (95.4)	1.88 (47.6)							
□ □ 42-N6-10	3/8 Male NPT	3/8 Male NPT		7.5	3.94 (100.2)	1.97 (50.1)							
□ □ 42-N8-10	1/2 Male NPT	1/2 Male NPT											
□ □ 42-MX16-13	16 mm E-JOE	16 mm E-JOE		0.5 (12.7)	10.0	4.56 (116.0)				2.28 (58.0)	5.71 (145.0)	1.89 (48.0)	1.50 (38.0)
□ □ 42-MX18-13	18 mm E-JOE	18 mm E-JOE				4.12 (104.6)				2.06 (52.3)			
□ □ 42-MX20-13	20 mm E-JOE	20 mm E-JOE	4.43 (112.6)			2.22 (56.3)							
□ □ 42-MX22-13	22 mm E-JOE	22 mm E-JOE	4.56 (116.0)			2.28 (58.0)							
□ □ 42-FX10-13	5/8" E-JOE	5/8" E-JOE											
□ □ 42-FX12-13	3/4" E-JOE	3/4" E-JOE	4.52 (115.0)			2.26 (57.5)							
□ □ 42-FN8-13	1/2 Female NPT	1/2 Female NPT	3.50 (89.0)			1.75 (44.5)							
□ □ 42-FN12-13	3/4 Female NPT	3/4 Female NPT	3.54 (90.0)			1.77 (45.0)							
□ □ 42-N12-13	3/4 Male NPT	3/4 Male NPT	4.14 (105.2)			2.07 (52.6)							
□ □ 42-MX20-19	20 mm E-JOE	20 mm E-JOE	0.71 (18.0)			19.0	4.87 (123.8)	2.43 (61.9)	6.30 (160.0)	2.08 (53.0)			
□ □ 42-MX22-19	22 mm E-JOE	22 mm E-JOE		30.0	5.11 (129.8)	2.66 (64.9)							
□ □ 42-MX25-19	25 mm E-JOE	25 mm E-JOE											
□ □ 42-FX12-19	3/4" E-JOE	3/4" E-JOE		19.0	4.92 (125.0)	2.46 (62.5)							
□ □ 42-FX16-19	1" E-JOE	1" E-JOE		30.0	5.27 (134.0)	2.63 (67.0)							
□ □ 42-FN12-19	3/4 Female NPT	3/4 Female NPT			4.25 (108.0)	2.12 (54.0)							
□ □ 42-FN16-19	1 Female NPT	1 Female NPT			5.00 (127.0)	2.50 (63.5)							
□ □ 42-N12-19	3/4 Male NPT	3/4 Male NPT		19.0	4.68 (119.0)	2.34 (59.5)							
□ □ 42-N16-19	1 Male NPT	1 Male NPT		30.0	5.07 (129.0)	2.53 (64.5)							
□ □ 42-FN16-25	1 Female NPT	1 Female NPT		0.98 (25.0)	Full Bore	4.44 (112.9)	2.22 (56.4)						

2-way Torque for Turning Handle lbf-in (N·m)

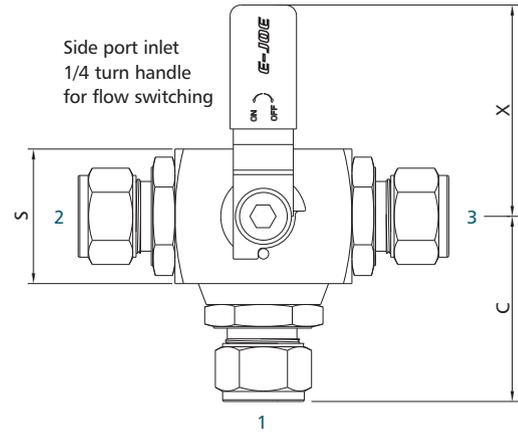
Orifice in. (mm)	Working Pressure, psig (bar)							
	0 (0)	1000 (69)	2000 (138)	3000 (207)	6000 (414)	7000 (482)	8000 (552)	10000 (690)
0.39 (10.0)	14 (1.6)	17 (2.0)	17 (2.0)	22 (2.5)	35 (4.0)	40 (4.5)	44 (5.0)	44 (5.0)
0.50 (12.7)	28 (3.2)	31 (3.5)	34 (3.8)	35 (4.0)	35 (4.0)	—	—	—
0.75 (19.0)	31 (3.5)	32 (3.6)	34 (3.8)	37 (4.2)	40 (4.5)	—	—	—

Valve that have not been actuated for a period of time may have a higher initial actuation torque.

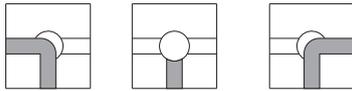
3-way Valves



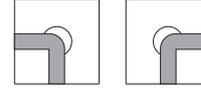
Vertical Pattern



Horizontal Pattern



Isolation



Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)								
	Connection 1	Connection 2/3			A	B	C	X	Y	S			
□ □ 42-MX6-V10	6 mm E-JOE	6 mm E-JOE	0.39 (10.0)	1.2	3.54 (90.0)	1.77 (45.0)	2.00 (51.0)	5.12 (130.0)	1.73 (44.0)	1.30 (32.0)			
□ □ 42-MX8-V10	8 mm E-JOE	8 mm E-JOE		3.7	3.60 (91.6)	1.80 (45.8)	2.02 (51.3)						
□ □ 42-MX10-V10	10 mm E-JOE	10 mm E-JOE		7.5	3.70 (94.0)	1.85 (47.0)	2.07 (52.5)						
□ □ 42-MX12-V10	12 mm E-JOE	12 mm E-JOE		1.2	3.78 (96.0)	1.89 (48.0)	2.01 (53.3)						
□ □ 42-MX14-V10	14 mm E-JOE	14 mm E-JOE		3.7	4.04 (102.5)	2.02 (51.2)	2.16 (54.8)						
□ □ 42-FX4-V10	1/4" E-JOE	1/4" E-JOE		7.5	4.24 (107.6)	2.12 (53.8)	2.13 (54.0)						
□ □ 42-FX6-V10	3/8" E-JOE	3/8" E-JOE		3.7	2.91 (74.0)	1.45 (37.0)	1.44 (36.5)						
□ □ 42-FX8-V10	1/2" E-JOE	1/2" E-JOE		7.5	3.03 (77.0)	1.51 (38.5)	1.57 (40.0)						
□ □ 42-FN4-V10	1/4 Female NPT	1/4 Female NPT		3.7	3.35 (85.0)	1.67 (42.5)	1.73 (44.0)						
□ □ 42-FN6-V10	3/8 Female NPT	3/8 Female NPT		7.5	3.36 (85.4)	1.68 (42.7)	1.90 (48.2)						
□ □ 42-FN8-V10	1/2 Female NPT	1/2 Female NPT		3.7	3.75 (95.2)	1.88 (47.6)	2.09 (53.1)						
□ □ 42-N4-V10	1/4 Male NPT	1/4 Male NPT		7.5									
□ □ 42-N6-V10	3/8 Male NPT	3/8 Male NPT											
□ □ 42-N8-V10	1/2 Male NPT	1/2 Male NPT											

Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)						
	Connection 1	Connection 2/3			A	B	C	X	Y	S	
□ □ 42-MX16-V13	16 mm E-JOE	16 mm E-JOE	0.5 (12.7)	10.0	4.04 (102.6)	2.02 (51.3)	2.41 (61.3)	5.71 (145.0)	1.89 (48.0)	1.50 (38.0)	
□ □ 42-MX18-V13	18 mm E-JOE	18 mm E-JOE			4.12 (104.6)	2.06 (52.3)	2.45 (62.3)				
□ □ 42-MX20-V13	20 mm E-JOE	20 mm E-JOE			4.43 (112.6)	2.22 (56.3)	2.61 (66.3)				
□ □ 42-MX22-V13	22 mm E-JOE	22 mm E-JOE			4.50 (114.4)	2.25 (57.2)	2.57 (65.3)				
□ □ 42-FX10-V13	5/8" E-JOE	5/8" E-JOE			4.52 (115.0)	2.26 (57.5)	2.57 (65.3)				
□ □ 42-FX12-V13	3/4" E-JOE	3/4" E-JOE			3.50 (89.0)	1.75 (44.5)	1.95 (49.5)				
□ □ 42-FN8-V13	1/2 Female NPT	1/2 Female NPT			3.54 (90.0)	1.77 (45.0)	2.16 (55.0)				
□ □ 42-FN12-V13	3/4 Female NPT	3/4 Female NPT			4.14 (105.2)	2.07 (52.6)	2.46 (62.6)				
□ □ 42-FN12-V13	3/4 Male NPT	3/4 Male NPT									
□ □ 42-MX20-V19	20 mm E-JOE	20 mm E-JOE	0.71 (18.0)	19.0	4.87 (123.8)	2.43 (61.9)	2.89 (73.4)	6.30 (160.0)	2.08 (53.0)	1.96 (50.0)	
□ □ 42-MX22-V19	22 mm E-JOE	22 mm E-JOE			5.11 (129.8)	2.66 (64.9)	3.00 (76.2)				
□ □ 42-MX25-V19	25 mm E-JOE	25 mm E-JOE			19.0	4.59 (116.6)	2.29 (58.3)				2.75 (69.8)
□ □ 42-FX12-V19	3/4" E-JOE	3/4" E-JOE			30.0	5.11 (129.8)	2.66 (64.9)				2.85 (72.4)
□ □ 42-FX16-V19	1" E-JOE	1" E-JOE			30.0	3.78 (96.0)	1.89 (48.0)				2.22 (56.5)
□ □ 42-FN12-V19	3/4 Female NPT	3/4 Female NPT			30.0	4.37 (111.0)	2.18 (55.5)				2.40 (60.8)
□ □ 42-FN16-V19	1 Female NPT	1 Female NPT			19.0	4.54 (115.2)	2.27 (57.6)				2.72 (69.1)
□ □ 42-FN12-V19	3/4 Male NPT	3/4 Male NPT			30.0	4.91 (124.8)	2.45 (62.4)				2.90 (73.9)
□ □ 42-FN16-V19	1 Male NPT	1 Male NPT									

3-way Torque for Turning Handle lbf·in (N·m)

Orifice in. (mm)	Working Pressure, psig (bar)							
	0 (0)	1000 (69)	2000 (138)	3000 (207)	6000 (414)	7000 (482)	8000 (552)	10000 (690)
0.39 (10.0)	14 (1.6)	13 (1.5)	13 (1.5)	11 (1.2)	9 (1.0)	7 (0.8)	7 (0.8)	5 (0.6)
0.50 (12.7)	28 (3.2)	28 (3.2)	26 (3.0)	22 (2.5)	17 (1.9)	—	—	—
0.75 (19.0)	31 (3.5)	29 (3.3)	26 (3.0)	25 (2.8)	18 (2.0)	—	—	—

Valve that have not been actuated for a period of time may have a higher initial actuation torque.

Options

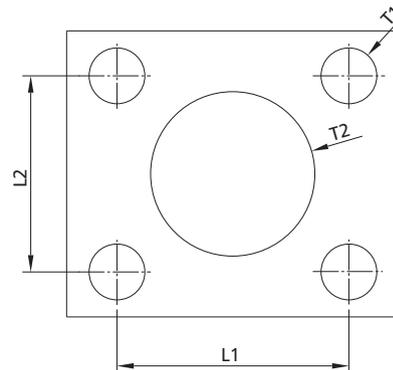
Mounting Options

Locking nut panel mounting

Orifice in. (mm)	Panel Hole in. (mm)	Panel Thickness in. (mm)
0.39 (10.0)	1.18 (30.0)	Max. 3/8 (9.5)
0.50 (12.7)	1.50 (38.0)	
0.75 (19.0)	1.50 (38.0)	

Screw hole panel mounting

Orifice in. (mm)	L1 in. (mm)	L2 in. (mm)	T1 in. (mm)	T2 in. (mm)
0.39 (10.0)	1.02 (26.0)	1.02 (26.0)	0.20 (5.0)	1.18 (30.0)
0.50 (12.7)	1.34 (34.0)	1.34 (34.0)	0.20 (5.0)	1.50 (38.0)
0.75 (19.0)	1.73 (44.0)	1.73 (44.0)	0.20 (5.0)	1.50 (38.0)



42 Series How to Order

A	B	C	D	E	F	G
Body Material	Valve Series	Inlet Type	Inlet Size	Inlet Type	Inlet Size	Orifice Size
SS	42	FN	8	FX	6	10
H	I	J	K	L		
Seat Material	Handle/Actuator	Panel Mounting	Flow Pattern	NACE MR0175		
P	EA	Y	V	SG		

A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
S1:	321 SS
91:	F91
92:	F92
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276

B	Valve Series
42:	42 Series Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
FX	Fractional Tube Fitting
MX	Metric Tube Fitting
UFB	Nut+Gasket+ Fractional Bulge Nipple
UMB	Nut + Gasket + Metric Bulge Nipple

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm
14	14 mm or M14 x 1.5
16	1" or 16 mm
18	18 mm
20	1 1/4" or 20 mm or M20 x 1.5
22	22 mm or M22 x 1.5
25	25 mm
28	28 mm
30	30 mm
32	32 mm

G	Orifice Size
10:	0.39" (10.0 mm)
13:	0.5" (12.7 mm)
19:	0.71" (18.0 mm)
25:	0.98" (25.0 mm)

H	Seat Material
	Standard with Virgin PVDF
K	PCTFE
P	PEEK

I	Handle/Actuator
	Standard with Balck Nylon Handle
PA	Pneumatic Actuator
EA	Electric Actuator

J	Panel Mounting
	Standard with no Panel Mounting
Y	Yes

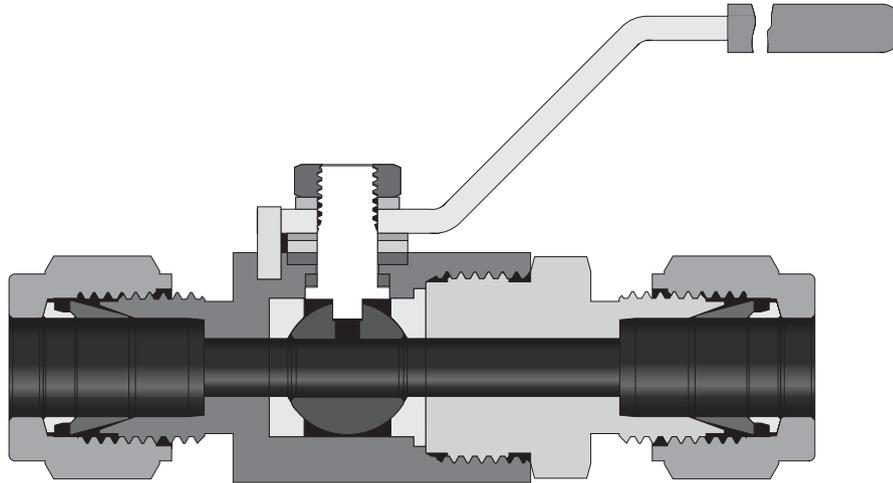
K	Flow Pattern
	Standard is Straight Flow
V	3-Way Vertical Pattern
H	3-Way Horizontal Pattern

L	NACE MR0175
	Standard with no NACE applicable
SG	With NACE MR0175

Remark:

- Standard thread pitch for metric threads are as follows:
M10 and below: 1 mm
M12 to M24: 1.5 mm
Standard thread pitch should be ignored in the ordering
NFmber, others should be specified.

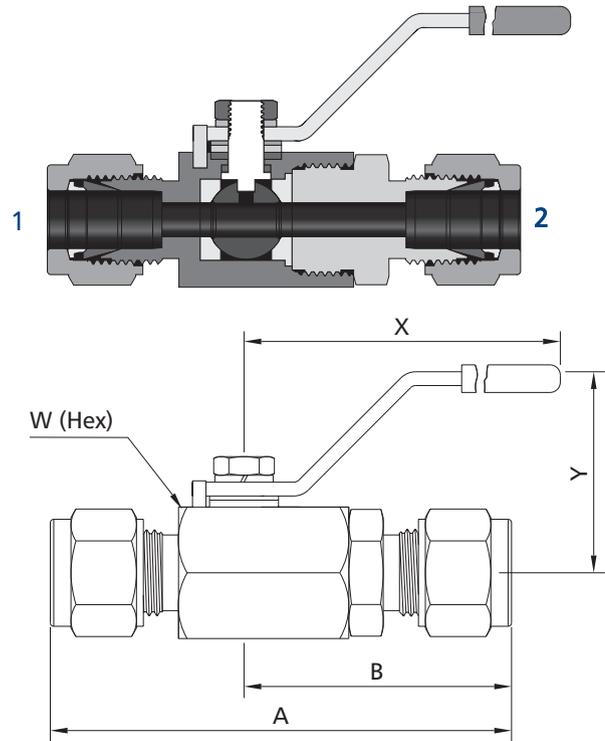
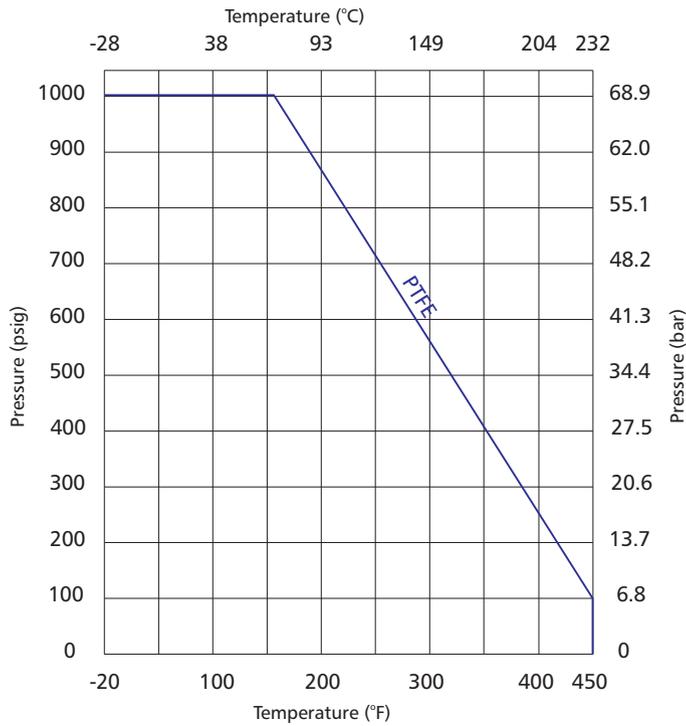
Hex Bar Stock Ball Valves



43 Series

- Compact barstock construction for high integrity.
- Blow-out proof design with internally loaded stem.
- Floating Ball design providing seat wear compensation.
- Micro-finished ball ensures a leak-tight shut-off on pressure.
- Standard lever handle, optional short handle.
- Standard maximum pressures:
 - PTFE seats: 68.9 bar (1000 psig)
 - TFM seats: 137 bar (2000 psig)
- Temperatures up to 450°F (232°C);
- Bi-directional flow.
- Low operating torque.
- Any reasonable connections available.
- Suitable for sour gas service; materials are selected in accordance with NACE MR0175/ISO 15156.
- Every valve is 100% factory tested with nitrogen.

Pressure vs. Temperature



Standard Materials of Construction

Item	Component	Valve Body Material			
		316 SS	304 SS	316L SS	Brass
1	Body	316 SS/A276	304 SS/A276	316L SS/A276	Brass/B16
2	Front Seat	PTFE/D1710			
3	Ball	316 SS/A276			
4	Back Seat	PTFE/D1710			
5	End Connector	316 SS/A276	304 SS/A276	316L SS/A276	Brass/B16
6	Bottom Packing	PTFE/D1710			
7	Washer	316 SS/A276			
8	Handle	304 SS/A240 or aluminium			
9	Sleeve	Vinyl			
10	Stem Nut	316 SS/A194			
11	Gasket	304 SS			
12	Coned-disk Spring	304 SS/A240			
13	Pin	304 SS/A276			
14	Top Packing	PTFE/D1710			
15	Stem	316 SS/A276			

Other materials available upon request.

Dimensions

Basic Ordering Number	Connection Type and Size		Orifice in. (mm)	Cv	Dimension, in. (mm)				
	Connection 1	Connection 2			A	B	W	X	Y
<input type="checkbox"/> <input type="checkbox"/> 43-MX6-5	6 mm E-JOE	6 mm E-JOE	0.18 (4.8)	1.25	2.57 (62.5)	1.50 (38.1)	3/4 (19.05)	2.36 (60)	1.18 (30)
<input type="checkbox"/> <input type="checkbox"/> 43-MX8-5	8 mm E-JOE	8 mm E-JOE			2.63 (66.8)	1.53 (38.8)			
<input type="checkbox"/> <input type="checkbox"/> 43-FX4-5	1/4" E-JOE	1/4" E-JOE			2.57 (62.5)	1.50 (38.1)			
<input type="checkbox"/> <input type="checkbox"/> 43-FX5-5	5/16" E-JOE	5/16" E-JOE			2.63 (66.8)	1.53 (38.8)			
<input type="checkbox"/> <input type="checkbox"/> 43-FN2-5	1/8 Female NPT	1/8 Female NPT			1.85 (47.0)	1.08 (27.4)			
<input type="checkbox"/> <input type="checkbox"/> 43-FP2-5	1/8 Female BSPP	1/8 Female BSPP			1.97 (50.0)	1.14 (29.0)			
<input type="checkbox"/> <input type="checkbox"/> 43-FP4-5	1/4 Female BSPP	1/4 Female BSPP			1.85 (47.0)	1.08 (27.4)			
<input type="checkbox"/> <input type="checkbox"/> 43-FN4-5	1/4 Female NPT	1/4 Female NPT							
<input type="checkbox"/> <input type="checkbox"/> 43-MX10-7	10 mm E-JOE	10 mm E-JOE	0.28 (7.1)	2.50	2.87 (72.9)	1.68 (42.7)	7/8 (22.23)		
<input type="checkbox"/> <input type="checkbox"/> 43-FX6-7	3/8" E-JOE	3/8" E-JOE			2.03 (51.6)	1.18 (30.0)			
<input type="checkbox"/> <input type="checkbox"/> 43-FP6-7	3/8 Female BSPP	3/8 Female BSPP							
<input type="checkbox"/> <input type="checkbox"/> 43-FN6-7	3/8 Female NPT	3/8 Female NPT							
<input type="checkbox"/> <input type="checkbox"/> 43-MX12-10	12 mm E-JOE	12 mm E-JOE	0.35 (9.0)	9.25	3.15 (80.0)	1.83 (46.5)	15/16 (24.0)	3.15 (80)	1.54 (39)
<input type="checkbox"/> <input type="checkbox"/> 43-FX8-10	1/2" E-JOE	1/2" E-JOE							
<input type="checkbox"/> <input type="checkbox"/> 43-FX10-10	5/8" E-JOE	5/8" E-JOE			3.24 (82.2)	1.87 (47.5)			
<input type="checkbox"/> <input type="checkbox"/> 43-FP8-10	1/2 Female BSPP	1/2 Female BSPP			2.08 (53.0)	1.12 (28.5)			
<input type="checkbox"/> <input type="checkbox"/> 43-FN8-10	1/2 Female NPT	1/2 Female NPT							
<input type="checkbox"/> <input type="checkbox"/> 43-MX14-13	14 mm E-JOE	14 mm E-JOE	0.49 (12.5)	12.65	3.50 (88.9)	2.00 (50.8)	1 1/4 (31.75)	3.94 (100)	1.77 (45)
<input type="checkbox"/> <input type="checkbox"/> 43-MX16-13	16 mm E-JOE	16 mm E-JOE							
<input type="checkbox"/> <input type="checkbox"/> 43-MX18-13	18 mm E-JOE	18 mm E-JOE							
<input type="checkbox"/> <input type="checkbox"/> 43-FX12-13	3/4" E-JOE	3/4" E-JOE			2.48 (63.0)	1.30 (33.0)			
<input type="checkbox"/> <input type="checkbox"/> 43-FP12-13	3/4 Female BSPP	3/4 Female BSPP			2.39 (60.7)	1.20 (30.5)			
<input type="checkbox"/> <input type="checkbox"/> 43-FN12-13	3/4 Female NPT	3/4 Female NPT							
<input type="checkbox"/> <input type="checkbox"/> 43-MX22-16	22 mm E-JOE	22 mm E-JOE	0.63 (16.0)	17.35	3.96 (100.6)	2.24 (57.1)	1 5/8 (41.27)		
<input type="checkbox"/> <input type="checkbox"/> 43-MX25-16	25 mm E-JOE	25 mm E-JOE			4.31 (109.5)	2.42 (61.5)			
<input type="checkbox"/> <input type="checkbox"/> 43-FX16-16	1" E-JOE	1" E-JOE			3.25 (82.6)	1.63 (41.3)			
<input type="checkbox"/> <input type="checkbox"/> 43-FP16-16	1 Female BSPP	1 Female BSPP			3.00 (76.5)	1.50 (38.1)			
<input type="checkbox"/> <input type="checkbox"/> 43-FN16-16	1 Female NPT	1 Female NPT							

43 Series How to Order

A Body Material	B Valve Series	C Inlet Type	D Inlet Size	E Inlet Type	F Inlet Size	G Orifice Size
SS	43	FN	4	FX	6	5
H Seat Material	I Handle	J NACE MR0175				
P	U	SG				

A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
S1:	321 SS
91:	F91
92:	F92
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276

B	Valve Series
43:	43 Series Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
FX	Fractional Tube Fitting
MX	Metric Tube Fitting
UFB	Nut+Gasket+ Fractional Bulge Nipple
UMB	Nut+ Gasket + Metric Bulge Nipple

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm
14	14 mm or M14 x 1.5
16	1" or 16 mm
18	18 mm
20	1 1/4" or 20 mm or M20 x 1.5
22	22 mm or M22 x 1.5
25	25 mm

G	Orifice Size
5:	0.18" (4.8 mm)
7:	0.28" (7.1 mm)
10:	0.35" (8.9 mm)
13:	0.47" (12.0 mm)
16:	0.63" (16.0 mm)

H	Seat Material
	Standard with Virgin PVDF
T	Reinforced PTFE

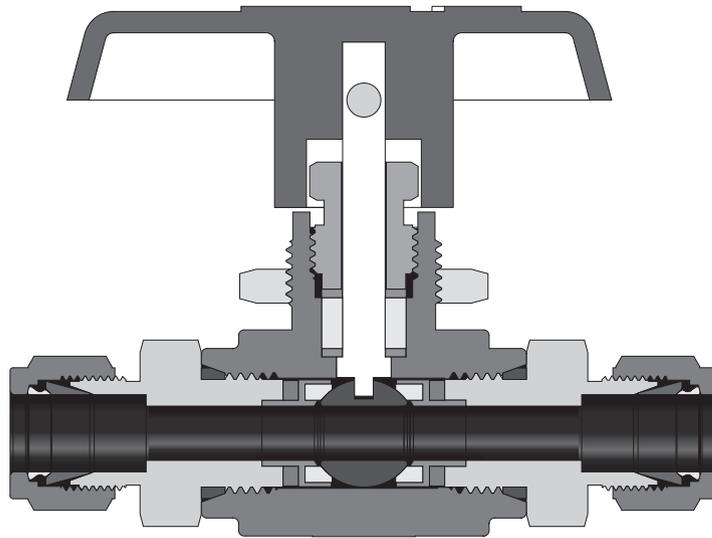
I	Handle
	Standard with Lever Handle Control
U	Black Short PP Handle

J	NACE MR0175
	Standard with no NACE applicable
SG	With NACE MR0175

Remark:

- Standard thread pitch for metric threads are as follows:
M10 and below: 1 mm
M12 to M24: 1.5 mm
Standard thread pitch should be ignored in the ordering
NFmber, others should be specified.

High Performance Ball Valves

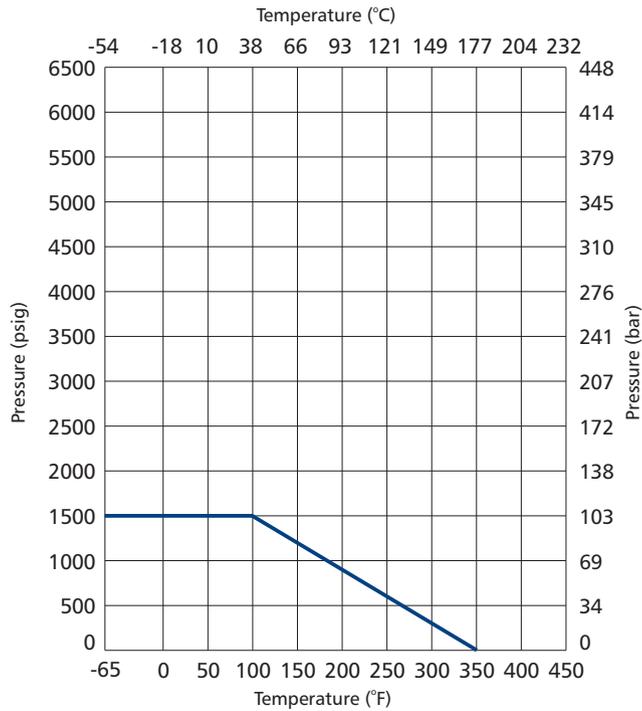


41 Series

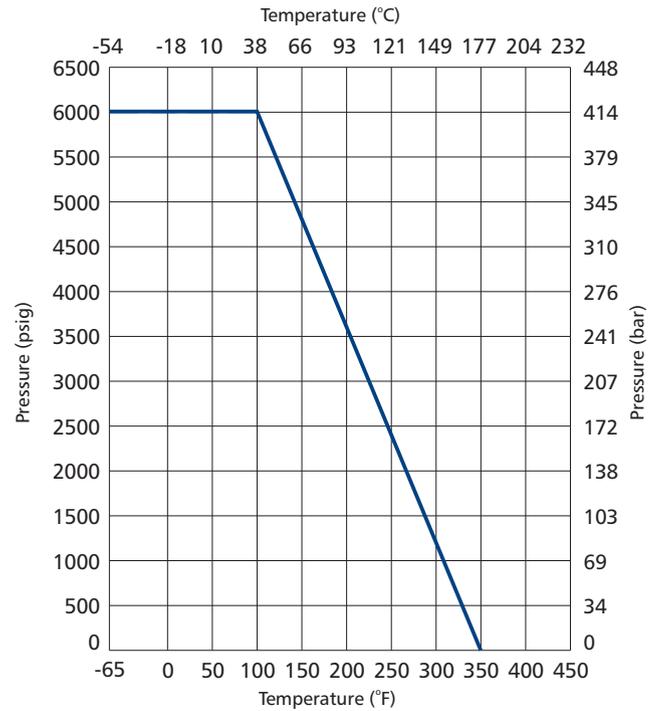
- Maximum working pressure: 6000 psig (414 bar)
- Working temperature: -65°F to 450°F (-54°C to 232°C)
- Bi-directional flow for straight valves
- Low operating torque
- Handle as flow direction indicator
- Positive handle stop
- Manual, electric or pneumatic actuation available
- Options for handle color
- Leak-tight performance testing for every valve at the maximum working pressure with nitrogen

Pressure vs. Temperature

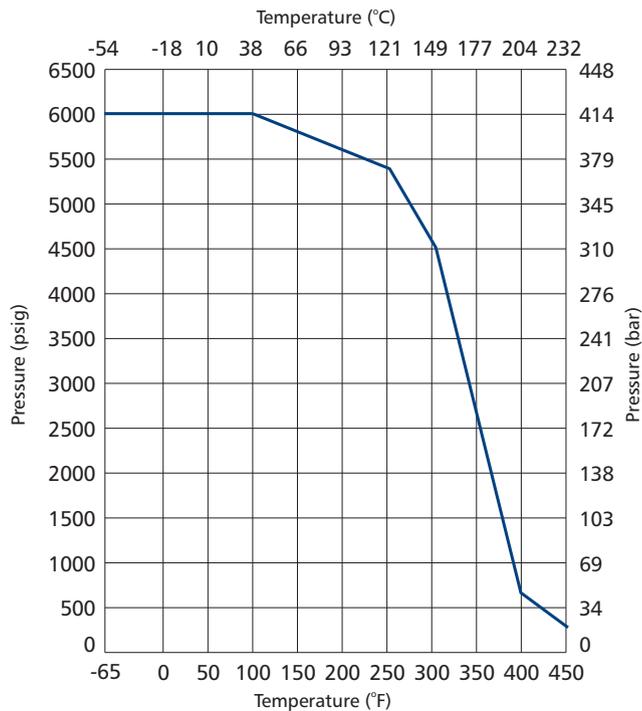
Stainless Steel Valves with PTFE Seat



Stainless Steel Valves with PCTFE Seat

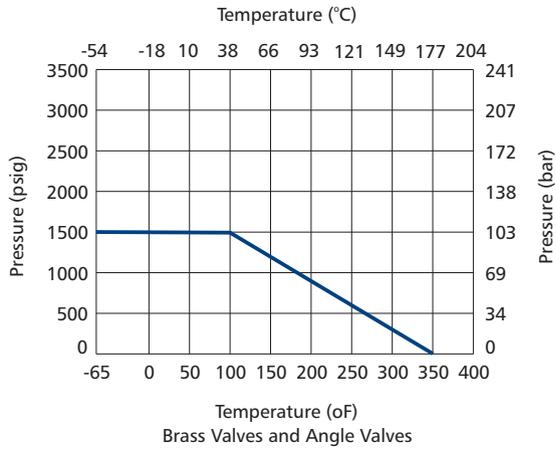


Stainless Steel Valves with PEEK Seat

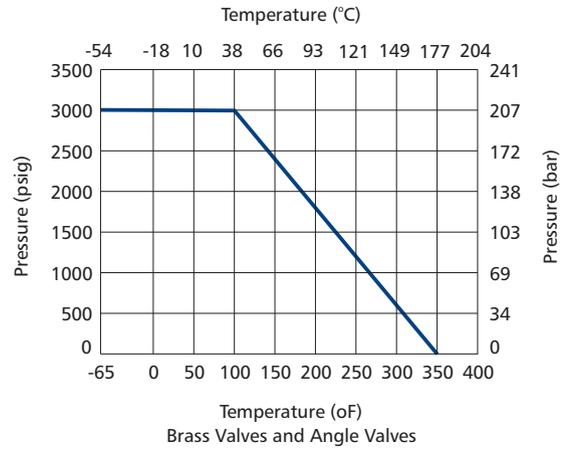


Pressure vs. Temperature

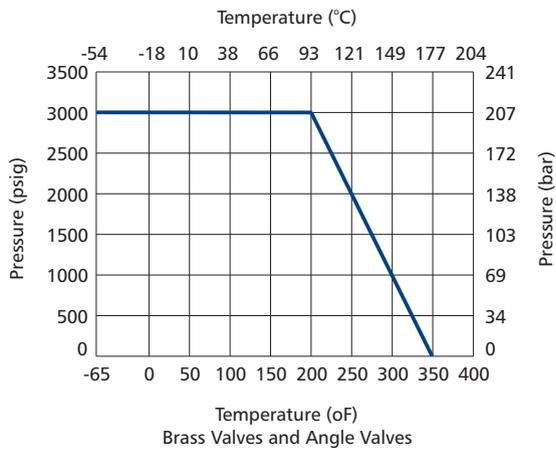
Brass Valves with PTFE Seat



Brass Valves with PCTFE Seat



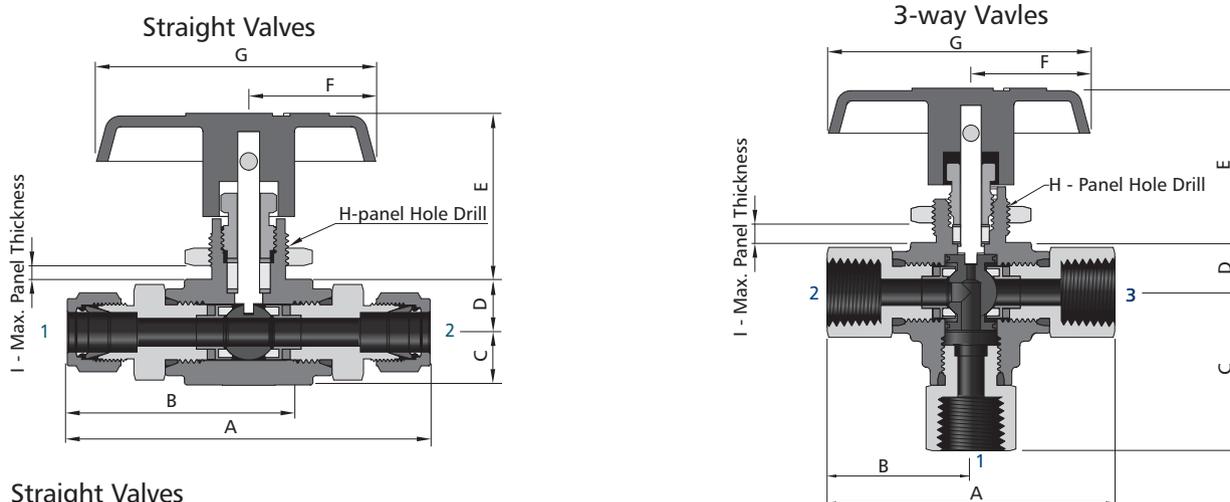
Brass Valves with PEEK Seat



Temperature Ranges

Packing Materials	Temperature Range °F (°C)
PTFE	-40 to 450 (-40 to 232)
Buna-N	-40 to 250 (-40 to 121)
Fluorocarbon FKM	-10 to 400 (-23 to 204)
Neoprene	-40 to 250 (-40 to 121)

Standard Materials of Construction



Straight Valves

Item		Valve Body Material	
		Stainless steel	Brass
1	Handle	Nylon or aluminium	
2	Packing Nut	316 SS/A276	C34000/B453
3	Panel Nut	316 SS/A276	C36000/B16
4	Body	CF8M/A351	C37700/B283
5	End connector	316 SS/A479	C36000/B16
6	Connector O-ring	PTFE	
7	Ball	316 SS/A479	
8	Seat	PTFE or PCTFE or PEEK	
9	Seat Retainer	316 SS/A276	C36000/B16
10	Stem Washer	316/A276	
11	Stem Packing	PTFE or fluorocarbon FKM or neoprene or buna N	
12	Stem	316 SS/A276	
13	Set Screw	Stainless steel	
	Lubricants	Fluorinated-based and silicone-based	

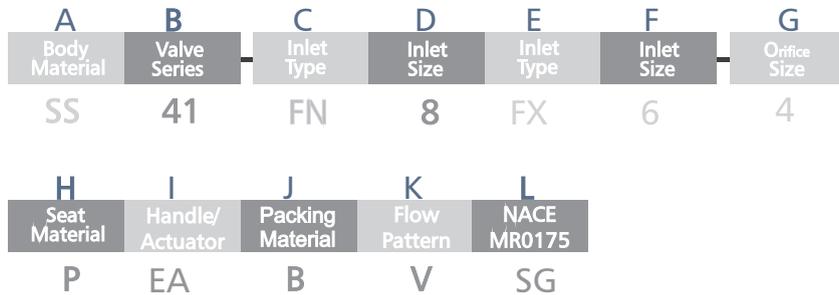
3-way Valves

Item	Component	Valve Body Material	
		Stainless Steel	Brass
1	Handle	Nylon or aluminium	
2	Packing Nut	316 SS/A276	C34000/B453
3	Panel Nut	316 SS/A276	C36000/B16
4	Body	CF8M /A351	C37700/B283
5	End Connector	316 SS/A479	C36000/B16
6	Connector O-ring	PTFE	
7	Packing	PTFE	
8	Seat	PTFE or PCTFE or PEEK	
9	Ball	316 SS/A479	
10	Seat Retainer	316 SS/A276	C36000/B16
11	Stem Back-up Ring	PEEK	
12	Stem Packing	PTFE or fluorocarbon FKM or neoprene or buna N	
13	Stem Washer	316 SS/A276	
14	Stem	316 SS/A276	
15	Set Screw	Stainless steel	
	Lubricants	Fluorinated-based and silicone-based	

3-way Valves Dimensions

Basic Ordering Number	Connection type and size		Orifice in. (mm)	Cv	Dimension, in. (mm)														
	Connection 1	Connection 2/3			A	B	C	D	E	F	G	H	I						
□□41-FX1-V1	1/16" E-JOE	1/16" E-JOE	0.052 (1.3)	0.06	2.60 (66.0)	1.30 (33.0)	1.39 (35.3)												
□□41-MX3-V1	3 mm E-JOE	3 mm E-JOE			2.74 (69.6)	1.37 (34.8)													
□□41-FX2-V2	1/8" E-JOE	1/8" E-JOE	0.093 (2.4)	0.21	2.72 (69.1)	1.36 (34.5)													
□□41-MX3-V2	3 mm E-JOE	3 mm E-JOE			2.74 (69.6)	1.37 (34.8)													
□□41-FR2-V4	1/8 Female BSPT	1/8 Female BSPT	0.165 (4.2)	0.63	2.14 (54.4)	1.07 (27.2)	1.15 (29.2)	0.33 (8.4)	1.00 (25.4)	1.16 (29.5)	1.88 (47.8)	0.58 (14.7)	0.18 (4.6)						
□□41-FP2-V4	1/8 Female BSPP	1/8 Female BSPP																	
□□41-FN2-V4	1/8 Female NPT	1/8 Female NPT																	
□□41-RT2-V4	1/8 Male BSPT	1/8 Male BSPT																	
□□41-BP2-V4	1/8 Male BSPP	1/8 Male BSPP																	
□□41-N2-V4	1/8 Male NPT	1/8 Male NPT																	
□□41-RT4-V4	1/ 4 Male BSPT	1/4 Male BSPT																	
□□41-BP4-V4	1/ 4 Male BSPP	1/4 Male BSPP																	
□□41-N4-V4	1/ 4 Male NPT	1/4 Male NPT																	
□□41-FX4-V5	1/ 4" E-JOE	1/4" E-JOE			0.187(4.7)	0.75	3.48 (88.4)							1.74 (44.2)	1.89 (48.0)				
□□41-MX6-V5	6 mm E-JOE	6 mm E-JOE	3.50 (89.0)	1.75 (44.5)			1.88 (47.8)												
□□41-FX6-V6	3/8" E-JOE	3/8" E-JOE	0.250(6.4)	1.35	3.60 (91.4)	1.80 (45.7)	1.94 (49.3)	0.47 (11.9)	1.48 (37.5)	0.75 (19.1)	2.52 (64.0)	0.77 (19.6)	0.25 (6.4)						
□□41-MX8-V6	8 mm E-JOE	8 mm E-JOE	0.250(6.4)	1.35	3.56 (90.4)	1.78 (45.2)	1.91 (48.5)												
□□41-MX10-V6	10 mm E-JOE	10 mm E-JOE			3.62 (92.0)	1.81 (46.0)	1.95 (49.5)												
□□41-FR4-V6	1/4 Female BSPT	1/4 Female BSPT	0.250(6.4)	1.35	3.02 (76.8)	1.51 (38.4)	1.65 (41.9)							0.47 (11.9)	1.48 (37.5)	0.75 (19.1)	2.52 (64.0)	0.77 (19.6)	0.25 (6.4)
□□41-FP4-V6	1/4 Female BSPP	1/4 Female BSPP																	
□□41-FN4-V6	1/4 Female NPT	1/4 Female NPT																	
□□41-RT4-V6	1/4 Male BSPT	1/4 Male BSPT																	
□□41-BP4-V6	1/4 Male BSPP	1/4 Male BSPP																	
□□41-N4-V6	1/4 Male NPT	1/4 Male NPT																	
□□41-RT6-V6	3/8 Male BSPT	3/8 Male BSPT																	
□□41-BP6-V6	3/8 Male BSPP	3/8 Male BSPP																	
□□41-N6-V6	3/8 Male NPT	3/8 Male NPT																	
□□41-FX8-V10	1/2" E-JOE	1/2" E-JOE						0.406 (10.3)	3.62	4.68 (118.8)	2.34(59.4)	2.68(68.0)	0.70 (17.8)						
□□41-FX12-V10	3/4" E-JOE	3/4" E-JOE																	
□□41-MX12-V10	12 mm E-JOE	12 mm E-JOE																	
□□41-MX14-V10	14 mm E-JOE	14 mm E-JOE																	
□□41-MX16-V10	16 mm E-JOE	16 mm E-JOE																	
□□41-MX18-V10	18 mm E-JOE	18 mm E-JOE																	
□□41-MX20-V10	20 mm E-JOE	20 mm E-JOE																	
□□41-MX22-V10	22 mm E-JOE	22 mm E-JOE																	
□□41-FN6-V10	3/8 Female NPT	3/8 Female NPT																	
□□41-FN8-V10	1/2 Female NPT	1/2 Female NPT																	
□□41-FP12-V10	3/4 Female BSPP	3/4 Female BSPP																	
□□41-FN12-V10	3/4 Female NPT	3/4 Female NPT																	
□□41-RT8-V10	1/2 Male BSPT	1/2 Male BSPT																	
□□41-BP8-V10	1/2 Male BSPP	1/2 Male BSPP																	
□□41-N8-V10	1/2 Male NPT	1/2 Male NPT																	
□□41-RT12-V10	3/4 Male BSPT	3/4 Male BSPT																	
□□41-BP12-V10	3/4 Male BSPP	3/4 Male BSPP																	
□□41-N12-V10	3/4 Male NPT	3/4 Male NPT																	

41 Series How to Order



A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
S1:	321 SS
91:	F91
92:	F92
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276

B	Valve Series
41:	41 Series Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
FX	Fractional Tube Fitting
MX	Metric Tube Fitting
UFB	Nut+Gasket+ Fractional Bulge Nipple
UMB	Nut+ Gasket + Metric Bulge Nipple

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm
14	14 mm or M14 x 1.5
16	1" or 16 mm
18	18 mm
20	1 1/4" or 20 mm or M20 x 1.5
22	22 mm or M22 x 1.5
24	M24 x1.5 mm

G	Orifice Size
1:	0.052" (1.3 mm)
2:	0.093" (2.4 mm)
3:	0.125" (3.2 mm)
4:	0.165" (4.2 mm)
5:	0.187" (4.7 mm)
6:	0.25" (6.4 mm)
10:	0.406" (10.3 mm)

H	Seat Material
Standard with Virgin PTFE	
K	PCTFE
P	PEEK

I	Packing Material
Standard with Reinforced PTFE	
B	Buna N
N	Neoprene
V	Fluorocarbon FKM

J	Handle/Actuator
Standard with Balck Nylon Handle	
PA	Pneumatic Actuator
EA	Electric Actuator

K	Flow Pattern
Standard is Straight Flow	
V	3-Way Vertical Pattern

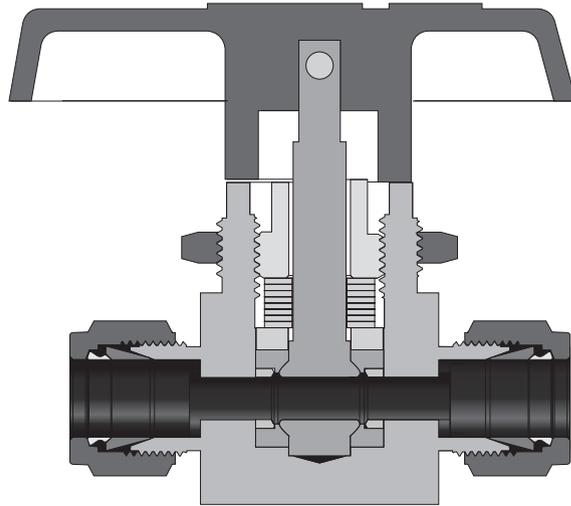
L	NACE MR0175
Standard with no NACE applicable	
SG	With NACE MR0175

Remark:

- Standard thread pitch for metric threads are as follows:
M10 and below: 1 mm
M12 to M24: 1.5 mm
Standard thread pitch should be ignored in the ordering NFmber, others should be specified.

One-piece Instrument Ball Valves

46 Series

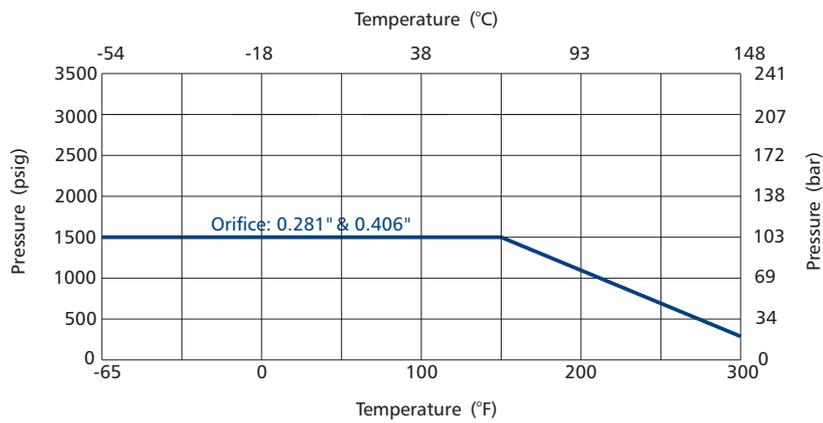
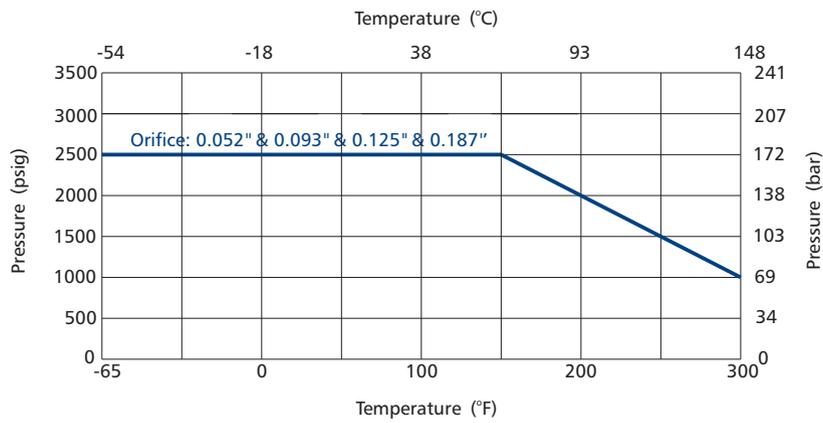
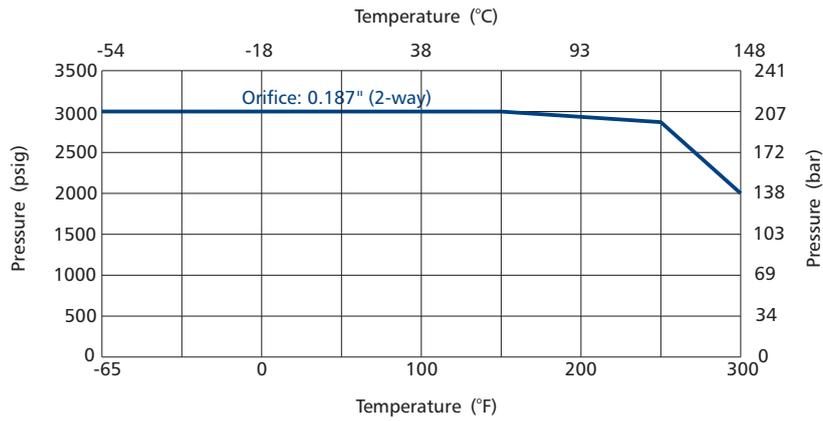


46 Series

- Maximum working pressure: 3000 psig (207 bar)
- Working temperature: -65°F to 300°F (-54°C to 148°C)
- Size from 1/16" to 3/4" or 3 mm to 18 mm
- 2-, 3-, 4-, 5-, 6- and 7-way models for on-off, switching and crossover service available
- One-piece body and one piece ball stem
- In-line inspection and repair after system relieved by top entry design
- Thermal cycle performance improved and wear compensated by live-loaded design
- Any reasonable connections available
- Pneumatic and electric actuation available
- Handle of different colors available for option
- Full operating pressure at any port
- Leak-tight performance testing for every valve at the maximum working pressure with nitrogen

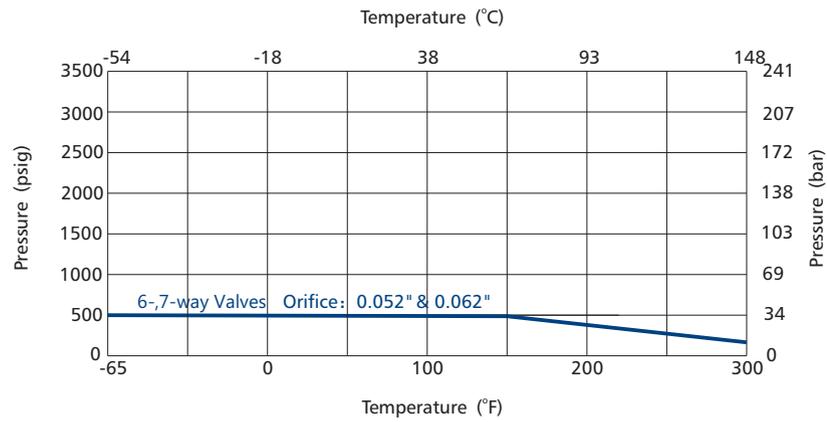
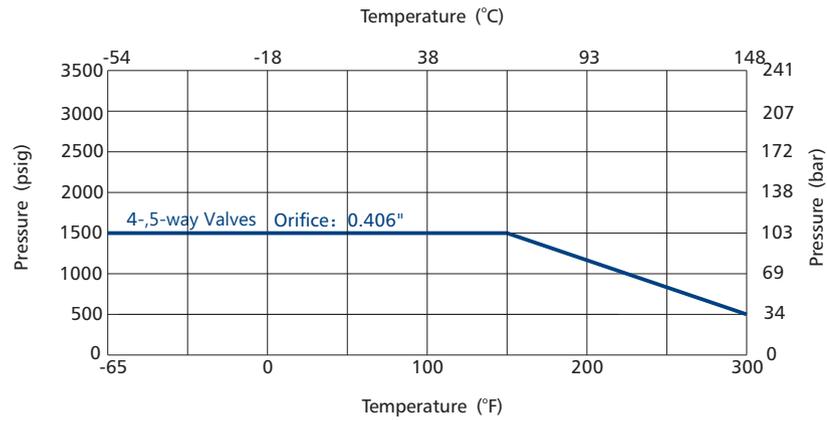
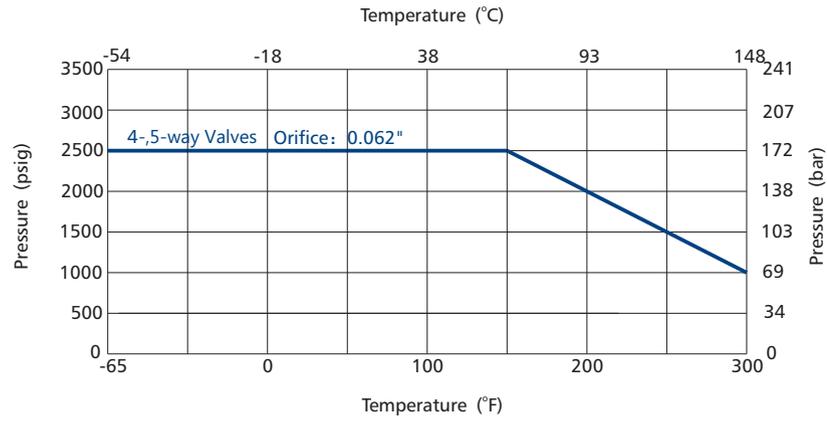
Pressure vs. Temperature

2-, 3-way Valves

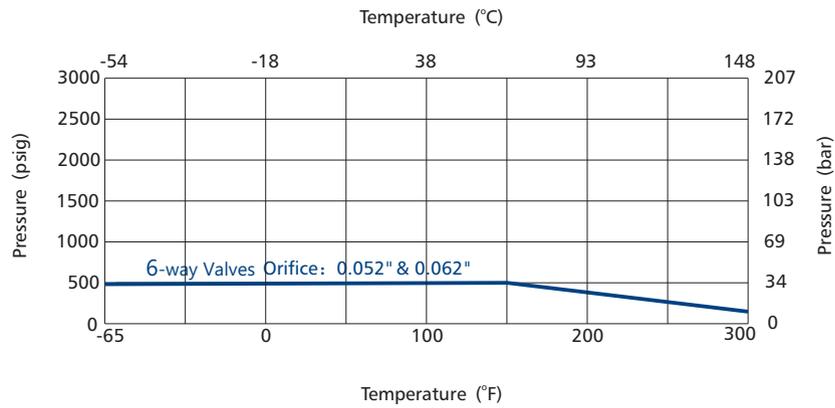
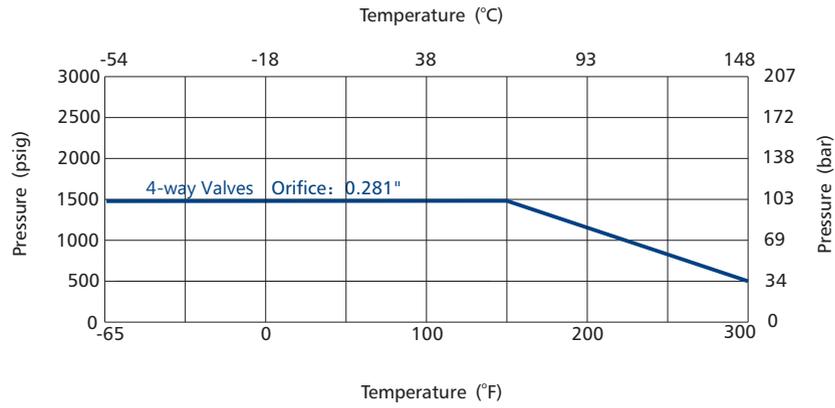
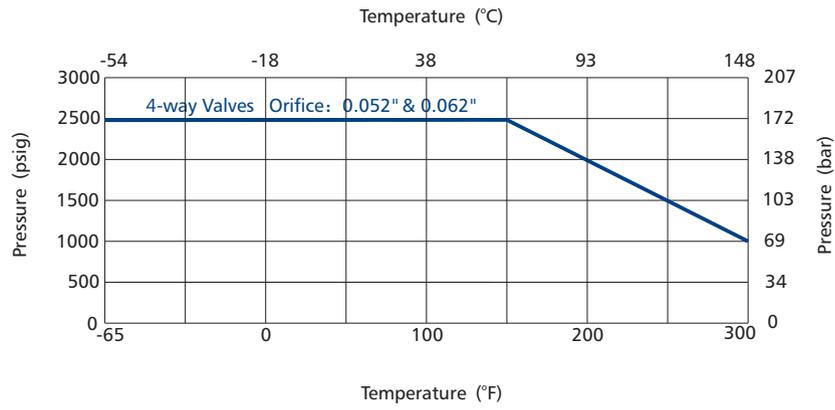


4-,5-,6-,7-way Valves

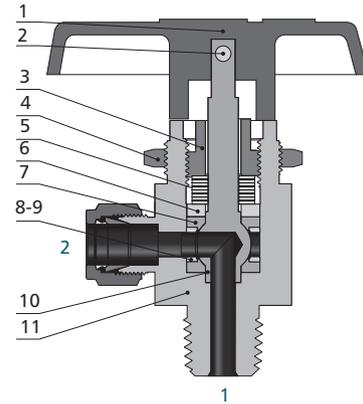
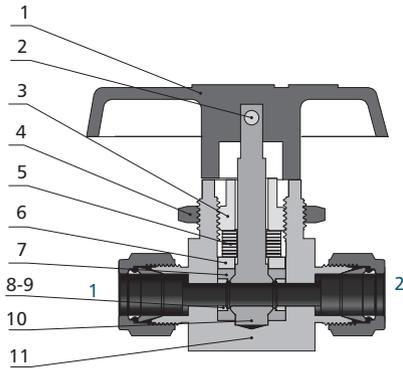
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Crossover (4-,6-way) Valves



Standard Materials of Construction

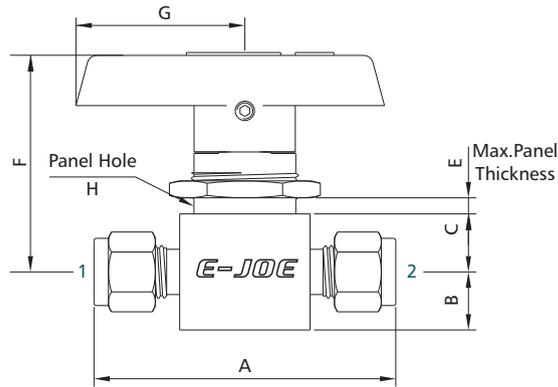


Item	Component	Valve Body Material		
		Stainless Steel	Brass	Alloy 400
		Material Grade/ASTM Specification		
1	Handle	Nylon or Aluminium		
2	Set Screw	S17400 SS/A564		
3	Packing Bolt	Powdered metal 300 series SS /B783 or 316 SS/A276,A479	Brass C36000/B16	Alloy 400/B164
4	Panel Nut	Powdered metal 300 series SS /B783 or 316 SS/A276,A479	Brass C36000/B16	Powdered metal 300 series SS /B783 or 316 SS/A276,A479
5	Dishing Spring	S17700/A693		
6	Gland	Powdered metal 300 series SS /B783 or 316 SS/A276	Brass C36000/B16	Alloy 400/B164
7	Packing Seat	PTFE/D1710 or UHMWPE/D4020		
8	Support Ring	Fluorocarbon-coated metal 300 series SS/B783	Fluorocarbon-coated brass powdered metal	Fluorocarbon-coated alloy 400 powdered metal
9	Support Disc			
10	Ball Stem	316 SS/A276	Brass C36000/B16	Alloy 400/B164
11	Body	316 SS/A276	Brass C36000/B16	Alloy 400/B164
Wetted Lubricant		Fluorinated-based and silicone-based		
Non-wetted Lubricant		Molybdenum disulfide with hydrocarbon binder coat		

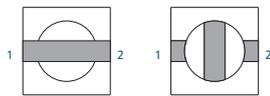
Dimensions

2-way Vavles

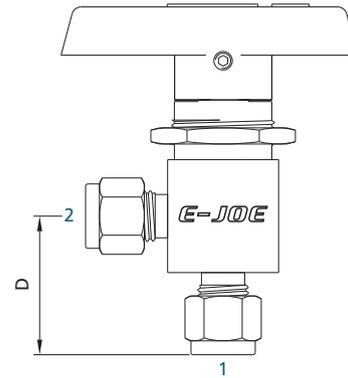
Straight



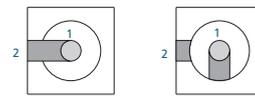
Open Close



Angle



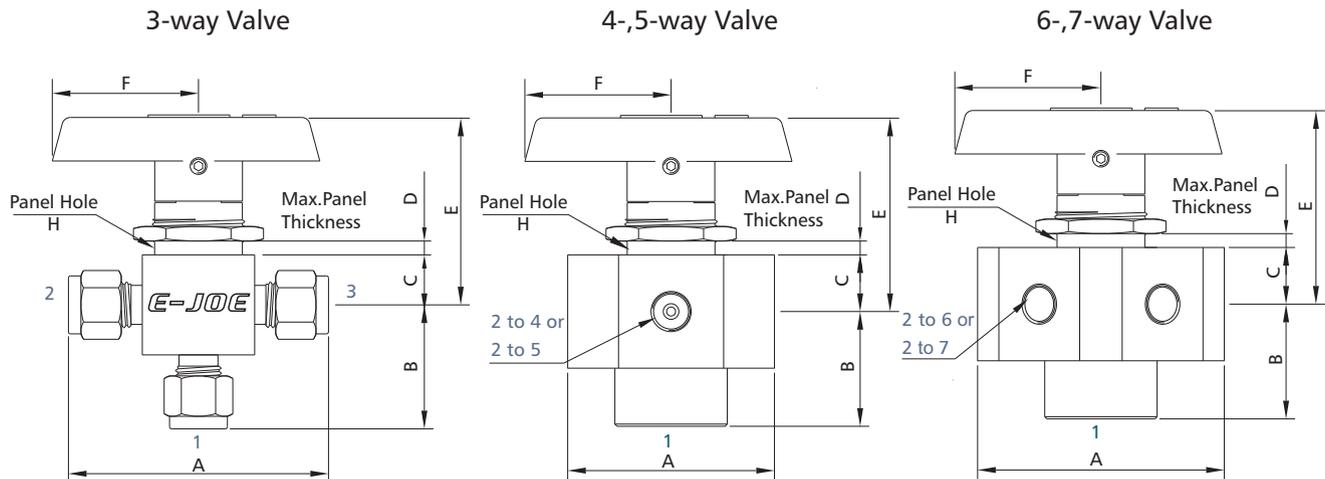
Open Close



Basic Ordering Number	Connection Type and Size	Orifice in. (mm)	Cv		Dimension, in.(mm)								
			Straight	Angle	A	B	C	D	E	F	G	H	
□□460-FX1	1/16" E-JOE	0.052 (1.3)	0.10	—	1.68 (42.7)								
□□462-FX2	1/8" E-JOE	0.093 (2.4)	0.20	0.15	2.01 (51.1)	0.28 (7.1)	0.34 (8.6)	0.97 (24.6)	1/4 (6.4)	1.36 (34.5)	1.12 (28.4)	19/32 (15.1)	
□□463-FX4	1/4" E-JOE	0.125 (3.2)	0.60	0.35	2.21 (56.1)			1.07 (27.2)					
□□465-FX4		0.187 (4.8)	1.40	0.90	2.39 (60.7)	0.38 (9.7)	0.44 (11.2)	1.17 (29.7)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)	
□□465-FX6	3/8" E-JOE	0.281 (7.1)	1.50		2.58 (65.5)			1.29 (32.8)					
□□467-FX6		0.281 (7.1)	6.00	2.00	3.05 (77.5)	0.56 (14.2)	0.56 (14.2)	1.43 (36.3)	3/8 (9.5)	2.07 (52.6)	2.00 (50.8)	1 1/8 (28.6)	
□□4610-FX8	1/2" E-JOE	0.406 (10.3)	12.00	4.60	3.92 (99.6)	0.69 (17.5)	0.69 (17.5)	1.74 (44.2)		2.43 (61.7)	3.00 (76.2)	1 1/2 (38.1)	
□□4610-FX12	3/4" E-JOE		6.40	3.80									
□□462-MX3	3 mm E-JOE	0.093 (2.4)	0.20	0.15	2.01 (51.1)	0.28 (7.1)	0.34 (8.6)	0.97 (24.6)	1/4 (6.4)	1.36 (34.5)	1.36 (34.5)	19/32 (15.1)	
□□463-MX6	6 mm E-JOE	0.125 (3.2)	0.60	0.35	2.21 (56.1)			1.07 (27.2)					
□□465-MX6		0.187 (4.8)	1.40	0.90	2.39 (60.7)	0.38 (9.7)	0.44 (11.2)	1.17 (29.7)	3/16 (4.8)	1.47 (37.3)	1.47 (37.3)	25/32 (19.8)	
□□465-MX8	8 mm E-JOE	0.281 (7.1)	1.50		2.46 (62.5)			1.20 (30.5)					
□□467-MX10	10 mm E-JOE	0.281 (7.1)	6.00	2.00	3.07 (78.0)	0.56 (14.2)	0.56 (14.2)	1.43 (36.3)	3/8 (9.5)	2.07 (52.6)	2.07 (52.6)	1 1/8 (28.6)	
□□4610-MX12	12 mm E-JOE	0.406 (10.3)	12.00	4.60	3.92 (99.6)	0.69 (17.5)	0.69 (17.5)	1.74 (44.2)		2.43 (61.7)	2.43 (61.7)	1 1/2 (38.1)	

Basic Ordering Number	Connection Type and Size	Orifice in. (mm)	Cv		Dimension, in.(mm)							
			Straight	Angle	A	B	C	D	E	F	G	H
□□463-FN2	1/8 Female NPT	0.125 (3.2)	0.50	0.30	1.63 (41.4)	0.28 (7.1)	0.34 (8.6)	0.81 (20.6)	1/4 (6.4)	1.36 (34.5)	1.12 (28.4)	19/32 (15.1)
□□465-FN2		0.187 (4.8)	1.20	0.70	2.0 (50.8)	0.38 (9.7)	0.44 (11.2)	1.0 (25.4)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)
□□465-FN4	1/4 Female NPT	0.90	0.75	2.06 (52.3)			1.03 (26.2)					
□□467-FN4			0.281 (7.1)	3.00	1.70	2.50 (63.5)	0.56 (14.2)	0.56 (14.2)	1.25 (31.8)	3/8 (9.5)	2.07 (52.6)	2.00 (50.8)
□□467-FN6	3/8 Female NPT	2.60	1.50									
□□4610-FN8	1/2 Female NPT	0.406 (10.3)	6.30	3.50	3.12 (79.2)	0.69 (17.5)	0.69 (17.5)	1.56 (39.6)		2.43 (61.7)	3.00 (76.2)	1 1/2 (38.1)
□□465-N4	1/4 Female NPT	0.187 (4.8)	1.20	0.75	2.00 (50.8)	0.38 (9.7)	0.44 (11.2)	1.03 (26.2)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)
□□465-FR4	1/4 Female BSPT		0.90		2.06 (52.3)							
□□467-FR6	3/8 Female BSPT	0.281 (7.1)	2.60	—	2.50 (63.5)	0.56 (14.2)	0.56 (14.2)	—	3/8 (9.5)	2.07 (52.6)	2.00 (50.8)	1 1/8 (28.6)
□□4610-FR8	1/2 Female BSPT	0.406 (10.3)	6.30		3.12 (79.2)	0.69 (17.5)	0.69 (17.5)					
□□465-N4FX4	1/4 Male NPT 1/4" E-JOE	0.187 (4.8)	1.60	0.75	2.20 (55.9)	0.38 (9.7)	0.44 (11.2)	1.03 (26.2)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)

Switching (3-,4-,5-,6- and 7-way) Valves



3L Flow Pattern



4L Flow Pattern



5L Flow Pattern



6L Flow Pattern



7L Flow Pattern



Special Flow Pattern

3HL Flow Pattern



5H Flow Pattern



5LL Flow Pattern



5HL Flow Pattern



Basic Ordering Number	Connection Type and Size	Orifice in. (mm)	Cv	Dimension, in.(mm)							
				A	B	C	D	E	F	H	
3-way Valve											
□□461-FX1-3L	1/16" E-JOE	0.052 (1.3)	0.08	1.68 (42.7)	0.81 (20.6)						
□□462-FX2-3L	1/8" E-JOE	0.093 (2.4)	0.15	2.01 (51.1)	0.97 (24.6)	0.34 (8.6)	1/4 (6.4)	1.36 (34.5)	1.13 (28.7)	19/32 (15.1)	
□□463-FX4-3L	1/4" E-JOE	0.125 (3.2)	0.35	2.21 (56.1)	1.07 (27.2)						
□□465-FX4-3L		0.187 (4.8)	0.90	2.39 (60.7)	1.17 (29.7)	0.44 (11.2)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)	
□□467-FX6-3L	3/8" E-JOE	0.281 (7.1)	2.00	2.89 (73.4)	1.43 (36.3)	0.56 (14.2)		2.07 (52.6)	2.00 (50.8)	1 1/8 (28.6)	
□□4610-FX8-3L	1/2" E-JOE	0.406 (10.3)	4.60	3.48 (88.4)	1.74 (44.2)	0.69 (17.5)	3/8 (9.5)	2.43 (61.7)	3.00 (76.2)	1 1/2 (38.1)	
□□4610-FX12-3L	3/4" E-JOE		4.90								

Basic Ordering Number	Connection Type and Size	Orifice in. (mm)	Cv	Dimension, in.(mm)						
				A	B	C	D	E	F	H
<input type="checkbox"/> 462-MX3-3L	3 mm E-JOE	0.093 (2.4)	0.15	2.01 (51.1)	0.97 (24.6)	0.34 (8.6)	1/4 (6.4)	1.36 (34.5)	1.13 (28.7)	19/32 (15.1)
<input type="checkbox"/> 463-MX6-3L	6 mm E-JOE	0.125 (3.2)	0.35	2.21 (56.1)	1.07 (27.2)					
<input type="checkbox"/> 465-MX6-3L		8 mm E-JOE	0.187 (4.8)	0.90	2.39 (60.7)	1.17 (29.7)	0.44 (11.2)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)
<input type="checkbox"/> 465-MX8-3L	0.80			2.46 (62.5)	1.20 (30.5)					
<input type="checkbox"/> 467-MX10-3L	10 mm E-JOE	0.281 (7.1)	2.00	2.89 (73.4)	1.43 (36.3)	0.56 (14.2)	3/8 (9.5)	2.07 (52.6)	2.00 (50.8)	1 1/8 (28.6)
<input type="checkbox"/> 467-MX12-3L	12 mm E-JOE	0.406 (10.3)	4.60	3.48 (88.4)	1.74 (44.2)			0.69 (17.5)	2.43 (61.7)	3.00 (76.2)
<input type="checkbox"/> 463-FN2-3L	1/8 Female NPT	0.125 (3.2)	0.30	1.63 (41.4)	0.81 (20.6)	0.34 (8.6)	1/4 (6.4)	1.36 (34.5)	1.13 (28.7)	19/32 (15.1)
<input type="checkbox"/> 465-FN4-3L	1/4 Female NPT	0.187 (4.8)	0.75	2.06 (52.3)	1.03 (26.2)	0.44 (11.2)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)
<input type="checkbox"/> 467-FN4-3L				3/8 Female NPT	0.281 (7.1)	1.70	2.50 (63.5)	1.25 (31.8)	0.56 (14.2)	3/8 (9.5)
<input type="checkbox"/> 467-FN6-3L	1.50	0.406 (10.3)	3.50		3.13 (79.5)	1.56 (39.6)	0.69 (17.5)	2.43 (61.7)	3.00 (76.2)	
<input type="checkbox"/> 4610-FN8-3L	1/2 Female NPT			0.406 (10.3)	3.50	3.13 (79.5)	1.56 (39.6)	0.69 (17.5)	2.43 (61.7)	3.00 (76.2)
<input type="checkbox"/> 465-FR4-3L	1/4 Female BSPT	0.187 (4.8)	0.75	2.06 (52.3)	1.03 (26.2)	0.44 (11.2)	3/16 (4.8)	1.47 (37.3)	1.53 (38.9)	25/32 (19.8)
<input type="checkbox"/> 467-FR6-3L	3/8 Female BSPT	0.281 (7.1)	1.50	2.50 (63.5)	1.25 (31.8)	0.56 (14.2)	3/8 (9.5)	2.07 (52.6)	2.00 (50.8)	1 1/8 (28.6)
<input type="checkbox"/> 4610-FR8-3L	1/2 Female BSPT	0.406 (10.3)	3.50	3.13 (79.5)	1.56 (39.6)	0.69 (17.5)		2.43 (61.7)	3.00 (76.2)	1 1/2 (38.1)

4- & 5-way Valve

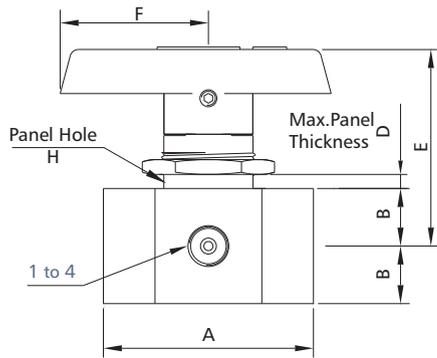
<input type="checkbox"/> 461-FX2-4	1/8" E-JOE	0.062 (1.6)	0.07	1.94 (49.3)	0.97 (24.6)	0.44 (11.2)	5/32 (4.1)	1.69 (42.9)	1.53 (38.9)	29/32 (23.1)
<input type="checkbox"/> 461-FX2-5L										
<input type="checkbox"/> 461-FN2-4	1/8 Female NPT	0.062 (1.6)	0.07	1.55 (39.4)	0.88 (22.4)	0.44 (11.2)	5/32 (4.1)	1.69 (42.9)	1.53 (38.9)	29/32 (23.1)
<input type="checkbox"/> 461-FN2-5L										
<input type="checkbox"/> 4610-FN8-4	1/2 Female NPT	0.406 (10.3)	3.50	3.13 (79.5)	1.56 (39.6)	0.69 (17.5)	3/8 (9.7)	2.43 (61.7)	3.00 (76.0)	1 1/2 (38.1)
<input type="checkbox"/> 4610-FN8-5L										

6- & 7-way Valve

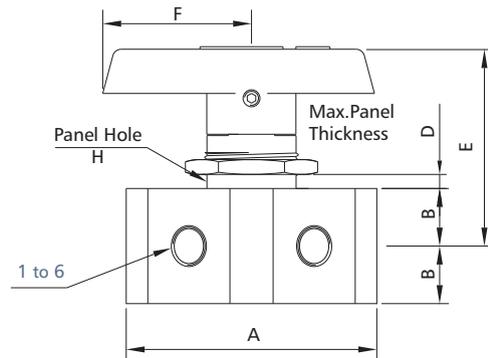
<input type="checkbox"/> 460-FX1-6	1/16" E-JOE	0.052 (1.3)	0.05	1.94 (49.3)	0.97 (24.6)	0.44 (11.2)	5/32 (4.1)	1.69 (42.9)	1.53 (38.9)	29/32 (23.1)
<input type="checkbox"/> 460-FX1-7										
<input type="checkbox"/> 461-FX2-6	1/8" E-JOE	0.062 (1.6)	0.07	1.94 (49.3)	0.97 (24.6)	0.44 (11.2)	5/32 (4.1)	1.69 (42.9)	1.53 (38.9)	29/32 (23.1)
<input type="checkbox"/> 461-FX2-7										

Crossover(4-, 6-way) Valves

4-way Valves



6-way Valves



Special Flow Pattern



Basic Ordering Number	Connection Type and Size	Orifice in. (mm)	Cv	Dimension, in.(mm)						
				A	B	D	E	F	H	
4-way Valve										
□□460-FX1-4C	1/16" E-JOE	0.052 (1.3)	0.06	1.55 (39.4)						
□□461-FX2-4C	1/8" E-JOE	0.062 (1.6)	0.08	1.95 (49.5)	0.44 (11.2)	3/16 (4.8)	1.68 (42.7)	1.53 (38.9)	29/32 (23.1)	
□□461-FN2-4C	1/8 Female NPT			1.55 (39.4)						
□□467-FN8-4C	1/2 Female NPT	0.281 (7.1)	1.60	3.13 (79.5)	0.69 (17.5)	3/8 (9.7)	2.43 (61.7)	3.00 (76.2)	1 1/2 (38.1)	
6-way Valve										
□□460-FX1-6C	1/16" E-JOE	0.052 (1.3)	0.06	1.95 (49.5)	0.44 (11.2)	3/16 (4.8)	1.68 (42.7)	1.53 (38.9)	29/32 (23.1)	
□□461-FX-6C	1/8" E-JOE	0.062 (1.6)	0.08							

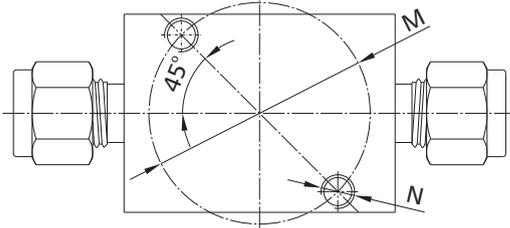
Bottom Screw Panel Mounting Options

Remark

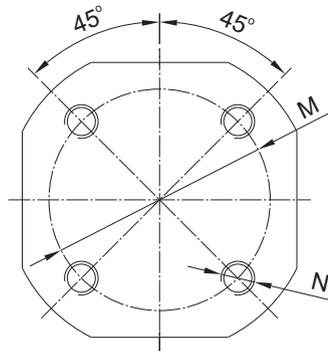
The bottom screw panel mounting options are not available on angle-pattern valves, 3-way valves, 6-way valves, 7-way valves.

Mounting Dimension

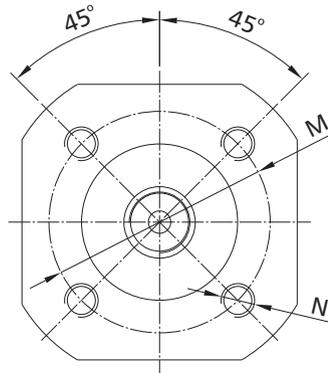
2-way



4-way

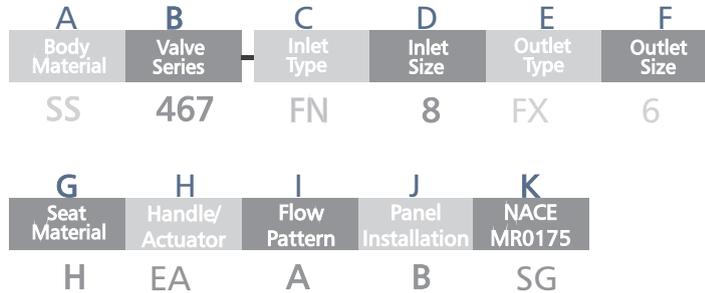


5-way



	Orifice in. (mm)	Dimensions, in. (mm)	
		M	N
2-way	0.052~0.125 (1.3~3.2)	0.625 (15.88)	M2.5 x 0.45 deep 6 mm (0.24")
	0.187 (4.8)	0.875 (22.23)	M3 x 0.5 deep 6 mm (0.24")
	0.281 (7.1)	1.25 (31.75)	M5 x 0.8 deep 6 mm (0.24")
	0.406 (10.3)	1.625 (41.28)	M5 x 0.8 deep 6 mm (0.24")
4-way	0.052~0.062 (1.3~1.6)	1.25 (31.75)	M5 x 0.8 deep 6 mm (0.24")
	0.281 (7.1)	2 (50.8)	M5 x 0.8 deep 6 mm (0.24")
5-way	0.052~0.062 (1.3~1.6)	1.25 (31.75)	M5 x 0.8 deep 6 mm (0.24")
	0.406 (10.3)	2 (50.8)	M5 x 0.8 deep 6 mm (0.24")

46 Series How to Order



A	Body Material
SS:	316 SS
6L:	316L SS
S4:	304 SS
4L:	304L SS
D5:	Duplex 2205
D7:	Duplex 2507
TI:	Titanium
A20:	Alloy 20
M:	Alloy 400
INC:	Alloy 600
HC:	Alloy C-276

B	Valve Series
460:	46 Series with 0.052" (1.3 mm) Orifice Ball Valves
461:	46 Series with 0.062" (1.6 mm) Orifice Ball Valves
462:	46 Series with 0.093" (2.4 mm) Orifice Ball Valves
463:	46 Series with 0.125" (3.2 mm) Orifice Ball Valves
464:	46 Series with 0.165" (4.2 mm) Orifice Ball Valves
465:	46 Series with 0.187" (4.7 mm) Orifice Ball Valves
466:	46 Series with 0.25" (6.4 mm) Orifice Ball Valves
467:	46 Series with 0.281" (7.1 mm) Orifice Ball Valves
4610:	46 Series with 0.406" (10.3 mm) Orifice Ball Valves

CE	Inlet/Outlet Type
FN	Female NPT
N	Male NPT
FR	Female BSPT
RT	Male BSPT
FM	Female ISO (for MRP)
MS	Male ISO (for MRG)
FP	Female BSPP (for RP)
BP	Male BSPP (for RG)
FX	Fractional Tube Fitting
MX	Metric Tube Fitting

DF	Inlet/Outlet Size
2	1/8"
4	1/4"
6	3/8" or 6 mm
8	1/2" or 8 mm
10	10 mm
12	3/4" or 12 mm
14	14 mm or M14 x 1.5
16	1" or 16 mm
18	18 mm

G	Seat Material
Standard with Virgin PTFE	
H	UHMWPE

H	Handle/Actuator
Standard with Balck Nylon Handle	
EA	90°Electric Actuator
EX	180°Electric Actuator
CS	90°Normally Closed Spring Return Pneumatic Actuator
OS	90°Normally Open Spring Return Pneumatic Actuator
DA	90°Double Acting Pneumatic Actuator

I	Flow Pattern
Standard is Straight Flow	
A	Angle
3L	3-way L Type
3HL	3-way HL Type
4L	4-way L Type
4C	4-way C Type
4H	4-way H Type
4HL	4-way HL Type
4V	4-way V Type
5L	5-way L Type
5H	5-way H Type
5HL	5-way HL Type
5LV	5-way LV Type
6L	6-way L Type
6C	6-way C Type
7L	7-way L Type

J	Panel Installation
Standard with Panel Nut	
B	Valve Body Bottem Screw

K	NACE MR0175
Standard with no NACE applicable	
SG	With NACE MR0175

Remark:

- Standard thread pitch for metric threads are as follows:
M10 and below: 1 mm
M12 to M24: 1.5 mm
Standard thread pitch should be ignored in the ordering
NFmber, others should be specified.