XOMOX®

brands you trust.

Tufline® Double Block and Bleed Sleeved Plug Valves

CRANE

ChemPharma Flow Solutions

www.cranechempharma.com

Tufline® Double Block and Bleed Sleeved Plug Valves

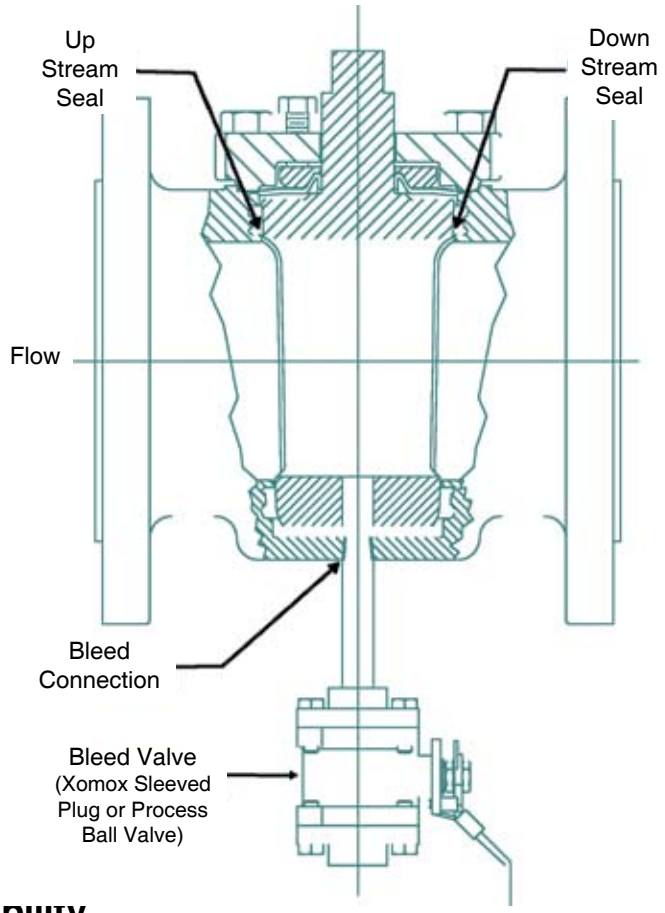
In order to minimize the chance of leakage past a valve so that systems, processes, or equipment can be isolated, processors or governing bodies often require that double block and bleed valving be installed into piping systems. Traditionally, a double block and bleed system consisted of two separate block valves and a bleed valve assembled on a pipe tee or an expensive lift and turn type valve. When isolation was required, both block valves would close and the bleed valve opened to drain the media from the pipe tee. By monitoring the outlet of the bleed valve, a user could determine whether the system, process, or equipment was properly isolated. While this multiple block valve system works effectively, it is expensive to install and maintain, especially when working with large valves or automated systems. The cost of the two block valves, the bleed valve, the actuation for all three valves, the control system to link them together, as well as the pipe tee, the flange bolting, and flange gaskets can add up quickly.

Alternate

Today processors have a more cost effective alternate to the traditional multi-valve system - the Tufline Double Block and Bleed Valve. Unlike traditional double block and bleed systems, Xomox can isolate with the use of only one valve due to the inherent upstream and downstream sealing properties of the Tufline Sleeved Plug Valve. It will maintain both an upstream and downstream seal between the ports under pressure differentials across the valve in either direction or under pressure balanced conditions. The bleed off between the upstream and downstream seals is accomplished via a drain hole in the bottom of the plug and a corresponding drain connection in the bottom of the valve body.

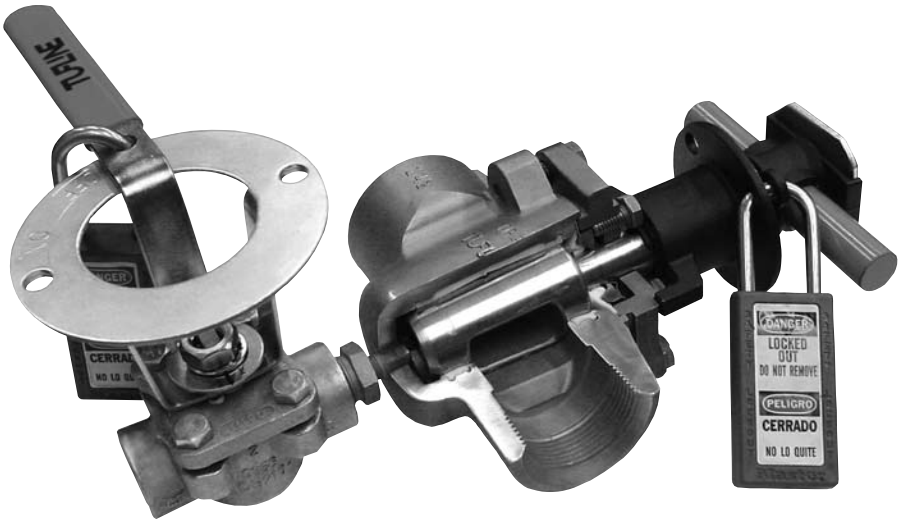
Tufline double block and bleed valves are available in a wide variety of configurations.

- ANSI classes 150, 300, and 600
- Standard materials include carbon steel, stainless steels, and high nickel alloys to exotics such as titanium and zirconium
- Standard and XP design
- Reduced and full ported
- End connections include flanged, threaded, welded, RTJ, and quick clamp
- Temperatures from -20°F to +600°F
- With or without optional bleed valve



Xomox Cost Effective

Availability



Applications

Xomox has supplied double block and bleed valves in numerous applications in practically every industry including:

- Chemical
- Petrochemical
- Oil & Gas
- Refining
- Pulp and Paper
- Mining
- Steel making
- Pharmaceutical
- Food processing

For dimensional information, pressure-temperature limitations, flow capacities, torque information, and “How to Order” please refer to the Tufline Sleeved Plug Valve brochure or Xomox website www.xomox.com.

Product Responsibility

XOMOX®

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CRANE ChemPharma Flow solutions Include: Pipe - Valves - Fitting - Actuators - Pumps

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Process Ball Valves

CRANE

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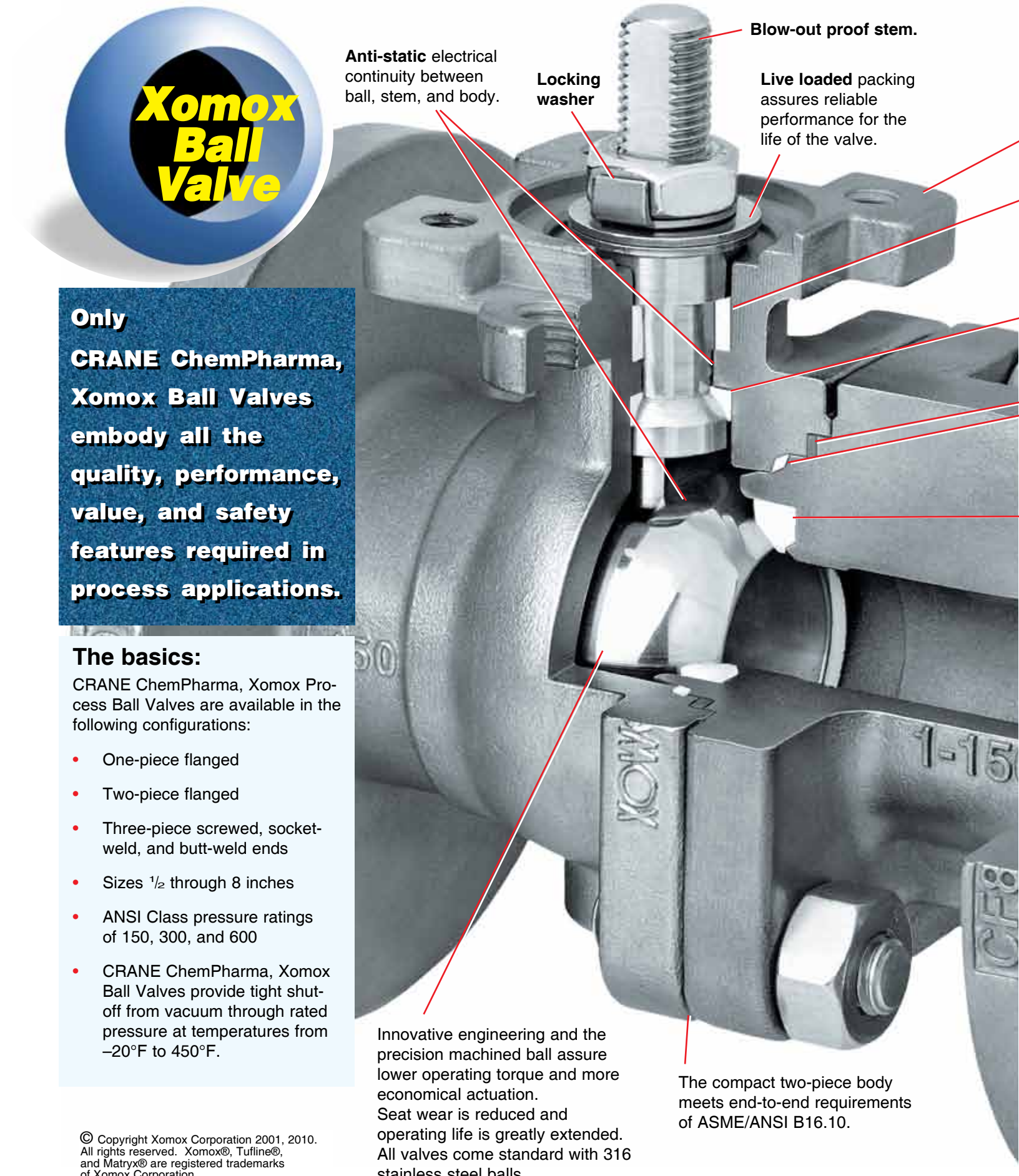
Xomox Ball Valve

Only CRANE ChemPharma, Xomox Ball Valves embody all the quality, performance, value, and safety features required in process applications.

The basics:

CRANE ChemPharma, Xomox Process Ball Valves are available in the following configurations:

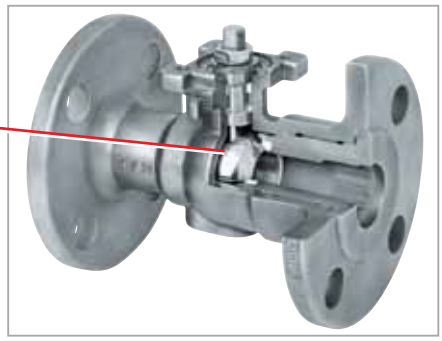
- One-piece flanged
- Two-piece flanged
- Three-piece screwed, socket-weld, and butt-weld ends
- Sizes ½ through 8 inches
- ANSI Class pressure ratings of 150, 300, and 600
- CRANE ChemPharma, Xomox Ball Valves provide tight shut-off from vacuum through rated pressure at temperatures from –20°F to 450°F.



The integral **ISO 5211** actuator mounting pad assures easy, low cost automation.

With optional graphite stem packing, the valve is fire-tested to **API-607, 4th Edition.**

For inventory economy and convenience, one-piece and two-piece valves have interchangeable **internal parts.**



Above: The compact one-piece valve meets ASME/ANSI B16.10 specifications.

The patented **S2**™ sealing system assures superior stem sealing.

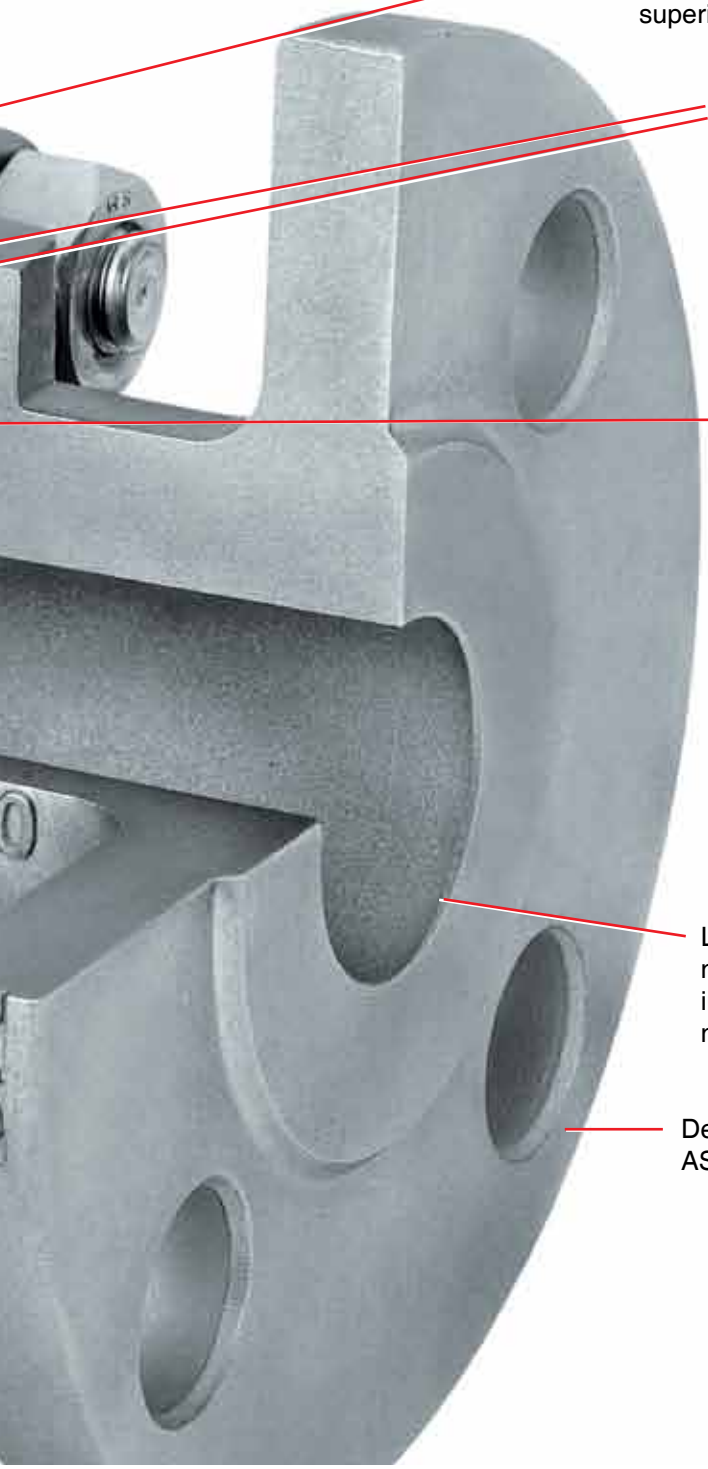
Dual body gaskets are standard on 1-piece and 2-piece CRANE ChemPharma, Xomox Process Ball Valves. This includes a PTFE chemically inert seal and a secondary FT graphite seal (Patent No. 6,837,482 on 2-piece valves).

Above: The compact three-piece valve body design allows for disassembly and maintenance without removing the valve from the line.*

* Non FT valves only.

Standard **Chemically Modified PTFE (CMP)** seat material reduces the need for multiple seat options.

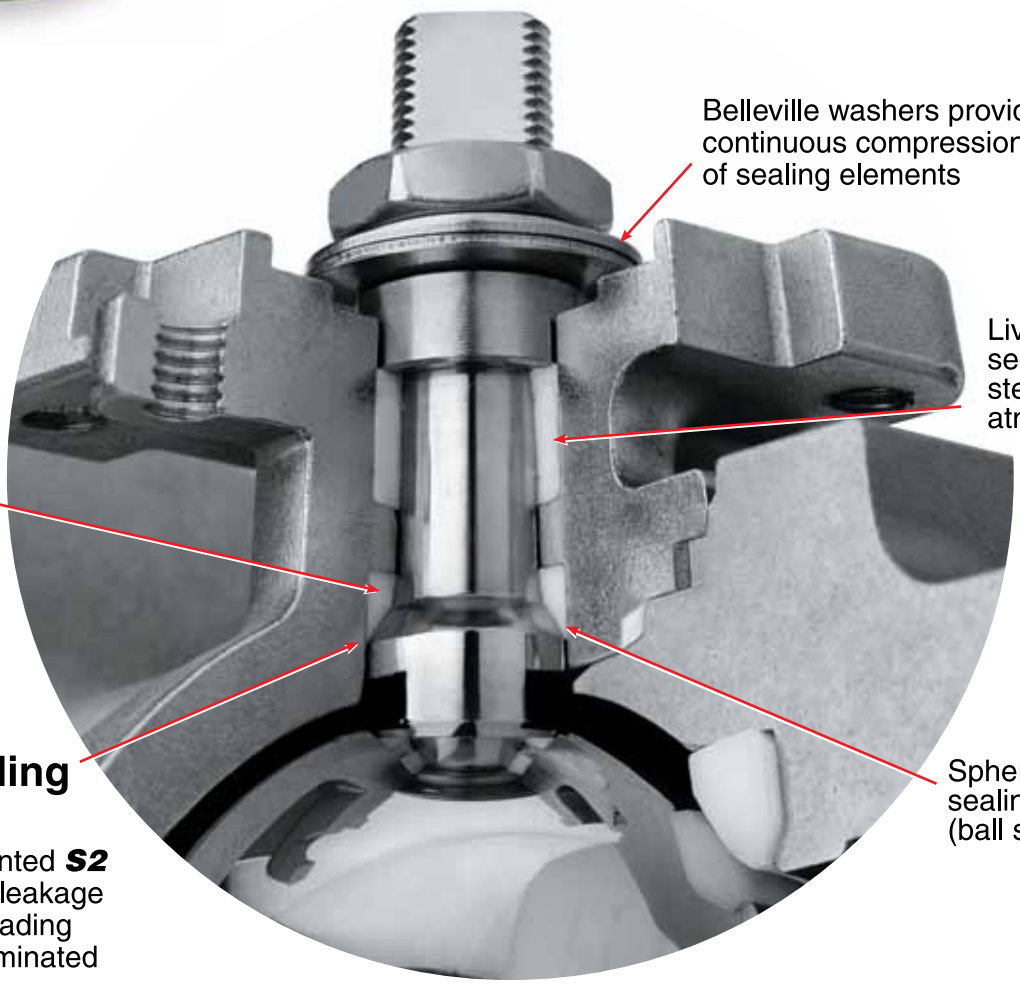
Compared to PTFE, CMP provides superior mechanical and thermal characteristics. CMP is more resistant to chemicals and cold flow. Other seal materials are available upon request.



Large port openings maximize **Cv factors**, increasing flow rates and minimizing pressure loss.

Development of casting is to ASTM E-446 Level II standards.

CRANE ChemPharma, Xomox's exclusive S2™ stem seal system provides superior fugitive emissions control in process applications.



Side loading solution.

With the patented ***S2*** design, stem leakage due to side loading is virtually eliminated

• Media-free stem.

The primary spherical **S2** stem seal eliminates media build-up on the stem. This prevents stem binding and torque increase. The secondary stem seal is not exposed to the process media.

• Maintenance-free operation.

The spherical **S2** stem sealing system automatically adjusts to compensate for wear, temperature, and pressure fluctuations.

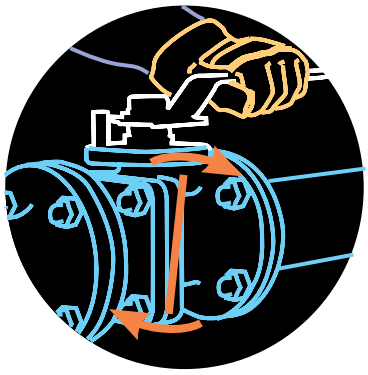
• Exceptional performance.

Documented performance, under actual service conditions, of more than 3-million cycles without measurable stem leakage.

The patented S2™ stem seal stops normal side loading stem leakage.

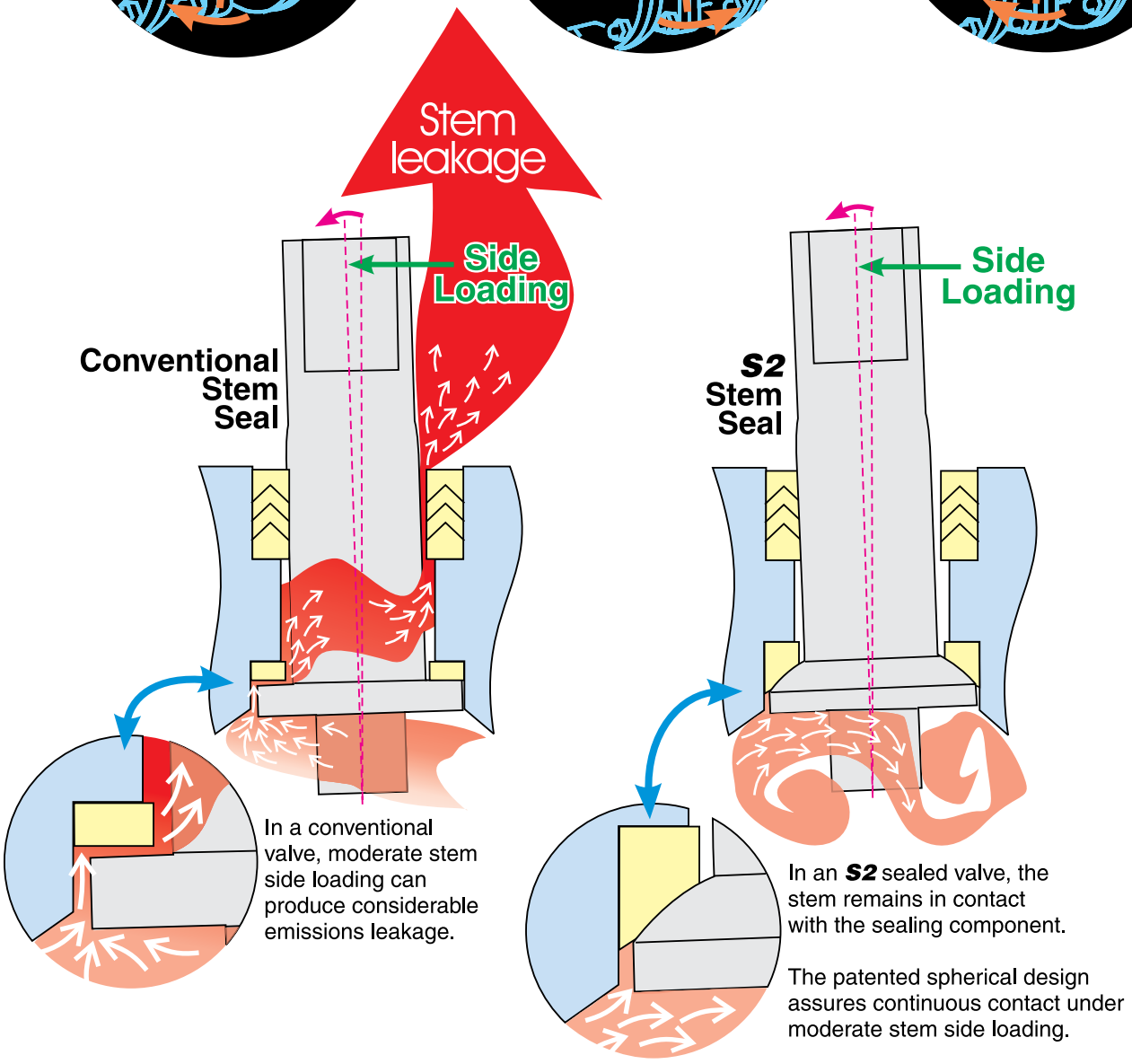
Typical causes of stem side loading resulting in leakage to atmosphere:

Heavy manual operation



Actuation loads and misalignment

Abusive contact

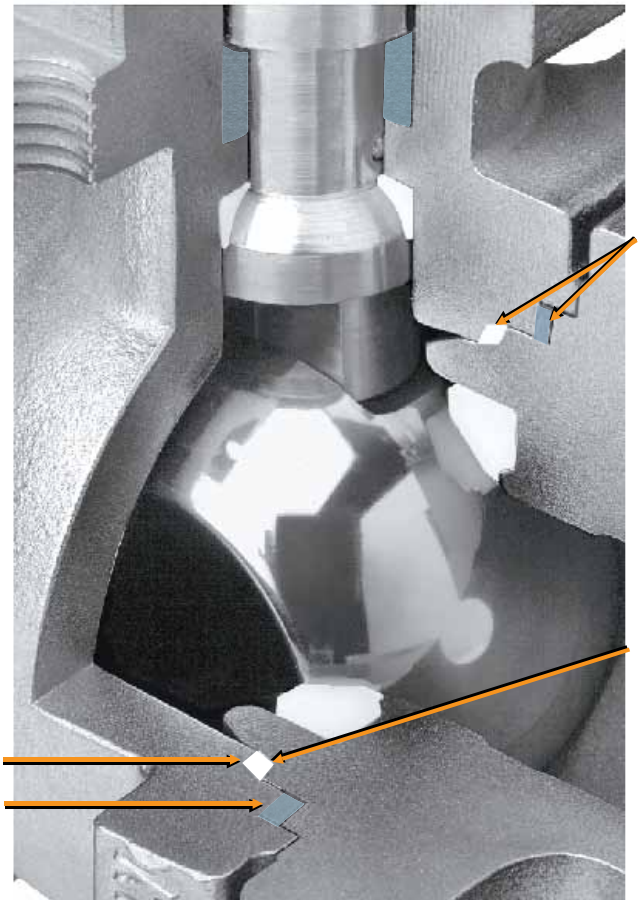


CRANE ChemPharma, Xomox meets the thermal challenge with the most effective body seal available.

The thermal cycling challenge.

Most PTFE body gaskets work well at static temperatures. The real challenge comes when you introduce a wide temperature swing is introduced.

In a standard gasket seal design, a thermal cycle can cause a leak due to differences in the thermal coefficient of expansion between the PTFE body seal and the metal body material.



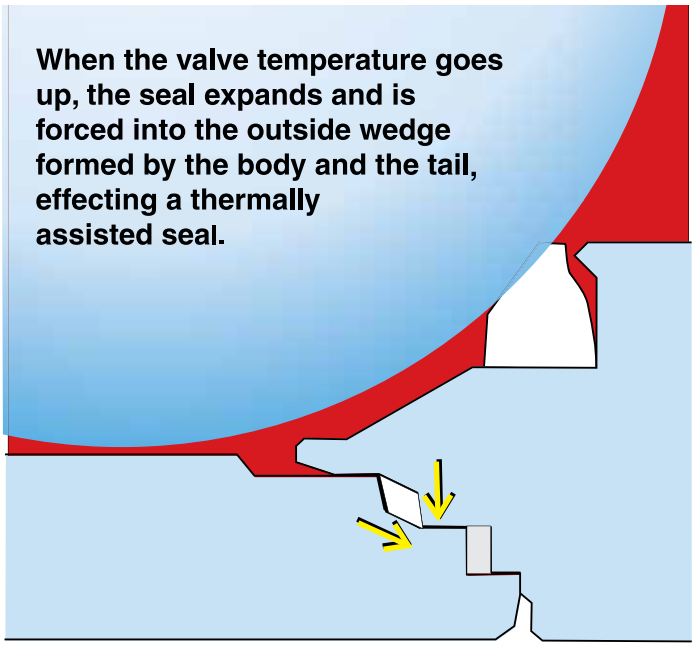
Dual body gaskets are standard on 1-piece and 2-piece CRANE ChemPharma, Xomox Process Ball Valves.This includes a PTFE chemically inert seal and a secondary FT graphite seal (patent-pending on 2-piece valves).

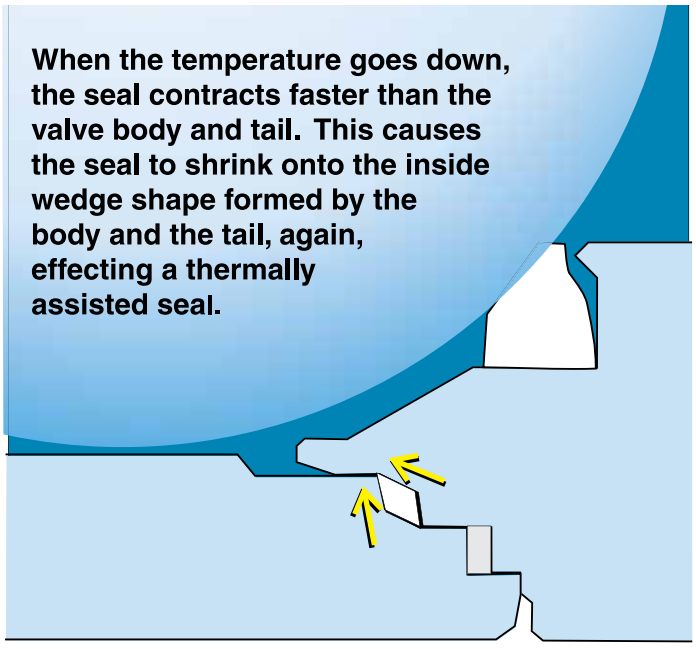
Compression of the two body joint gaskets is precisely controlled to prevent cold flow and distortion.The gasket seal is uniform and secure.

Thermally-assisted sealing.

CRANE ChemPharma, Xomox's diamond shaped, thermally assisted PTFE body seal, will seal at all temperatures in its design range, even during thermal cycling.

To enhance the seal, this unique design takes advantage of the differences in the rates of thermal expansion between the PTFE and the metal to enhance the seal.





Fugitive Emissions Module

ISO 5211 mounting pad top & bottom makes installation on CRANE ChemPharma, Xomox Ball Valves and mounting of actuators simple and economical

Interface matches valve making it field convertible with existing mounting kit or handle

Double set of belleville washers live load both stem packing and the **S2** spherical seal. This assures positive sealing in high cycle severe service applications

PTFE chevron stem packing provides a secondary dynamic stem seal

Exclusive spherical **S2** stem seal (See pages 4 & 5 of this catalog for details)

316SS Investment Casting developed to ASTM E-446 Level II standards assures casting integrity and provides corrosion resistance

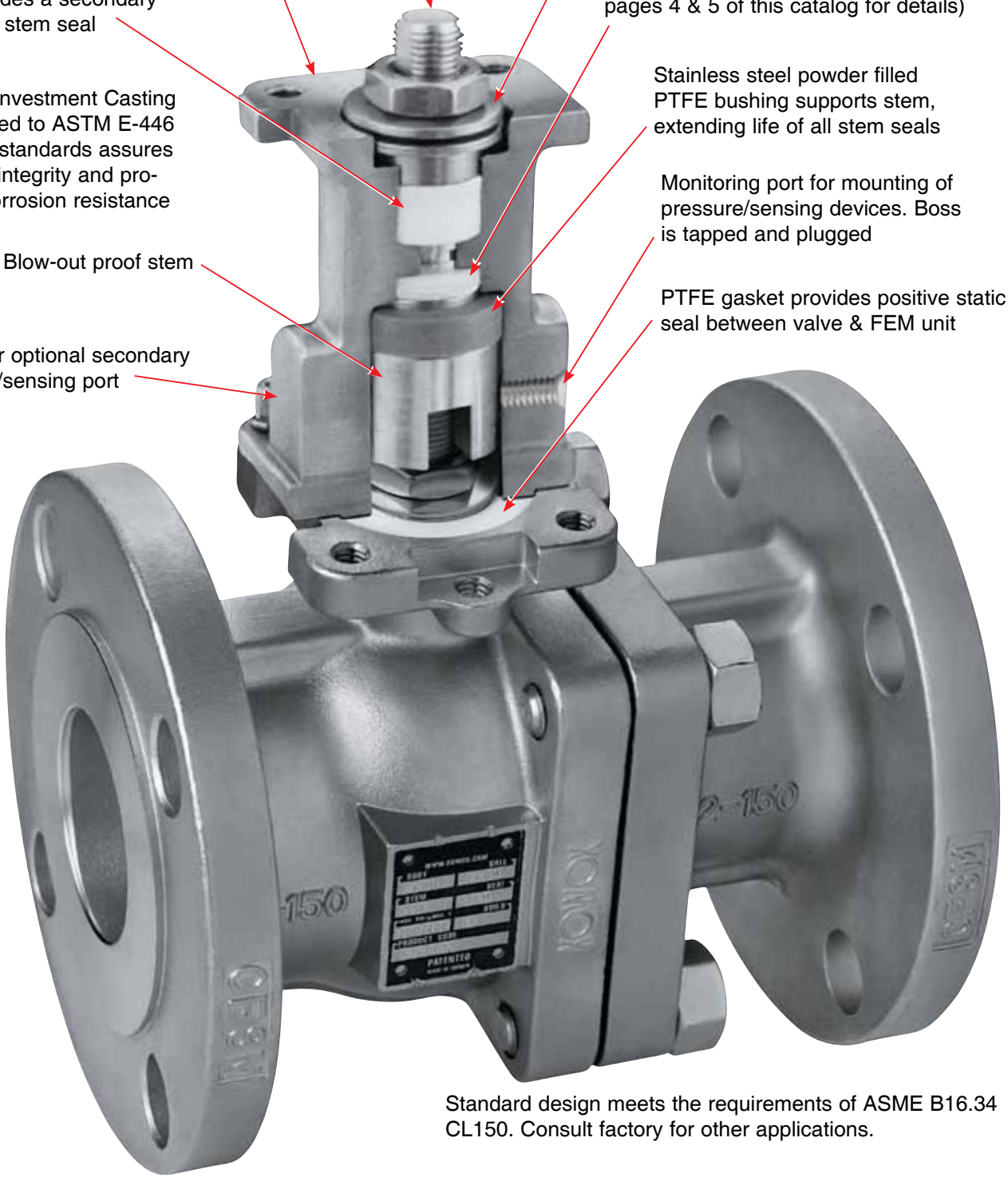
Stainless steel powder filled PTFE bushing supports stem, extending life of all stem seals

Monitoring port for mounting of pressure/sensing devices. Boss is tapped and plugged

Blow-out proof stem

PTFE gasket provides positive static seal between valve & FEM unit

Boss for optional secondary purging/sensing port

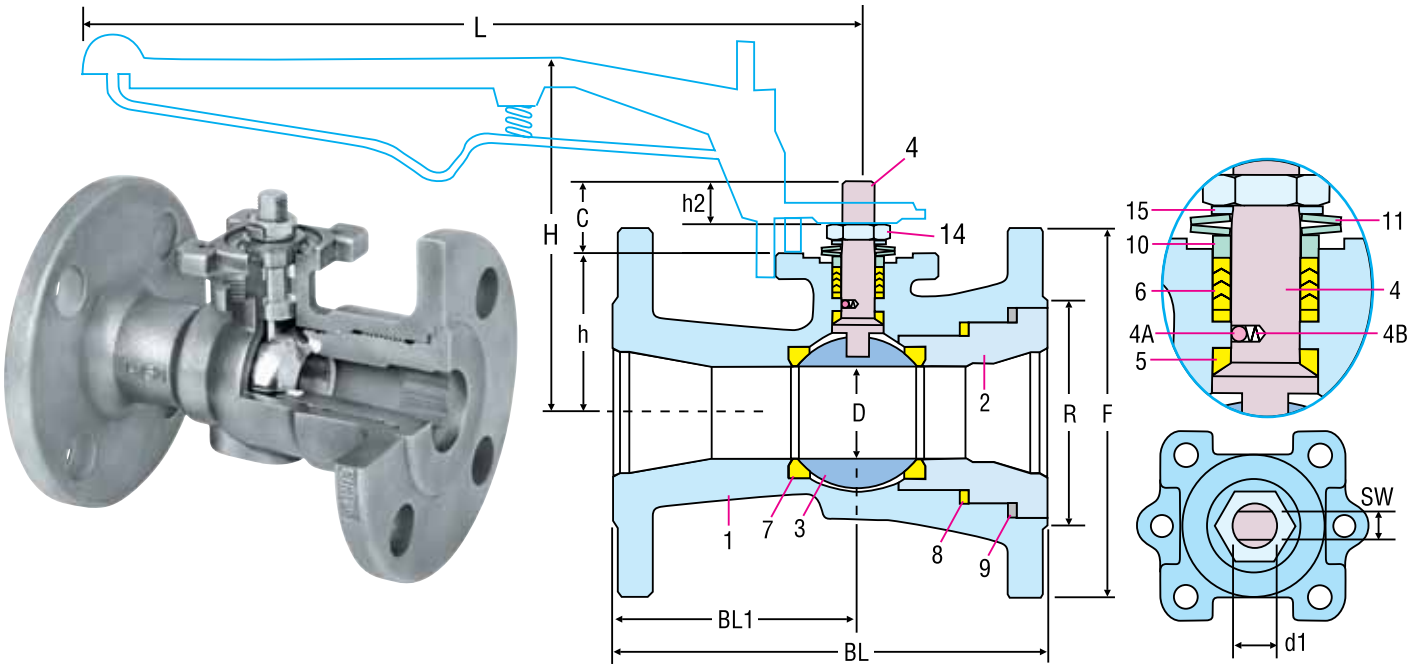


Standard design meets the requirements of ASME B16.34 CL150. Consult factory for other applications.

Sample CRANE ChemPharma, Xomox Process Ball Valve Specifications

Sizes	½" - 4" Class 150 Full Port Carbon / Stainless Trim	6" - 8" Class 150 Full Port Stainless / Stainless Trim
Body	ASTM A216, WCB	ASTM A351, CF8M
Tail	ASTM A216, WCB	ASTM A351, CF8M
Pressure-Temperature Rating	285 psig 100°F 100 psig 480°F	275 psig 100°F
Size Range	½" - 4"	6" - 8"
End Connections	Flanged ASME 16.5, Class 150, raised face	Flanged ASME 16.5, Class 150, raised face
Seat	CMP (Chemically modified PTFE)	CMP (Chemically modified PTFE)
Stem Seal	PTFE **S2** stem seal	CMP **S2** stem seal
Primary Body Gasket	PTFE diamond shaped, thermally assisted	PTFE diamond shaped, thermally assisted
Secondary Body Gasket	Grafoil	Grafoil
Ball	316SS	316SS
Stem	316SS Blowout proof	316SS Blowout proof
Stem Packing	PTFE live loaded	PTFE live loaded
Studs	ASTM A193, B7M	ASTM A193, B8M
Nuts	ASTM A194, 2HM	ASTM A194, 8MA
Operator	SS latching / locking lever	Gear operator
References	ASME / ANSI B16.10, ASME B16.34	ASME / ANSI B16.10, ASME B16.34
Design	2-piece, full bore	2-piece, full bore
Manufacturer	Xomox Corporation	Xomox Corporation
Figure Number	521F-266-TAP16-LL	521F-666-TAP16-G

One-Piece Body / ANSI B16.34 / Class 150 & 300



Reduced Port

¾ to 4 inch

End-to-end dimensions:
ASME / ANSI B16.10
Short Pattern

Xomox Figure Numbers:
Class 150 - **511R**
Class 300 - **513R**

The exclusive, patented **S2** stem design is:

- Blow-out proof
- Fire-tested
- Highly resistant to side-loading leakage.

Parts & Materials

No.	Part Description	Carbon	Stainless
1	Body	ASTM A216. WCB	ASTM A351. CF8M
2	Tail	ASTM A216. WCB	ASTM A351. CF8M
3	Ball	316SS	316SS
4	Stem	316SS	316SS
4A	Anti-Static Ball	316SS	316SS
4B	Anti-Static Spring	316SS	316SS
5	S2 Stem Seal Ring	PTFE	PTFE
6	Packing Set	PTFE	PTFE
	Fire Tested Packing Set	Graphite	Graphite
7	Soft Seat Seal Ring	CMP	CMP
8	Body Gasket - Inner Seal	PTFE	PTFE
9	Body Gasket - Outer Seal	GRAPHITE	GRAPHITE
10	Gland	316SS	316SS
11	Spring Washer	SST	SST
14	Stem Nut	ASTM A194. 8MA	ASTM A194. 8MA
15	Locking Washer	304SS	304SS

Size	Flange Dia. (F)		No. of Flange Bolt Holes		Dia. of Flange Bolt Holes		Dia. of Flange Bolt Circle	
	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300
¾	3.88	4.62	4.00	4.00	0.62	0.75	2.75	3.25
1	4.25	4.88	4.00	4.00	0.62	0.75	3.12	3.50
1½	5.00	6.12	4.00	4.00	0.62	0.88	3.88	4.50
2	6.00	6.50	4.00	8.00	0.75	0.75	4.75	5.00
3	7.50	8.25	4.00	8.00	0.75	0.88	6.00	6.62
4	9.00	10.00	8.00	8.00	0.75	0.88	7.50	7.88

Size	D Flow Dia.	Face-to-Face Dim. BL		Dim. BL1		h	h2	H	L	C	SW	d1	Raised Face Dia.(R)	ISO Flange	ISO Bolt Size Metric	ISO Bolt Circle	Weight (pounds)	
		Cl. 150	Cl. 300	Cl. 150	Cl. 300												Cl.150	Cl.300
¾	.50	4.62	6.00	2.35	3.74	1.54	0.43	4.88	5.75	0.75	.248	0.38	1.69	F04	M5xP.8	1.65	5	8
1	.75	5.00	6.50	2.62	4.12	1.77	0.35	5.13	5.75	0.63	.248	0.38	2.00	F04	M5xP.8	1.65	7	10
1½	1.25	6.50	7.50	3.84	4.84	2.19	0.59	5.50	6.93	0.91	.315	0.44	2.88	F05	M6xP1	1.97	18	24
2	1.50	7.00	8.50	3.93	5.43	2.60	0.70	5.63	10.88	1.07	.374	0.63	3.62	F07	M8xP1.25	2.76	19	25
3	2.50	8.00	11.12	4.04	7.16	3.64	1.00	8.50	12.40	1.74	.669	0.88	5.00	F10	M10xP1.5	4.02	40	54
4	3.00	9.00	12.00	4.93	7.93	4.02	1.00	8.88	12.40	1.74	.669	0.88	6.19	F10	M10xP1.5	4.02	58	81

Two-Piece Body / B16.34 / ANSI Class 150 & 300

Reduced Port
6 & 8 inch

End-to-end dimensions:
ASME / ANSI B16.10
Short Pattern

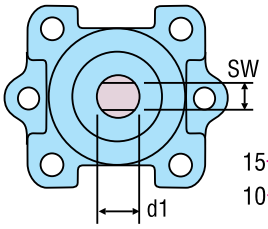
Xomox Figure Numbers:
Class 150 - **521R**
Class 300 - **523R**

Full Port
½ to 8 inch

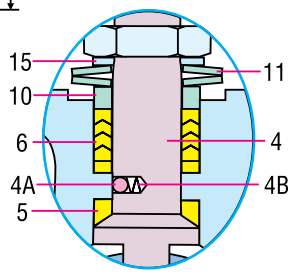
End-to-end dimensions:
ASME / ANSI B16.10
Long Pattern

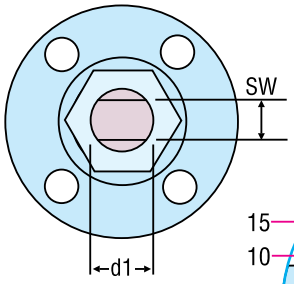
Xomox Figure Numbers:
Class 150 - **521F**
Class 300 - **523F**

The exclusive, patented S2 stem design is:
- Blow-out proof
- Fire-tested
- Highly resistant to side-loading leakage.

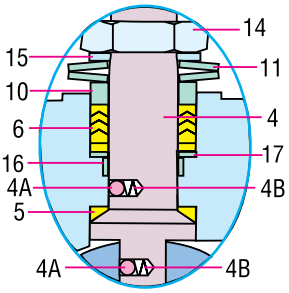


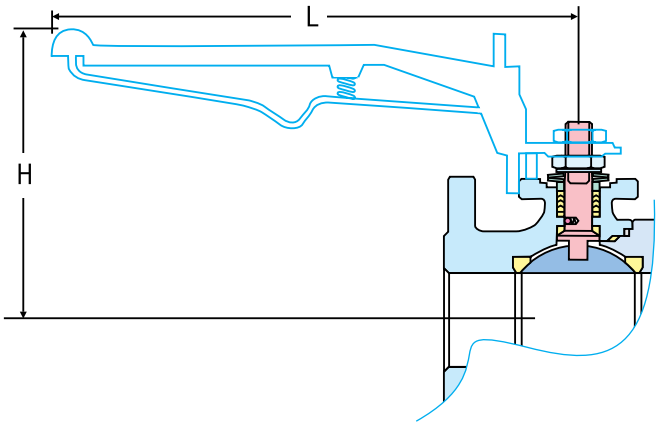
½ to 4 Inch Valves

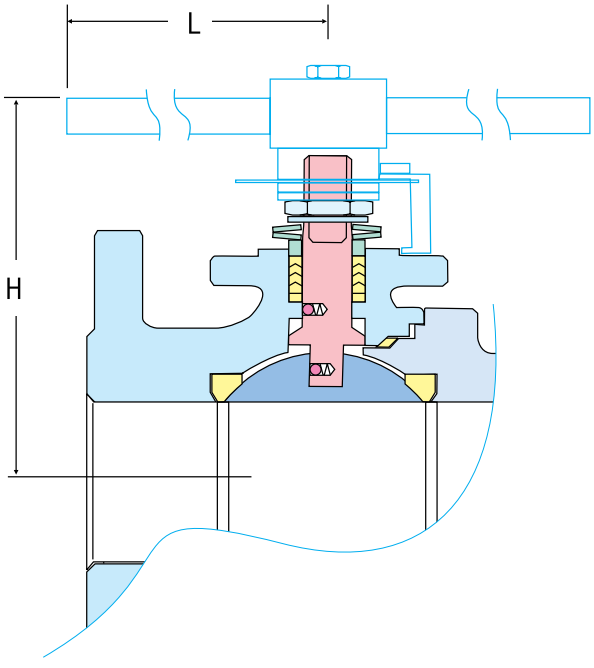


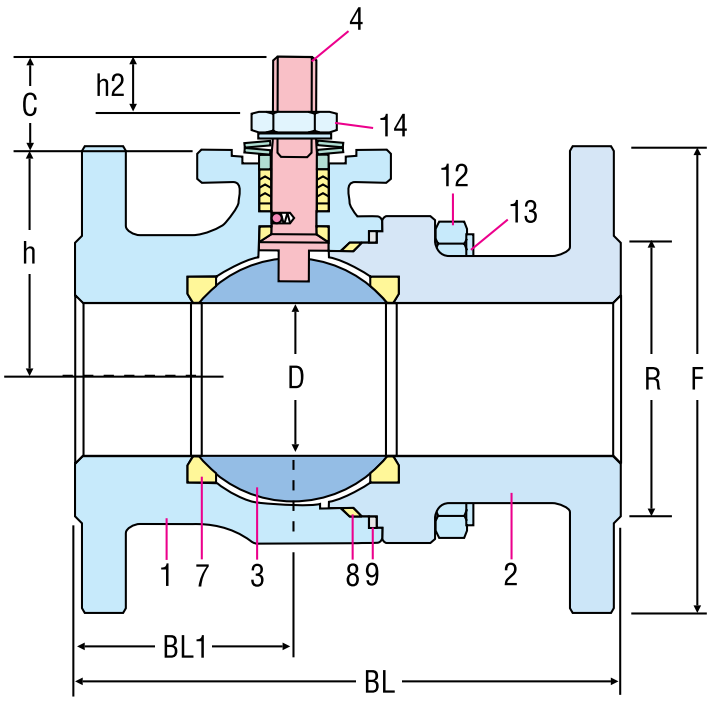


6 & 8 Inch Valves









Reduced Port

Size	D Flow Dia.	Face-to-Face Dim. BL Cl. 150	Face-to-Face Dim. BL Cl. 300	Dim. BL.1 Cl. 150	Dim. BL.1 Cl. 300	h	h2	H	L	C	SW	d1	Raised Face Dia. (R)	ISO Flange	ISO Bolt Size Metric	ISO Bolt Circle	Weight (pounds) Cl. 150	Weight (pounds) Cl. 300
6	4.00	10.50	15.88	4.88	7.28	5.91	1.41	10.77	18.70	2.95	1.063	1.42	8.50	F12	M12x1.75	4.92	114	181
8	6.00	11.50	16.50	5.51	7.28	7.87	1.94	13.60	23.62	3.78	1.417	1.89	10.62	F14	M16x2.0	5.51	200	313

Full Port

Size	D Flow Dia.	Face-to-Face Dim. BL Cl. 150	Face-to-Face Dim. BL Cl. 300	Dim. BL1 Cl. 150	Dim. BL1 Cl. 300	h	h2	H	L	C	SW	d1	Raised Face Dia. (R)	ISO Flange	ISO Bolt Size Metric	ISO Bolt Circle	Weight (pounds) Cl. 150	Weight (pounds) Cl. 300
1/2	.50	4.25	5.50	1.82	2.30	1.54	0.43	4.88	5.75	0.74	.248	0.38	1.38	F04	M5xP.8	1.65	5	6
3/4	.75	4.62	6.00	1.92	2.41	1.77	0.35	5.13	5.75	0.63	.248	0.38	1.69	F04	M5xP.8	1.65	5	9
1	1.00	5.00	6.50	1.91	2.69	2.03	0.61	5.50	6.93	0.93	.315	0.44	2.00	F05	M6xP1.0	1.97	8	13
1 1/2	1.50	6.50	7.50	2.20	3.27	2.58	0.70	5.63	10.88	1.09	.374	0.63	2.88	F07	M8xP1.25	2.76	14	22
2	2.00	7.00	8.50	2.76	3.03	2.95	0.70	6.00	10.88	1.07	.374	0.63	3.62	F07	M8xP1.25	2.76	21	30
3	3.00	8.00	11.12	3.83	4.98	4.02	1.00	8.88	12.40	1.74	.669	0.88	5.00	F10	M10xP1.5	4.02	47	69
4	4.00	9.00	12.00	3.62	5.12	4.82	1.44	9.63	20.31	2.44	.669	1.13	6.19	F10	M10xP1.5	4.02	76	88

Size	D Flow Dia.	Face-to-Face Dim. BL Cl. 150	Face-to-Face Dim. BL Cl. 300	Dim. BL1 Cl. 150	Dim. BL1 Cl. 300	h	h2	H	L	C	SW	d1	Raised Face Dia.(R)	ISO Flange	ISO Bolt Size Metric	ISO Bolt Circle	Weight (pounds) Cl. 150	Weight (pounds) Cl. 300
6	6.00	15.50	15.88	7.28	8.46	7.87	1.94	13.60	23.62	3.78	1.417	1.89	8.50	F14	M16x2.0	5.51	193	267
8	8.00	18.00	19.75	7.28	9.37	10.04	2.00	-	-	4.13	1.811	2.36	10.62	F16	M20x2.5	6.50	371	517

Flange Data

Size	Flange Dia. (F) Cl. 150	Flange Dia. (F) Cl. 300	No. of Flange Bolt Holes Cl. 150	No. of Flange Bolt Holes Cl. 300	Dia. of Flange Bolt Holes Cl. 150	Dia. of Flange Bolt Holes Cl. 300	Dia. of Flange Bolt Circle Cl. 150	Dia. of Flange Bolt Circle Cl. 300
1/2	3.50	3.75	4	4	0.62	0.62	2.38	2.62
3/4	3.88	4.62	4	4	0.62	0.75	2.75	3.25
1	4.25	4.88	4	4	0.62	0.75	3.12	3.50
1 1/2	5.00	6.12	4	4	0.62	0.88	3.88	4.50
2	6.00	6.50	4	8	0.75	0.75	4.75	5.00
3	7.50	8.25	4	8	0.75	0.88	6.00	6.62
4	9.00	10.00	8	8	0.75	0.88	7.50	7.88
6	11.00	12.50	8	12	0.88	0.88	9.50	10.62
8	13.50	15.00	8	12	0.88	1.00	11.75	13.00

Parts For 6 & 8 Inch Valves Only

No.	Part Description	Carbon	Stainless
5	**S2** Stem Seal Ring	CMP	CMP
16	Bearing, Stem	25% Glass Filled PTFE	25% Glass Filled PTFE
	Fire Tested Bearing, Stem	Nickel Plated SST Bearing	Nickel Plated SST Bearing
17	Anti-Extrusion Ring	316SS	316SS

Parts & Materials

No.	Part Description	Carbon	Stainless
1	Body	ASTM A216. WCB	ASTM A351. CF8M
2	Tail	ASTM A216. WCB	ASTM A351. CF8M
3	Ball	316SS	316SS
4	Stem	316SS	316SS
4A	Anti-Static Ball	316SS	316SS
4B	Anti-Static Spring	316SS	316SS
5	S2 Stem Seal Ring	PTFE	PTFE
6	Packing Set	PTFE	PTFE
	Fire Tested Packing Set	Graphite	Graphite
7	Soft Seat Seal Ring	CMP	CMP
8	Body Gasket - Inner Seal	PTFE	PTFE
9	Body Gasket - Outer Seal	GRAPHITE	GRAPHITE
10	Gland	316SS	316SS
11	Spring Washer	SST	SST
12	Nut	ASTM A194. 2HM	ASTM A194. 8M
13	Stud	ASTM A193. B7M	ASTM A193. B8M
14	Stem Nut	ASTM A194. 8M	ASTM A194. 8M
15	Locking Washer	304SS	304SS

Three-Piece Body / ANSI B16.34 / Class 150, 300 & 600

Reduced Port

¾ to 2 inch

Xomox Figure Numbers:
Class 600 - **536R**

Full Port

½ to 2 inch

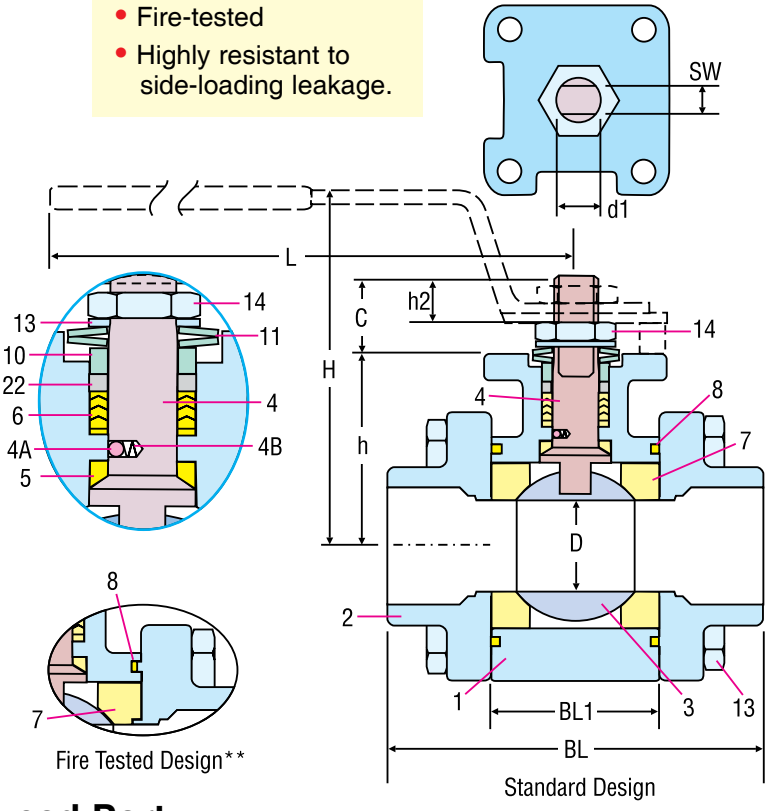
Xomox Figure Numbers:
Class 600: ½" - 1½" - **536F**
Class 300: 2" - **533F**

The exclusive, patented S2 stem design is:

- Blow-out proof
- Fire-tested
- Highly resistant to side-loading leakage.

The three piece body is designed for easy in-line maintenance.*

* Non FT valves only.



Fire Tested Design**

Standard Design

Reduced Port

Size	D Flow Dia.	C	h2	L	SW	d1	H	h	Face To Face BL	BL1	ISO 5211	ISO Bolt Size	Wt. lbs.
¾	.59	.67	.35	5.31	.25	.38	3.31	1.52	2.82	.99	F04	M5xP.8	1.90
1	.79	.67	.35	5.31	.25	.38	3.46	1.65	3.80	1.27	F04	M5xP.8	3.26
1½	1.26	.79	.47	6.50	.31	.44	3.98	2.19	4.61	1.94	F05	M6xP1.0	6.08
2	1.57	.92	.55	7.87	.37	.63	4.61	2.58	5.08	2.25	F07	M8xP1.25	8.82

Full Port

Size	D Flow Dia.	C	h2	L	SW	d1	H	h	Face To Face BL	BL1	ISO 5211	ISO Bolt Size	Wt. lbs.
½	.59	.67	.35	5.31	.25	.38	3.31	1.52	2.82	.99	F04	M5	2.20
¾	.79	.67	.35	5.31	.25	.38	3.46	1.65	3.80	1.27	F04	M5	3.31
1	.98	.79	.47	6.50	.31	.44	3.86	2.03	4.29	1.67	F05	M6	4.45
1½	1.50	.92	.55	7.87	.37	.63	4.61	2.58	5.08	2.25	F07	M8	9.08
2	2.00	.92	.51	7.87	.37	.63	4.61	2.93	5.59	2.81	F07	M8	14.93

Parts & Materials

No.	Part Description	Carbon	Stainless
1	Body	ASTM A216 WCB	ASTM A351 CF8M
2	End Caps	ASTM A216 WCB	ASTM A351 CF8M
3	Ball	316SS	316SS
4	Stem	316SS	316SS
4A	Anti-Static Ball	316SS	316SS
4B	Anti-Static Spring	316SS	316SS
5	S2 Stem Seal Ring	PTFE	PTFE
6	Packing Set	PTFE **Graphite****	PTFE **Graphite****
7	Soft Seat Seal Ring	CMP	CMP
8	Body Gasket	PTFE **Graphite****	PTFE **Graphite****
10	Gland	316SS	316SS
11	Spring Washer	SST	SST
13	Bolt (Body Joint)	ASTM A193 B7M	ASTM A193 B8M
14	Stem Nut	ASTM A194 Gr8	ASTM A194 Gr8
15	Locking Washer	304SS	304SS
22	Thrust Washer	50% TFE 50% SST	50% TFE 50% SST

** Fire tested valves

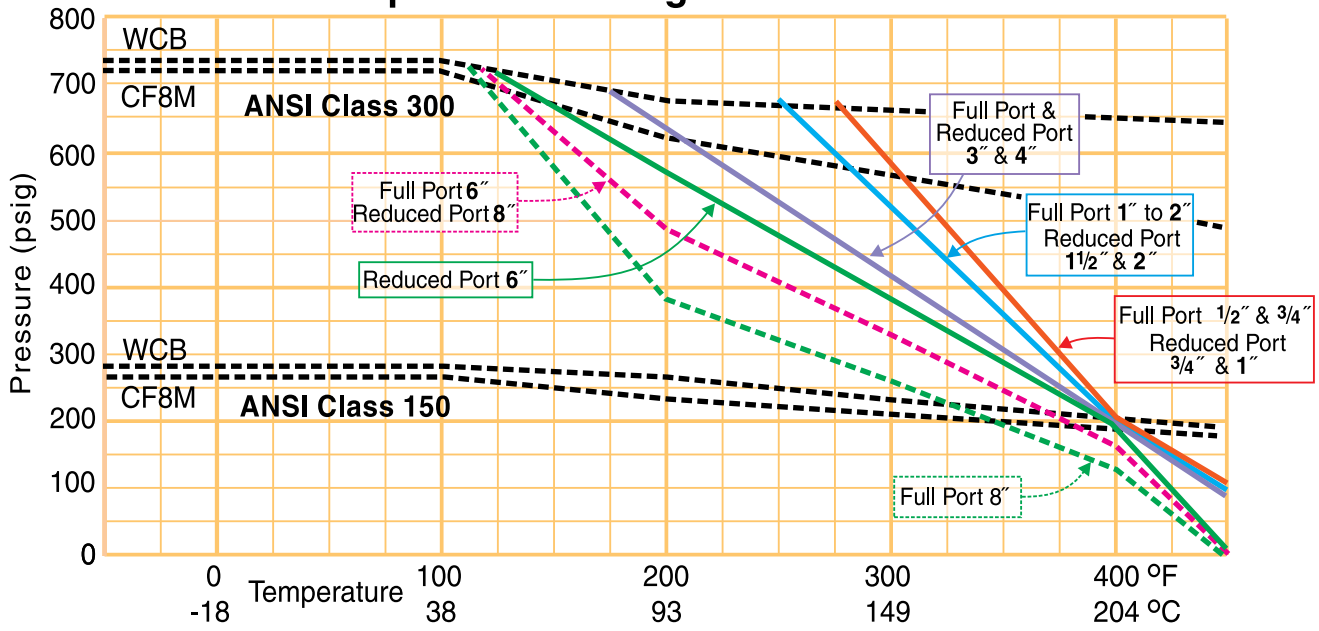
Actuator Sizing Torques

Torques in IN-LBS

Valve Size		Maximum Differential Pressure, psi . . . Seat Material: CMP									
Reduced Port	Full Port	0-100	200	285	400	500	600	740	1000	1200	1480
3/4	1/2	45	45	45	45	45	47	50	53	56	60
1	3/4	60	60	60	60	66	73	80	83	86	90
	1	90	90	90	90	96	103	110	116	123	130
1 1/2		130	130	130	130	142	155	170	185	200	220
2	1 1/2	225	225	225	225	240	265	290	325	360	400
	2	380	380	380	400	425	450	480	-	-	-
3		500	500	500	550	610	675	750	-	-	-
4	3	750	750	750	890	1,050	1,250	1,480	-	-	-
	4	1,980	1,980	1,980	2,175	2,400	2,650	2,950	-	-	-
6		2,175	2,175	2,175	2,450	2,775	3,150	3,600	-	-	-
8	6	4,475	4,475	4,475	5,100	5,800	6,600	7,550	-	-	-
	8	9,550	9,550	9,550	10,450	11,400	12,450	13,625	-	-	-

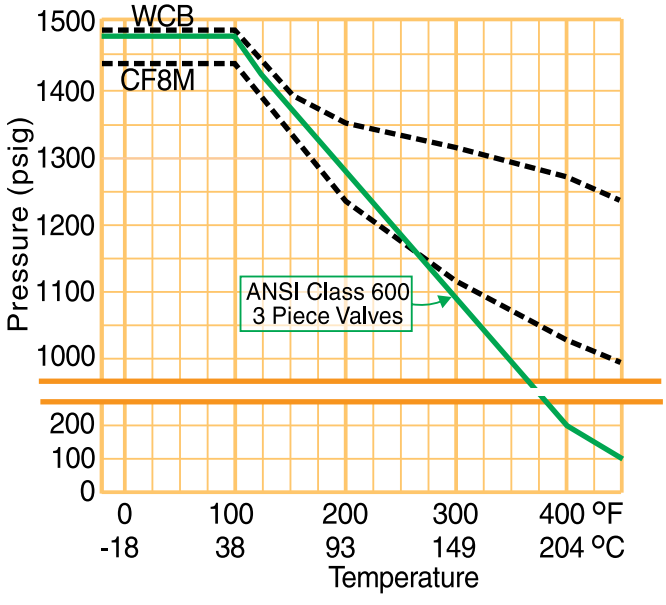
Note: Torques are for clean and clear fluids.

Pressure/Temperature Ratings - CMP Seat



Cv Factors

Valve Size	Classes 150 & 300 **Full Port**	Classes 150 & 300 **Reduced Port**	Class 600 **Full Port**	Class 600 **Reduced Port**
1/2	30	-	25	-
3/4	51	16	50	19
1	95	35	80	42
1 1/4	-	-	150	60
1 1/2	255	105	240	125
2	440	120	460	165
3	1,240	380	-	-
4	2,150	650	-	-
6	5,500	1,650	-	-
8	9,950	1,950	-	-



How To Specify

Figure Number

Size	Product	Configuration	ANSI Class	Port	End Connection	Stem Seal Option	Body	Ball	Stem	Packing	Seat Style	Seat	Operator	Service
1″	- 5	- 2	- 1	- R	- —	—	2	- 6	- 6	- T	- A	- P16	- L	N

Size
See the Quick Reference Table below.

Product
Standard Ball Valve. . .**5**

Configuration
1 Piece Body . . .**1**
2 Piece Body . . .**2**
3 Piece Body . . .**3**

ANSI Class
Class 150 . . . **1**
Class 300 . . . **3**
Class 600 . . . **6**

Port
Reduced . . .**R**
Full . . . . . .**F**

End Connection
Raised Face Flanged **—**
Screwed End . . . . . **SE**
Socket Weld* . . . . . **SW**
Butt Weld . . . . . **BW**

Stem Seal Option
Standard Stem Nut Adjustment . . . **—**
FEM Unit . . . . . **FM**

Body
Carbon Steel (WCB) **2**
316 Stainless Steel (CF8M) . . . **6**

Ball
316 Stainless Steel (CF8M) . . . **6**

Stem
316 Stainless Steel (CF8M) . . . **6**

Packing
PTFE V-Ring . . . . . **T**
Graphite . . . . . **G**

Seat Style
Soft Style . . . **A**

Seat
TFM
(Standard) **P16**
Other (Specify) . . . **Z**

Operator
None . . . . . **N**
Lever With Locking Device. . **L**
Locking Latching Lever . . . **LL**
Extended Lever . . . . . **E**
Gear . . . . . **G**
Gear With Locking Device. . **GL**
Automated (Specify) . . . . . **A**

Service
Nace . . . . . **N**
Oxygen . . . . **O**
Chlorine . . . **C**

*Schedule 40 only.

Consult factory for alternate materials.

Product Availability Quick Reference Table

Body Configuration	Port	ANSI Pressure Class	Locking Lever ½	¾	1	1½	2	3	4	Enclosed Gear 6	8	Tufline Figure Number
1-Piece Flanged	Reduced	150		●	●	●	●	●	●			511R
		300		●	●	●	●	●	●			513R
2-Piece Flanged	Full	150	●	●	●	●	●	●	●	●	●	521F
		300	●	●	●	●	●	●	●	●	●	523F
	Reduced	150								●	●	521R
		300								●	●	523R
3-Piece Screwed End Socket Weld End Butt Weld End	Full	300					●					533F*
		600	●	●	●	●						536F
	Reduced	600	●	●	●	●	●					536R

*533F valves are class 600 valves that all derated to operate at 1,000 PSI @ 100° F.

CRANE ChemPharma, Xomox & Matryx® Actuators.

Tufline Valves are available as part of a complete valve package.

Actuators are
available in three models:
- Double acting vane
- Rack & pinion spring return
- Electric

Tufline automated valve packages assure you of single-source responsibility for flow control equipment.

With Tufline valves, Matryx and CRANE ChemPharma, Xomox actuators, Xomox control accessories, and Tufline problem solving expertise, our customers are assured of valve packages that will provide optimum performance in any application.

Comprehensive side-by-side testing confirms that the Matryx and CRANE ChemPharma, Xomox rack and pinion actuators provide longer service life with more
consistent torque.

Solid performance data means processors can size actuators with more of a confidence factor and less of a “fudge-factor”. Initial cost, repair costs, replacement costs, and costly downtime can all be reduced.

Rack and pinion actuators are available in both double-acting and spring-return models with both 90° and 180° rotation.

CRANE ChemPharma, Xomox Automation & Service Centers.

Strategically located CRANE ChemPharma, Automation & Service Centers provide a variety of services. These range from standard repair to major modification and accessory packaging.

XOMOX®

CRANE ChemPharma Flow Solutions™

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4444 Cooper Road,
Cincinnati, OH 45242, U.S.A.
Tel.: (513) 745-6000
Fax: (513) 745-6086

XOMOX International GmbH & Co. OHG
Von-Behring-Straße 15,
D-88131 Lindau/Bodensee
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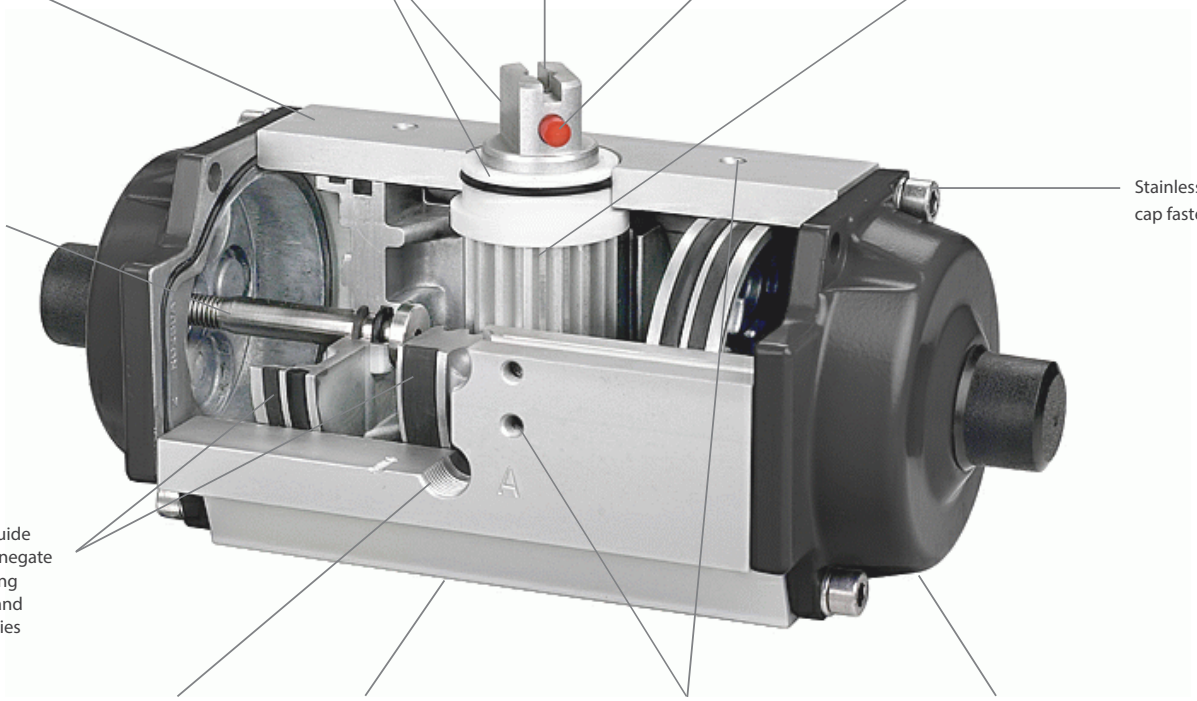
Design Features & Benefits



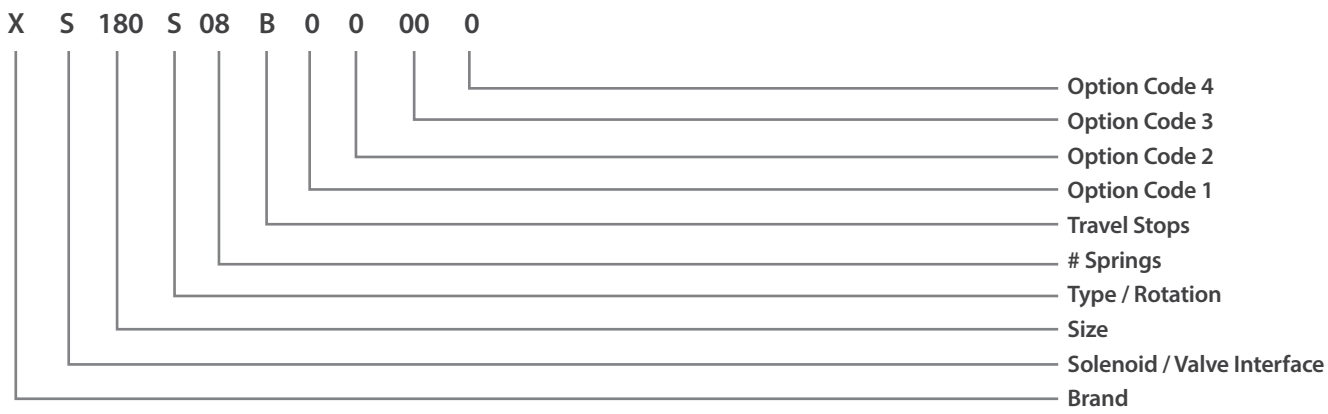
BENEFITS

- **High Quality and Reliability**
- **Economical**
- **Modular Design allows Flexible Configuration**
- **Improved Plant and Operator Safety**
- **Easy to Maintain and Service**

UNIQUE DESIGN FEATURES

- Patented, pressure balanced shaft prevent axial forces acting on the bearings. This results in high reliability, long life and low wear.
- Shaft and bearing bushings mounted from inside, are of blow-out safe design with no need for external circlips or snap rings providing high operational safety.
- Robust anodized aluminum bodies ensure even expansion under thermal influences; no jamming of the piston and a high level of corrosion protection.
- Self lubricating piston guide bands made of graphite infused teflon prevent piston tilt under load, provide longer service life due to low friction, with no maintenance required.
- Pre-compressed encapsulated springs allow for easier assembly/disassembly and provide an extra layer of safety protection against spring energy release.
- Compliance with international interface standards ISO 5211/DIN 3337 and VDE/VDI 3845 (NAMUR).
- Simple retrofitting of accessories, such as solenoid valves, limit switch, positioners, etc.
- Compact design allows extensive direct mounting orientations.

Product Configuration Code



Brand	
Xomox	X

Solenoid / Valve Interface	
Imperial - ¼" NPT Air Connection (VDI/VDE 3845 NAMUR)	S
Standard ISO 5211 Interface square (0° offset)	
Metric - G ¼" BSP Air Connection (VDI/VDE 3845 NAMUR)	D
Standard ISO 5211 / DIN 3337 interface Diamond (45° offset)	

Sizes	
Model Sizes: 002, 006, 012, 025, 050, 090, 30, 180, 205, 380, 630, 960, H15	XXX

Travel Stops	
Single Travel Stop for Open position (Sizes 002 and 006)	A
Dual Travel Stops with -4/+4 degrees of travel adjustment (Sizes 012 to 180)	B
Optional external Dual Travel Stops (Sizes 205 to H15)	C

Type / Rotation	
Double Acting (No Springs)	D
Spring Return, Spring to Close (FCW)	S
Spring Return, Spring to Open (FCCW)	A

# Springs	
Double Acting, No Springs	OO
Spring Return- 01 through 18 (even combinations standard, odd combinations optional)	XX

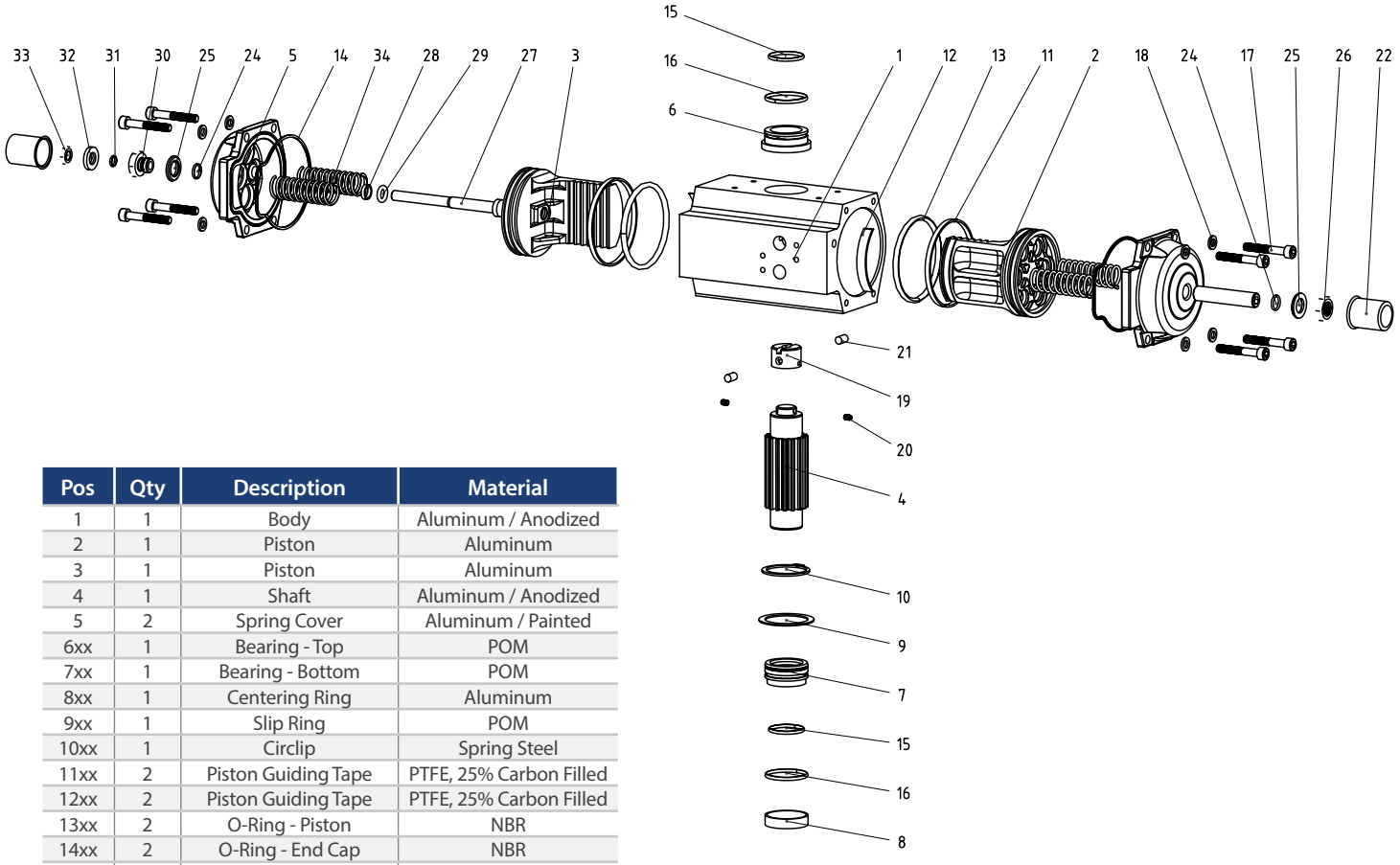
Option Code 1 - Temperature	
Standard -20° to 80°C (-4° to 176°F)	0
Low Temperature -40° to 80°C (-40° to 176°F)	1
High Temperature -20° to 140°C (-4° to 284°F)	2

Option Code 2 - Finish	
Anodized Body & Polyurethane finish (RAL 5002) End Caps	0
Consult Factory for Other Options	X

Option Code 3 - Shaft / Springs	
Anodized Aluminum Shaft / Standard Springs	0
Anodized Aluminum Shaft / Encapsulated Springs	1

Option Code 4 - Mounting Configuration	
Standard ISO F Pattern for Each Body Size	OO
Consult Factory for Optional Mounting Configurations	X

Materials of Construction



Pos	Qty	Description	Material
1	1	Body	Aluminum / Anodized
2	1	Piston	Aluminum
3	1	Piston	Aluminum
4	1	Shaft	Aluminum / Anodized
5	2	Spring Cover	Aluminum / Painted
6xx	1	Bearing - Top	POM
7xx	1	Bearing - Bottom	POM
8xx	1	Centering Ring	Aluminum
9xx	1	Slip Ring	POM
10xx	1	Circlip	Spring Steel
11xx	2	Piston Guiding Tape	PTFE, 25% Carbon Filled
12xx	2	Piston Guiding Tape	PTFE, 25% Carbon Filled
13xx	2	O-Ring - Piston	NBR
14xx	2	O-Ring - End Cap	NBR
15xx	1	O-Ring - Shaft	NBR
16xx	2	O-Ring	NBR
17	8	End Cap Screws	Stainless Steel
18	8	Washer	Stainless Steel
19	1	Shaft head	POM
20	2	Set Screw	Stainless Steel
21	2	Indicator	Polyamid
22	2	Cap	Polyethelene
23	1	End Position	
24xx	2	O-Ring	NBR
25	1	Washer	POM
26	1	Flat Hexagon Nut	Stainless Steel
27	1	Pull Rod	Nickel Plated Steel
28xx	1	PTFE Band	PTFE, 25% Carbon Filled
29xx	1	O-Ring	NBR
30	1	Threaded Bushing	Nickel Plated Steel
31xx	1	O-Ring	NBR
32	1	Washer	Steel
33	1	Flat Hexagon Nut	Stainless Steel
34	6	Encapsulated Springs	CrSi, Alloy Coating

General Specifications

Torque Range

Double Acting: 66 in-lbs to 107531 in-lbs (8.1 Nm to 11752 Nm)

Spring Return: 42 in-lbs to 103199 in-lbs (4.5 Nm to 11263 Nm)

Pressure Range

Double Acting 40 to 120psig (2.0 to 8.0 bar)

Spring Return 87 to 120 psig (5.0 to 8.0 bar), with maximum spring set
43 to 120 psig (2.5 to 8.0 bar), reduced spring quantity

Pressure Media

- Air, dry or lubricated and inert gases
- For sub-zero applications, take appropriate measures
- Mentioned pressure levels are "gauge pressures".
  Gauge pressure is equal to absolute pressure minus atmospheric pressure.

Finish

- Body: Anodized
- End Caps: Polyurethane coated RAL shades (60-80 µm)
- Shaft: Silver Anodized
- Fasteners: Stainless Steel
- Bearings: POM

Lubrication

- KlÜBER BEM 41-132

Temperature Range

- Standard: Nitrile seals (Buna-N rubber): -4F to 176F (-20C to 80C)
- Low temperature option: -40F to 176 F (-40°C to 80°C)
- High temperature option: -20F to 248F (-20°C to 140°C)

Angle of Rotation

- Factory set at 0° to 90°

Spring Return & Double Acting Actuators

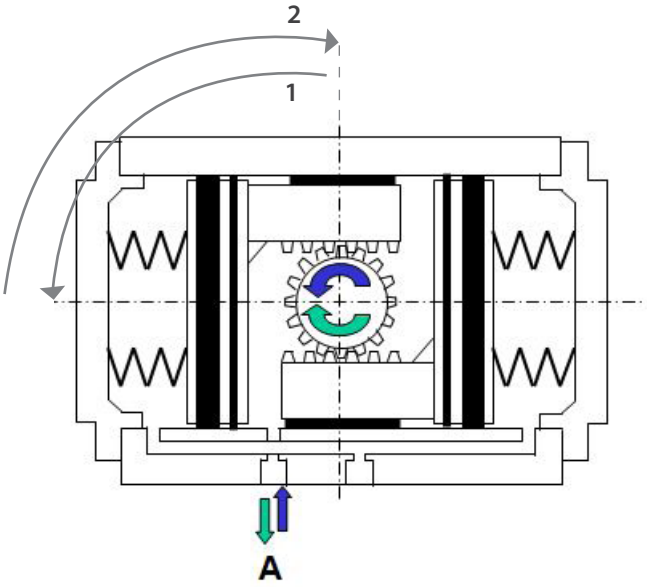
Spring Return Actuators

1. Standard (Opening) – Air at "A" causes counter clock-wise (CCW) rotation – Positive "Fail Safe" Close on air failure.

1= Central air chamber pressurized

2. Standard (Closing) – Air exhausted from "A" causes clock-wise (CW) rotation Reverse – Pinion can be changed so that Positive "Fail Safe" Open on loss of air.

2= Spring stroke



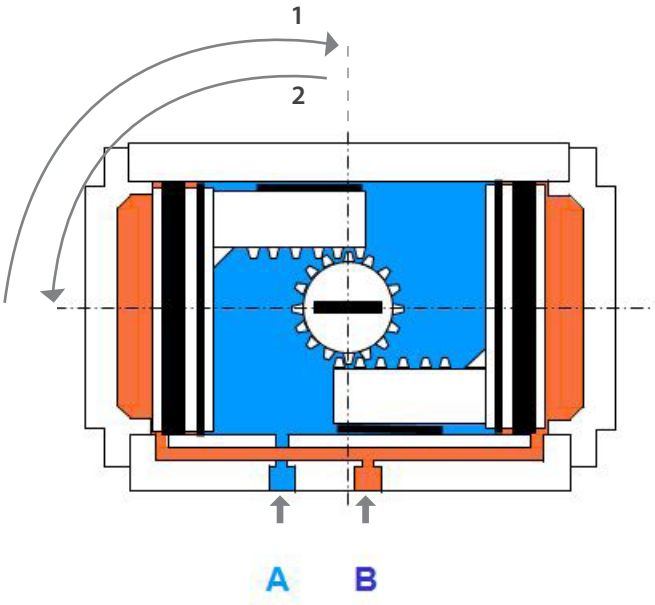
Double Acting Actuators

1. Standard (Closing) – Air at "B" causes clock-wise (CW) rotation.

1= Central air chamber pressurized

2. Reverse (opening) - Air at "A" causes counter clock-wise (CCW) rotation.

2= Spring stroke



NOTE: Views are from above

XRP Double Acting Torques - Imperial Units

	Spring Quantity	Spring Start	Spring End	40 psig Start	40 psig End	60 psig Start	60 psig End	80 psig Start	80 psig End	100 psig Start	100 psig End	120 psig Start	120 psig End
XS 002	02	16	8	58	50	91	83	124	116	157	149	N/A*	N/A*
	04	32	16	50	34	83	67	116	100	149	133	N/A*	N/A*
	06	48	24	42	18	75	51	108	84	141	117	N/A*	N/A*
	08	64	32			67	35	100	68	133	101	N/A*	N/A*
	10	80	40			59	19	92	52	125	85	N/A*	N/A*
	12	96	48					84	36	117	69	N/A*	N/A*
XS 006	02	36	18	133	115	209	190	284	266	360	342	N/A*	N/A*
	04	73	36	115	78	190	154	266	230	342	305	N/A*	N/A*
	06	109	55	97	42	172	118	248	193	324	269	N/A*	N/A*
	08	146	73			154	81	230	157	305	232	N/A*	N/A*
	10	182	91			136	45	211	120	287	196	N/A*	N/A*
	12	219	109					193	84	269	159	N/A*	N/A*
XS 012	02	73	36	265	228	415	379	565	529	716	680	866	830
	04	145	73	228	156	379	306	529	457	680	607	830	757
	06	218	109	192	83	342	234	493	384	643	534	794	685
	08	290	145			306	161	457	311	607	462	757	612
	10	363	181			207	88	420	239	571	389	721	540
	12	435	218					384	166	534	317	685	467
XS 025	02	142	71	515	444	808	737	1100	1030	1393	1322	1686	1615
	04	283	142	444	302	737	595	1030	888	1322	1181	1615	1474
	06	425	212	373	161	666	454	959	746	1252	1039	1544	1332
	08	566	283			595	312	888	605	1181	898	1474	1190
	10	708	354			524	170	817	463	1110	756	1403	1049
	12	850	425					746	322	1039	614	1332	907
XS 050	02	259	130	952	822	1493	1363	2034	1904	2574	2445	3115	2985
	04	519	259	822	563	1363	1104	1904	1644	2445	2185	2985	2726
	06	778	389	692	303	1233	844	1774	1385	2315	1926	2856	2467
	08	1038	519			1104	585	1644	1125	2185	1666	2726	2207
	10	1297	649			974	325	1515	866	2055	1407	2596	1948
	12	1557	778					1385	606	1926	1147	2467	1688
XS 090	02	474	237	1820	1583	2849	2612	3878	3641	4907	4670	5936	5699
	04	949	474	1583	1109	2612	2138	3641	3167	4670	4195	5699	5224
	06	1423	712	1346	635	2375	1663	3404	2692	4433	3721	5461	4750
	08	1897	949			2138	1189	3167	2218	4195	3247	5224	4276
	10	2372	1186			1901	715	2929	1744	3958	2772	4987	3801
	12	2846	1423					2692	1269	3721	2298	4750	3327
XS 130	02	719	359	2772	2413	4338	3978	5903	5544	7469	7110	9034	8675
	04	1437	719	2413	1694	3978	3260	5544	4825	7110	6391	8675	7957
	06	2156	1078	2053	975	3619	2541	5185	4107	6750	5672	8316	7238
	08	2847	1437			3260	1822	4825	3388	6391	4954	7957	6519
	10	3593	1797			2900	1104	4466	2669	6032	4235	7597	5801
	12	4312	2156					4107	1951	5672	3516	7238	5082

NOTES:

All torque values are inch-pounds for pressure supply listed.

Torque values are same for both Spring Fail Clockwise, FCW (XRP style S) & Counterclockwise, FCCW, (XRP style A).

Recommended Safety Factor = 20% for single acting actuators.

* Max Pressure 100 psig

CRANE

XRP Spring Return Torques - Imperial Units

	Spring Quantity	Spring Start	Spring End	40 psig Start	40 psig End	60 psig Start	60 psig End	80 psig Start	80 psig End	100 psig Start	100 psig End	120 psig Start	120 psig End
XS 180	02	945	473	3643	3170	5701	5228	7759	7286	9816	9344	11874	11401
	04	1890	945	3170	2225	5228	4283	7286	6341	9344	8399	11401	10456
	06	2836	1418	2698	1280	4756	3338	6813	5396	8871	7453	10929	9511
	08	3781	1890			4283	2393	6341	4450	8399	6508	10456	8566
	10	4726	2363			3810	1447	5868	3505	7926	5563	9984	7621
	12	5671	2836					5396	2560	7453	4618	9511	6676
XS 205	02	1490	745	5422	4677	8505	7760	11589	10844	14673	13927	17756	17011
	04	2981	1490	4677	3186	7760	6270	10844	9354	13927	12437	17011	15521
	06	4471	2236	3932	1696	7015	4780	10099	7863	13182	10947	16266	14030
	08	5961	2981			6270	3289	9354	6373	12437	9456	15521	12540
	10	7452	3726			5525	1799	8608	4883	11692	7966	14775	11050
	12	8942	4471					7863	3392	10947	6476	14030	9559
XS 380	02	2237	1119	8137	7018	12765	11646	17393	16274	22020	20902	26648	25530
	04	4475	2237	7018	4781	11646	9409	16274	14037	20902	18665	25530	23292
	06	6712	3356	5900	2544	10528	7172	15155	11799	19783	16427	24411	21055
	08	8949	4475			9409	4934	14037	9562	18665	14190	23292	18818
	10	11186	5593			8290	2697	12918	7325	17546	11953	22174	16581
	12	13424	6712					11799	5088	16427	9715	21055	14343
XS 630	02	3728	1864	13554	11690	21263	19400	28972	27109	36681	34818	44391	42527
	04	7455	3728	11690	7963	19400	15672	27109	23381	34818	31090	42527	38799
	06	11183	5591	9827	4235	17536	11944	25245	19653	32954	27362	40663	35071
	08	14910	7455			15672	8217	23381	15926	31090	23635	38799	31344
	10	18638	9319			13808	4489	21517	12198	29226	19907	36935	27616
	12	22366	11183					19653	8471	27362	16180	35071	23889
XS 960	03	5591	2796	20620	17825	32328	29532	44036	41240	55744	52948	67452	64656
	06	11183	5591	17825	12233	29532	23941	41240	35649	52948	47357	64656	59065
	09	16774	8387	15029	6642	26737	18350	38445	30058	50153	41766	61861	53474
	12	22366	11183			23941	12758	35649	24466	47357	36174	59065	47882
	15	27957	13979			21145	7167	32853	18875	44561	30583	56269	42291
	18	33549	16774					30058	13283	41766	24991	53474	36699
XS H15	02	8663	4331	31512	27181	49434	45103	67356	63024	85278	80946	103199	98868
	04	17325	8663	27181	18518	45103	36440	63024	54362	80946	72284	98868	90205
	06	25988	12994	22849	9855	40771	27777	58693	45699	76615	63621	94537	81543
	08	34651	17325			36440	19114	54362	37036	72284	54958	90205	72880
	10	43314	21657			32109	10452	50030	28374	67952	46295	85874	64217
	12	51976	25988					45699	19711	63621	37633	81543	55554

NOTES:

All torque values are inch-pounds for pressure supply listed.

Torque values are same for both Spring Fail Clockwise, FCW (XRP style S) & Counterclockwise, FCCW, (XRP style A).

Recommended Safety Factor = 20% for single acting actuators.

XRP Double Acting Torques

XOMOX XRP DOUBLE ACTING TORQUE (in-lbs)

Model	40 psig	60 psig	80psig	100 psig	120 psig
XS **002** D00A	66	99	132	165	N/A*
XS **006** D00A	151	227	303	378	N/A*
XS **012** D00B	301	451	602	752	903
XS **025** D00B	586	878	1171	1464	1757
XS **050** D00B	1082	1622	2163	2704	3245
XS **090** D00B	2058	3086	4115	5144	6173
XS **130** D00B	3131	4697	6263	7828	9394
XS **180** D00B	4116	6173	8231	10289	12347
XS **205** D00A	6167	9251	12334	15418	18501
XS **380** D00A	9256	13883	18511	23139	27767
XS **630** D00A	15418	23127	30836	38545	46254
XS **960** D00A	23416	35124	46832	58540	70248
XS **H15** D00A	35844	53765	71687	89609	107531

NOTES:

All torque values are inch-pounds for pressure supply listed.

Recommended Safety Factor = 10% for double acting actuators.

* Max Pressure 100 psig

XOMOX XRP DOUBLE ACTING TORQUE (Nm)

Model	3 Bar	3.5 Bar	4 Bar	4.2 Bar	5 Bar	6 Bar	7 Bar	8 Bar
XS **002** D00A	8.1	9.5	10.8	11.5	13.5	16.2	18.9	N/A*
XS **006** D00A	18.6	21.7	24.8	26.4	31.0	37.2	43.4	N/A*
XS **012** D00B	37	43	49	52.3	62	74	86	99
XS **025** D00B	72	83.5	95	101	119	143	167	191
XS **050** D00B	133	155	177	188.3	222	266	310	364
XS **090** D00B	253	295	337	358	421	505	589	673
XS **130** D00B	385	449	513	545.3	642	770	898	1026
XS **180** D00B	506	590.0	675	717	843	1012	1181	1350
XS **205** D00A	758	884.5	1011	1074.3	1264	1517	1770	2023
XS **380** D00A	1138	1327.5	1517	1611.8	1896	2275	2654	3033
XS **630** D00A	1896	2212	2528	2685.8	3159	3791	4423	5055
XS **960** D00A	2879	3359	3839	4079	4799	5758	6718	7677
XS **H15** D00A	4407	5141.5	5876	6243	7345	8814	10283	11752

NOTES:

All torque values are Newton-meters for pressure supply listed.

Recommended Safety Factor = 10% for double acting actuators.

* Max Pressure 7 Bar

CRANE

XRP Spring Return Torques - Metric Units

	Spring	Spring		3 Bar		3.5 Bar		4 Bar		4.2 Bar		5 Bar		6 Bar		7 Bar		8 Bar	
	Quantity	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
XS 002	02	1.8	0.9	7.2	6.3	8.6	7.7	9.9	9.0	10.6	9.7	12.6	11.7	15.3	14.4	18.0	17.1	N/A*	N/A*
	04	3.6	1.8	6.3	4.5	7.7	5.9	9.0	7.2	9.7	7.9	11.7	9.9	14.4	12.6	17.1	15.3	N/A*	N/A*
	06	5.4	2.7	5.4	2.7	6.8	4.1	8.1	5.4	8.8	6.1	10.8	8.1	13.5	10.8	16.2	13.5	N/A*	N/A*
	08	7.2	3.6	4.5	0.9	5.9	2.3	7.2	3.6	7.9	4.3	9.9	6.3	12.6	9.0	15.3	11.7	N/A*	N/A*
	10	8	4.5					6.3	2.8	7.0	3.5	9.0	5.5	11.7	8.2	14.4	10.9	N/A*	N/A*
	12	10.8	5.4									8.1	2.7	10.8	5.4	13.5	8.1	N/A*	N/A*
XS 006	02	4	2	16.6	14.6	19.6	17.7	22.6	20.8	24.2	22.4	29.0	27.0	35.2	33.2	41.4	39.4	N/A*	N/A*
	04	8.2	4.1	14.5	10.4	17.6	13.5	20.7	16.6	22.3	18.2	26.9	22.8	33.1	29.0	39.3	35.2	N/A*	N/A*
	06	12.2	6.1	12.5	6.4	15.6	9.5	18.7	12.6	20.3	14.2	24.9	18.8	31.1	25.0	37.3	31.2	N/A*	N/A*
	08	16.4	8.2	10.4	2.2	13.5	5.3	16.6	8.4	18.2	10.0	22.8	14.6	29.0	20.8	35.2	27.0	N/A*	N/A*
	10	20.6	10.3					14.5	4.2	16.1	5.8	20.7	10.4	26.9	16.6	33.1	22.8	N/A*	N/A*
	12	24.6	12.3									18.7	6.4	24.9	12.6	31.1	18.8	N/A*	N/A*
XS 012	02	8.3	4.1	32.9	28.7	39.1	34.9	45.2	41.0	48.3	44.1	57.5	53.3	69.9	65.7	82.2	78.0	94.5	90.3
	04	16.6	8.2	28.8	20.4	35.0	26.6	41.1	32.7	44.2	35.8	53.4	45.0	65.8	57.4	78.1	69.7	90.4	82.0
	06	24.9	12.3	24.7	12.1	30.9	18.3	37.0	24.4	40.1	27.5	49.3	36.7	61.7	49.1	74.0	61.4	86.3	73.7
	08	33.2	16.4	20.6	3.8	26.8	10.0	32.9	16.1	36.0	19.2	45.2	28.4	57.6	40.8	69.9	53.1	82.2	65.4
	10	41.5	20.5					28.8	7.8	31.9	10.9	41.1	20.1	53.5	32.5	65.8	44.8	78.1	57.1
	12	49.8	24.6									37.0	11.8	49.4	24.2	61.7	36.5	74.0	48.8
XS 025	02	16	8	64	56	76	68	87	79	93	85	111	103	135	127	159	151	183	175
	04	32	16	56	40	68	52	79	63	85	69	103	87	127	111	151	135	175	159
	06	48	24	48	24	60	36	71	47	77	53	95	71	119	95	143	119	167	143
	08	64	32	40	8	52	20	63	31	69	37	87	55	111	79	135	103	159	127
	10	80	40					55	15	61	21	79	39	103	63	127	87	151	111
	12	96	48									71	23	95	47	119	71	143	95
XS 050	02	30	15	118	103	140	125	162	147	173	158	207	192	251	236	295	280	349	334
	04	59	29	104	74	126	96	148	118	159	129	193	163	237	207	281	251	335	305
	06	89	44	89	44	111	66	133	88	144	99	178	133	222	177	266	221	320	275
	08	118	58	75	15	97	37	119	59	130	70	164	104	208	148	252	192	306	246
	10	148	73					104	29	115	40	149	74	193	118	237	162	291	216
	12	178	88									134	44	178	88	222	132	276	186
XS 090	02	56	27	226	197	268	239	310	281	331	302	394	365	478	449	562	533	646	617
	04	112	53	200	141	242	183	284	225	305	246	368	309	452	393	536	477	602	561
	06	168	80	173	85	215	127	257	169	278	190	341	253	425	337	509	421	593	505
	08	224	107	146	29	188	71	230	113	251	134	314	197	398	281	482	365	566	449
	10	280	134					203	57	224	78	287	141	371	225	455	309	539	393
	12	336	160									261	85	345	169	429	253	513	337
XS 130	02	84	41	344	301	408	365	472	429	504	461	601	558	729	686	857	814	985	942
	04	169	81	304	216	368	280	432	344	464	376	561	473	689	601	817	729	945	857
	06	253	122	263	132	327	196	391	260	423	292	520	389	648	517	776	645	904	773
	08	337	162	223	48	287	112	351	176	383	208	480	305	608	433	736	561	864	689
	10	422	203					310	91	342	123	439	220	567	348	695	476	823	604
	12	506	244									398	136	526	264	654	392	782	520

NOTES:

All torque values are Newton-meters for pressure supply listed.

Torque values are same for both Spring Fail Clockwise, FCW (XRP style S) & Counterclockwise, FCCW, (XRP style A).

Recommended Safety Factor = 20% for single acting actuators.

XRP Spring Return Torques - Metric Units

	Spring	Spring		3 Bar		3.5 Bar		4 Bar		4.2 Bar		5 Bar		6 Bar		7 Bar		8 Bar	
	Quantity	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
XS 180	02	111	53	453	395	538	480	622	564	664	606	790	732	959	901	1128	1070	1297	1239
	04	222	107	399	284	484	369	568	453	610	495	736	621	905	790	1074	959	1243	1128
	06	332	160	346	174	431	259	515	343	557	385	683	511	852	680	1021	849	1190	1018
	08	443	213	293	63	378	148	462	232	504	274	630	400	799	569	968	738	1137	907
	10	554	267					408	121	450	163	576	289	745	458	914	627	1083	796
	12	665	320									523	178	692	347	861	516	1030	685
XS 205	02	169	84	674	589	801	716	927	842	990	905	1180	1095	1433	1348	1686	1601	1939	1854
	04	337	169	589	421	716	548	842	674	905	737	1095	927	1348	1180	1601	1433	1854	1686
	06	506	253	505	252	632	379	758	505	821	568	1011	758	1264	1011	1517	1264	1770	1517
	08	674	337	421	84	548	211	674	337	737	400	927	590	1180	843	1433	1096	1686	1349
	10	843	421					590	168	653	231	843	421	1096	674	1349	927	1602	1180
	12	1011	506									758	253	1011	506	1264	759	1517	1012
XS 380	02	253	126	1012	885	1202	1075	1391	1264	1486	1359	1770	1643	2149	2022	2528	2401	2907	2780
	04	506	253	885	632	1075	822	1264	1011	1359	1106	1643	1390	2022	1769	2401	2148	2780	2527
	06	756	379	759	382	949	572	1138	761	1233	856	1517	1140	1896	1519	2275	1898	2654	2277
	08	1011	506	632	127	822	317	1011	506	1106	601	1390	885	1796	1264	2148	1643	2527	2022
	10	1264	632					885	253	980	348	1264	632	1643	1011	2022	1390	2401	1769
	12	1517	758									1138	379	1517	758	1896	1137	2275	1516
XS 630	02	421	211	1685	1475	2001	1791	2317	2107	2475	2265	2948	2738	3580	3370	4212	4002	4844	4634
	04	843	421	1475	1053	1791	1369	2107	1685	2265	1843	2738	2316	3370	2948	4002	3580	4634	4212
	06	1264	632	1264	632	1580	948	1896	1264	2054	1422	2527	1895	3159	2527	3791	3159	4423	3791
	08	1685	843	1053	211	1369	527	1685	843	1843	1001	2316	1474	2948	2106	3580	2738	4212	3370
	10	2107	1053					1475	421	1633	579	2106	1052	2738	1684	3370	2316	4002	2948
	12	2528	1264									1895	631	2527	1263	3159	1895	3791	2527
XS 960	02	632	316	2563	2247	3043	2727	3523	3207	3763	3447	4483	4167	5442	5126	6402	6086	7361	7045
	04	1264	632	2247	1615	2727	2095	3207	2575	3447	2815	4167	3535	5126	4494	6086	5454	7045	6413
	06	1896	948	1931	983	2411	1463	2891	1943	3131	2183	3851	2903	4810	3862	5770	4822	6729	5781
	08	2528	1264	1615	351	2095	831	2575	1311	2815	1551	3535	2271	4494	3230	5454	4190	6413	5149
	10	3160	1580					2259	679	2499	919	3219	1639	4178	2598	5138	3558	6097	4517
	12	3792	1896									2903	1007	3862	1966	4822	2926	5781	3885
XS H15	02	979	489	3918	3428	4653	4163	5387	4897	5754	5264	6856	6366	8325	7835	9794	9304	11263	10773
	04	1958	979	3428	2449	4163	3184	4897	3918	5264	4285	6366	5387	7835	6856	9304	8325	10773	9794
	06	2937	1468	2939	1470	3674	2205	4408	2939	4775	3306	5877	4408	7346	5877	8815	7346	10284	8815
	08	3616	1958	2449	791	3184	1526	3918	2260	4285	2627	5387	3729	6856	5198	8325	6667	9794	8136
	10	4894	2447					3429	982	3796	1349	4898	2451	6367	3920	7836	5389	9305	6858
	12	5873	2937									4408	1472	5877	2941	7346	4410	8815	5879

NOTES:

All torque values are Newton-meters for pressure supply listed.

Torque values are same for both Spring Fail Clockwise, FCW (XRP style S) & Counterclockwise, FCCW, (XRP style A).

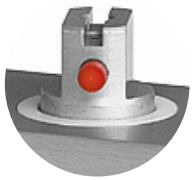
Recommended Safety Factor = 20% for single acting actuators.

* Max Pressure 7 Bar

Additional Features & Options

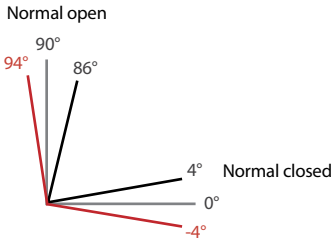
Visual Indicator

The position indicator is per the NAMUR standard providing local 90 degree indication and allows for the connection of a larger limit switch box with indicator.



Limit Stops

Adjustable limit stops for both open and closed positions provide 8 degrees of travel protection (4 degrees over-travel / 4 degrees under-travel)



Environmental Protection

Various types of coatings are available to help protect the actuator from harsh environmental conditions such as salt spray, chemicals, acids, fire, etc.

High/Low temperature kits allow the conversion of a standard actuator into either a high temperature version or low temperature version to meet extended operating temperature requirements.

The High temperature version incorporates special grease, Viton o-rings, seals, and metallic bearings suitable for operation up to 248 degrees F (120 degrees C)

The Low temperature version incorporates special grease, EPDM o-rings, and metallic bearings suitable for operation down to -40 degrees F (-40 degrees C)

Valve Interface

Shaft connections meet ISO 5211 standards and are available in square (0 degree offset), diamond (45 degree offset), and double-d for direct NAMUR mounting or bracket/coupling installation.

Shaft connection adapters allow reduction to accommodate smaller valve shafts.

Centering rings allow compliance with DIN 3337 and are available to make connection to a valve as simple as possible.

Manual Over-Rides

Allow the dis-connection of the actuator from the valve so that a manual operation can be performed.

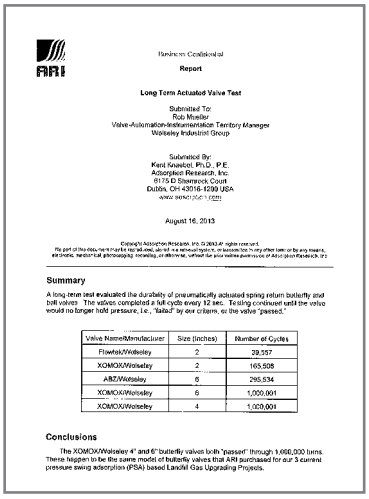
Repair Kits

Spare parts kits are available for maintenance/repair or the conversion of a standard actuator to a different configuration.

Crane Sizing Program & Documentation

3rd Party Certification

The XOMOX Rack&Pinion (XRP) actuator's patented dual-piston, 3-point guide band suspension system provides a short, uniform, low-friction, guided stroke for optimum performance. It has been 3rd party tested and certified to operate to over 1 million full open/closed cycles without failure confirming that XRP actuators provide more consistent torque and longer service life than virtually any other actuator. The test was completed by Absorption Research, Inc an independent 3rd party who simulated real world conditions of a XRP actuator operating a Tufline HP butterfly valve. Detailed test results are available from Xomox Product Engineering Test Report Number 13-10-001.



Report

Long Term Actuated Valve Test

Submitted To:
Rob Mueller
Valve-Automation-Instrumentation Territory Manager
Wolseley Industrial Group

Submitted By:
Kent Knaebel, Ph.D., P.E.
Adsorption Research, Inc.
6175 D Shamrock Court
Dublin, OH 43016-1299 USA

August 16, 2013

Summary

A long-term test evaluated the durability of pneumatically actuated spring return butterfly and ball valves. The valves completed a full cycle every 12 sec. Testing continued until the valve would no longer hold pressure, i.e., "failed" by one criteria, or the valve "passed."

Valve Name/Manufacturer	Size (inches)	Number of Cycles
Flowtek/Wolseley	2	29,557
XOMOX/Wolseley	2	165,508
ABZ/Wolseley	6	295,534
XOMOX/Wolseley	6	1,000,001
XOMOX/Wolseley	4	1,000,001

Conclusions

The XOMOX/Wolseley 4" and 6" butterfly valves both "passed" through 1,666,000 turns. There happen to be the same model of butterfly valves that ARI purchased for our 5 current pressure swing adsorption (PSA) based Landfill Gas Upgrading Projects.

ARI
Adsorption Research Inc.
6175 Shamrock Court, Suite D
Dublin, OH 43016-1200 USA

Crane Sizing Program

The Crane Sizing Program can be used to quickly determine the proper actuator size for a valve or to work on a number of valves and actuators for a large project. The Quicksize feature allows you to fill in individual valve information and the program will determine the actuator size/configuration required to meet the torque requirements.

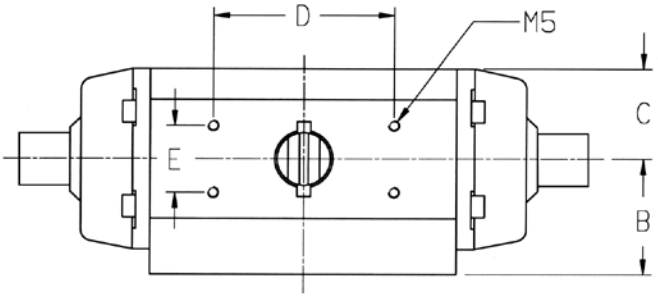
The Project Worksheet feature allows all the valve and actuator data to be entered/ imported into a spreadsheet format making it easy to generate project quotations. The Engineering Calculation feature allows several different common valve/actuator engineering calculations to be done:

- Actuator Torque Tables will calculate the torque output of a selected actuator range at any supply pressure
- Speed Calculation can be done by inputting the actuator and process data to determine how quickly the actuator will open/close
- Tank Sizing is used to determine the size of an air tank required to operate the actuator after loss of air (failure)
- Hot Line Calculation can help to determine what type of actuator seals should be used and the distance the actuator should be mounted away from the process/valve

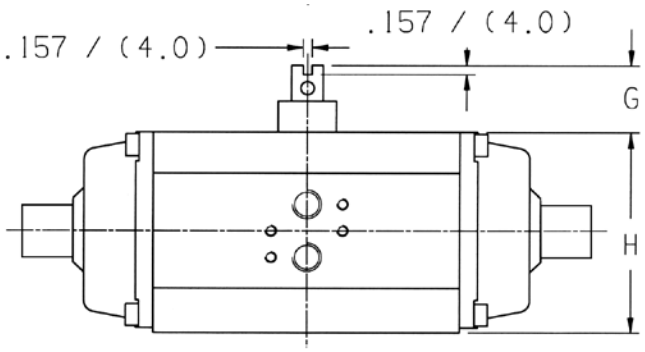
The Control Valve Sizing feature provides a simplified sizing technique for valve flow sizing for gas, liquid, or steam processes, saving a great deal of manual calculation effort to achieve an acceptable level of accuracy.

All of the information generated by the Crane Sizing Program can be printed out in ISA style data sheets.

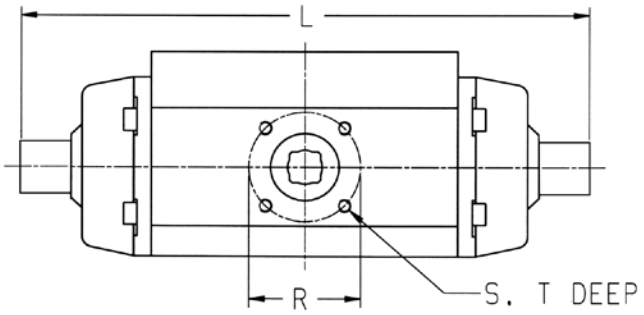
Size 012-180 Dimensions



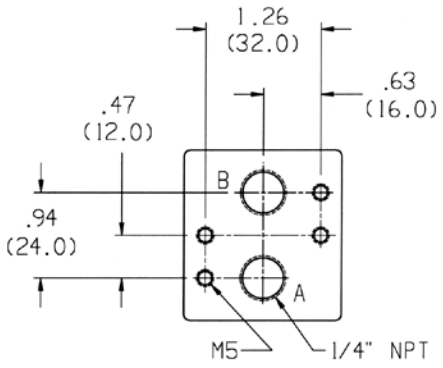
Top View



Side View



Bottom View

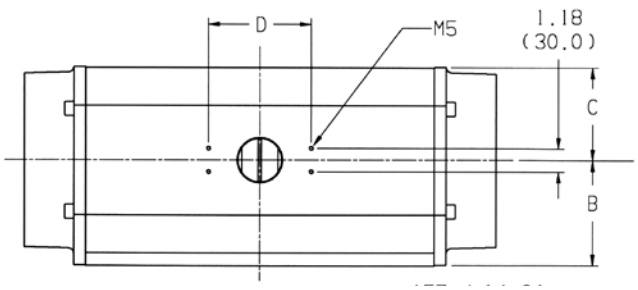


Solenoid Valve Interface

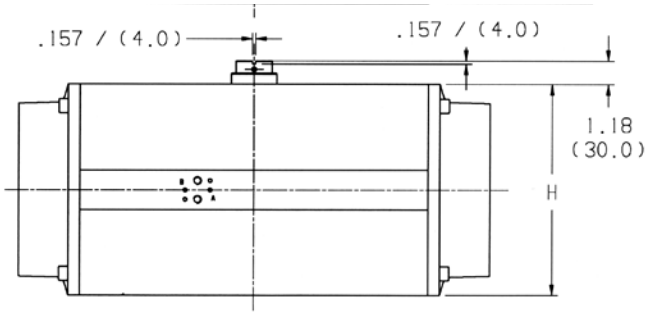
SIZE	L	G	H	B	C	D	E	R	S	T	ISO	SQ
XS012	10.43	0.79	3.58	2.66	1.61	3.15	1.18	1.97	M6	0.35	F05	0.55
	265	20	91	67.5	41	80	30	50		9		14
XS025	11.42	0.79	4.76	3.23	2.17	3.15	1.18	1.97	M6	0.35	F05	0.55
	290	20	121	82	55	80	30	50		9		14
XS050	14.37	0.79	5.75	3.70	2.64	3.15	1.18	2.76	M8	0.49	F07	0.67
	365	20	146	94	67	80	30	70		12.5		17
XS090	17.72	1.18	6.54	4.29	3.07	5.12	1.18	4.02	M10	0.63	F10	0.87
	450	30	166	109	78	130	30	102		16		22
XS130	20.67	1.18	7.56	4.53	3.54	5.12	1.18	4.92	M12	0.71	F12	1.06
	525	30	192	115	90	130	30	125		18		27
XS180	21.06	1.18	8.58	5.08	4.02	5.12	1.18	4.92	M12	0.71	F12	1.06
	535	30	218	129	102	130	30	125		18		27
	Inches											
	mm											

NOTE: Dimensions are in inches and millimeters. Dimensions are nominal. For certified drawings contact factory.

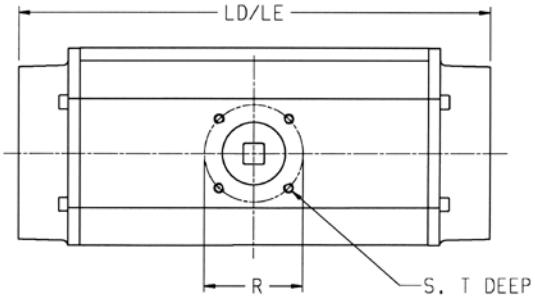
Size 205-H15 Dimensions



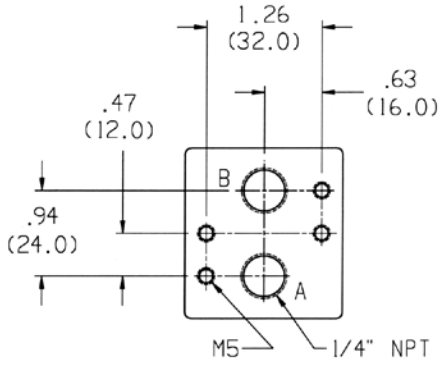
Top View



Side View



Bottom View



Solenoid Valve Interface

SIZE	LD	LE	H	B	C	D	R	S	T	ISO	SQ
XS205	15.24	19.13	10.71	5.91	4.69	5.12	5.51	M16	0.98	F14	1.42
	387	486	272	150	119	130	140		25		36
XS380	20.08	23.70	10.71	5.91	4.69	5.12	5.51	M16	0.98	F14	1.42
	510	602	272	150	119	130	140		25		36
XS630	22.09	29.17	13.54	7.36	6.77	5.12	6.50	M20	1.26	F16	1.81
	561	741	344	187	172	130	165		32		46
XS960	22.05	29.69	16.61	8.90	8.31	5.91	6.50	M20	0.35	F16*	1.81
	560	754	422	226	211	150	165		32		46
XSH15	26.34	34.61	17.72	9.45	8.86	5.91	ISO F25 Only See XS960/XSH15 View				2.17
	669	879	450	240	225	150					55
	Inches	LD = Length of Double-acting Actuator LE = Length of Spring Return Actuator * This Model also has ISO F25 Mounting Pattern									
	mm	**NOTE:** Dimensions are in inches and millimeters. Dimensions are nominal. For certified drawings contact factory.									

XOMOX®

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Matryx® Vane Actuators

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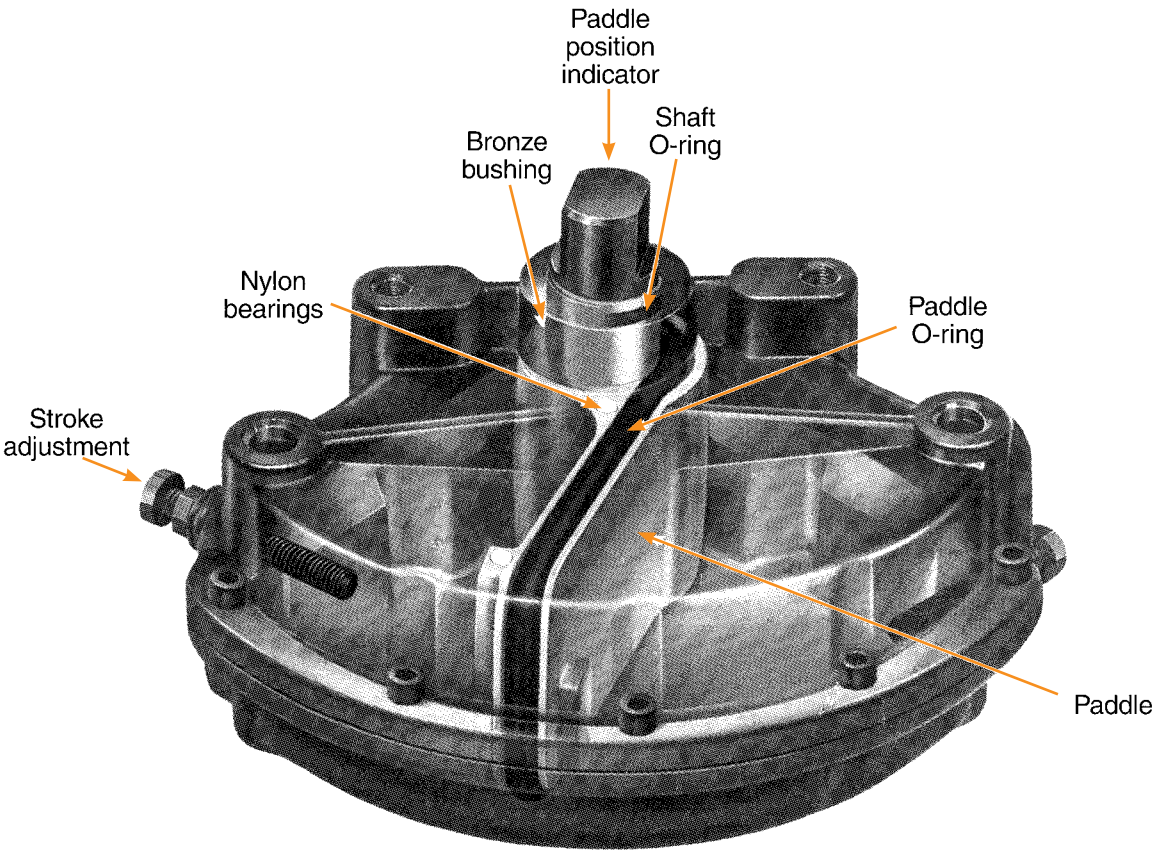


Matryx® Vane Actuators provide unmatched features:

Compact, lightweight, yet powerful.
Matryx Vane Actuators are smaller than other types of actuators in the torque output range of up to 36,000 in-lb. Matryx Vane Actuators produce a high ratio of torque output per pound of actuator weight.

Long life.
Exhaustive factory tests and customer applications have substantiated the long life of Matryx vane actuators.

Durable housing.
The housing is die cast aluminum for maximum strength. The housing is then coated with a high quality alkyd enamel for excellent atmospheric corrosion resistance.

Modular construction.
Accessory control components can be easily added in the field.

Ease of installation.
Matryx vanes are easy to install because of their lightweight, compact design. Mounting kits are available for all types of valves and other devices.

Wide temperature range.
Matryx vanes can operate efficiently from 0° to 225°F. Contact the factory for applications in other temperature ranges.

Simplicity.
Only one moving part, the vane (paddle), is needed to transmit the torque to the valve. Because the paddle is cast directly on the shaft, there is no lost motion during the stroke. This design provides excellent repeatability when used with a positioner.

Uniform seal.
The paddle comes assembled with integral nylon bearings to equalize O-ring compression around the paddle.

Low friction.
The Matryx vanes use Buna-N (Nitrile) O-rings and bronze bushings to minimize friction. The result is a design which is more than 90% efficient in torque output.

Low maintenance.
There are only 3 soft parts which can wear during operation - 1 paddle O-ring and 2 shaft O-rings. These O-rings are easily replaced and are readily available from the factory and all automation centers.

External stroke adjustment.
The Matryx vanes are designed with convenient external travel stops to allow a wide range of rotation adjustment (+/-10 at each end of the stroke).

Available special features.
See page 9 for a description of the options currently available.

Operating Torques For Double Acting Vane Actuation*

inch-lbs (nm)

MODEL	40 psi (2.7 bar)	60 psi (4.1 bar)	80 psi (5.5 bar)	100 psi (6.8 bar)	120 psi (8.2 bar)
MX60	210	315	450	560	680
	(24)	(36)	(51)	(63)	(77)
MX200	680	1050	1450	1850	2200
	(77)	(119)	(164)	(209)	(249)
MX450	1800	2700	3600	4500	5400
	(203)	(305)	(407)	(508)	(610)
MX750	2660	4100	5325	6900	8350
	(300)	(463)	(602)	(780)	(943)
MX1250	4730	7120	9350	11750	14250
	(534)	(804)	(1056)	(1328)	(1610)
MX3000	12000	18000	24000	30000	36000
	(1356)	(2034)	(2712)	(3389)	(4067)

Operating Torques For 90° Fail-Safe Vane Actuation *

inch-lbs (nm)

MODEL	Position	40 psi (2.7 bar)	60 psi (4.1 bar)	80 psi (5.5 bar)	100 psi (6.8 bar)	120 psi (8.2 bar)
MX60FS	OPEN	210	315	450	560	680
		(24)	(36)	(51)	(63)	(77)
	CLOSE *Beginning*	200	288	412	514	624
		(22)	(33)	(47)	(58)	(71)
	CLOSE *End*	*120*	*175*	*255*	*325*	*400*
		(13)	*(20)*	*(29)*	*(37)*	*(45)*
MX200FS	OPEN	680	1050	1450	1850	2200
		(77)	(119)	(164)	(209)	(249)
	CLOSE *Beginning*	623	960	1330	1700	2000
		(70)	(108)	(150)	(192)	(226)
	CLOSE *End*	*382*	*565*	*815*	*1065*	*1285*
		(43)	*(64)*	*(92)*	*(120)*	*(145)*
MX450FS	OPEN	1800	2700	3600	4500	5400
		(203)	(305)	(407)	(508)	(610)
	CLOSE *Beginning*	1571	2510	3350	4200	5020
		(178)	(283)	(378)	(475)	(567)
	CLOSE *End*	*1181*	*1890*	*2520*	*3150*	*3780*
		(134)	*(214)*	*(285)*	*(356)*	*(427)*
MX750FS	OPEN	2660	4100	5325	6900	8350
		(300)	(463)	(602)	(780)	(943)
	CLOSE *Beginning*	2401	3950	5120	6650	8050
		(272)	(446)	(578)	(750)	(910)
	CLOSE *End*	*1700*	*2725*	*3625*	*4765*	*5820*
		(193)	*(308)*	*(410)*	*(538)*	*(658)*
MX1250FS	OPEN	4730	7120	9350	11750	14250
		(534)	(804)	(1056)	(1328)	(1610)
	CLOSE *Beginning*	4220	6850	9000	11300	13700
		(479)	(774)	(1017)	(1276)	(1548)
	CLOSE *End*	*2710*	*4260*	*5780*	*7400*	*9090*
		(308)	*(481)*	*(653)*	*(836)*	*(1027)*
MX3000FS	OPEN	12000	18000	24000	30000	36000
		(1356)	(2034)	(2712)	(3389)	(4067)
	CLOSE *Beginning*	10000	16500	22000	27500	33000
		(1136)	(1860)	(2480)	(3100)	(3729)
	CLOSE *End*	*6000*	*12000*	*16000*	*20000*	*24000*
		(681)	*(1350)*	*(1800)*	*(2250)*	*(2712)*

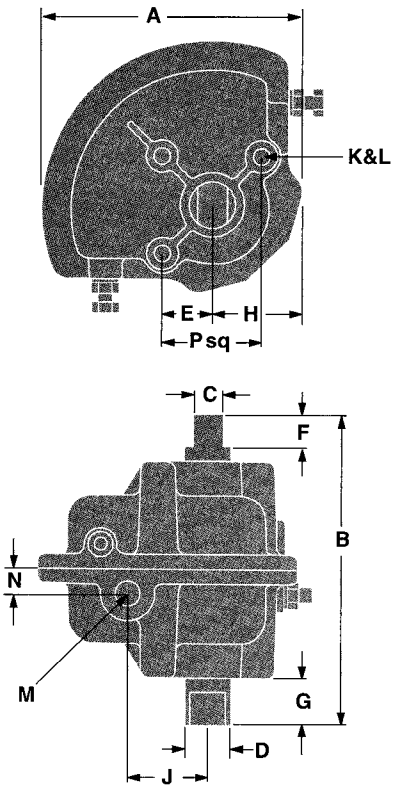
* Actuator Sizing:

When sizing an actuator to a valve, damper, or other device, a safety factor should be added to the maximum torque requirement of the device to assure the automated device's operation.

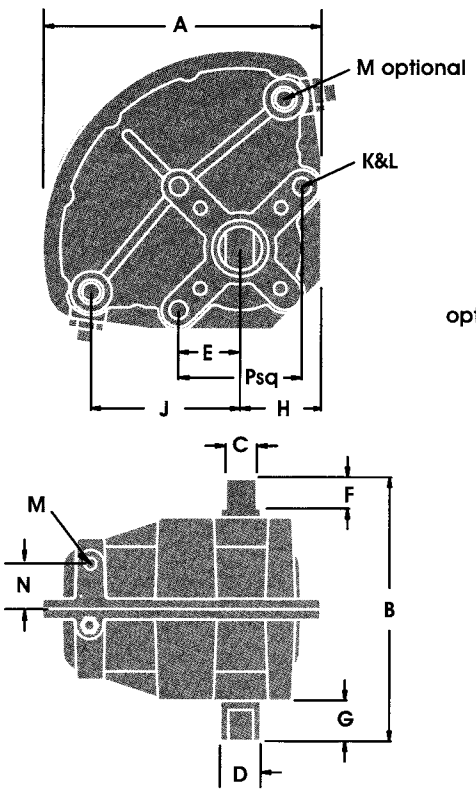
For Double Acting Vane Actuators, the safety factor should be 10%.

For Fail-Safe Vane Actuators, the safety factor should be 20%.

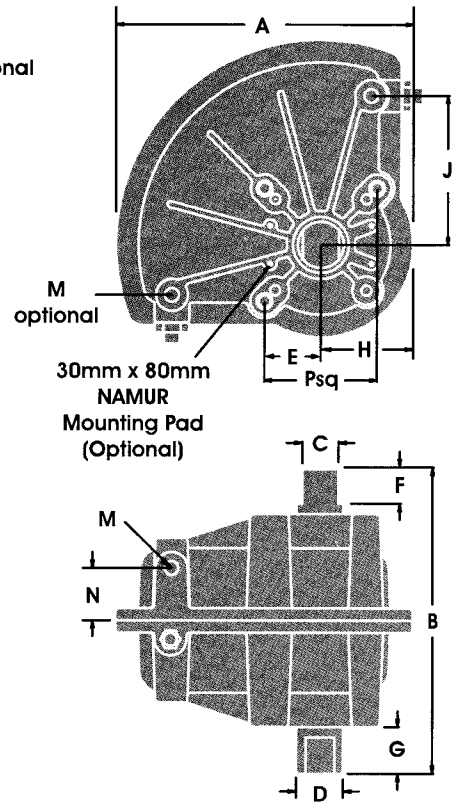
Dimensional Data for Double Acting Vanes



Model MX60



Model MX200



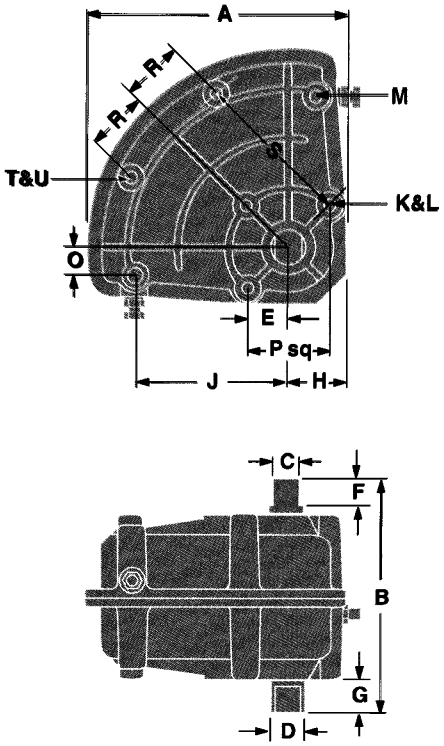
Model MX450

LEGEND

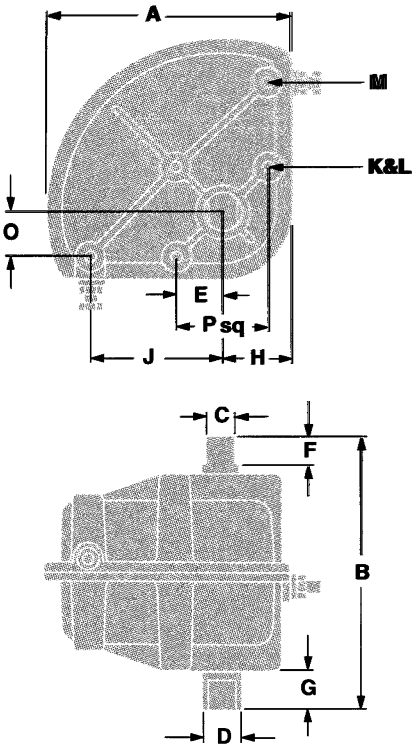
Standard letter designations for double acting vane actuators

A	overall length
B	total height
C	shaft end flats dimension
D	shaft end diameter
E	center line of vane shaft to center line of mounting holes
F	depth of shaft end flats
G	length of the shaft from mounting surface to the end of the shaft
H	center line of vane shaft to right end of vane
J	center line of vane shaft to port center line
K	vane mounting holes dimensions and quantity
L	vane mounting hole depth of thread
M	port size. Alternative port locations available upon request for models MX200, MX450, and MX3000
N	center line of assembled vane to port center line
O	center line of vane shaft to port center line
P	vane mounting holes arrangement
R	accessory mounting hole arrangement
S	center line of vane shaft to center line of accessory mounting hole
T	accessory mounting hole dimension and quantity
U	accessory mounting hole depth of thread

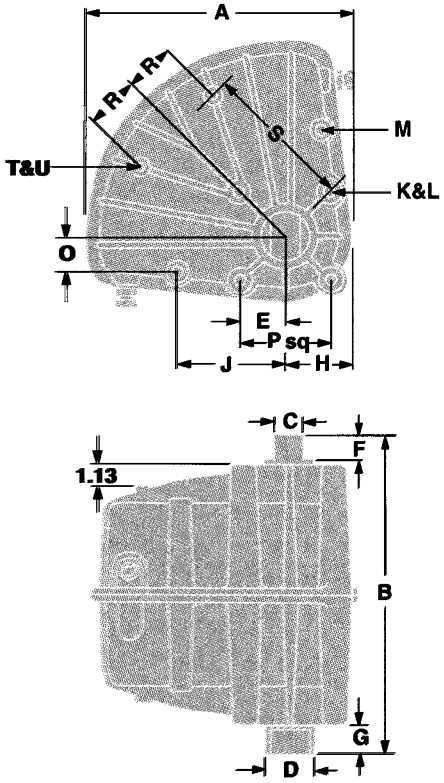
Note: *Vane shown in full clockwise position when viewed from top of vane.*



Model MX1250



Model MX750



Model MX3000

DIMENSIONS inches (mm)

Models	MX60	MX200	MX450	MX750	MX1250	MX3000
A	4.87	6.94	9.25	9.31	10.88	13.62
	(124)	(176)	(235)	(236)	(276)	(346)
B	5.88	6.56	9.56	10.50	10.00	16.63
	(149)	(166)	(243)	(267)	(254)	(422)
C *	.563	.750	1.124	1.125	1.125	1.500
	(14.3)	(19.0)	(28.6)	(28.6)	(28.6)	(38.1)
D *	.875	1.064	1.437	1.442	1.442	2.495
	(22.2)	(27.0)	(36.5)	(36.6)	(36.6)	(63.4)
E	.94	1.50	1.75	1.75	1.75	2.30
	(24)	(38)	(44)	(44)	(44)	(58)
F *	.63	.75	1.13	1.13	1.13	1.31
	(16)	(19)	(29)	(29)	(29)	(33)
G *	.91	1.00	1.50	1.50	1.50	1.56
	(23)	(25)	(38)	(38)	(38)	(39)
H	1.69	2.13	2.88	2.63	2.50	3.46
	(43)	(54)	(74)	(67)	(63)	(88)
J	1.50	3.62	4.63	5.00	6.38	5.50
	(38)	(92)	(118)	(127)	(162)	(140)
K * [UNC]	5/16-18	3/8-16	1/2-13	1/2-13	1/2-13	3/4-10
qty	3	3	3	3	3	4
L *	.50	.56	.81	.75	.62	1.50
	(13)	(14)	(21)	(19)	(16)	(38)
M * [NPT]	1/4-18	1/4-18	1/4-18	1/4-18	3/8-18	3/8-18
qty	2	4	4	4	4	4
N	.50	.94	1.63	-----	-----	-----
	(13)	(24)	(41)	-----	-----	-----
O	-----	-----	-----	1.75	1.19	1.88
	-----	-----	-----	(44)	(30)	(48)
P *	1.88	3.00	3.50	3.50	3.50	4.60
	(48)	(76)	(89)	(89)	(89)	(117)
R *	-----	-----	-----	-----	2.50	2.63
	-----	-----	-----	-----	(63)	(67)
S *	-----	-----	-----	-----	6.63	7.69
	-----	-----	-----	-----	(168)	(195)
T * [UNC]	-----	-----	-----	-----	1/2-13	1/2-13
qty	-----	-----	-----	-----	2	2
U *	-----	-----	-----	-----	.62	.56
	-----	-----	-----	-----	(16)	(14)

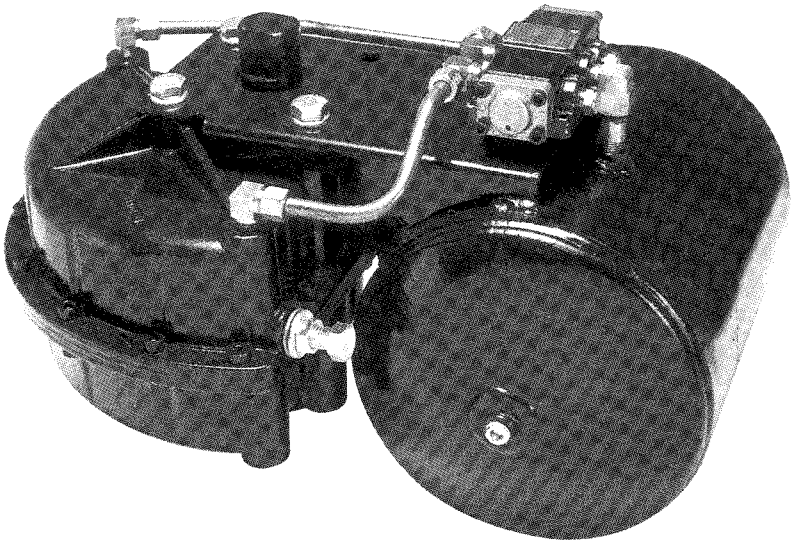
* Typical on both top and bottom of actuator

WEIGHTS

lbs	3	7	14	18	22	65
kg	(1.4)	(3.2)	(6.4)	(8.2)	(10.0)	(29.6)

Fail-Safe Vane Actuators

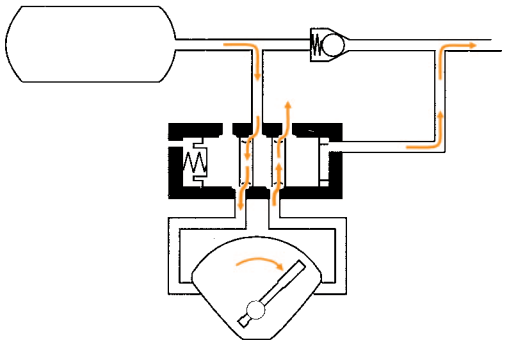
Matryx Fail-Safe Vane Actuators utilize an air accumulator to assure valve closure, regardless of air pressure droop (temporary low air pressure). The accumulator design makes Matryx vanes 100% positively fail-safe because they will fail instantaneously when air pressure is lost or falls below a predetermined minimum air setting. The Matryx pneumatic Fail-Safe systems have been field tested and proven reliable under a variety of service conditions.



Fail-Safe Arrangement 1* (FS1)

(Fail-Safe on ***air*** failure)

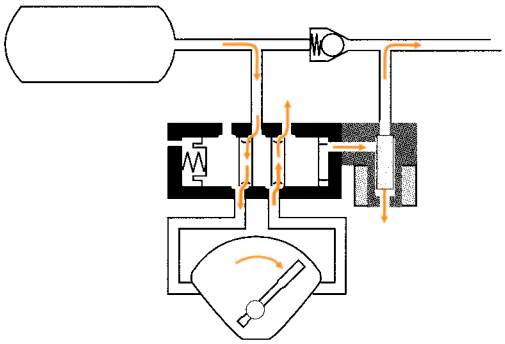
As air (above 45 psig) is admitted to the 4-way air operated pilot valve, it switches, and air moves the vane 90° and also charges the accumulator. When air drops below 15 psig, the pilot switches, allowing accumulator air to move the vane 90° to the "safe" position.



Fail-Safe Arrangement 2* (FS2)

(Fail-Safe on ***air or electric*** failure)

This is identical to Arrangement 1 except that a 3-way solenoid valve** controls air supply to pilot valve. On loss of air pressure, the pilot switches to the "safe" position. On electrical failure, the solenoid de-energizes, exhausting the air from the pilot valve. Explosion-proof is available.



**Solenoid valve may be integral as shown or separate from pilot valve.

FEATURES

- No spring drift. No change in position with the normal droop in plant air supply pressure. Spring actuators "drift" as the air supply droops.
- Cost savings. In some cases, the Matryx system is less than half the cost of a comparable spring return unit.
- Remote mounting capability. The Matryx Fail-Safe system can easily be mounted remotely on a nearby wall or structural support.
- A safer system. No special tools or safety enclosures are needed for maintenance, like some spring actuators. For safe, easy maintenance, the tank is simply depressurized.

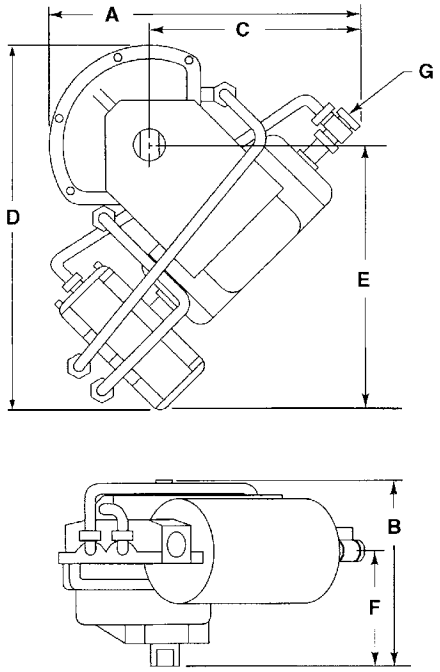
*Other Fail-Safe arrangements are available.

Fail-Safe arrangement 3 will function on ***air or electric*** failure (like the FS2) but also incorporates a pressure switch to monitor the air supply. If pressure drops below the pressure switch setting, the switch opens and the solenoid is de-energized, switching to the "safe" position. Accumulator air then moves the vane 90°, pressure switch resets 10 psi above the failure setting, and normal operation resumes.

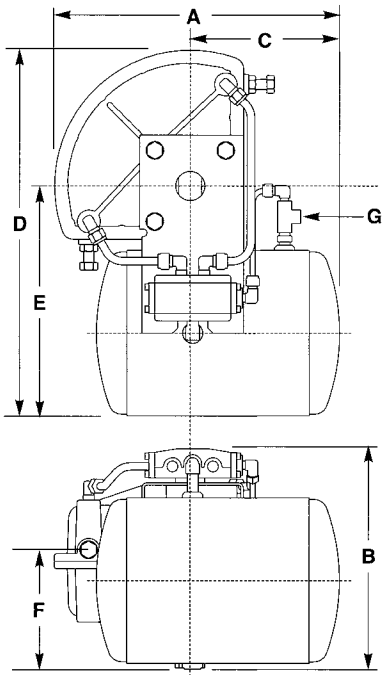
Fail-Safe arrangement 4 will function on ***electric*** failure only. On electrical failure, the solenoid de-energizes and moves the actuator to the "safe" position. If there could be air failure with no effect on the electrical service, this arrangement should not be used.

Consult the factory for questions regarding your specific application.

Fail-Safe (FS) Vane Dimensions



MX60FS



MX200FS - MX3000FS

90° Matryx Fail-Safe Actuator Dimensions inches (mm)

Model	A	B	C	D	E	F	G [NPT]	Tank Volumes* Cu.In.
MX60FS	8.94 (227)	5.88 (149)	5.69 (115)	11.18 (284)	8.00 (203)	3.50 (89)	1/4-18 1/4-18	40
MX200FS	11.75 (298)	7.63 (194)	6.88 (175)	13.63 (347)	8.81 (224)	3.63 (92)	1/4-18 1/4-18	95
MX450FS	14.69 (373)	9.93 (245)	8.00 (203)	16.88 (429)	10.50 (267)	4.38 (111)	1/4-18 1/4-18	302
MX750FS	14.75 (375)	10.50 (267)	8.00 (203)	18.68 (475)	12.00 (305)	4.25 (108)	1/4-18 1/4-18	542
MX1250FS	21.00 (534)	10.88 (276)	12.50 (318)	20.38 (518)	12.00 (305)	3.75 (95)	1/4-18 1/4-18	634
MX3000FS	22.38 (568)	16.68 (424)	10.13 (257)	26.18 (665)	16.00 (406)	8.38 (213)	1/4-18 1/4-18	1963

The dimensions above are for Fail-Safe Arrangement 1 models. Contact factory for other arrangements.
*Tank volume represents enough capacity to stroke the actuator 1 time at listed torque.

Weights *

Model	MX60FS1	MX200FS1	MX450FS1	MX750FS1	MX1250FS1	MX3000FS1
lbs	18	24	28	37	40	102
kg	(8)	(11)	(13)	(17)	(18)	(47)

*For FS Arrangement 2 units, add 1 lb. to the weights shown for FS1 models.

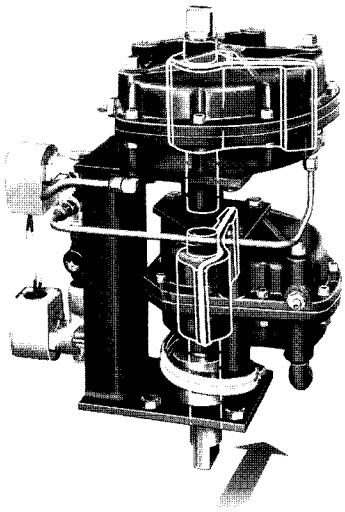
180° Matryx Vane Actuators

Models MX60-180 through MX3000-180.

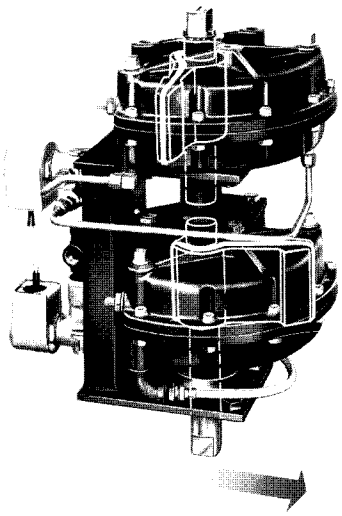
Matryx 180° actuator systems make use of two 90° actuators and two solenoid valves to eliminate the need for a positioner or elaborate limit switch setup to control stopping at the 90° position. The output torques of the 180° actuators are the same as the 90° units. Available in weatherproof or explosion proof construction.

180° systems can also be supplied as fail-safe units. Fail-safe versions can be constructed to fail in any of the 3 positions shown; however, position 2 (90°) is the standard fail position.

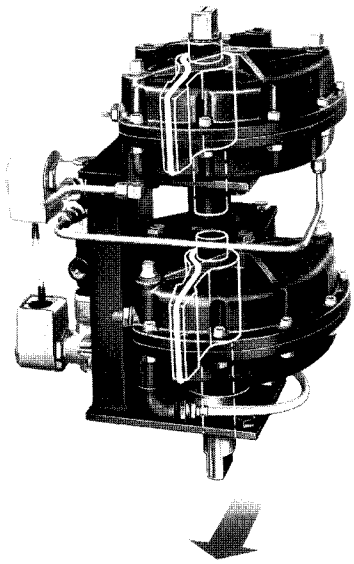
Position 1 (0°)



Position 2 (90°)



Position 3 (180°)



Operation:

Three position control is obtained by the use of two 4-way solenoid valves.

To obtain position 1 (full counterclockwise), the top solenoid is energized. To obtain position 2 (center), neither solenoid is energized. For position 3 (full clockwise), the bottom solenoid is energized.

180° movement is obtained by adding the 90° stroke of both actuators. The upper unit rotates the housing of the lower unit 90°. The vane of the lower unit then rotates 90° within its housing, so the result is 180°.

Chemical resistant plastic tubing provides flexible air connection to the lower actuator.

Options & Direct Mount Configuration

Optional Materials & Applications

Matryx Vanes can be supplied with special materials to meet your application requirements. Some examples include:

- ***Extended travel stop screws***
- ***Custom exterior coatings***
- ***PTFE interior coatings***
- ***High or low temperature trim***
- ***Special greases***
- ***Hydraulic units***

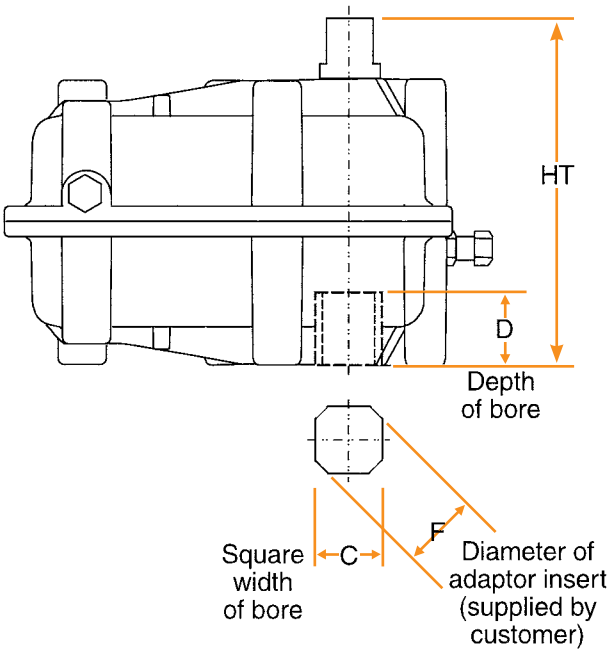
Contact the factory to discuss special applications.

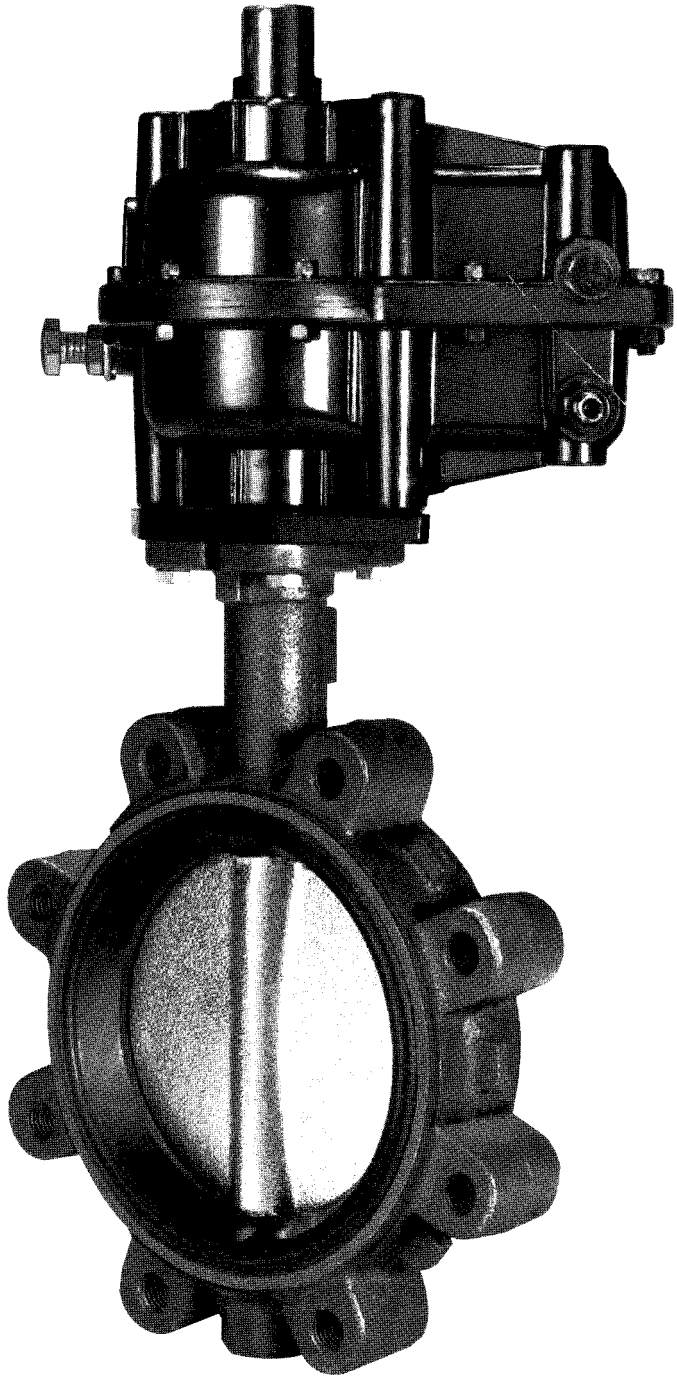
Direct Mount Vane Actuators

Direct mounting offers a number of benefits:

- ***Eliminates costly brackets and couplings.***
- ***Speeds the assembly to valves.***
- ***Reduces the height of valve assemblies.***
- ***Eliminates lost motion due to worn couplings.***

Direct mountable Matryx Vane Actuators can be supplied in a variety of socket styles including: double D, square, rectangular, and keyed. Custom shapes can also be provided (refer to the schematic below for design parameters). Direct mount sockets can be provided on one or both ends of the actuator shaft.





Dimensions for Direct Mounted Vanes inches

Model	C	D	F	HT
MX60DM	.506/.503	1.00	.545	4.97
MX200DM	.632/.628	1.25	.826 MAX	5.56
MX450DM	.882/.878	1.50	1.000	8.13
MX750DM	.882/.878	1.50	1.000	9.00
MX1250DM	1.004/1.000	1.75	1.190	8.50
MX3000DM	1.630/1.625	2.00	2.093/2.000	15.08

Performance Characteristics & Materials Of Construction

Performance Characteristics

Pressure: Matryx Vanes are designed to operate between 40-120 psig.

Maximum supply pressure: 120 psig.

Temperature: All standard trim Matryx Vanes will operate in an ambient temperature range from 0° to 225° F (-17° to 107°C). Consult factory for applications beyond this range.

Speed of operation: The stroking speed of an actuator depends on a number of variables like valve type, pipeline flow conditions, size & length of air supply lines, air supply volume and pressure, etc. Normal stroke times range from 1-4 seconds. Consult factory for stroke times required outside of this range.

Operating media: Air or any non-corrosive gas. Consult factory when considering other operating media (water, hydraulic oil, etc.). For applications where extremely dry, non-lubricated air is used, special trim (O-rings and lubricants) may be required.

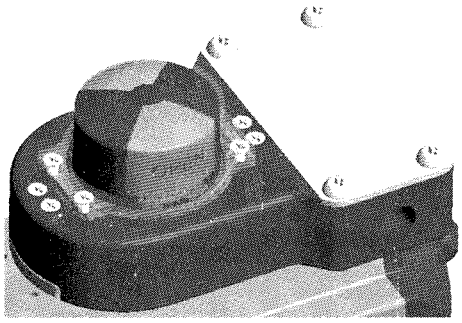
Model	Air Consumption (Cubic inches per 90°)	Stroke Adjustment Min.*	Stroke Adjustment Max.
MX60	13.5	75°	112°
MX200	41.0	74°	110°
MX450	110.0	80°	110°
MX750	146.0	80°	110°
MX1250	232.0	80°	102°
MX3000	630.0	80°	98°

* Requires optional extended travel stop screws.

Materials of Construction

Housing	Die cast aluminum
Coating (external)	Alkyd enamel
Vane O-ring	Buna-N (Durometer 50)
Shaft O-rings (2)	Buna-N (Durometer 70)
Vane	Die cast aluminum
Shaft	Carbon steel
Bushings (2)	660 phosphor bronze
Lubricant*	Dubois MPG-2 Petroleum based grease
Housing sealer	RTV silicone rubber
For Fail Safe Models	
Accumulator tank	Steel
Check valve	Brass
Pilot control valve	Die cast aluminum

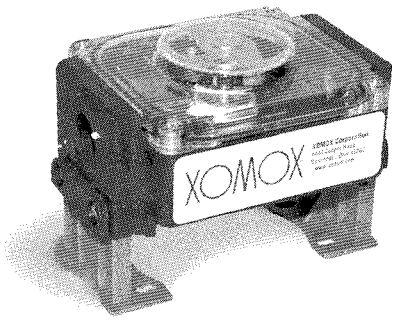
* Grease does not contain silicone when utilizing Buna-N or Viton seals. EPDM seals utilize silicone based grease.



TUFSWITCH – Demanding, All Area Capability

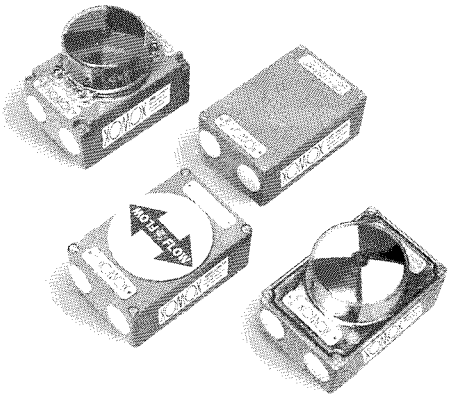
- Epoxy coated aluminum housing
- 3D position indicator
- Very low profile design
- Direct actuator mounting w/integral mounting kit
- Magnetic targets are isolated and sealed
- Top actuator shaft is protected from contaminants
- NEMA 4, 4x, 6p, 7 & 9
- Non-incentive and intrinsically safe options
- Proximity or inductive switches only
- Three position dribble control option
- 4 to 20mA feedback transmitter option
- **A**ctuator **S**ensor **i**nterface option

ASi interface



MCR Series – Economical – General Purpose

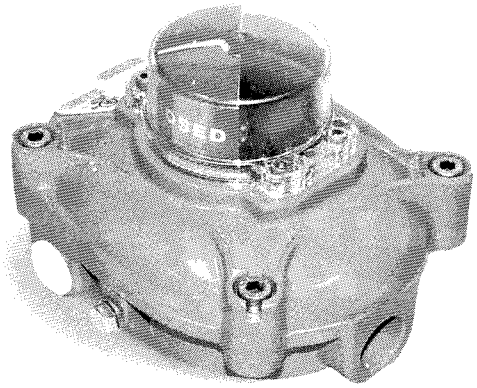
- Engineered resin housing
- 3D position indicator
- Designed for use in NEMA 4, 4x environments
- General purpose and intrinsically safe options
- Mechanical or inductive switches



MCA Series – Conventional w/Multiple Options

- Epoxy coated aluminum or stainless steel housing
- 3D, Disk or No position indication
- NEMA 4, 4x, Class I Division 2 & intrinsically safe
- Mechanical, proximity or inductive switches
- World's first wireless option
- Three position dribble control option
- 4 to 20mA feedback transmitter option
- **A**ctuator **S**ensor **i**nterface option

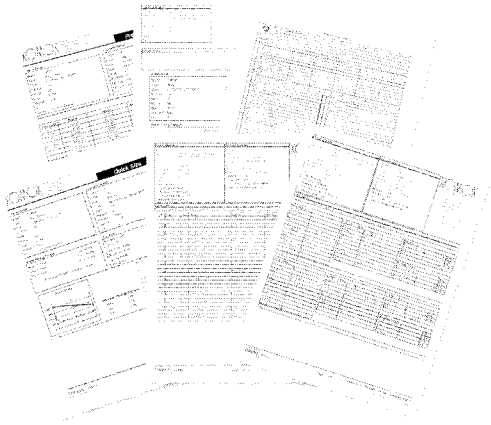
ASi interface



MXA Series – Explosion Proof

- Epoxy coated aluminum housing
- 3D position indicator
- NEMA 4, 4x, 7 & 9
- Non-incentive and intrinsically safe options
- Mechanical, proximity or inductive switches
- Three position dribble control option
- 4 to 20mA feedback transmitter option
- **A**ctuator **S**ensor **i**nterface option

ASi interface



Xomox Sizing Program

- Build Projects
- Quote Projects
- Quick Actuator Sizing
- ISA Style Data Sheets
- Multiple Valve Sizing
- Simplified Valve Flow Sizing
  - Liquid
  - Gasses
  - Steam
- Common Engineering Performance Calculations
- Accumulator Tank Sizing
- Speed Of Operation
- Hot Line Mounting Kit Sizing

XOMOX®

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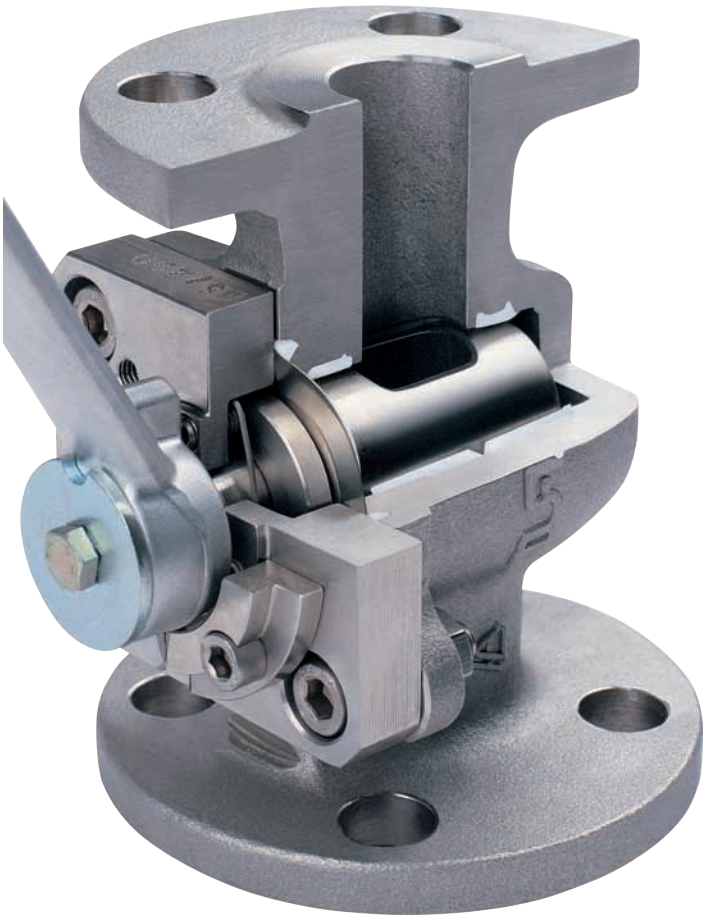
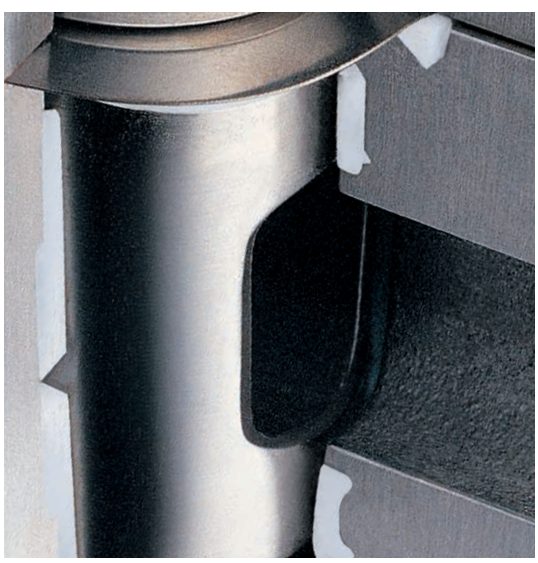


TUFLIN® Plug Valve

- No Lubrication, no maintenance cost
- Excellent shut-off and control properties
- No cavities also at media containing solid particles and crystallizing fluids
- No residuals, no contamination of the process media
- Tight shut-off of liquids and gases (Leakrate < 10^{-6} mbar l/sec)
- Long service-life at highest reliability
- Economical life-cycle-cost at different applications
- For more than 40 years TUFLIN® sleeved plug have proven to be reliable shutoff and throttling service devices. They are used in a wide range of severe and highly demanding services - ideal for corrosive, scaling, adhering, inflammable, or erosive flow media. These valves show excellent performance in traditional ball and gate valve applications, and they offer a cost-efficient solution for tight shutoff and throttling of gases, vapors, slurries, etc.

Technical Features

- PTFE-sleeve entirely retained by 360° lips around the ports.
- PTFE-sleeve acts as primary seal in the waterway and to atmosphere.
- Due to the PTFE-sleeve no lubrication necessary. Therefore, no contamination of the process fluid by lubricants.
- Secondary seal at the cover – also in FIRESAFE-design available (optional).
- Conical plug shape grants low operation torques and vertical adjustment possibility.
- Compact and robust body design (one-piece cast body).
- Low weight
- Easy operation 0° - 90°



Technical Data

Size Range: DN 15 – DN 400 / NPS ½ - 16“

Pressure Range: PN 10 – PN 100 / ANSI Class 150 – 600 (also according to JIS and BS)
Vacuum
(Vacuum range: up to 1.33 x 10^{-2} mbar)

Temperature Range: 173 K up to 553 K (-100°C up to +280°C)

Materials

Body and Plug	
Ductile Iron	EN-JS1049 as per EN 1563, 0.7659 (Ni Resist) as per DIN 1694
Carbon Steel	e.g. EN10213-2 (1.0619), A216-WCB, A352-LCB
Stainless Steel	e.g. 1.4408, 1.4309 as per EN 10213-4, CF8M, CF8C, CF8, CF3M, CF3, special Alloys: 1.4539, CN7M, A494-M-35-1 (Monel), A494-CZ100 (Nickel), A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titan), A494-CY-40 (Alloy 600) Other material acc. to DIN/EN and ASTM on request.
Sleeves	PTFE, glasfibre-reinforced PTFE, PE, PTFE-X and PTFE-XC for special applications (virgin plastic material)

Options

- FIRESAFE
- Oil- and Grease-free, i.e. for oxygen
- Relief hole or slot for polymerizing media and chlorine
- Fullbore
- Control plug valve
- Special design for HF-service
- Nucelar designs
- Special designs for specific applications

Approvals/Certificates

CE-Marking
EU Type Test Approval
FIRESAFE certificate according to API607 4th ed.
Several approvals from clients
GOST R

Other

Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client’s requirements.

TUFLIN®-Two-way Plug Valves

- Two-way design (straight water way)
- Flange-, Weld (SW/BW)- resp. Threaded Ends
- ISO-Cover for standardised actuator mounting acc. to DIN/ISO 5211

Technical Data

Size Range: DN 15 – 400 / NPS ½ - 16
Pressure Range: PN 10-100 (EN 1092-1)
ANSI Class 150-600 (also according to JIS & BS)
Vacuum
(Vacuum range: up to 1.33 x 10^{-2} mbar)
Temperature Range: 173 K up to 553 K (-100° C up to +280° C)

Materials

Ductile Iron EN-JS1049 as per EN 1563,
Carbon Steel e.g. EN10213-2 (1.0619), A216-WCB, A352-LCB
Stainless Steel e.g. 1.4408, 1.4539, 1.4309, CF8M, CF8, CF3M, CN7M, A494-M-35-1 (Monel), A494-CZ100, A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titanium)
Other materials on request.

Sleeves and sealings made from virgin PTFE.
Further materials for sleeves available depending on pressure and temperature.

Options

- FIRESAFE
- Oil- and Grease-free, i.e. for oxygen
- Relief hole or slot for polymerizing media and chlorine
- Nucelar designs
- Special designs for specific applications

Approvals/Certificates

CE-Marking; EU Type Test Approval; FIRESAFE certificate according to API607 4th ed.; Several approvals from clients; GOST R

Applications

Corrosive flow media; Inflammable media; Adhering flow media
Erosive flow media; Toxic flow media

Other

Standard lever – material: Aluminum
Steel lever
T-lever – material: Steel
Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.

TUFLIN®-Jacketed Plug Valves

- Plug Valve with Jacket
- Jackets from flange to flange (PJ) resp. Full-Jacketed (FJ) with Oversize-flanges
- Large jacket volume
- Jackets in materials Carbon Steel and Stainless Steel (1.4301)
- Several Jacket connection designs and Jacket connections (sockets with weld and threaded ends, flanges acc. to DIN and ANSI)
- For Two-way- and Mulitport valve types available
- ISO-Cover

Technical Data

Size Range: DN 15 – 350 / NPS ½ - 14
Pressure Range: PN 10-100 (EN 1092-1)
ANSI Class 150-600 (also according to JIS & BS)
Vacuum
(Vacuum range: up to 1.33 x 10^{-2} mbar)
Temperature Range: 173 K up to 553 K (-100° C up to +280° C)

Materials

Carbon Steel e.g. EN10213-2 (1.0619), A216-WCB
Stainless Steel e.g. 1.4408, 1.4539, 1.4309, CF8M, CF8, CF3M, CN7M, A494-M-35-1 (Monel), A494-CZ100, A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titanium)
Other materials on request.

Sleeves and sealings made from virgin PTFE.
Further materials for sleeves available depending on pressure and temperature.

Options

- FIRESAFE
- Oil- and Grease-free, i.e. for oxygen,
- Relief hole or slot for polymerizing media and chlorine
- Special designs for specific applications

Approvals/Certificates

CE-Marking; EU Type Test Approval; FIRESAFE certificate according to API607 4th ed.; Several approvals from clients; GOST R

Applications

Liquid Sulphur; Bitumen; Tar; Resins; other corrosive, polymerisating, etc. media, which must be maintained on their process temperature.

Other

Standard lever – material: Aluminum
Steel lever
T-lever – material: Steel
Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.

TUFLIN®-Multiport Plug Valves

- Identical technical features like the two-way-valve
- Mulitport-design for a variety of applications
- 3-way- up to 5-way-valves
- Different Plug designs
- 3-way valves also with Jackets
- Valves acc. to DIN and ANSI
- Valves with Flanged-, Weld (SW/BW)- resp. Threaded Ends
- DIN/ISO 5211-Cover available

Technical Data

Size Range: DN 15 – 300 / NPS ½ - 12
Pressure Range: PN 10-40 (EN 1092-1)
ANSI Class 150 - 300 (also according to JIS & BS)
Other pressure classes on request
Vacuum
(Vacuum range: up to 1.33 x 10^{-2} mbar)
Temperature Range: 173 K up to 553 K (-100° C up to +280° C)

Materials

Ductile Iron EN-JS1049 as per EN 1563,
Carbon Steel e.g. EN10213-2 (1.0619), A216-WCB, A352-LCB
Stainless Steel e.g. 1.4408, 1.4539, 1.4309, CF8M, CF8, CF3M, CN7M, A494-M-35-1 (Monel), A494-CZ100, A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titanium)
Other materials on request.

Sleeves and sealings made from virgin PTFE.
Further materials for sleeves available depending on pressure and temperature.

Options

- FIRESAFE
- Oil- and Grease-free, i.e. for oxygen
- Special designs for specific applications

Approvals/Certificates

CE-Marking; EU Type Test Approval; FIRESAFE certificate according to API607 4th ed.; Several approvals from clients; GOST R

Applications

Change-over valves for example for mixing of media, tank filling filter- and drying-units, pump circuits

Other

Standard lever – material: Aluminum
Steel lever
T-lever – material: Steel
Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.

TUFLIN®-Sleeved Plug Valves with triple sealing

- Identical technical features like the two-way-valve
- Three independent sealing systems to atmosphere
  Primary seal = PTFE-sleeve
  Secondary seal = cover sealing set
  Tertiary Seal = Safety stuffing box
- Safety stuffing box guarantees emergency sealing, even when the first two sealing systems are damaged
- For Two-way- and Mulitport valve types available (except for lined valves)
- DIN/ISO 5211-connection at the cover

Technical Data

Size Range: DN 15 – 400 / NPS ½ - 16
Pressure Range: PN 10-40 (EN 1092-1)
ANSI Class 150-300 (also according to JIS & BS)
Higher pressure classes on request
Vacuum
(Vacuum range: up to 1.33 x 10^{-2} mbar)
Temperature Range: 173 K up to 553 K (-100° C up to +280° C)

Materials

Ductile Iron EN-JS1049 as per EN 1563,
Carbon Steel e.g. EN10213-2 (1.0619), A216-WCB
Stainless Steel e.g. 1.4408, 1.4539, 1.4309, CF8M, CF8, CF3M, CN7M, A494-M-35-1 (Monel), A494-CZ100, A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titanium)
Other materials on request.

Sleeves and sealings made from virgin PTFE.
Further materials for sleeves available depending on pressure and temperature.

Options

- FIRESAFE
- Leakage detection
- Oil- and Grease-free, i.e. for oxygen

Approvals/Certificates

CE-Marking; EU Type Test Approval; FIRESAFE certificate according to API607 4th ed.; Several approvals from clients; GOST R

Applications

For extreme critical media (for example toxic, lethal)
In case of quick working temperature cycling

Other

Standard lever – material: Aluminum
Steel lever
T-lever – material: Steel
Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.

TUFLIN®-Control Plug Valves

- Identical technical features like the two-way-valve
- Regulation of the process medium by means of Flow Cage and Control Plug
- Variable applications due to different cv-values
- Easy adaption on changed process conditions just by exchange of the Flow Cage (larger or smaller cv-value)
- Control Valve with thight shut-off
- Also available for Plug Valves with Jackets
- DIN/ISO 5211-Cover

Technical Data

Size Range: DN 15 – 300 / NPS ½ - 12
Pressure Range: PN 10-40 (EN 1092-1)
ANSI Class 150-300 (also according to JIS & BS)
Higher pressure classes on request
Vacuum
(Vacuum range: up to 1.33 x 10^{-2} mbar)
Temperature Range: 173 K up to 553 K (-100° C up to +280° C)

Materials

Carbon Steel EN10213-2 (1.0619), A216-WCB
Stainless Steel e.g. 1.4408, 1.4539, 1.4309, CF8M, CF8, CF3M, CN7M, A494-M-35-1 (Monel), A494-CZ100, A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titanium)
Other materials on request.

Sleeves and sealings made from virgin PTFE.
Further materials for sleeves available depending on pressure and temperature.

Options

- FIRESAFE
- Oil- and Grease-free, i.e. for oxygen
- Special designs for specific applications

Approvals/Certificates

CE-Marking; EU Type Test Approval; FIRESAFE certificate according to API607 4th ed.; Several approvals from clients; GOST R

Applications

Regulation of process media

Other

Standard lever – material: Aluminum
Steel lever
T-lever – material: Steel
Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.

TUFLIN®-High Pressure Plug Valves (PN 100 / ANSI Class 600)

- Identical technical features like the two-way-valve
- High Pressure Design for PN 100 resp. ANSI Class 600
- 2-way-valves
- Also with Jackets
- Valves acc. to DIN and ANSI
- Valves withFlanged-, resp. Weld (SW/BW)-Ends
- DIN/ISO 5211-Cover available

Technical Data

Size Range: DN 25 – 350 / NPS 1 - 14
Pressure Range: PN 100(EN 1092-1); ANSI Class 600
Temperature Range: 173 K up to 553 K (-100° C up to +280° C)

Materials

Carbon Steel EN10213-2 (1.0619), A216-WCB
Stainless Steel e.g. 1.4408, 1.4539, 1.4309, CF8M, CF8, CF3M, CN7M, A494-M-35-1 (Monel), A494-CZ100, A494-N7M (Alloy B2), A494-CW2M (Alloy C4), B367-C2 (Titanium)
Other materials on request.

Options

FIRESAFE
Oil- and Grease-free, i.e. for oxygen

Approvals/Certificates

CE-Marking
GOST R

Applications

High Pressure applications
for example in Reverse Osmosis Desalination Plants

Other

Operation with Lever or Gear
Operation with pneumatic (recommended with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.

TUFLIN®-HF-Plug Valves

- Identical technical features like at the two-way-valve
- TUFLIN®-Plug Valve licensed by PHILLIPS Petroleum Co. and UOP for their HF-Alkylation-Processes
- Body and plug in ASTM A-494-1994 Grade M-35-1 resp. M-30-C
- TUFLIN® HF-SPV have proven themselves with years of service in thousand of hydrofluoric acid applications

Technical Data

Size Range:	NPS ½ - 20
Pressure Range:	ANSI Class 300 und 600 (de-rated)
Temperature Range:	As per Licensor's specification

Materials

ASTM A494-1994 M-35-1 resp. M-30-C

Options

Fullbore-design

Approvals/Certificates

PHILLIPS
UOP
GOST R

Applications

HF-Alkylation

Other

- Operation with Lever or Gear
- Operation with pneumatic (recommendet with XOMOX XRP-actuators), electrical and hydraulic actuators as per client's requirements.
- For HF-Alkylation-Process also licensed: CRANE-PACIFIC Gate Globe and Check Valves.
- Centralized HF CRANE Service Center for XOMOX & Pacific HF valves (Stock of valves and spares, support, repair and maintenance).
- Single source for a complete HF-valve package.

Further TUFLIN® Plug Valve Designs

Options

- Fullbore Valves
- Sampling valves
- Interconnected Valve Combinations
- Pump change-over Valves
- Firebrigade Valves
- Double-Block and Bleed Valves
- Nuclear Valves
- Tank Car and Container Valves (compact plug valves)
- All valves can be automated with XOMOX XRP-actuators.

Subject to technical revisions.

XOMOX-XRP Automated Plug Valves

XOMOX®

XOMOX International GmbH & Co. OHG
Von-Behring-Straße 15
D-88131 Lindau/Bodensee
Tel.: (49) 8382-702-0
Fax: (49) 8382-702-144

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ChemPharma Flow Solutions

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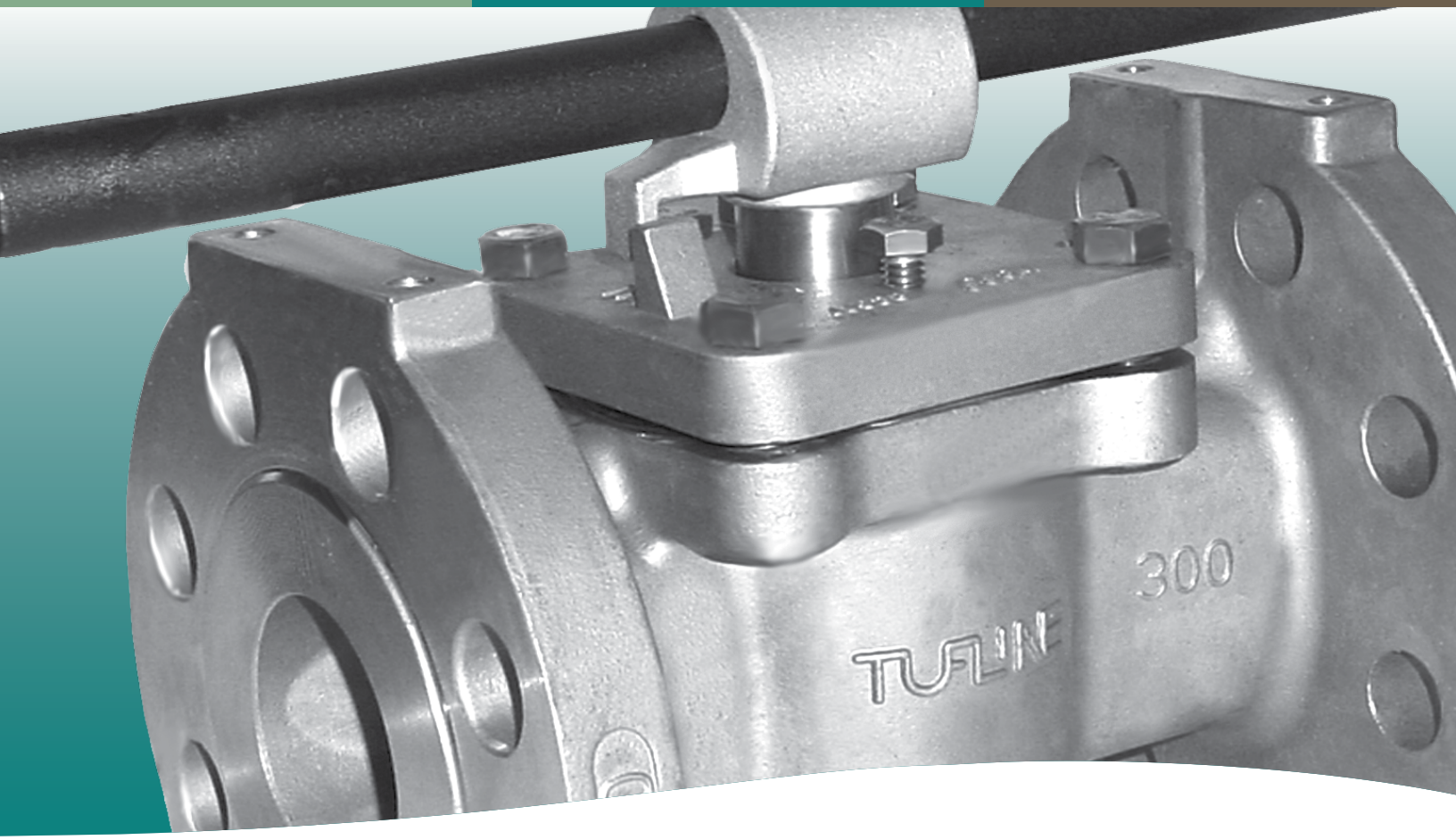
CRANE ChemPharma Flow Solutions Include: Pipe - Valves - Fittings - Actuators - Pumps

DEPA® ELRO® PSI™ LINED PIPING SYSTEMS RESISTOFLEX®

ResistoPure® revo® Saunders® the science inside XOMOX®

XOMOX®

brands you trust.



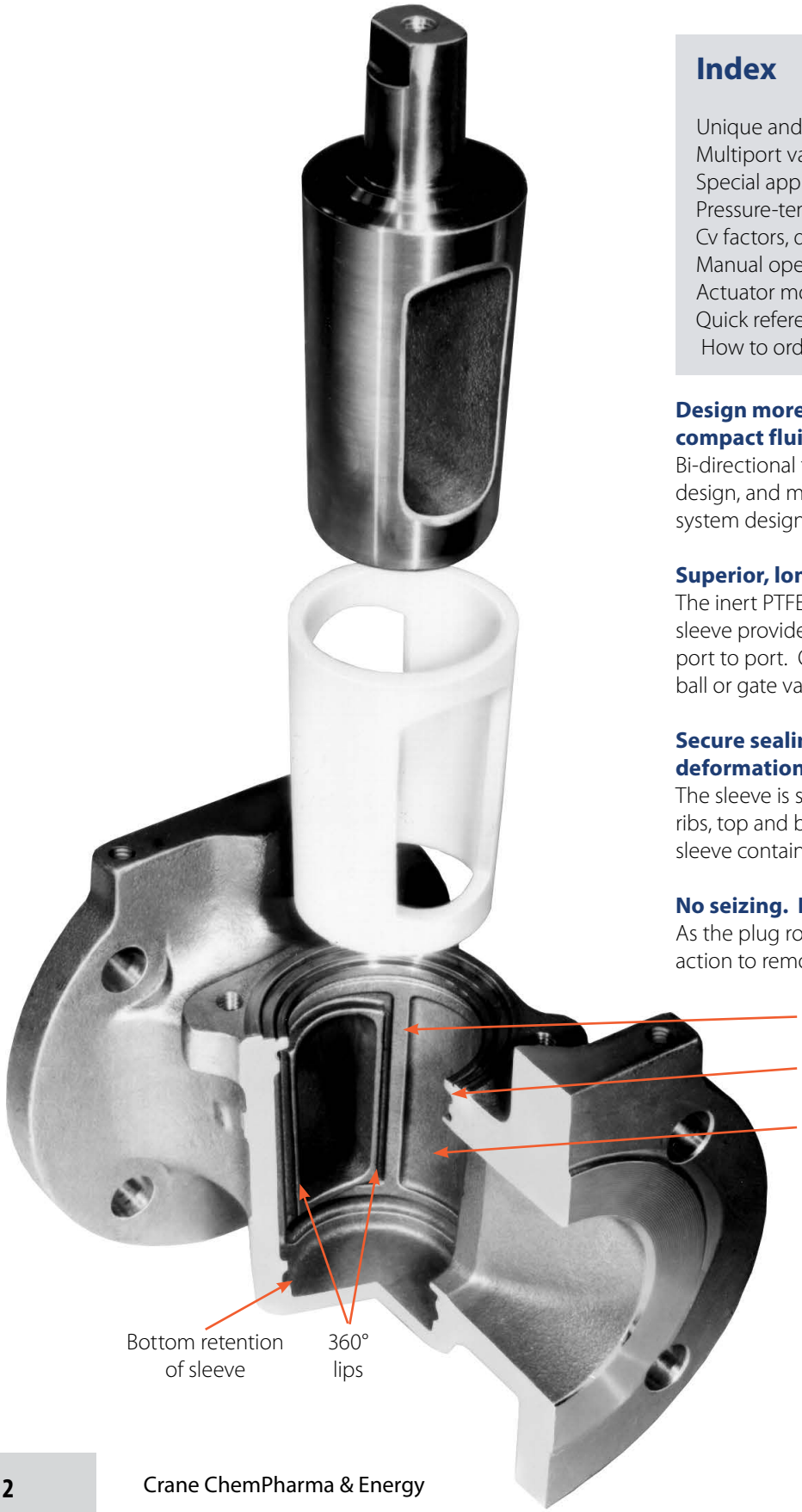
Tufline® Sleeved Plug Valves

CRANE®

Crane ChemPharma & Energy

www.cranecpe.com

XOMOX®



Index

Design more economical, flexible, and compact fluid handling systems.
Bi-directional flow, simple actuation, lightweight, compact design, and multiport configurations all facilitate improved system design.

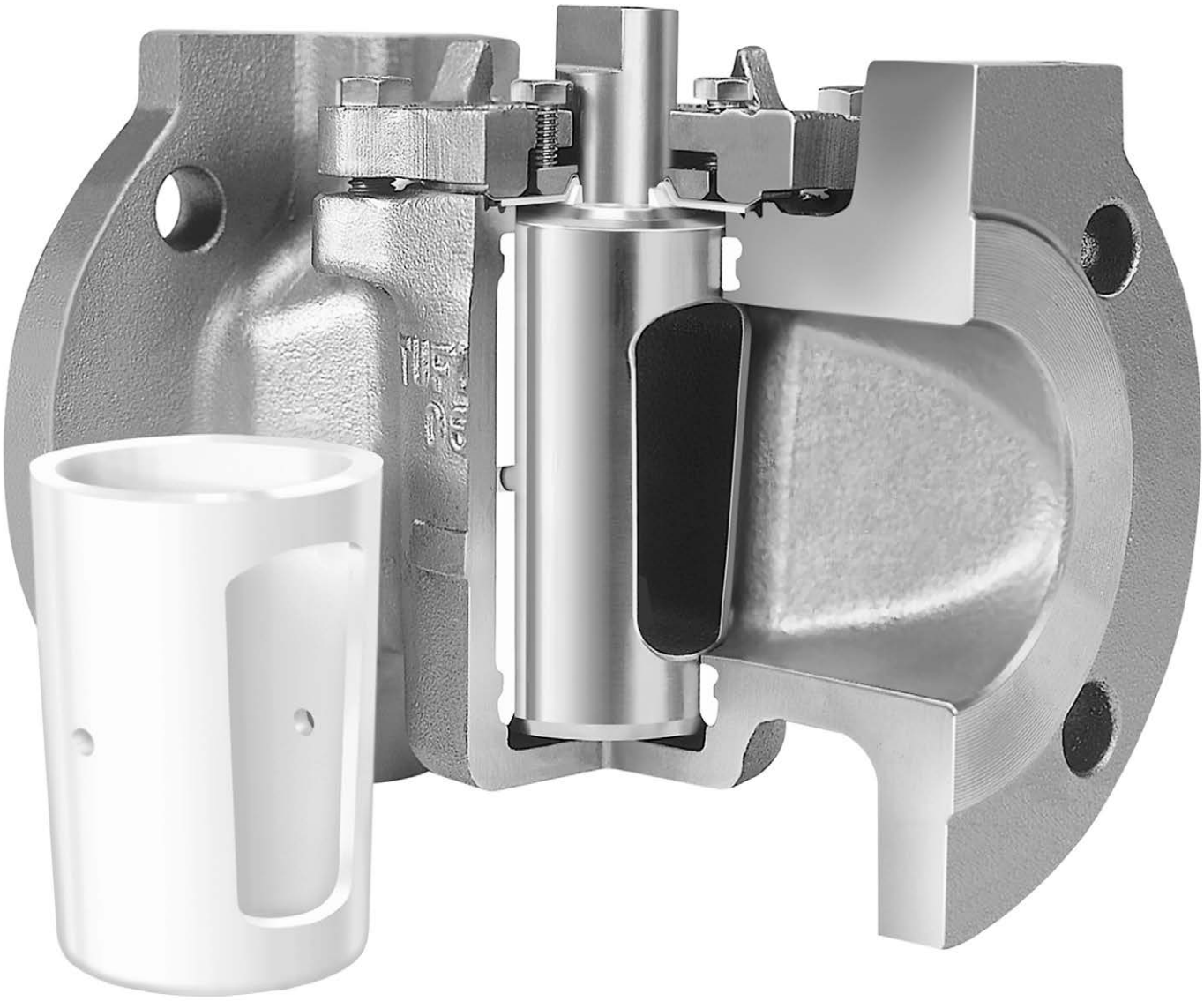
Superior, longer-lasting in-line sealing.
The inert PTFE sleeve completely surrounds the plug. The sleeve provides a large, circumferential sealing surface from port to port. Open, closed, or rotating, the seal is assured. No ball or gate valve can match this sealing power.

Secure sealing with no cold-flow, deformation, or rotation of the sleeve.
The sleeve is securely nestled in the valve body. High pressure ribs, top and bottom retention, and 360° port lips all assure sleeve containment.

No seizing. No sticking.
As the plug rotates, the 360° port lips provide a self-cleaning action to remove scaling and adhering media.

No cavities. No contamination.
There are no body cavities where flow media can accumulate and contaminate future processing. This cavity-free design also prevents sticking.

Eliminate unscheduled downtime and maintenance... plus get greatly extended service life.



Many processors experience dramatic cost reductions when they switch from ball and gate valves.

Trouble-free sealing is provided by the large, full-circumferential PTFE sleeve. No ball or gate valve can match this sealing capacity.

A simple turn of the top adjustment bolts keeps the sleeve sealing tight and the valve in service far longer.

The PTFE sleeve has a low coefficient of friction. It acts as a lubricant. Ease of operation is assured, even when the valve is left open or closed for extended periods.

Two independent sealing systems provide double protection against atmospheric leakage. Turn the page for details about this valve's superior double stem seal.

Standard cost and greatly extended service life assure exceptionally low, long-term cost-of-ownership.

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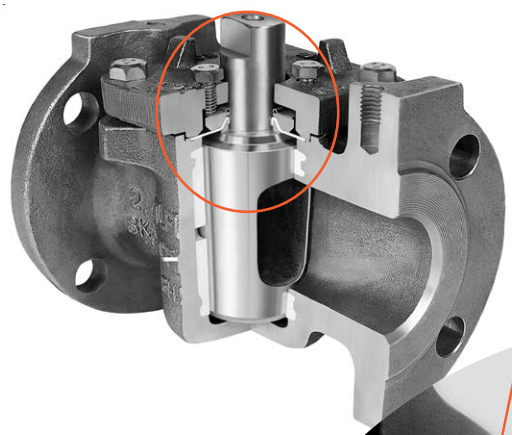
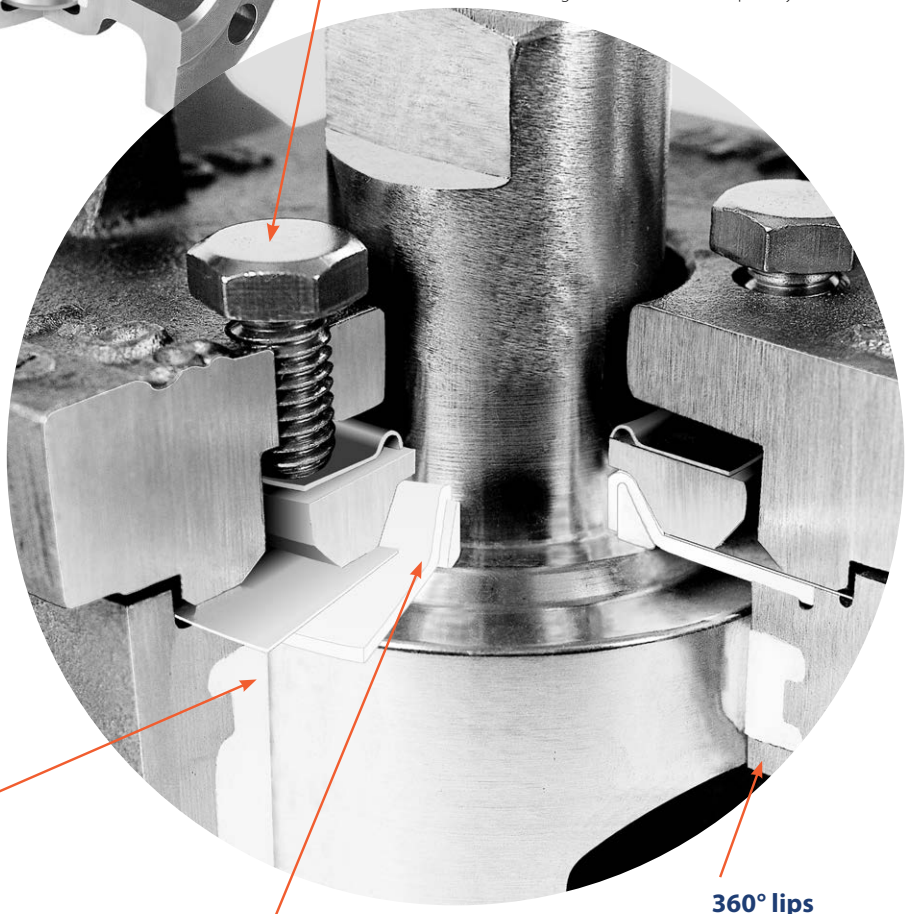
Design Features



The Tufline® sleeved plug valve pays for itself many times over with more up-time and greatly extended service life.

- This product offers a fully adjustable in-line seal and dual stem seal.
- Bolts in the top cover provide quick and easy adjustment.
- Adjust out in-line leakage between shutdowns.
- Adjust out potential stem leakage.

No ball or gate valve offers this capability.



Stem Seal 1
The primary stem seal is around the circumference of the plug. Flow media is prevented from reaching the stem.

There are two independent environmental seals.

You get double seal protection at no extra cost.

Stem Seal 2
The secondary backup seal system provides a wide comprehensive backup seal along the top edge of the plug and the stem.

Unmatched Stem Sealing
The Tufline standard dual stem seal is clearly superior to those of gate valves, ball valves, other plug valves, and many expensive valves with extended auxiliary packing.

360° lips
Port defining lips were developed and patented by Tufline. The lips surround the ports.

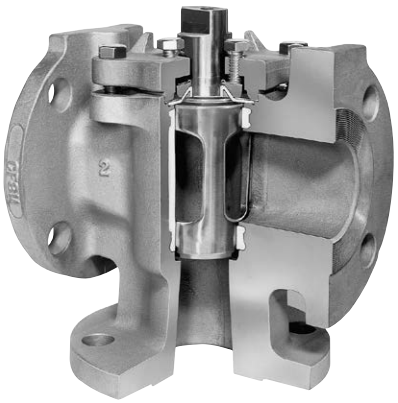
The lips improve valve performance and extend service life by:

- Preventing sleeve cold flow and deformation.
- Eliminating sleeve rotation.
- Breaking up and removing adhering, scaly deposits from the outer surface of the plug as it rotates.

Multiport Valves

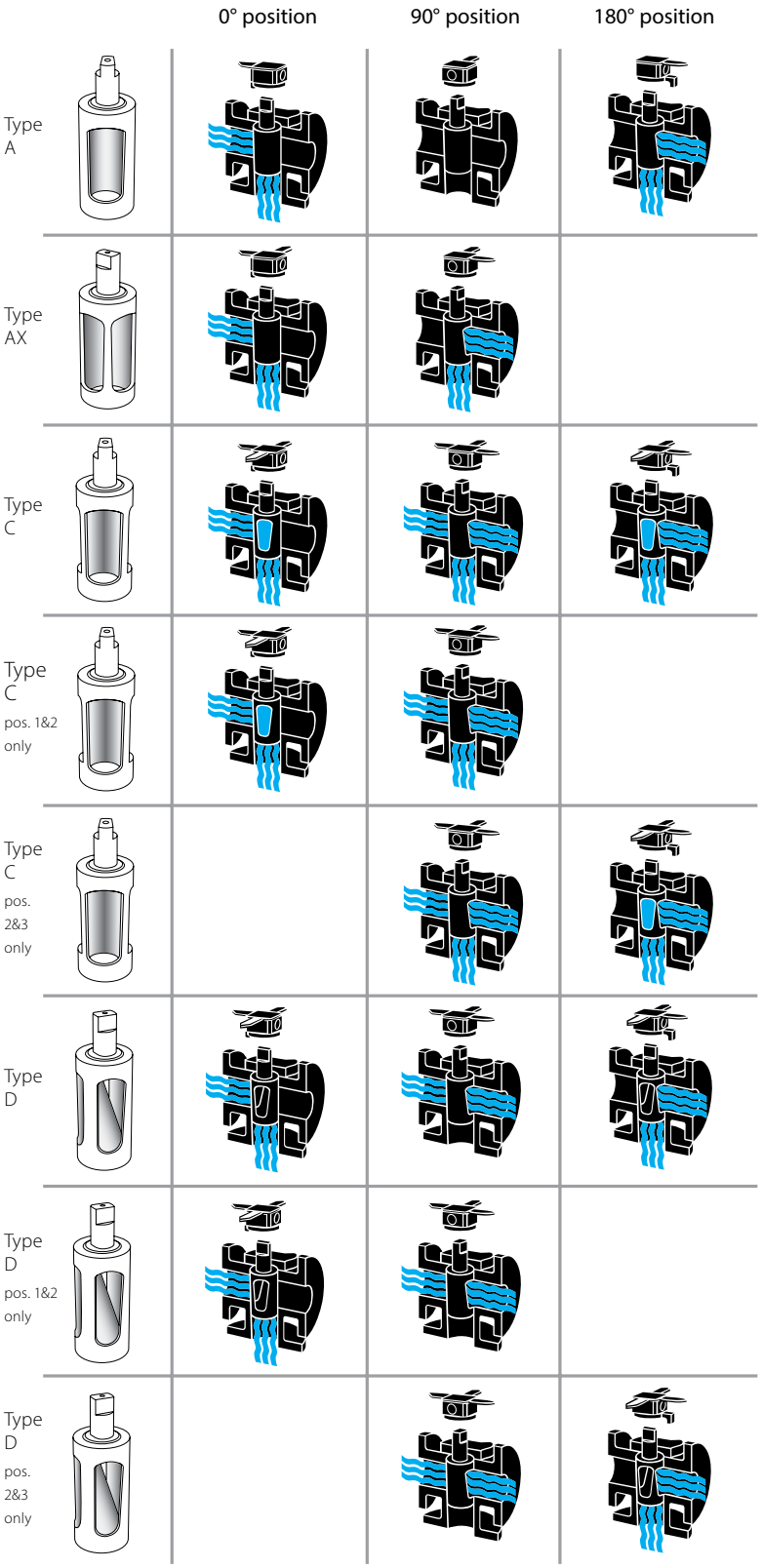
Tufline Multiport Sleeved Plug Valves bring economy and a more compact system design to thousands of applications.

Bi-directional flow for more flexibility.
In the diagrams the color indicates the path of fluid flow. Bi-directional flow permits more system design options.



3-way arrangements.
Only the Type A plug will shut off the flow. With the Type AX, C, and D plugs, there is always flow between the bottom port and one of the side ports.

4-way valves.
For optimum system flexibility, 4-way multiported valves are available. For details such as sizes available and dimensional information visit www.cranecpe.com or contact the factory.



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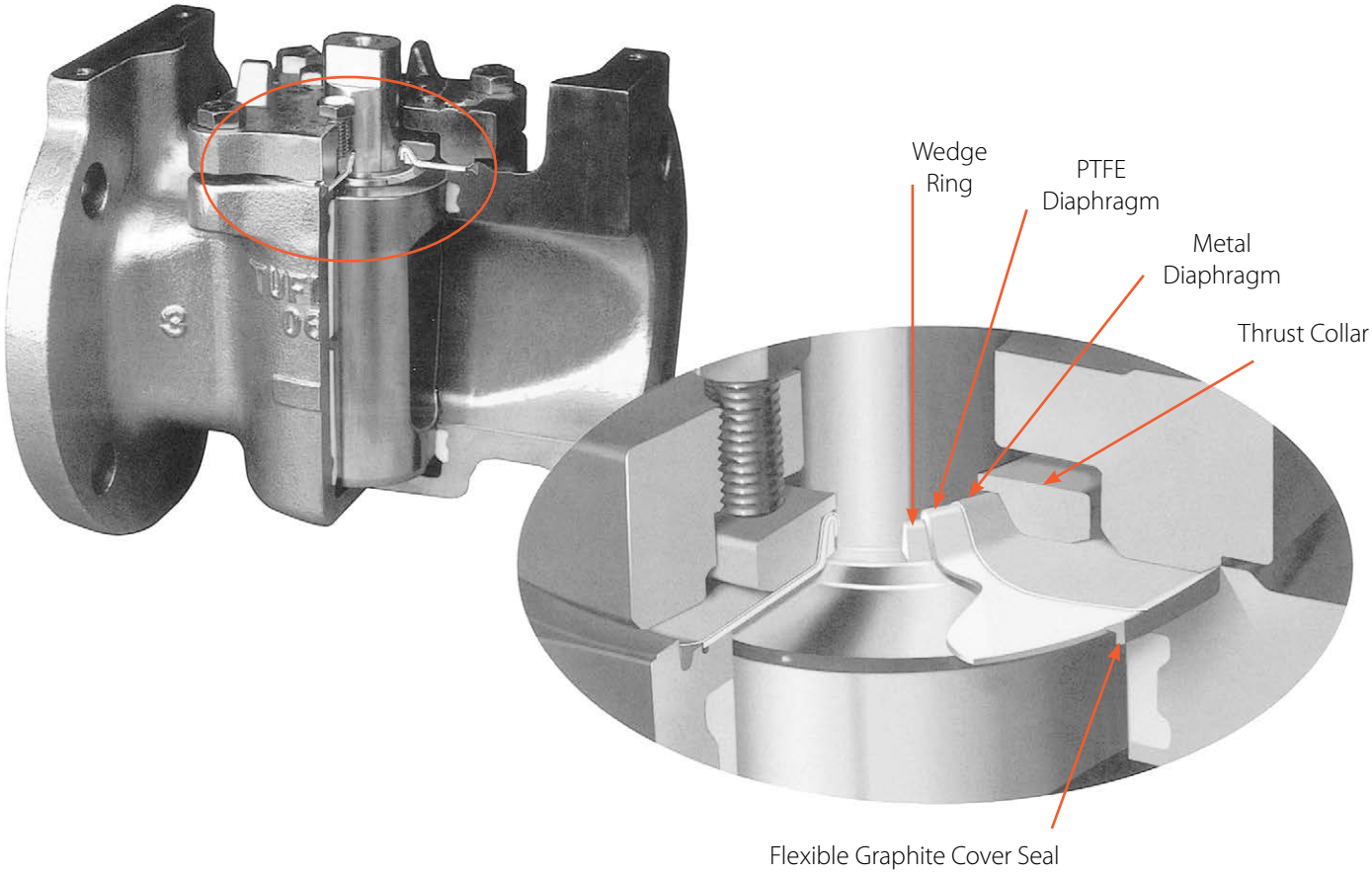
Fire-Tested Valves **API-607 Standards**



Tufline Fire-Tested Sleeved Plug Valves have been tested in accordance with API-607 - Fourth Edition - Section 4.2 - Specifications For External Leakage. These valves exceed the sealing requirements specified in those standards. A tight external seal was maintained even after the PTFE sleeve and sealing parts were totally destroyed by fire.

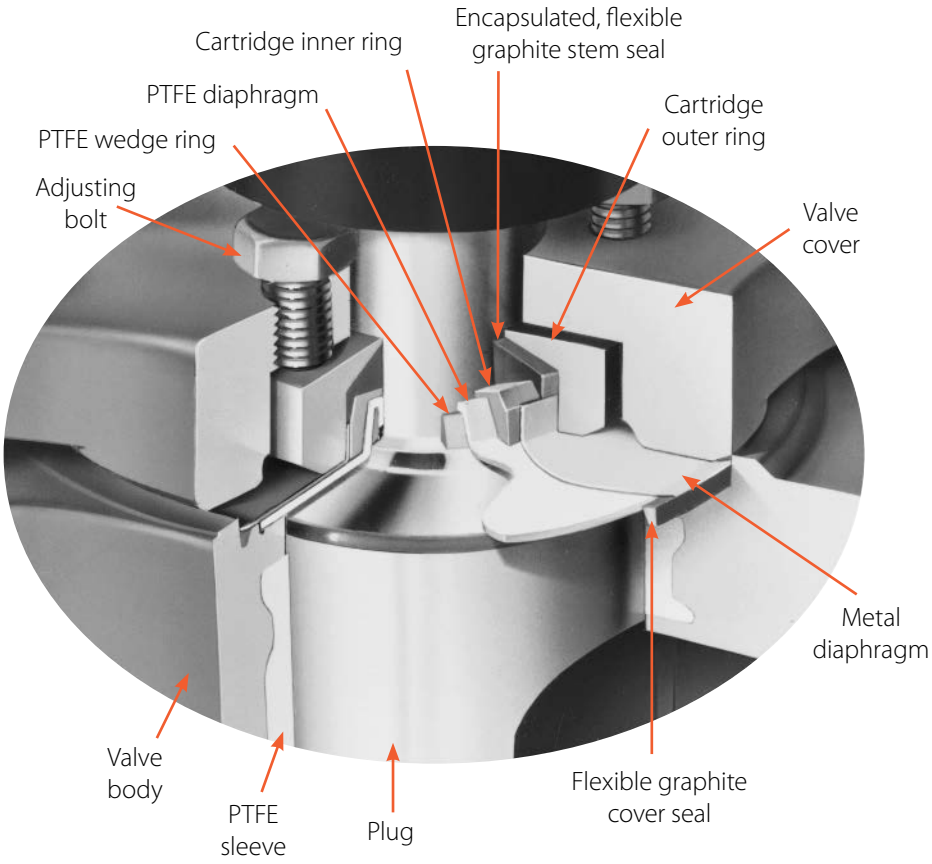
Fire tested stem seal
A metal diaphragm overlays the PTFE diaphragm. If the PTFE diaphragm and wedge ring are destroyed by fire, the metal diaphragm maintains the seal.

Fire tested cover seal.
In the standard valve, if the PTFE sleeve and diaphragm are destroyed by fire, leakage would occur at the cover joint. The flexible graphite cover seal prevents this. It is fitted into a machined counter-bore in the valve body. The cover bolts compress the graphite ring between the valve body and cover. Even if fire occurs, this seal is maintained.

Vented plug.
In fire-tested valves, the plug is vented on the upstream side. This relieves the expansive pressure caused by the heat of the fire. Valves with vented plugs are unidirectional. An arrow stamped on the valve body indicates the flow direction.

- Sizes: ½" - 6".
  For larger sizes use the Tertiary Top Seal shown on the next page.
- Configurations: 2, 3, and 4-way.
  Also partially and fully jacketed.
- End connections: Screwed, flanged, weld.
- Pressure ratings: ANSI 150, 300, and 600.

Tertiary Top Seal Valves



Control fugitive emissions.

This optional top seal package provides exceptional control of fugitive emissions. It meets or exceeds the most stringent current regulatory requirements.

Triple sealed for extra protection

Under normal conditions, there are three active seals between the flow media and the atmosphere. Primary sealing is provided by the interaction of the plug, sleeve, and body.

Secondary sealing is provided by the PTFE and metal diaphragms.

Tertiary sealing is provided at the stem by the encapsulated, flexible graphite stem seal and at the body/cover joint by the graphite cover seal ring.

This simple system assures stem sealing

This simple, compact, patented design harnesses complex dynamic forces to assure effective sealing to atmosphere.

The metallic cartridge totally encapsulates the flexible graphite tertiary dynamic stem seal.

At its outer edge, the metal diaphragm overlaps the graphite static seal ring to reinforce the
tertiary seal at the body-to-cover joint.

The PTFE wedge ring concentrates the sealing force of the PTFE diaphragm radially against the valve stem for more reliable prevention of external leakage at this secondary seal.

API-607 Standards

Like the fire-tested valve, the Tufline Tertiary Top Seal Sleeved Plug valve also exceeds API-607 - Fourth Edition - Section 4.2 - Specifications For External Leakage. It is available in a broader range of sizes than the standard fire-tested model.

Vented Plug

If this valve is intended for use in a fire tested application, a vented plug is required.

- Sizes: $^1/_2$ inch - 24 inch.
- Configurations: 2, 3, and 4-way. Also partially and fully jacketed.
- End connections: Screwed, flanged, socket weld, and butt weld.
- Pressure ratings: ANSI 150, 300, and 600.

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Caged Plug Valves

PTFE sleeve protection

Tufline Sleeved Plug Valves can be furnished with caged plugs. This provides soft seat protection in throttling applications and in services with high pressure drop through the valve.

Typical applications:

- Waste sludge
- Calcium carbonate slurry
- Alum
- Brine
- Green liquor
- Raw river water
- Lime mud
- Sulfuric acid with zinc powder
- Phosphoric acid slurry
- Soda ash
- ... and many others

The cage is contained within the plug. It is fixed in place by pins that are welded in the bottom of the valve body. Bearings on the cage provide clearance between the plug and the cage, so the plug rotates freely.

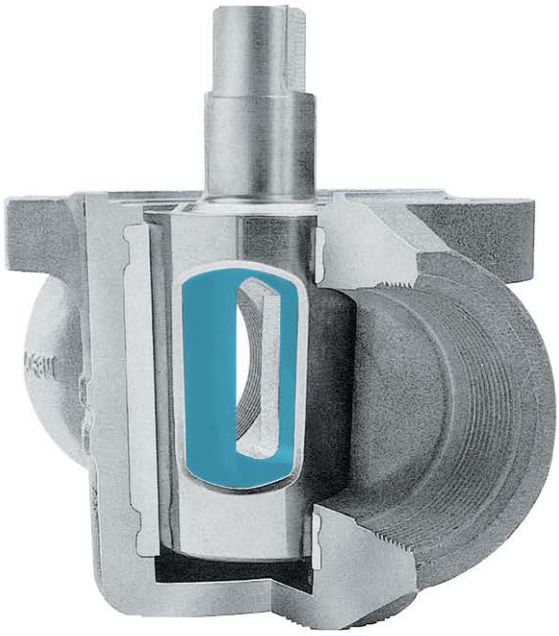
Metal-to-metal throttling

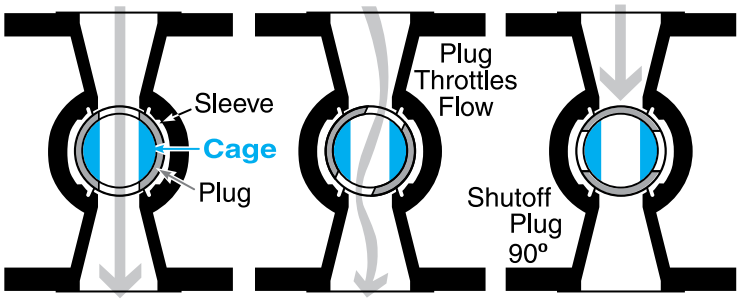
With caged plugs, there is metal-to-metal throttling and metal-to-soft seat shutoff. In throttling applications, the cage protects the seat from erosion by shielding the soft seat from direct flow impingement at the valve ports.

High velocity fluids

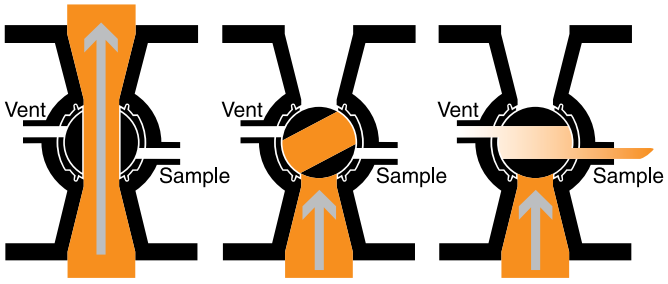
With high velocity fluids, the cage reduces turbulence and cutting action. The cage provides a more direct, contoured flow path through the valve.

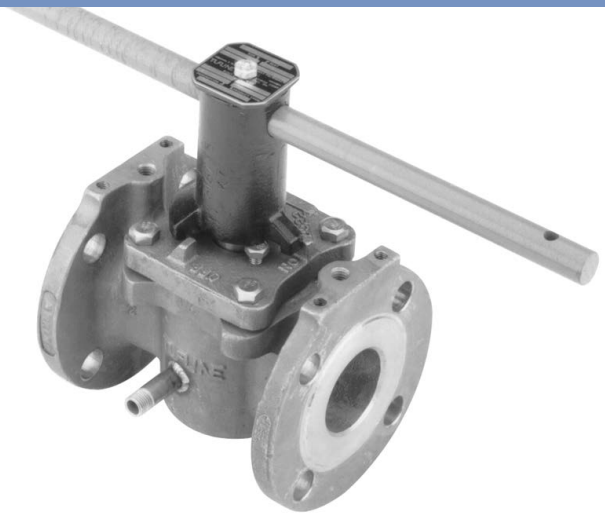
- Sizes: 1" - 8".
- Materials: WCB body with CD4MCuN plug and cage.
- CF8M body with CD4MCuN plug and cage.
- (Other materials upon application. Consult your Tufline Sales Engineer.)





Sampling Valves





Fluid analysis, equipment evaluation, problem solving, and quality control all depend on convenient sampling.

Safe, simple sampling

1. Valve open - normal flow.
2. As the valve is rotated and passes the intermediate position, flow is shut off. A specific amount of media is trapped within the plug. There is no trans-flow.
3. With the valve in the fully closed position, the trapped sample can be transferred into an appropriate container by operating sample and vent valving.

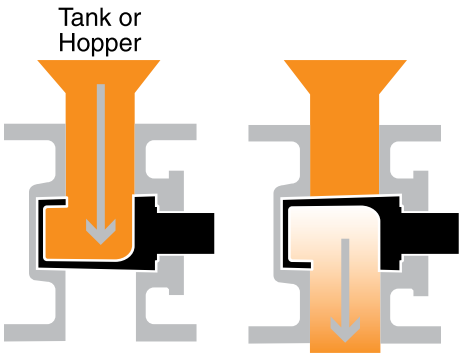
Infrequent use

In many applications, sampling valves are cycled infrequently. Tufline Sampling Valves provide excellent operating reliability, even after being left open for long periods of time.

Tufline Sampling Valves are available in a full range of classes, sizes, and materials. You can also choose from several levels of fugitive emissions control.

Plug Cavity Volume - Cubic inches (approx.)

1″	1 1/2″	2″	2 1/2″	3″	4″	6″
0.8	1.8	4.5	8.7	8.7	20	58



Gravity Sampling System

Material drops from the tank or hopper into the plug cavity. The modified plug has an opening on one side only. The plug is rotated 180° and the plug contents are fed into the gravity or vacuum system pipe.

The plug rotates 180° to its original position and refills. The valve can be manually or automatically operated. A typical application is metered injection of a pelletized or liquid catalyst.

Gravity Plug Cavity Volume - Cubic inches (approx.)

1/2″	1″	1 1/2″	2″	2 1/2″	3″	4″	6″	8″
0.2	1.3	3	7	11	11	27	64	142

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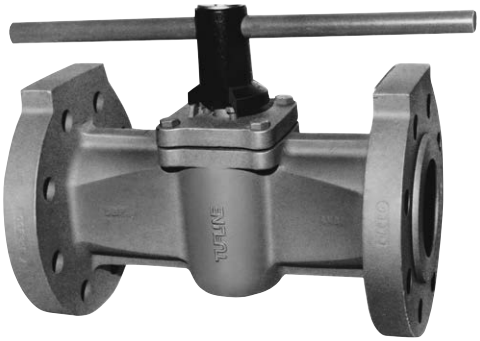
Additional Configurations

Separate descriptive brochures and technical data are available for these valves. Ask your Sales Engineer for details.

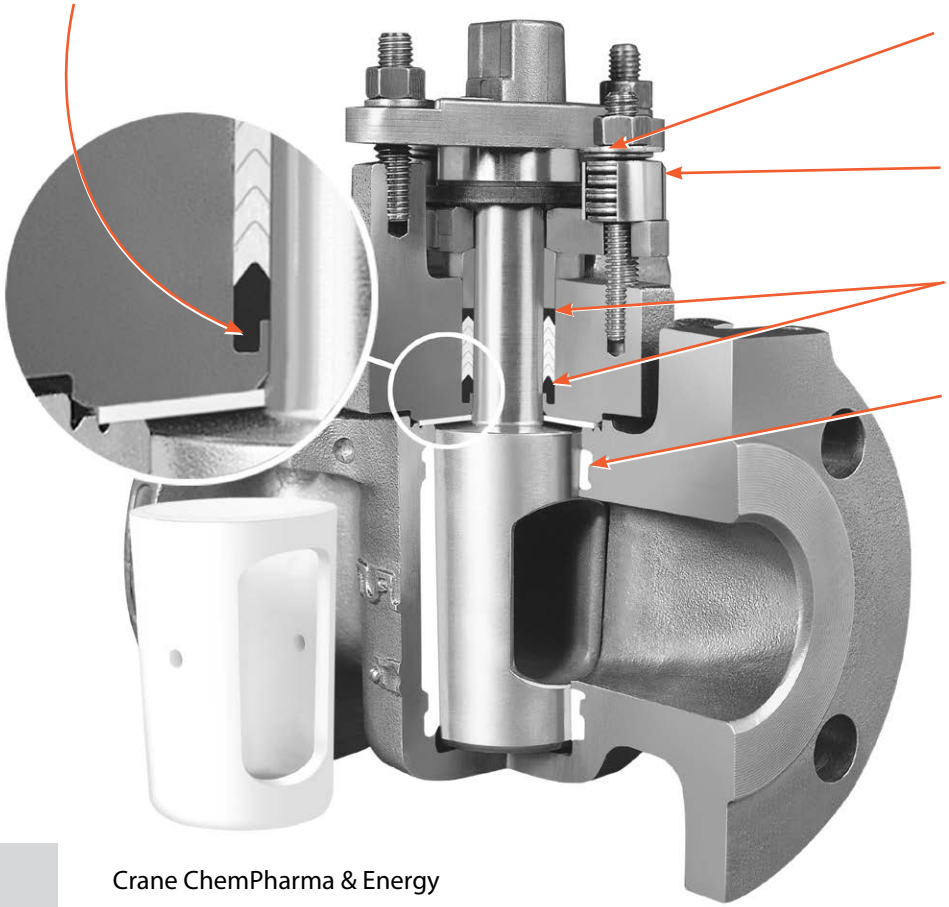
Severe service.
Tufline Severe Service Valves provide outstanding protection against external leakage, even with extreme thermal cycling.



Class 600.
Available in sizes 1/2" thru 24" in a wide variety of materials. Multiported also available.

Tufline XP® Sleeved Plug Valves have a patented shrink seal lip. During thermal cycling, when fugitive emissions are most likely to escape, this patented shrink-seal lip tightens the seal.

To enhance protection against leakage to atmosphere, the PTFE chevron rings provide a secondary (completely redundant) pressure-assisted stem seal.



Live loaded spring washers provide a constant, uniform pressure on the packing. This is especially important during thermal cycling.

To protect the spring washers from damage and particle intrusion, they are completely enclosed.

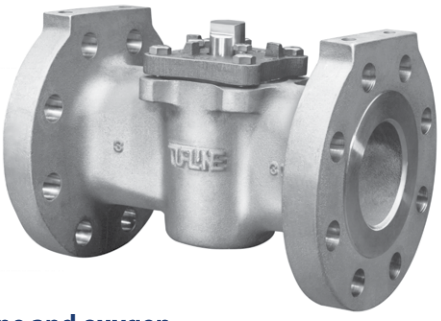
Carbon graphite filled PTFE end rings prevent extrusion of the PTFE packing.

The primary external seal is around the top of the plug.

An optional monitoring/injection port is also available.

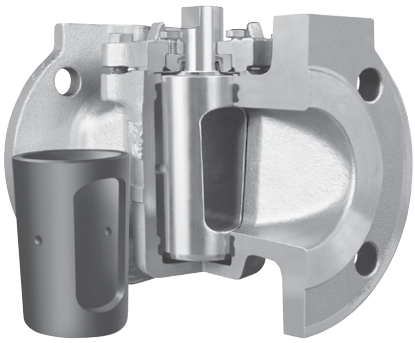
Additional Configurations

Vacuum
All standard Tufline valves are satisfactory for vacuum service to as low as .01 microns of absolute pressure. However, special cleaning is required to achieve this rating. Vacuum ratings have been established by independent laboratories by helium leak tests on mass spectrometers.

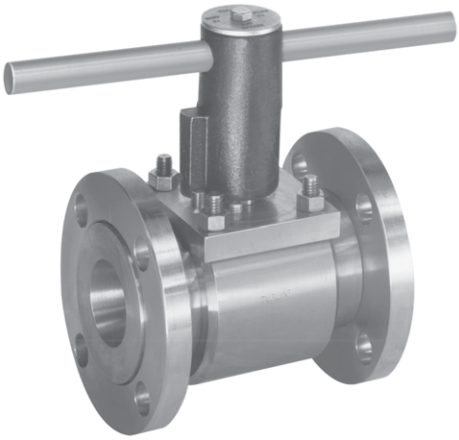


Chlorine and oxygen
Cleaning, testing, drying, sealing, and packaging are all in accordance with recommended procedures.

XENITH™ 600°F

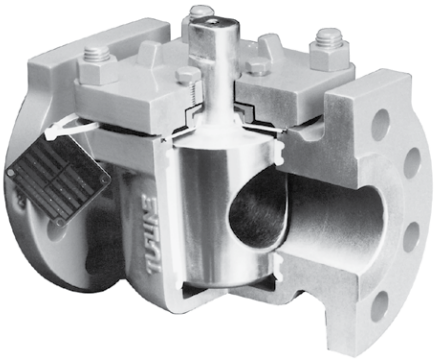


High temperature
X eniTh sleeved plug valve provide reliable shut-off in applications with temperatures up to 600° F.



Bar stock
Wetted surfaces of these valves are available in virtually any material including titanium and zirconium.

Vented plugs
Tufline valves are available with vented plugs on the upstream side. Venting the plug results in a unidirectional valve.



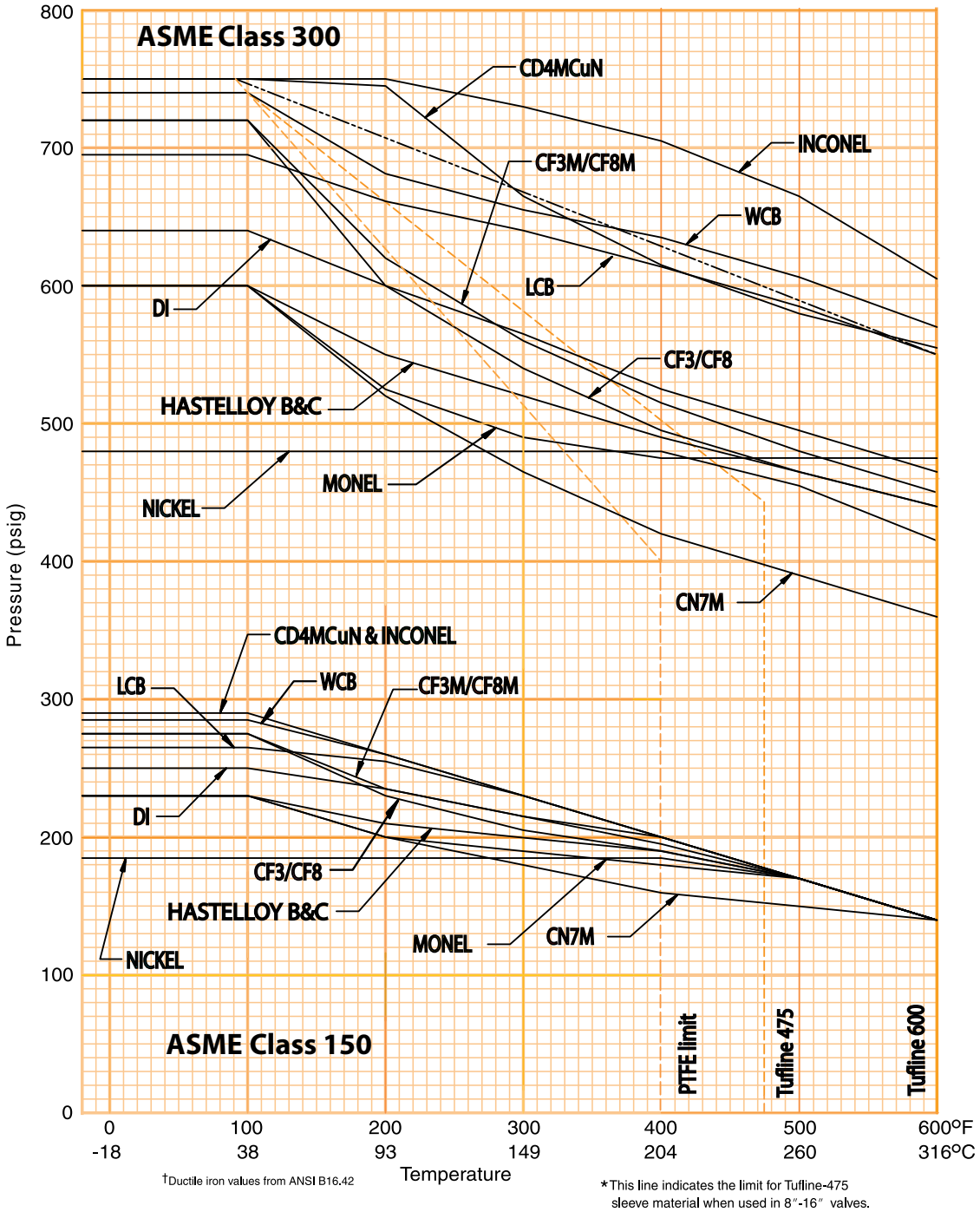
Full port
Full round bores, no cavities, and lips that remove adhering flow media all make this valve ideal for slurries, brines, muds, and sewage. Both 2-way and 3-way valves are available.

Pressure/Temperature Ratings

The useful range of PTFE sleeved plug valves is -20°F to +400°F Tufline-475 sleeve: -20°F to +475°F Tufline-600 sleeve: -20°F to +600°F with maximum temperature variation of 200°F.

Applications beyond these ranges can be handled effectively but may require valve adjustments at the operating temperature.

Material selections are governed by the limits imposed by ASME B16.34, 1996 edition and B16.34a 1998 edition.



†Ductile iron values from ANSI B16.42

*This line indicates the limit for Tufline-475 sleeve material when used in 8″-16″ valves.

Cv, Torque & Dimensions

Cv factors for valve sizing

Class 150 & Class 300

Size	2-Way	3-Way A, AX, C pos.	3-Way D pos. 0° &180°	3-Way D pos. 90°	4-Way	5-Way
1/2	9	7	4	5	4	6
3/4	9	7	4	5	6	6
1	43	20	11	17	15	27
1 1/2	89	40	21	37	30	42
2	172	70	40	47	54	69
3	294	100	54	87	74	120
4	548	175	94	159	150	200
6	1,075	350	210	255	340	390
8	1,591	475	360	450	455	575
10	2,159	650	450	750	610	785
12	3,200	965	650	1,000	900	1,160

Class 150

Size	2-Way
14	3,200
16	5,280
18	5,600
20	5,900
24	11,000

Class 300

Size	2-Way
14x12x14	3,200
14x16x14	5,280
16	5,600
18	5,900
20	11,000

Operating Torques (Inch-Pounds)

Figures are for 2-Way valves with PTFE sleeves. Consult factory for torque adjustment factors for other sleeve materials.

Class 150 & Class 300

Size	Break Torque	Seating Torque	Running Torque
1/2	140	80	70
3/4	140	80	70
1	400	250	200
1 1/2	800	500	400
2	1,100	650	550
3	1,200	700	600
4	2,400	1,450	1,200
6	5,000	3,000	2,500
8	7,800	4,700	3,900
10	14,400	8,600	7,200
12	21,000	12,600	10,500

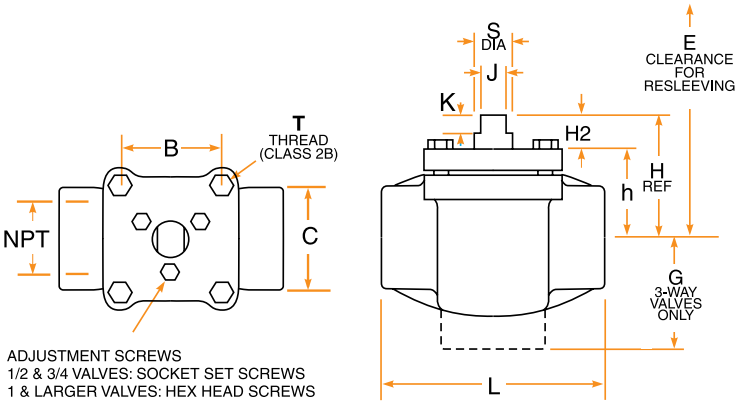
Class 150

Size	Break Torque	Seating Torque	Running Torque
14	21,000	12,600	10,500
16	36,000	21,000	18,000
18	36,000	21,000	18,000
20	36,000	21,000	18,000
24	100,000	60,000	50,000

Class 300

Size	Break Torque	Seating Torque	Running Torque
14x12x14	21,000	12,600	10,500
14x16x14	36,000	21,000	18,000
16	36,000	21,000	18,000
18	36,000	21,000	18,000
20	100,000	60,000	50,000

Screwed end dimensions



Socket Weld

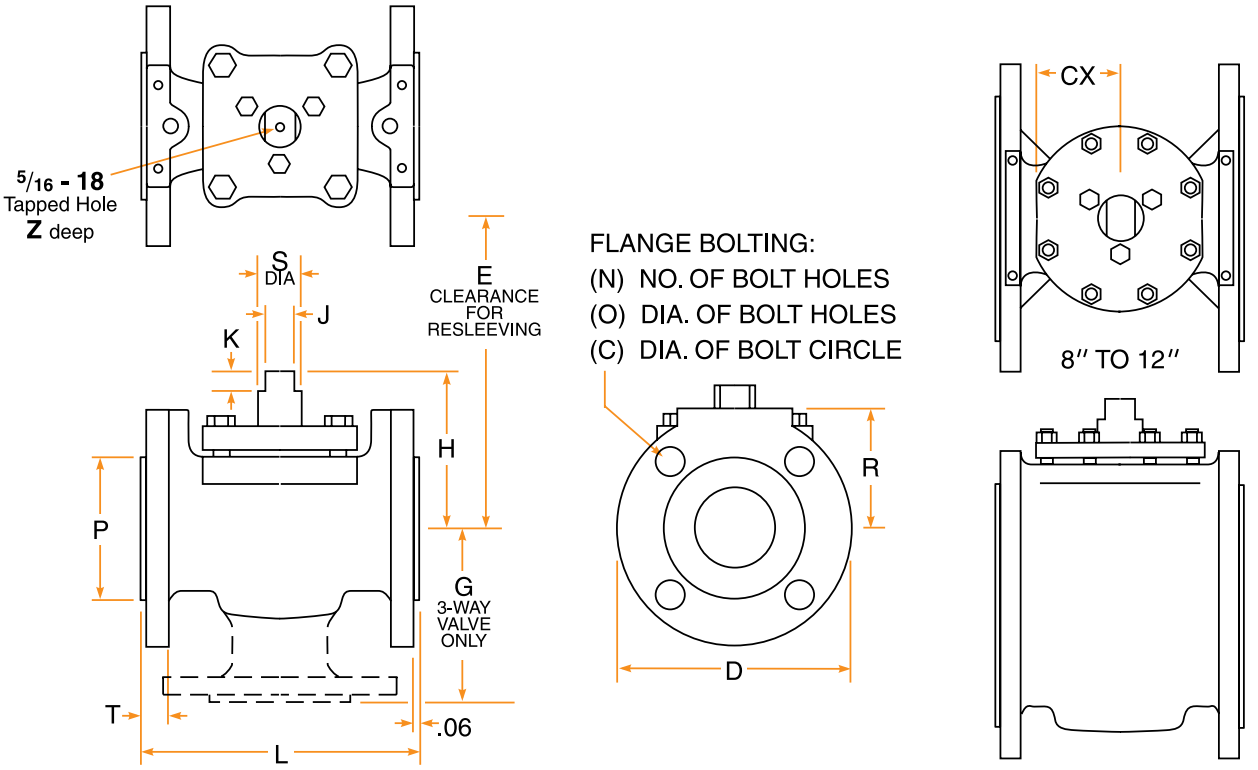
Size	D	DP
1/2	.860	.38
3/4	1.070	.50
1	1.335	.50
1 1/2	1.920	.50
2	2.411	.63

Screwed End / Class 150 / 2-Way - Figure No. 066* & 3-Way Figure No. 036*
Class 300 / 2-Way - Figure No. 0366 & 3-Way Figure No. 0336

Size	L	H	h	H2	B	C	S	J	K	T	E	Weight 2-Way	G 3-Way	Weight 3-Way
1/2	3.25	1.92	1.06	.86	1.43	1.68	.50	.250	.66	5/16-18	6.00	1.5	1.69	1.75
3/4	3.25	1.92	1.06	.86	1.43	1.68	.50	.250	.66	5/16-18	6.00	1.5	1.80	1.75
1	4.63	2.50	1.66	.86	1.90	2.21	.63	.438	.32	3/8-16	7.00	4	2.38	5
1 1/2	5.50	3.06	2.09	.97	2.33	2.33	.88	.563	.44	3/8-16	8.00	10	2.88	11
2	6.50	3.56	2.56	1.00	3.02	3.02	1.13	.750	.53	7/16-14	9.13	14	3.38	16

*Note: 1/2" thru 2" ANSI Class 150 and Class 300 valves are identical in fit, form, and function. They are only marked and tagged differently.

Dimensions



Flanged End / Class 150 / 2-Way - Figure No. 067 & 3-Way Figure No. 037

Size	L	H	D	T	P	R	N	O	C	S	J	K	E	Z	CX	Weight	G	Weight
1/2	4.25	1.92	3.50	.38	1.38	1.75	4	.63	2.38	.50	.250	.66	6.00	-	1.09	2.8	2.75	3.8
3/4	4.63	1.92	3.88	.41	1.69	1.94	4	.63	2.75	.50	.250	.66	6.00	-	1.09	3.3	2.88	4.5
1	5.00	2.50	4.25	.44	2.00	2.13	4	.63	3.13	.63	.438	.32	7.00	.53	1.38	6.5	3.50	9
1 1/2	6.50	3.06	5.00	.56	2.88	2.50	4	.63	3.88	.88	.563	.44	8.00	.59	1.56	13	4.13	17
2	7.00	3.56	6.00	.63	3.63	3.00	4	.75	4.75	1.13	.750	.53	9.13	.78	2.00	20	4.50	26
2 1/2†	8.00	4.13	7.50	.75	4.13	3.75	4	.75	5.50	1.13	.750	.53	10.13	.78	2.00	31	5.13	42
3	8.00	4.13	7.50	.75	5.00	3.75	4	.75	6.00	1.13	.750	.53	10.13	.78	2.00	31	5.13	42
4	9.00	5.22	9.00	.94	6.19	4.63	8	.75	7.50	1.25	.875	.78	22.00	.90	2.50	54	6.00	69
6	10.50	7.35	11.00	1.00	8.50	5.50	8	.88	9.50	2.00	1.398	1.00	25.00	-	3.06	95	7.50	119
8	11.50	9.32	13.50	1.13	10.63	6.75	8	.88*	11.75	2.00	1.398	1.00	28.00	-	4.12	175	9.00	214
10	13.00	10.81	16.00	1.19	12.75	8.00	12	1.00*	14.25	2.50	1.673	1.00	29.00	-	4.50	260	11.00	331
12	14.00	11.81	19.00	1.25	15.00	9.50	12	1.00*	17.00	3.00	1.968	1.00	35.00	-	5.31	355	-	-
14	15.00	11.75	21.00	1.38	16.25	10.50	12	1.13*	18.75	2.97	1.968	.995	N/A	-	5.31	430	-	-
16	30.00	14.96	23.50	2.12	18.50	11.50	16	1.13	21.25	3.94	2.00	1.575	N/A	-	N/A	925	-	-
18	33.00	14.96	25.50	2.25	21.00	12.75	16	1.25	22.75	3.94	2.00	1.575	N/A	-	N/A	1,005	-	-
20	36.00	14.96	27.50	2.38	23.00	14.00	20	1.25	25.00	3.937	2.00	1.575	N/A	-	N/A	1,200	-	-
24	39.00	20.48	32.00	2.50	27.25	16.13	20	1.38*	29.50	6.00	4.00	2.000	N/A	-	N/A	2,500	-	-

*On 8" valves, the two top holes in the flange are tapped for 3/4-10UNC-2B threads.
On 10" and 12" valves, the two top holes in the flange are tapped for 7/8-9UNC-2B threads.
On 14" valves, the two top holes in the flange are tapped for 1-8UNC-2B threads.
On 24" valves, the top six holes in the flange are tapped for 1 1/4-8UNC-2B threads.

† 2 1/2" valves are machined from 3" castings, but the flanges are machined to 2 1/2" dimensions.

Dimensions are in inches. Weights are in pounds.

Dimensions

Flanged End / Class 300 / 2-Way - Figure No. 0367 & 3-Way Figure No. 0337

Size	L	H	D	T	P	R	N	O	C	S	J	K	E	Z	CX	Weight	G	Weight
1/2	5.50	1.92	3.75	.56	1.38	1.88	4	.63	2.63	.50	.250	.66	6.00	-	1.09	6	2.88	8
3/4	6.00	1.92	4.63	.63	1.69	2.31	4	.75	3.25	.50	.250	.66	6.00	-	1.09	9	3.00	12
1	6.50	2.50	4.88	.69	2.00	2.44	4	.75	3.50	.63	.438	.32	7.00	.53	1.38	11	3.75	15
1 1/2	7.50	3.06	6.13	.81	2.88	3.06	4	.88	4.50	.88	.563	.44	8.00	.59	1.56	21	4.38	29
2	8.50	3.56	6.50	.88	3.63	3.25	8	.75	5.00	1.13	.750	.53	9.13	.78	2.00	28	4.75	37
2 1/2†	11.13	4.13	8.25	1.13	4.13	4.13	8	.88	5.88	1.13	.750	.53	10.13	.78	2.00	38	5.56	53
3	11.13	4.13	8.25	1.13	5.00	4.13	8	.88	6.63	1.13	.750	.53	10.13	.78	2.00	38	5.56	53
4	12.00	5.22	10.00	1.25	6.19	5.13	8	.88	7.88	1.25	.875	.78	22.00	.90	2.50	80	6.75	105
6	15.88	7.35	12.50	1.44	8.50	6.25	12	.88	10.63	2.00	1.398	1.00	25.00	-	3.06	165	8.50	207
8	16.50	9.32	15.00	1.63	10.63	7.50	12	1.00**	13.00	2.00	1.398	1.00	28.00	-	4.12	267	10.00	334
10	18.00	10.81	17.50	1.88	12.75	8.75	16	1.13***	15.25	2.50	1.673	1.00	29.00	-	4.50	395	12.00	470
12	19.75	11.81	20.50	2.00	15.00	10.25	16	1.25	17.75	3.00	1.968	1.00	35.00	-	5.31	540	-	-
14	30.00	14.96	23.00	2.12	16.25	11.50	20	1.25*	20.25	3.937	2.00	1.575	N/A	-	N/A	925	-	-
16	33.00	14.96	25.50	2.25	18.50	12.75	20	1.38	22.50	3.937	2.00	1.575	N/A	-	N/A	1,005	-	-
18	36.00	14.96	28.00	2.38	21.00	14.00	24	1.38	24.75	3.937	2.00	1.575	N/A	-	N/A	1,200	-	-
20	39.00	20.48	32.00	2.50	23.00	16.13	24	1.38	27.00	6.00	4.00	2.00	N/A	-	N/A	2,500	-	
24	39.00	20.48	32.00	2.50	27.25	16.13	20	1.38*	29.50	6.00	4.00	2.000	N/A	-	N/A	2,500	-	-

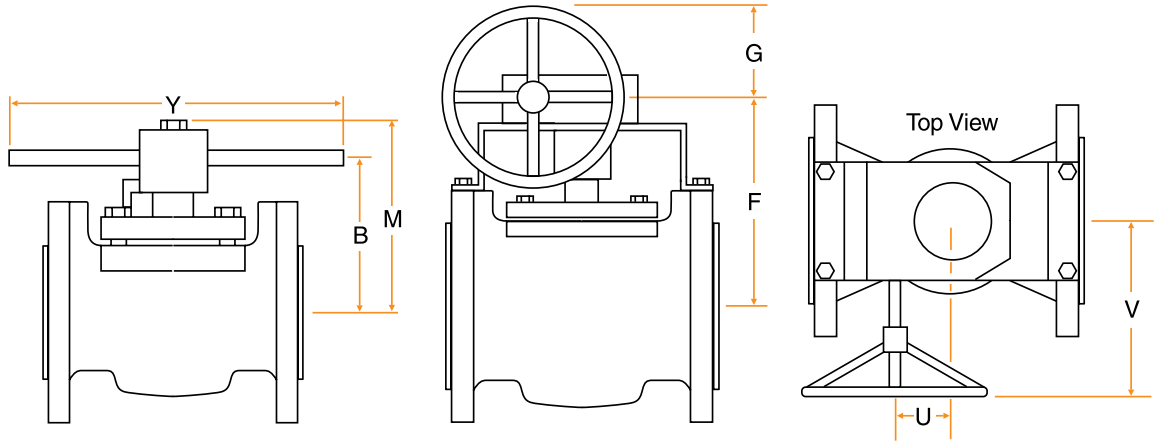
* On 14" valves, the two top holes in the flanges are tapped for 1-1/8-8UN-2B threads.

** On 8" valves, the two top holes in the flanged are tapped for 7/8-9UNC-2B threads.

** On 10" valves, the two top holes in the flanged are tapped for 1-8UNC-2B threads.

† 21/2" valves are machined from 3" castings, but the flanges are machined to 21/2" dimensions.

Dimensions are in inches. Weights are in pounds.



Wrench & Enclosed Gear Operator Dimensions.

These operator dimensions apply to all flange types and all multiport valves.

Size	M	B	Y
1/2	-	4.00	6.38
3/4	-	4.00	6.38
1	3.81	2.88	8.75
1 1/2	4.56	3.63	12.50
2	5.13	4.00	18.00
2 1/2	5.69	4.63	24.00
3	5.69	4.63	24.00
4	7.06	5.75	30.00

Size	F	G	U	V
4	8.75	6.00	2.06	8.00
6	11.50	9.00	2.62	10.38
8	13.50	9.00	2.62	10.38
10	15.25	12.00	3.53	12.31
12	16.25	15.00	4.88	15.88
14	21.66	15.00	5.38	16.90
16	21.66	12.00	5.12	17.66
18	21.66	12.00	5.12	17.66
20	32.92	15.75	16.97	24.00
24	32.92	15.75	16.97	24.00

XOMOX®

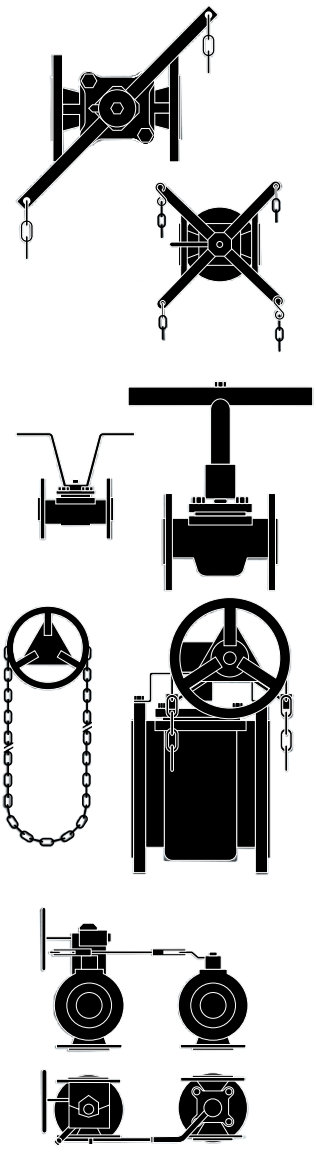
Automation & Manual Operators

Manual Operators

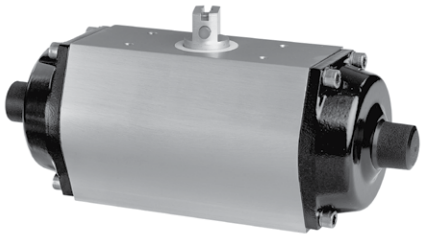
A wide variety of handle and gear operators are available.

You can choose from chain wrenches, T-wrenches, chain wheels, and tandem adapters.

Talk with your Tufline Sales Engineer about your specific requirements, sizing, and how to order.



CRANE ChemPharma, Xomox Actuators – Automation Accessories

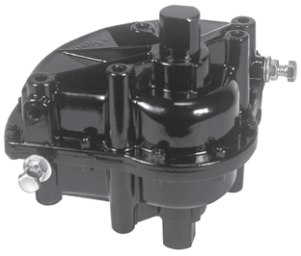


CRANE ChemPharma, Xomox XRP™ Actuators.
The unique features of the CRANE ChemPharma, Xomox XRP Pneumatic Rack & Pinion Actuators include:

- A balanced pinion which does not require an external retaining clip to prevent the pinion from blowing out.
- Individual single point adjustment for both the CW and CCW directions.
- 98 degrees of total travel on the most popular sizes.
- Vertically aligned air passages allow increased air flow minimizing cycle time.

CRANE CPE, Xomox Limit Switches.
A wide variety of switching options and other automation accessories are available.

Locking Devices.
Specify whether the valve is to be locked open, closed, or both.
(The lock is not supplied.)



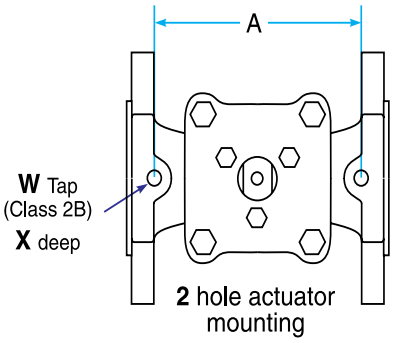
Matryx® Vane Actuators.
Matryx Vane Actuators provide the most reliable and efficient remote control of any type of rotary operation. They are used for ball, plug, and butterfly valves as well as other mechanisms such as dampers, switches, and safety devices. They are available up to 30,000 in-lbs of torque.

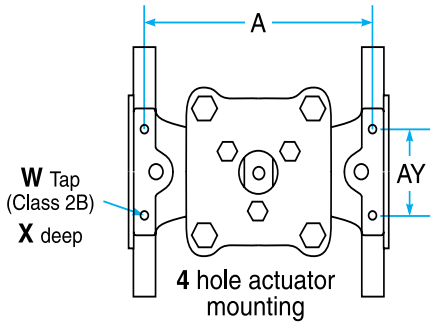
Actuator mounting hole configurations

Full dimensions for valve and actuator assemblies are available.

Class 150

Size	4 hole pattern				2 hole pattern		
	A	AY	W	X	A	W	X
1/2	-	-	-	-	3.62	5/16-18	.47
3/4	-	-	-	-	3.75	5/16-18	.47
1	4.19	1.75	5/16-18	.38	-	-	-
1 1/2	5.75	1.75	5/16-18	.47	-	-	-
2	6.31	2.25	5/16-18	.47	-	-	-
2 1/2	7.13	3.50	3/8-16	.56	-	-	-
3	7.13	3.50	3/8-16	.56	-	-	-
4	8.00	4.00	7/16-14	.63	-	-	-
6	9.44	4.00	7/16-14	.63	-	-	-
8	10.19	6.00	1/2-13	.63	-	-	-
10	11.56	6.00	1/2-13	.63	-	-	-
12	12.53	6.00	1/2-13	.63	-	-	-
14	13.750	6.00	1/2-13	.63	-	-	-
16	27.812	8.00	5/8-11	1.00	-	-	-
18	30.688	8.00	5/8-11	1.00	-	-	-
20	33.56	8.00	5/8-11	1.00	-	-	-
24	36.25	11.50	1.00-8	1.50	-	-	-

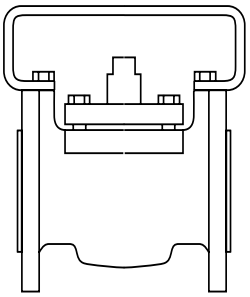


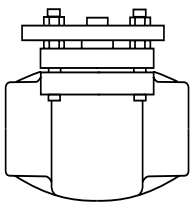


Class 300

Size	4 hole pattern				2 hole pattern		
	A	AY	W	X	A	W	X
1/2	-	-	-	-	4.38	5/16-18	.47
3/4	-	-	-	-	4.38	5/16-18	.47
1	5.75	1.75	5/16-18	.38	-	-	-
1 1/2	6.63	1.75	5/16-18	.47	-	-	-
2	7.56	2.25	5/16-18	.47	-	-	-
2 1/2	9.94	3.50	3/8-16	.56	-	-	-
3	9.94	3.50	3/8-16	.56	-	-	-
4	10.69	4.00	7/16-14	.63	-	-	-
6	14.00	4.00	7/16-14	.63	-	-	-
8	14.63	6.00	1/2-13	.63	-	-	-
10	15.69	6.00	1/2-13	.63	-	-	-
12	17.38	6.00	1/2-13	.63	-	-	-
14	27.812	8.00	5/8-11	1.00	-	-	-
16	30.688	8.00	5/8-11	1.00	-	-	-
18	33.563	8.00	5/8-11	1.00	-	-	-
20	36.25	11.50	1.00-8	1.50	-	-	-
24	36.25	11.50	1.00-8	1.50	-	-	-

Dimensions are in inches.


Standard flange mount


Standard screwed end mount

XOMOX®

Quick Reference Selection Table

The table below provides a brief overview of the most commonly specified valves. When ordering, be sure to specify all options including body, plug, and sleeve materials.

No. of Ports	Type*	ANSI Class	Size Range	Operator	Figure Number	Notes
2	Screwed End	150	1/2 – 2	Wrench	066	2-way Tufline Sleeved Plug Valves provide tight shutoff from high vacuum through rated pressure at temperatures from -20°F to 600°F
		300			0366	
	Flanged End	150	1/2-4		067	
			4 – 24	Enclosed Gear	067EG	
		300	1/2 – 4	Wrench	0367	
			4 – 24	Enclosed Gear	0367EG	
	Partial Jacket	150	1 – 4	Wrench	067PJ	Standard jacketed valves are available in carbon steel or CF8M stainless steel. All jackets are rated at 235 psi at 400°F. Full jacketed valves have over-sized flanges.
			4 – 12	Enclosed Gear	067PJ-EG	
		300	1 – 4	Wrench	0367PJ	
			4 – 12	Enclosed Gear	0367PJ-EG	
	Full Jacket	150	2x1x2-6x4x6	Wrench	067FJ	
			6x4x6-12x10x12	Enclosed Gear	067FJ-EG	
		300	2x1x2-6x4x6	Wrench	0367FJ	
			6x4x6-12x10x12	Enclosed Gear	0367FJ-EG	
3	Screwed End	150	1/2 – 2	Wrench	036	When ordering 3-way valves, be sure to include the port configuration. Refer to page 5.
		300	1/2 – 2		0336	
	Flanged End	150	1/2 – 4		037	
			4 – 12	Enclosed Gear	037EG	
		300	1/2 – 4	Wrench	0337	
			4 – 12	Enclosed Gear	0337EG	
	Partial Jacket	150	1 – 4	Wrench	037PJ	
			4 – 8	Enclosed Gear	037PJ-EG	
		300	1 – 4	Wrench	0337PJ	
			4 – 8	Enclosed Gear	0337PJ-EG	
4	Screwed End	150	1/2 – 2	Wrench	046	Bodies are available in carbon steel or CF8M stainless steel. Standard pressure/ temperature ratings apply, with the exception that pressure drop should not exceed 170 psi at 100°F when switching.
	Flanged End		1/2 – 4		047	
	Flanged End		6 – 12	Enclosed Gear	047-EG	

* Socket weld and butt weld end valve information is available in a separate catalog.

How to specify

Materials

The following are ASTM designations for materials listed elsewhere in this catalog.

Carbon steel	ASTM A216 WCB
302 stainless steel	ASTM A240 Type 302
304 stainless steel	ASTM A240 Type 304
304 stainless steel	ASTM A351 CF8
304L stainless steel	ASTM A351 CF3
316 stainless steel	ASTM A351 CF8M
316L stainless steel	ASTM A351 CF3M
Alloy 20	ASTM A351 CN7M
Bronze	ASTM B61
CD4MCuN	ASTM A995 CD4MCuN
Ductile Iron	ASTM A395
Hastelloy B	ASTM A494 N7M
Hastelloy C	ASTM A494 CW6M
Inconel	ASTM A494 CY40
Nickel	ASTM A494 CZ-100
Monel	ASTM A494 M30-C (Body) or ASTM A494 M351 (Plug)
Ni-Al Bronze	ASTM B148 Gr.958
Titanium	ASTM B367 Gr. C-3
Zirconium	ASTM B752 Gr. 702

Other ferrous and non-ferrous materials are available upon application.

Size	Figure No.	Option	Body	Plug	Sleeve	Operator	Service
1″	- 066	- FT	- 6	- 6	- P1	- W	- C

Size & Figure No.

See Quick Reference Selection Table on the previous page

Options

Fire Tested	FT
Tertiary Top Seal	TS
Cage Control	CCV
Extended Packing	XP
Partial Jacket	PJ
Full Jacket	FJ
Port Arrangements for 3-Way valves (See pg 6)	A, AX, C, or D

Valve specifications may include multiple options.

Body

Alloy 20	0
Ductile Iron	1
Carbon Steel	2
Monel	3
Nickel	5
CF8M	6
Hastelloy B	8
Hastelloy C	9
CD4MCuN	27
Inconel	40
Other (Specify)	X

* Specify actuator type and available air supply.

** Consult your Xomox Sales Engineer for a wide variety of other available service options.

Plug

Alloy 20	0
Monel	3
304SS	4
Nickel	5
CF8M	6
Hastelloy B	8
Hastelloy C	9
CD4MCuN	27
Inconel	40
Other (Specify)	X

Sleeve

PTFE	P1
15% RPTFE	P2
25% RPTFE	P3
PFA	P6
Xomox-7	P7
UHMWPE	P8
Tufline-475	P16
Tufline-600	P20
Other (Specify)	PX

Operator

Less Operator	N
Wrench	W
Wrench with locking device	WY
Gear	G
Gear with locking device	GZ
Actuator*	A

Service

Chlorine	C
Oxygen	O
Vacuum	V
General Service	Blank
Other**	X

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STOCKHAM® Triangle® UNI-CHEK® w.t.a.® XOMOX®

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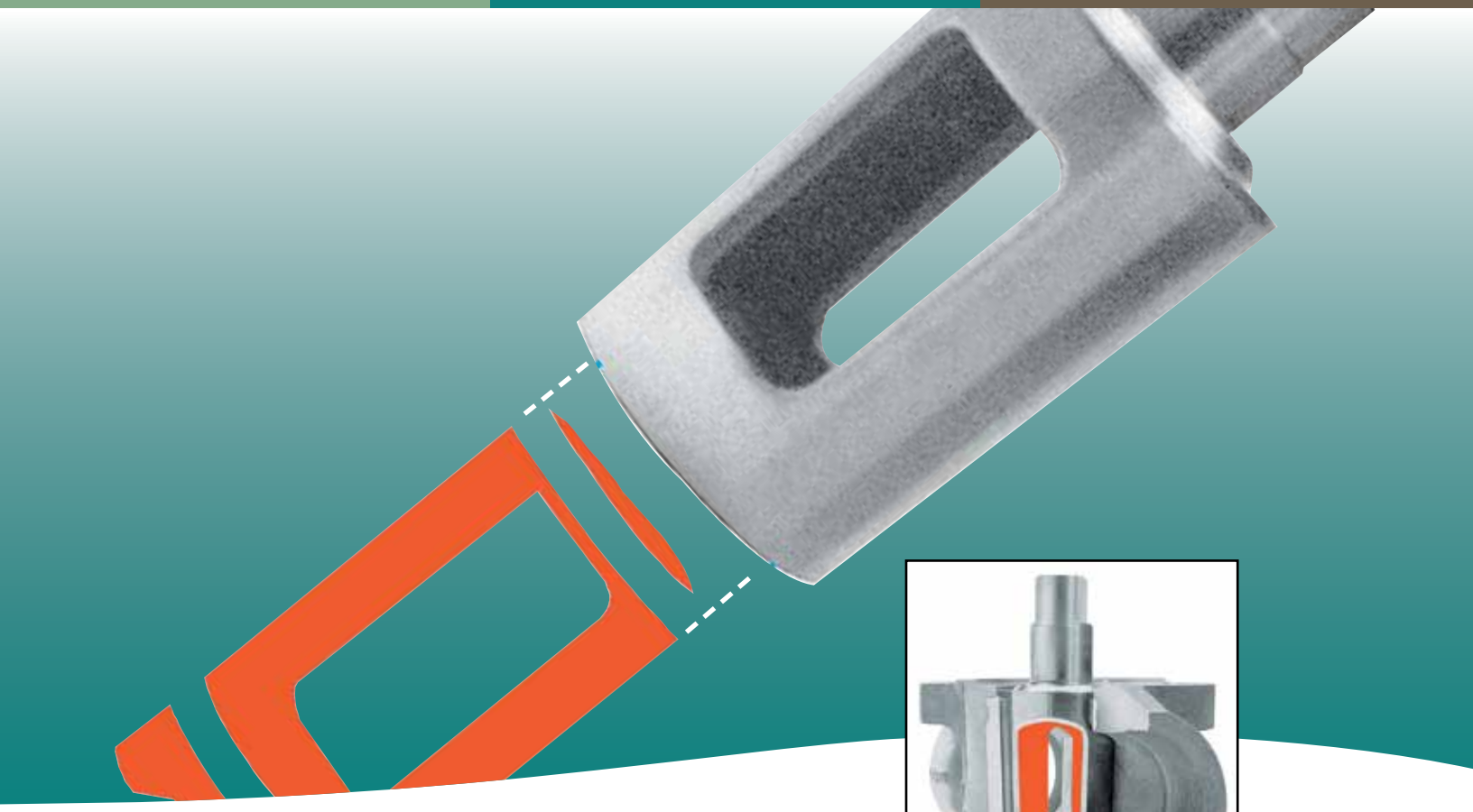


Tufline® Cage Control Valves

CRANE

ChemPharma Flow Solutions

www.cranechempharma.com

Features and Benefits.

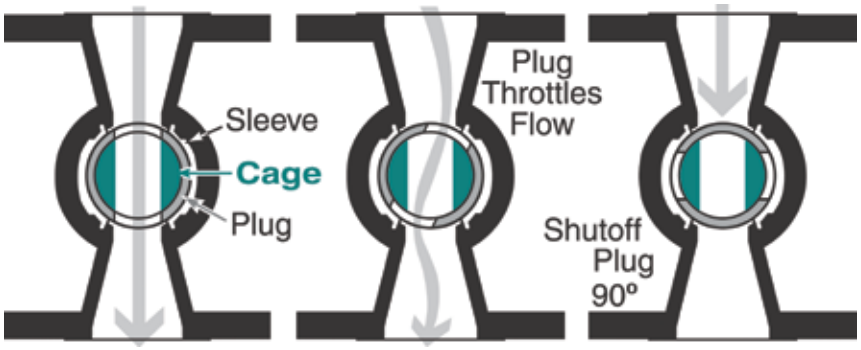
Tufline® Sleeved Plug Valves can be furnished with caged plugs to provide soft seat protection in throttling applications and in services with high pressure drops through the valve. The caged plug design allows metal-to-metal throttling while providing metal-to-soft seat shutoff for both automatic and manually controlled applications.

The design is simple and efficient. The cage is located within the plug and is fixed in the valve body. Bearings on the flow cage provide clearance between the plug and cage, allowing the plug to rotate freely.

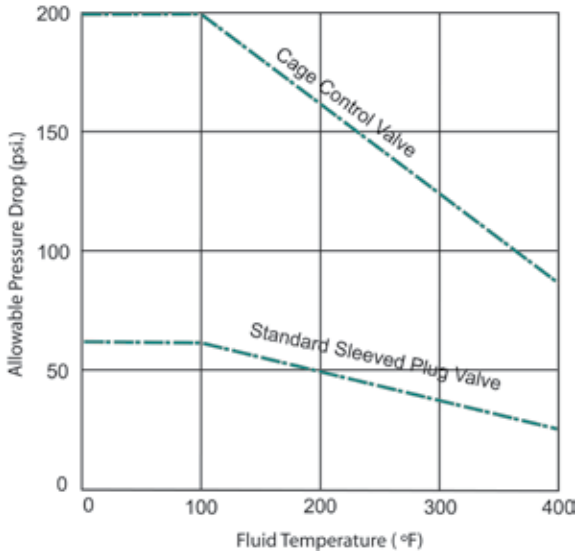
The cage plug assembly protects the seat from erosion in throttling applications by shielding the soft seat from direct flow impingement at the valve ports. The cage mechanism also serves to reduce turbulence and the cutting action of high velocity liquids, slurries and gaseous vapors by providing a more direct, contoured flow path through the valve.

Available Materials & Sizes.

Cage Control Valves are available in sizes 1" through 12". Standard body material are WCB or CF8M while the standard plug and cage material are CD4MCuN. Other sizes and materials are available upon request.



Tufline Cage Control Flow Characteristics Cv factors for sizing 2-way valves.



Throttling Pressure Drop Limitations for Plug Control Valves.

1. The chart above may be used for evaluating throttling pressure drop at any position for valves 4" and smaller. Consult the factory for 6" to 12" pressure drop information. (Note: In the closed position, valve can withstand full pressure drop).

2. Cage Control Valves have the same pressure-temperature rating as standard valves. Refer to the standard sleeved plug valve pressure-temperature chart for specific material rating.

Plug Valve Trim Options.

- Reduced ports: 50%, 25%, 12-1/2%, 6-1/4%, and 3-1/8% of standard Tufline Valve Cv
- V-ports
- Special port shapes for unusual processes are available upon request

Typical Applications.

Waste Sludge
Raw River Water
Alum
Brine
Sulfuric Acid with Zinc Powder
45%-50% KOH in Water
Phosphoric Acid Slurry
Borax One Supply
Trona Slurry
Soda Ash
Titanium Dioxide
Scrubber Effluent
Dilution Liquor
Green Liquor
Heavy Black Liquor
Lime Mud
Digester Relief
Caustic Soda
Clay Slurry
Starch Slurry
Calcium Carbonate
Fly Ash Slurry
Tank Bottom Residues
Sodium Chlorate Solution

Dimensional Data.

The Tufline Cage Control modification does not effect or change the dimensions from the standard valve design. Please refer to the appropriate valve type for dimensional information.

Operating Torques.

The Tufline Cage Control modification does not effect or change the operating torque from the standard valve design. Please refer to the appropriate valve type for operating torque informaton.

How to specify

Size / Figure No. / Option / Body / Plug & Cage / Sleeve / Operator / Service

1″ - 066 - CCV - FT - 6 - 27 - P1 -W - C

Size & Figure No.
See Quick Reference Selection Table on the previous page

Options
Fire Tested . . . . . **FT**
Tertiary Top Seal . . . **TS**

Valve specifications may include multiple options.

Body
Carbon Steel . . . **2**
316SS **6**
CD4MCuN **27**
Other (Specify) . **X**

Service
General Service . . . **Blank**
Other** . . . **X**

Operator
Less Operator . . . **N**
Wrench . . . . . **W**
Wrench with locking device . **WY**
Gear . . . . . **G**
Gear with locking device . . **GZ**
Actuator* . . . . . **A**

Sleeve
PTFE **P1**
15% RPTFE . **P2**
PFA **P6**
Tufline-475 . **P16**
Tufline-600 . **P20**

Plug & Cage
CD4MCuN **27**
Other (Specify) . **X**

* Specify actuator type and available air supply.

** Consult your Xomox Sales Engineer for a wide variety of other available service options.

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XOMOX®

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Xomox® FK Soft Seated Ball Valve

CRANE®

www.cranecpe.com

Heritage of Innovation & Quality

Crane Co. is a diversified manufacturer of highly engineered industrial products, founded in 1855. Crane has approximately 11,000 employees in the Americas, Europe, Asia and Australia, and is traded on the New York Stock Exchange (NYSE:CR).

One of its businesses (within Fluid Handling segment), XOMOX® was established in 1956 as the Continental Manufacturing Company. The principal product was the Tufline fluorocarbon-sleeved plug valve. The concept of the nonlubricated sleeved plug valve was developed owing to the advent of Teflon® by the E.I. du Pont de Nemours and Company.

Today, XOMOX ranks among the most successful and well known global manufactures of industrial valves for demanding service applications. XOMOX manufactures and supplies a broad line of fluid flow process control products for the **process industry** including chemical, fertilizer, petrochemical, water treatment, pulp & paper, fossil fuel and nuclear power generation, oil and gas-transmission and production, among others.

When you buy products from us, you get much more than just valves:

Traceability
A stainless steel, tag is attached to all manufactured and modified valves. It includes standard ANSI information.

Fully Tested
All valves manufactured by Xomox are tested in accordance with Xomox strict manufacturing procedures and industry regulations.

Field Repair Services
Xomox technicians are available for field repair and emergency service at your site.

Consistent Quality
The high Xomox quality is supported by our extensive practical experience, state-of-the-art manufacturing, and quality assurance certified by international inspections authorities. Please visit our website for details.

Crane Fluid Handling: Global Presence, Local Support.

Manufacturing facilities include:
Cincinnati, USA
Lindau, Germany
Chihuahua, Mexico
Székesfehérvár, Hungary
Chennai, India
Ningjin, China

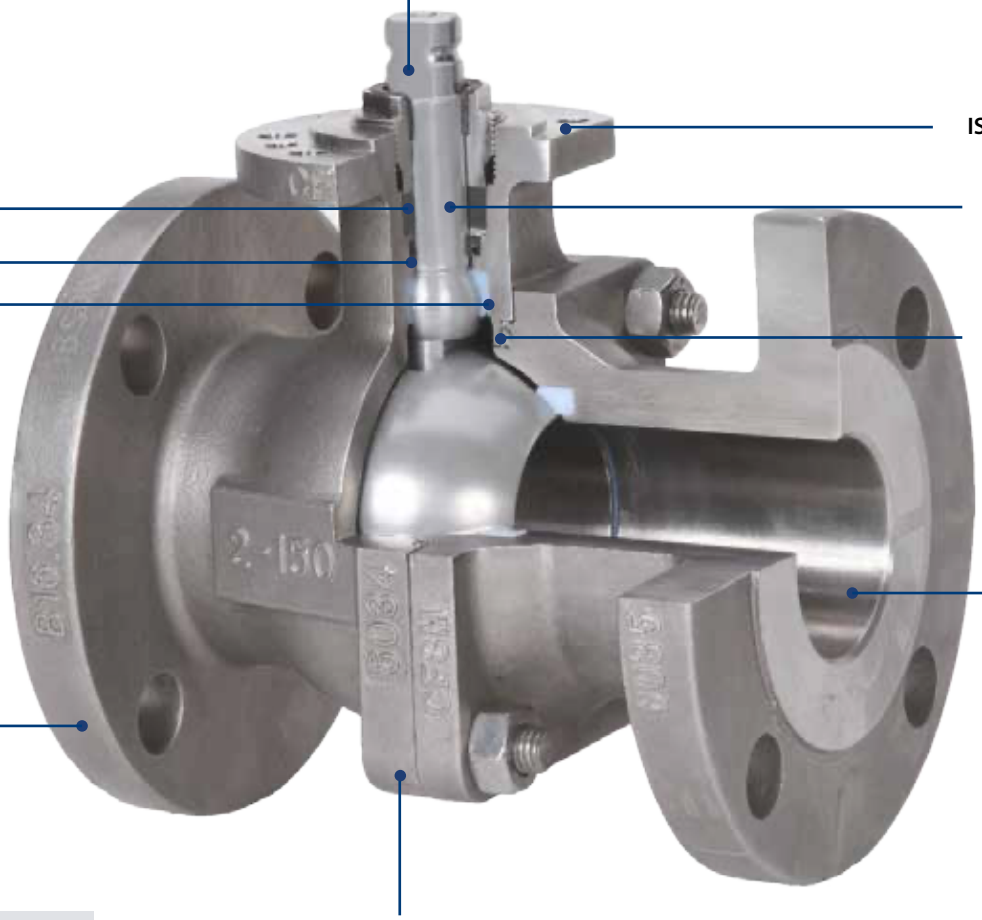
Xomox FK Ball Valve Features and Benefits

Features & Benefits

1. Three independent stem seals offer superior **fugitive emissions control**, certified to the following standards: EPA Method-21, ISO-15848, and TA-Luft according to VDI 2440.
2. **Self-relieving** seats permit relief of excess pressure to protect the integrity of the valve while maintaining bi-directional operation.
3. Patented SX ball-stem design provides high maximum stem torque capability and built-in side load resistance for **extended valve life** under severe conditions including thermal-cycling.
4. Dual material spiral wound body gasket, including a PTFE chemically inert inner seal and a secondary graphite outer seal, is supplied as standard.

FIRE SAFE

Fire tested as standard per API 607-6th edition & ISO 10497:2010



Floating ball design ½" - 8"
Trunnion ball design 10" - 12"

Xomox®FK Ball Valve

Body Configuriation	Port	Figure Number	ANSI Pressure Class	IN.	½"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	12"
				DN	15	20	25	40	50	80	100	150	200	250	300
2pc Floating	Full Port	K21F	150		●	●	●	●	●	●	●	●	●		
		K23F	300		●	●	●	●	●	●	●	●	●		
2pc Trunnion	Full Port	K21F-T	150											●	●
		K23F-T	300											●	●

Xomox®FK Ball Valves are available in the following configurations:

- Two-piece, raised face flanged ends
- Sizes ½" through 12"
- Pressure ratings ANSI Class 150 and 300
- Xomox FK ball valves provide tight shutoff from vacuum through rated pressure at temperatures up to 450°F (230°C)

Traceability

A stainless steel tag is attached to all manufactured and modified valves. It includes standard ANSI information and an individual serial number.

Testing

Each valve is tested according to API 598.

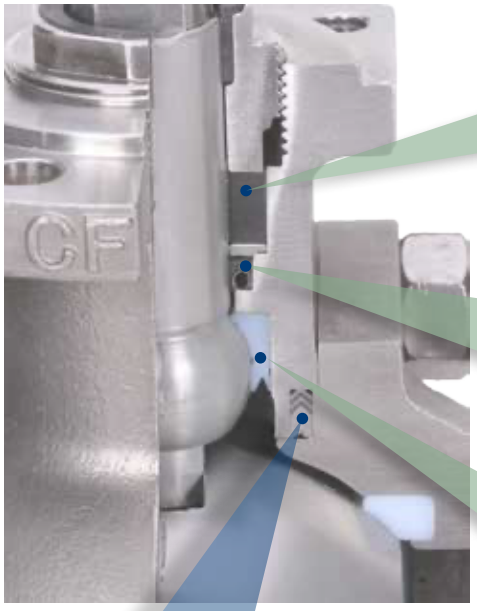
Features Include

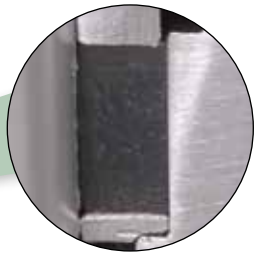
- Full bore design
- Face-to-face dimension long pattern ASME B16.10
- Raised face flange dimension per ASME B16.5
- Self-relieving seats
- Fire tested API 607 6th edition & ISO 10497:2010
- Anti-static design (electrical continuity between ball-stem-body)
- Blow-out proof stem
- Actuator mounting flange according to ISO 5211
- Patented SX stem seal for side load protection
- Fugitive emissions per EPA Method-21, ISO-15848, & TA-Luft (VDI 2440)

Soft-Seated Ball Valves Designed to ASME Standards

Xomox FK valves are designed in accordance with ASME B16.34, API-608, API-6D. These ball valves feature a full-port split body design, and the option of a locking hand lever or an enclosed operating gear and hand wheel.

Superior Sealing





Stem Seal

TERTIARY STEM SEAL (adjustable)

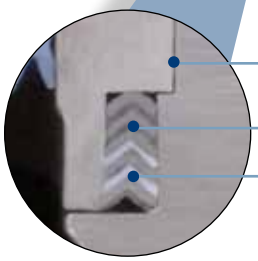
The graphite packing arrangement is the third stem seal and can be adjusted if a leak is ever detected.

SECONDARY STEM SEAL (pressure assisted)

The Spring Energized Lip Seal is the second independent stem seal; the spring is forcing the seal lips against the stem and the body ID while the pressure assists the spring to create a superior seal. The spring compensates for lip wear, tolerances and eccentricities and provides permanent resilience **(Live Loading)** to the seal.

PRIMARY STEM SEAL (pressure assisted)

The innovative patented "pressure assisted" SX stem seal provides the highest protection against fugitive emissions while supplying superior side load resistance.



Body Seal

METAL-TO-METAL BODY JOINT

SECONDARY BODY SEAL
(outer graphite fire tested seal)

PRIMARY BODY SEAL
(inner PTFE chemical seal)

Thermal Cycling Protection

To combat the effects of pressure and temperature fluctuations, our dual-material body gasket is supplied as standard and offers chemical seal and fire-safe operation.

The Thermal Cycling Challenge

Most PTFE body gaskets work well at static temperatures; the real challenge comes when you introduce a wide temperature swing. In a standard gasket seal design, thermal cycle can cause a leak due to difference in the thermal expansion between the PTFE body seal and the metal body joint.

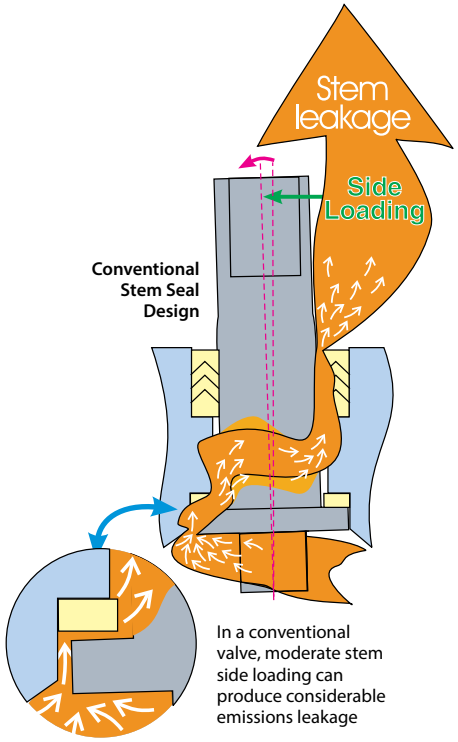
The need for a gasket to have the ability to recover cannot be over emphasized. The effects of pressure and temperature fluctuations, the temperature differential across the body joint, together with bolt stress relaxation and creep, demand a gasket with adequate flexibility and recovery to maintain a seal even under these varying service conditions.

The Xomox FK body gasket design uses a dual material spiral wound body gasket with a PTFE chemically inert inner seal and a secondary graphite fire-tested outer seal.

The spiral wound gasket is an industry proven design providing structural support and "Live Loading" via the metal spiral "v" shape rings. These "v" rings located in the fully-contained body groove protect the PTFE and graphite seals from extrusion and cold flow during thermal cycles.

Side Load Protection

THE PROBLEM:

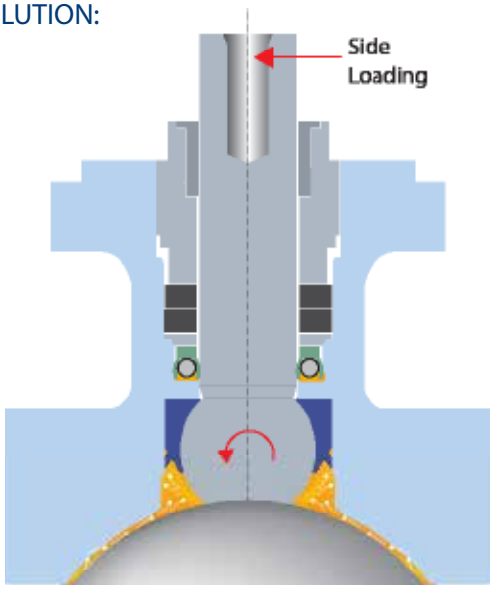


The most common problem with traditional ball valve designs is stem seal leakage.

A primary cause of stem seal failure is due to side loads on the stem. This failure becomes a serious safety issue when the valves are used on hazardous applications common to the chemical process industry.

In a conventional valve, moderate stem side loading can lead to significant emissions issues. Side loading can be caused by manual operation, abusive contact, and actuation loads due to misalignment.

THE SOLUTION:



The Xomox FK ball valve sealing system provides a triple stem seal. The primary seal is the patented SX spherical stem seal that compensates for stem movement and seat wear caused by side loads and high-cycle applications.

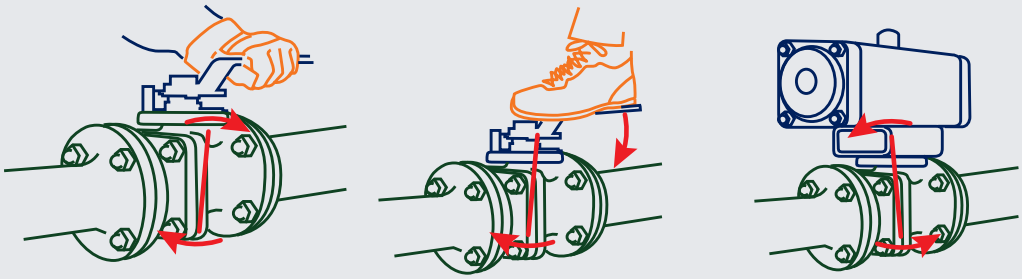
When the stem is in a side load situation, either internal or external to the valve, the pressure between the spherical surface of the stem and SX seal remains constant, leading to a superior external seal.

The spherical ball shape of the stem and the mating SX seal combine to provide a compression seal which is enhanced by the addition of a "V" lip design feature that is also in compression and is pressure assisted.

This patented SX seal system makes it possible to provide a valve design that offers significant advantages including longer lifespan, greater leak prevention and improved safety, which is especially important when handling hazardous media.

Our customers can now order a standard off-the-shelf ball valve with triple top seals for maximum emissions protection.

Typical Side Load Issues



Xomox FK ball valves deliver economical solutions for the vast majority of chemical applications while maintaining the highest possible degree of performance in terms of in-line leakage and fugitive emissions.

FK Ball Valve - Performance Chart

FUNCTION		MEDIA TYPES										APPLICATION REQUIREMENTS									
On / Off	Throttling	Clean Liquids & Gases	Dirty Liquids & Gases	Corrosive Liquids & Gases	Hazardous Liquids & Gases	Viscous Liquids	Scaling Liquids & Slurries	Abrasive Slurries	Fibrous Slurries	Dry Materials	Vacuum Service	High Flow Capacity	Low Torque	Fugitive Emissions Control	Reduced Maintenance	Extended Service Life	Sizes	Pressure Ratings	High Temperature (ASME/EN)	Low Temperature	Key Benefit
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	½ " - 12" DN15/DN300	Class 150/300	450°F / 230°C	-20°F / -29°C	Safety / Economy

Source: Crane Engineering

● Superior Performance ● Limited Application

They are commonly used within the following industries:

- Chlor-Alkali
- Industrial Chemicals
- Metal and Mining
- Nitrogen and Phosphate Fertilizers
- Refining
- Petrochemical

Special Application Services:

- NACE
- Chlorine
- Oxygen

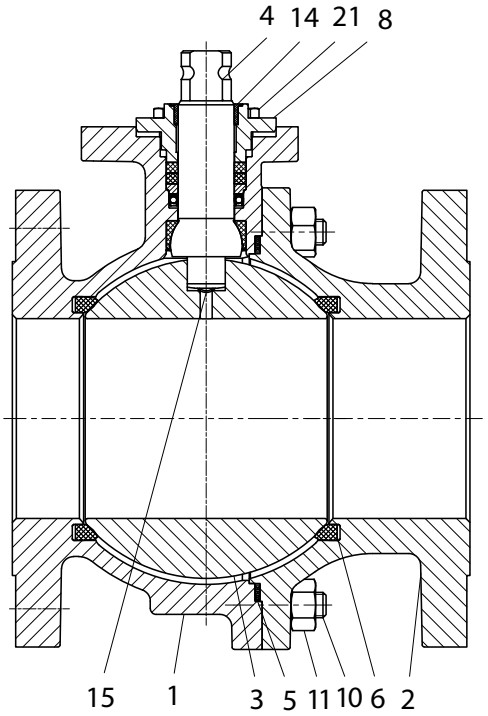
Special Materials:

- WCB and CF8M standard body materials
- Higher alloys available
  (Example: Alloy-20, Monel, Inconel & Hastelloy C)

Technical Specifications

Floating Ball Type

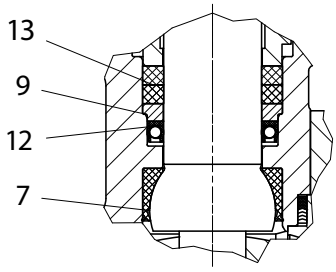
CL150 - K21F
CL300 - K23F
Full Port ½" - 8"
ASME/ANSI B16.10
Long Pattern



Materials of Construction

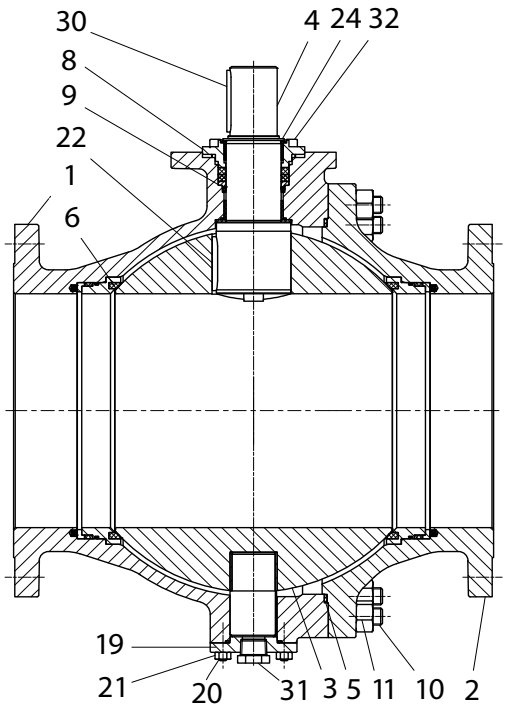
	Description	Carbon Steel	Stainless Steel
1	Body	ASTM A216 Gr WCB	ASTM A351 Gr CF8M
2	Tail	ASTM A216 Gr WCB	ASTM A351 Gr CF8M
3	Ball	316ss	316ss
4	Stem	UNS S31803	UNS S31803
5	Body Gasket	PTFE/Graphite/316ss	PTFE/Graphite/316ss
6	Seat	TFM	TFM
7	SX Stem Seal	TFM	TFM
8	Packing Gland	316ss	316ss
9	Support Ring	316ss	316ss
10	Stud	ASTM A193 Gr B7	ASTM A193 Gr B8M Cl.2
11	Heavy Hex Nut	ASTM A194 Gr.2H	ASTM A194 Gr.8M
12	Spring-energized Lip Seal	PTFE Filled/SST	PTFE Filled/SST
13	Packing	Graphite	Graphite
14	Guide Bushing	PTFE-Carbon filled	PTFE-Carbon filled
15	Anti-static Spring	SST	SST
*16	Stop Pin	316ss	316ss
*17	Hand Lever	316ss	316ss
*18	Socket Head Cap Screw	316ss	316ss
*19	Hex Nut	316ss	316ss
*20	Locking Pin with Ring	316ss	316ss
**21	Packing Adjustment Bolt	ASTM A193 Gr.B8M Cl.2	ASTM A193 Gr.B8M Cl.2

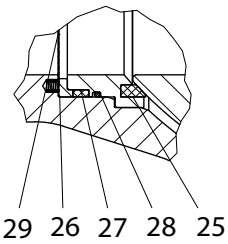
*Not shown
** Only on 4"-8"



Trunnion Ball Type

CL150 - K21F-T
CL300 - K23F-T
Full Port 10" - 12"
ASME/ANSI B16.10
Long Pattern

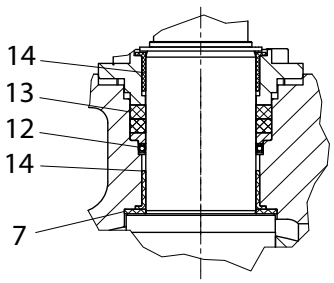




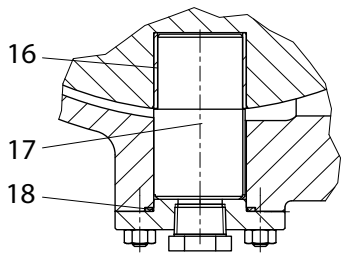
Detail view of seat

Materials of Construction

Item	Description	Carbon Steel	Stainless Steel
1	Body	ASTM A216 Gr WCB	ASTM A351 Gr CF8M
2	Tail	ASTM A216 Gr WCB	ASTM A351 Gr CF8M
3	Ball	316ss	316ss
4	Stem	UNS S31803	UNS S31803
5	Body Gasket	PTFE/Graphite/316ss	PTFE/Graphite/316ss
6	Seat	TFM	TFM
7	Stem Seal	TFM	TFM
8	Packing Gland	316ss	316ss
9	Support Ring	316ss	316ss
10	Stud	ASTM A193 Gr B7	ASTM A193 Gr B8M Cl.2
11	Heavy Hex Nut	ASTM A194 Gr.2H	ASTM A194 Gr.8M
12	Spring-energized Lip Seal	PTFE Filled/SST	PTFE Filled/SST
13	Packing	Graphite	Graphite
14	Flange Bearing	Reinforced Thermoplastic	Reinforced Thermoplastic
16	Sleeve Bearing	Reinforced Thermoplastic	Reinforced Thermoplastic
17	Bottom Stem	316ss	316ss
18	Gasket	PTFE/Graphite/316ss	PTFE/Graphite/316ss
19	Cover	316ss	316ss
20	Stud	ASTM A193 Gr. B7	ASTM A193 Gr. B8 Cl.2
21	Heavy Hex Nut	ASTM A194 Gr.2H	A194 Gr.8M
22	Parallel Key	316ss	316ss
24	Retaining Ring	SST	SST
25	Seat Retaining Ring	316ss	316ss
26	L-Ring	316ss	316ss
27	Seal Ring	Graphite	Graphite
28	O-Ring	Viton	Viton
29	Spring	SST	SST
30	Parallel Key	316ss	316ss
31	Pipe Plug	316ss	316ss
32	Packing Adjustment Bolt	ASTM A193 Gr.B8M Cl.2	ASTM A193 Gr.B8M Cl.2



Detail view of top stem



Detail view of bottom stem

How To Order

Size	-	Product	Configuration	ANSI Class	Port	Ball Type	-	Body Material	Ball Material	Stem Material	Packing Material	Seat Style	Seat Material	-	Operator	Service
2	-	K	2	1	F		-	2	6	6	G	A	P16	-	LL	

Size

	IN	DN
0.5	½"	15
0.75	¾"	20
1	1"	25
1.5	1½"	40
2	2"	50
3	3"	80
4	4"	100
6	6"	150
8	8"	200
10	10"	250
12	12"	300

Product

K	FK Series Ball Valve

Configuration

2	2-pc body

ASME Class

1	Class 150
3	Class 300

Port

F	Full

Ball Type

(blank)	Floating Design
T	Trunnion Mounted Design

Body Material

0	Alloy 20
2	WCB Carbon Steel
3	Monel
6	CF8M Stainless Steel
9	Hastelloy C
40	Inconel

Ball Material

Alloy 20	0
Monel	3
316SS	6
Hastelloy C	9
Inconel	40

Stem Material

Alloy 20	0
Monel	3
318SS	6
Hastelloy C	9
Inconel	40
17-4PH	N

Packing Material

PTFE / Flexible Graphite	G

Seat Style

Soft	A

Seat Material

TFM	P16

Operator

None	N
Lever w/locking device	LL
Gear	G
Gear w/locking device	GL
Automated (Specify)	A

Service

General	(blank)
NACE	N
Oxygen	O
Chlorine	C
Other (Specify)	Z

Comprehensive Product Portfolio

BALL VALVES

Xomox FK
2 Piece

Xomox
Reduced Bore
1 Piece

Xomox
2 Piece

Xomox
3 Piece

PLUG VALVES

Xomox 2 Way Flanged
Sleeve Plug Valve

Xomox XP
Sleeved Plug Valve

Xomox
Severe Service Valve

Xomox HF Sleeve
Plug Valve

LINED PRODUCTS

Xomox Lined
Plug Valve

Xomox Lined
Butterfly Valve

Xomox Lined
Ball Check Valve

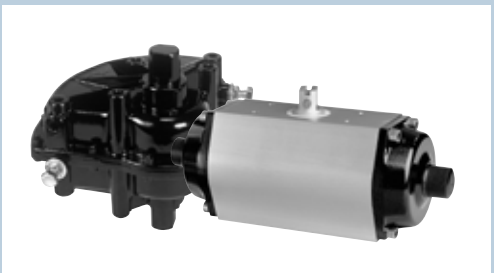
Xomox Lined
Ball Valve

BUTTERFLY VALVES

Xomox High-Performance
Wafer Butterfly Valve

Xomox High-Performance
Lug Butterfly Valve

ACTUATION



Xomox Actuators

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NOZ-CHEK® PACIFIC® RESISTOFLEX® revo® Saunders® the science inside
STOCKHAM® Triangle® UNI-CHEK® w.t.a.® XOMOX®

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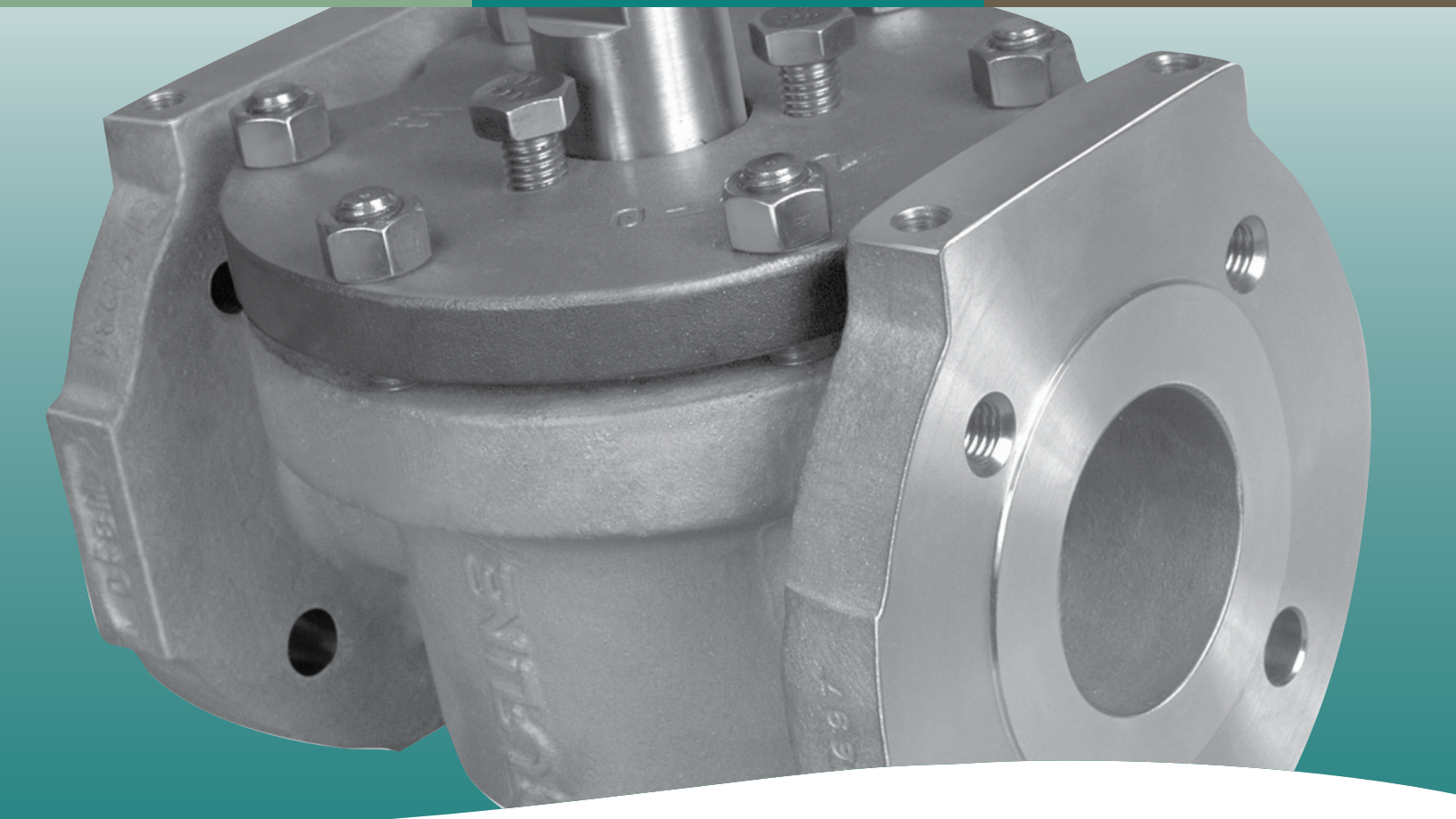

Tufline® Full Port Sleeved Plug Valves

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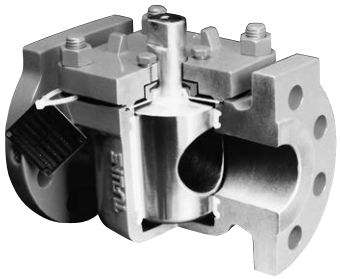
Tufline Full Port Sleeved Plug Valves



Two-Way
Full Port Sleeved Plug Valves

Full port design advantages.

With the full-area round port there is no diminished or constricted flow. Ideal wherever low pressure-drop and high-flow efficiency are important.

No pockets or cavities.

Unlike full port ball valves, Tufline valves have no cavities to entrap contaminating media. This is an important consideration for food and pharmaceutical applications.

For applications such as polymers, chemicals, salts, slurries, brines, muds, plastics, or sewage, there are no cavities where the flow media can collect and solidify.

Easy cleaning.

When requested, the Full Port Sleeved Plug Valve can be supplied prepped to accomodate the use of a pipeline pig for mechanical cleaning. This facilitates processing of heavy, viscous substances such as tar and pitch.

Ease of cleaning is also important when handling condensable media such as sulfur, polyvinylchloride, phthalic-anhydride, and vinylchloride monomer.

120° 3-Way Full Port
Sleeved Plug Valves

Self-cleaning.

Metal lips completely surround the valve ports. With each rotation of the valve, heavy scale which may have collected on the plug seal surface is broken-up and wiped away.

Standard features that assure exceptional performance.

Superior sealing, fugitive emissions control, greatly extended service life, economy of operation, and ease of automation are all standard features of Tufline Sleeved Plug valve configurations.

More information.

For Tufline Sleeved Plug Valve detailed data, ask for the comprehensive 20-page catalog. It includes performance characteristics, and a variety of options. To receive a copy call your Crane ChemPharma, Xomox Sales Office.

General specifications appropriate for both valves

ANSI Classes:
150, 300, & 600
Other pressure classes available upon request.

Temperature rating:
–20°F to +600°F

Materials:
Typically, body material is CF8M (316 stainless steel) or WCB (carbon steel), Plugs are CF8M (316 stainless steel).
PTFE sleeves are standard.
A wide variety of other materials and options are available.
See the How To Order table on page 7.

End connections:
Raised face flanges with phonographic serrations are standard. Other flange facings are available on request.

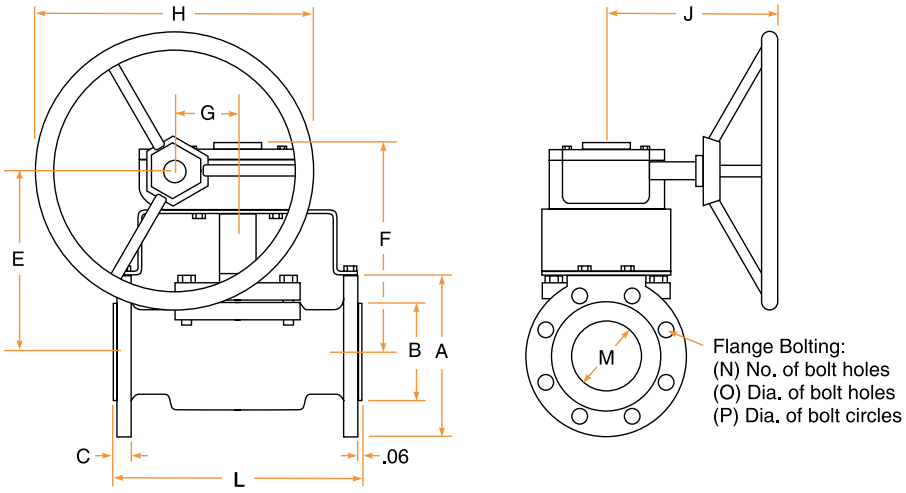
Actuation:
All valves can be supplied with a variety of manual, pneumatic, or electric actuators.

Tufline can provide reliable, single-source responsibility for your complete valve package.

Quality assurance:
At every step in the foundry, machining, manufacturing, and assembly processes, valve parts are inspected to assure high quality. Every valve is pressure tested for tight shutoff.

Tufline Full Port Sleeved Plug Valves
Dimensions

Dimensions are in inches. Weights are in pounds.



Class 150 - Figure No. 2067 / Class 300 - Figure No. 20367

Size	A	B	C	E	F	G	H	J	M	L	Wts.	Cv	Torque*
¾	4.62	1.69	.63						.83	6.00	20	50	400
1	4.88	2.00	.69						1.05	6.50	28	100	500
1½	6.13	2.88	.81						1.56	7.50	35	270	1000
2	6.50	3.63	.88						2.06	8.50	54	450	1440
3	8.25	5.00	1.12	9.69	11.53	2.63	18.00	10.38	3.06	11.13	135	1130	3600
4	10.00	6.19	1.25	10.38	12.69	3.50	30.00	12.31	4.03	12.00	205	2200	4800
6	12.50	8.50	1.44	12.69	20.08	5.38	30.00	15.88	6.00	15.88	475	5350	17,000
8	15.00	10.63	1.62	14.38	24.08	5.43	24.00	17.25	7.98	19.75	875	10400	32,000
10	17.50	12.75	1.88	18.65	24.59	6.25	36.00	18.76	9.84	22.38	1600	15850	75,000
12	23.00	15.00	2.00	21.67	29.17	9.33	18.00	23.72	11.78	28.00	2500	22000	100,000
18	28.50	21.00	2.75	**	**	**	**	00.00	17.25	43.00	6000	47000	425,000

Valves ½ through 2 inch are typically not supplied with enclosed gear operators.

Class 150
Figure No. 2067

Size	N	O	P
¾	4	.63	2.75
1	4	.63	3.13
1½	4	.63	3.88
2	4	.75	4.75
3	4[1]	.75	6.00
4	8[1]	.75	7.50
6	8[7]	.88	9.50
8	8[2]	.88	11.75
10	12[5]	1.00	14.25
12	12[2]	1.00	17.00
18	16[4]	1.25	22.75

Class 300
Figure No. 20367

Size	N	O	P
¾	4	.75	3.25
1	4[1]	.75	3.50
1½	4	.88	4.50
2	8	.75	5.00
3	8[3]	.88	6.63
4	8[3]	.88	7.88
6	12[4]	.88	10.62
8	12[5]	1.00	13.00
10	16[6]	1.12	15.25
12	16[4]	1.25	17.75
18	24[8]	1.38	24.75

* Valve break torque in inch-lbs with PTFE sleeve.

** Consult factory

Also available:
- 90° 3-way and 4-way configurations.
- Configurations specially approved for HF-alkylation.

1. Two top holes in flanges are tapped.
2. Two top and two bottom holes in flanges are tapped.
3. Four top holes in flanges are tapped.
4. Four top and four bottom holes in flanges are tapped.
5. Four top and two bottom holes in flanges are tapped.
6. Six top and two bottom holes in flanges are tapped.
7. All eight holes in flanges are tapped.
8. Six top and six bottom holes in flanges are tapped.

Tufline 120° 3-Way Full Port Sleeved Plug Valve

Facilitates more efficient and more economical system design.

The Tufline 120° Full Port 3-way Sleeved Plug Valve replaces conventional and cumbersome pipe “T” and twin block valve arrangements.

Improved flow characteristics.

In addition to the improved flow provided by the full port configuration, the 120° flow pattern provides greater flow efficiency than 90° 3-way valves.

Additional design features.

In addition to the unique design features found in the standard-port and 2-way full port configurations, this valve offers:

- Configuration for cleaning with a mechanical pig when requested.
- 120° and 240° manual or automated operation.
- Visual indication of flow direction.
- Allows transflow when switching.

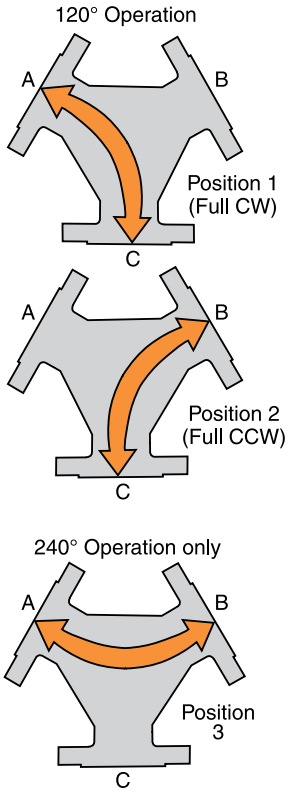
Appropriate applications.

This valve is ideal for dual safety relief valve switching and other applications where low pressure drop and high flow efficiency are important.

This design offers significant advantages for handling slurries, diversion, or blending where full flow and a low pressure drop is desirable.

Port arrangements.

In the diagrams at the right, the color indicates the path of fluid flow.



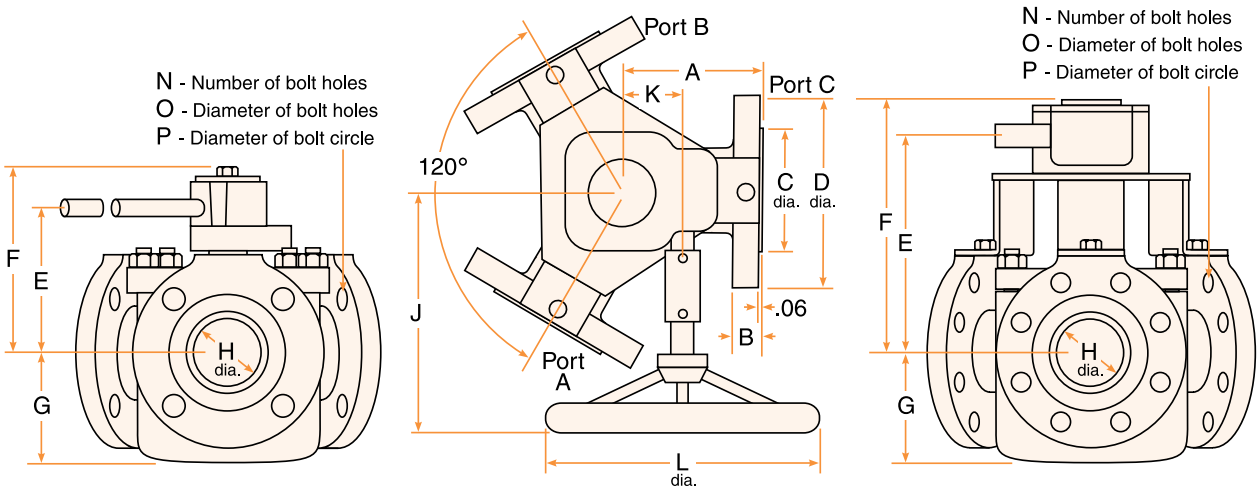
Cv and torque values.

Size	Cv Factors For Valve Sizing	Valve Break Torques in.lbs* (PTFE Sleeve)
1	36	300
1½	90	1500
2	175	1500
3	400	7020
4	725	7560
6	1750	17,000
8	3200	32,000

* For Tufline-600 sleeves, multiply valve break torques by 1.35.

Tufline 120° 3-Way Full Port Sleeved Plug Valve
Dimensions

Dimensions are in inches. Weights are in pounds.



Class 150 - Figure No. 9037 / With Wrench

Size	A	B	C	D	E	F	G	H	J	K	L	N	O	P	Wts.
1	3.00	.56	2.00	4.25	3.63	4.66	3.00	1.05	11.25	-	-	4	.62	3.13	21
1½	4.13	.88	2.88	6.50	4.88	6.06	3.75	1.61	29.00	-	-	4	*	3.88	44
2	4.13	.88	3.63	6.50	4.88	6.06	3.75	2.06	29.00	-	-	4	.75	4.75	47

*Tapped ½-13 UNC hole.

Class 150 - Figure No. 9037 / With Enclosed Gear

Size	A	B	C	D	E	F	G	H	J	K	L	N	O	P	Wts.
3	6.00	1.13	5.00	8.25	9.50	11.44	4.75	3.07	12.00	3.50	18.00	4	.75	6.00	135
4	7.00	1.25	6.19	10.00	10.38	12.75	5.63	4.03	11.31	4.13	16.00	8	.75	7.50	195
6	8.00	1.44	8.50	12.50	11.63	15.00	6.50	6.07	17.41	4.69	24.00	8	.88	9.50	265
8	9.50	1.62	10.62	15.00	14.50	17.81	7.50	7.98	18.71	2.11	24.00	8	.88	11.75	775

Class 300 - Figure No. 9337 / With Wrench

Size	A	B	C	D	E	F	G	H	J	K	L	N	O	.P	Wts.
1	3.00	.69	2.00	4.88	3.63	4.66	3.00	1.05	11.25	-	-	4	.75	3.50	23
1½	4.13	.88	2.88	6.50	4.88	6.06	3.75	1.61	29.00	-	-	4	**	4.50	44
2	4.13	.88	3.63	6.50	4.88	6.06	3.75	2.06	29.00	-	-	8	.75	5.00	47

*Tapped ¾-10 UNC hole.

Class 300 - Figure No. 9337 / With Enclosed Gear

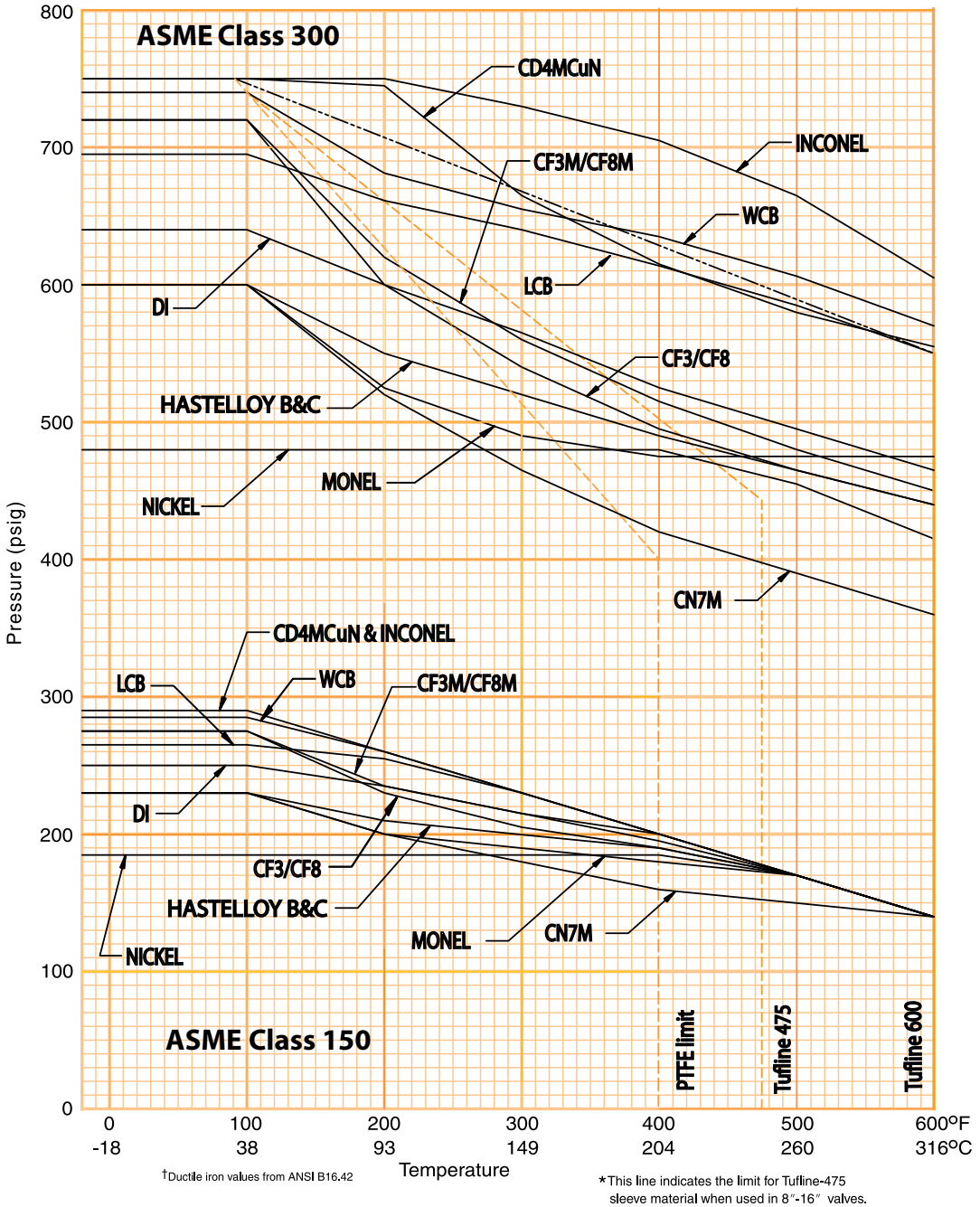
Size	A	B	C	D	E	F	G	H	J	K	L	N	O	P	Wts.
3	6.00	1.13	5.00	8.25	9.50	11.44	4.75	3.07	12.00	3.50	18.00	8	.88	6.63	135
4	7.00	1.25	6.19	10.00	10.38	12.75	5.63	4.03	11.31	4.13	16.00	8	.88	7.88	195
6	8.00	1.44	8.50	12.50	11.63	15.00	6.50	6.07	17.41	4.69	24.00	12	.88	10.63	265
8	9.50	1.62	10.62	15.00	14.50	17.81	7.50	7.98	18.71	2.11	24.00	12	1.00	13.00	775

Pressure-temperature ratings

The useful range of PTFE sleeved plug valves is -20˚F to +400˚F
Tufline-475 sleeve: -20˚F to +475˚F
Tufline-600 sleeve: -20˚F to +600˚F
with maximum temperature variation of 200˚F.

Applications beyond these ranges can be handled effectively but may require valve adjustments at the operating temperature.

Material selections are governed by the limits imposed by AMSE B16.34, 2004 edition.



†Ductile iron values from ANSI B16.42

*This line indicates the limit for Tufline-475 sleeve material when used in 8″-16″ valves.

How to Order

CRANE ChemPharma, Xomox Rack & Pinion (XRP)™ Actuators and Matryx® Actuators.

Tufline automated valve packages assure you of single-source responsibility for flow control equipment.

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CRANE ChemPharma, Xomox Automation & Service Centers.

Our Automation & Service Centers are strategically located to provide comprehensive:

- Automated valve packaging.
- Valve modification.
- Valve repair.
- Application counseling.

For more information, fast response, comprehensive service, and knowledgeable technical help, call your Crane ChemPharma, Xomox Automation & Service Center.

Size / Figure No. / Option / Body / Plug / Sleeve / Operator / Service

1″ - 2067 - FT - 6 - 6 - P1 - W - C

Figure No.

2-Way
Class 150 . . **2067**
Class 300 . . **20367**
Class 600 . . **20667**

120° 3-Way
Class 150 . . **9037**
Class 300 . . **9337**
Class 600 . . **9637**

Options

Fire Tested . . . . . **FT**
Tertiary Top Seal . . . **TS**
Cage Control . . . . **CCV**
Extended Packing . **XP**
Partial Jacket . . . . . **PJ**
Full Jacket . . . . . **FJ**

Port Arrangements for 3-Way valves (See page 4)
. . . . . **120°** or **240°**

Body

Alloy 20 . . . . . **0**
WCB **2**
Monel **3**
304SS **4**
Nickel **5**
CF8M **6**
Hastelloy B **8**
Hastelloy C **9**
CD4MCuN **27**
Inconel **40**
Other (Specify) . **X**

Service

Chlorine . . **C**
Oxygen . . **O**
Vacuum . . **V**
General Service . . . **Blank**
Other** . . . **X**

Operator

Wrench . . . . . **W**
Gear . . . . . **G**
Actuator* . . . . . **A**
Less Operator . **N**

Sleeve

PTFE **P1**
15% RPTFE . **P2**
25% RPTFE . **P3**
PFA **P6**
Xomox-7 . . . . **P7**
UHMWPE . . . **P8**
Tufline-475 . **P16**
Tufline-600 . **P20**
Other (Specify) . . . **PX**

Plug

Alloy 20 . . . . . **0**
Monel **3**
304SS **4**
Nickel **5**
CF8M **6**
Hastelloy B **8**
Hastelloy C **9**
CD4MCuN **27**
Inconel **40**
Other (Specify) . **X**

* Specify actuator type and available air supply.

** Consult your Tufline Sales Engineer for a wide variety of other available service options.

XOMOX®

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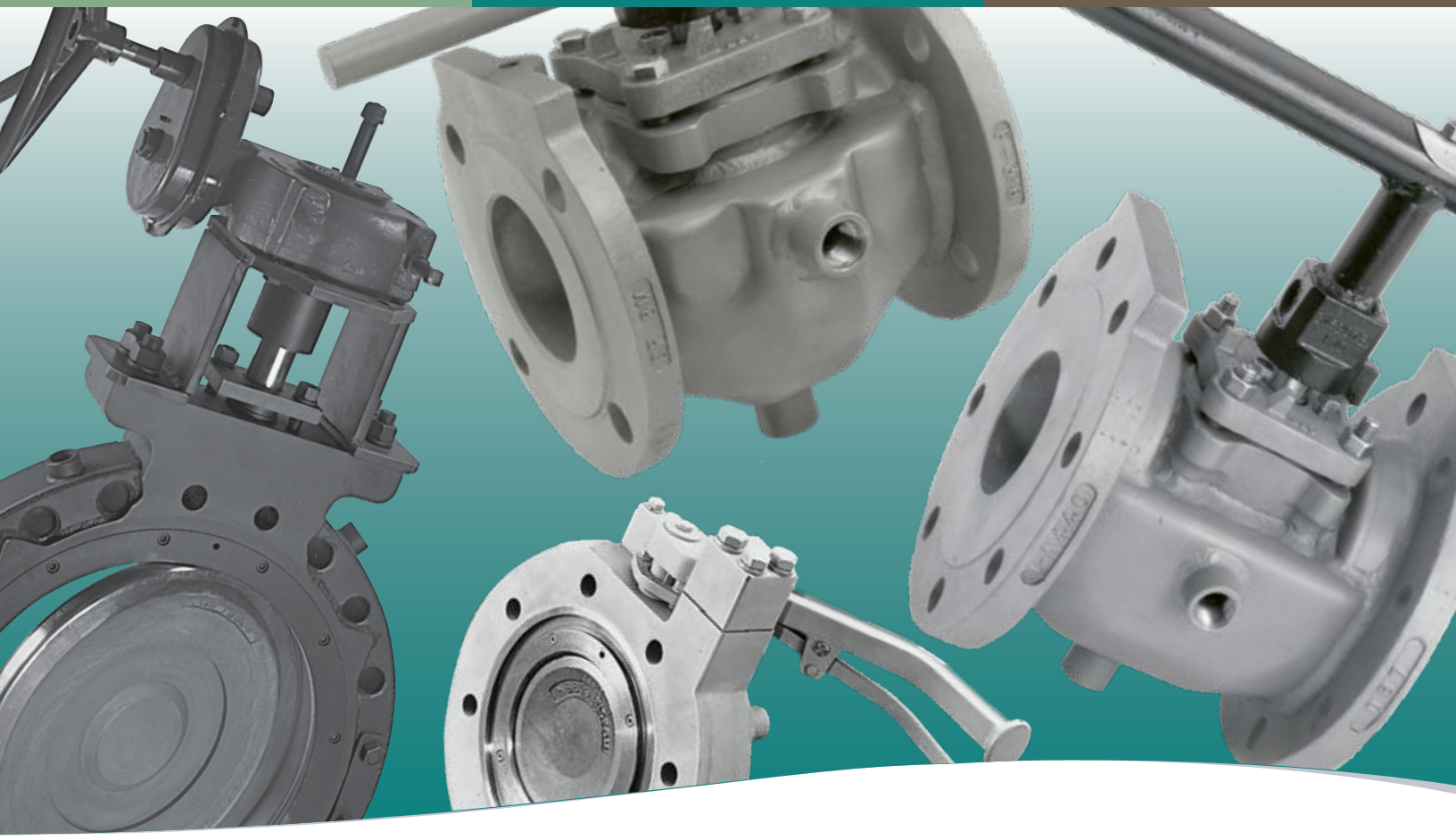

XOMOX® Jacketed Valves

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Choose from a broad range of Tufline® valves specifically designed for handling temperature-sensitive fluids.

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The Xomox team works with you to assure optimum valve performance.

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Problem solvers.

Talk with a Xomox Sales Engineer about any aspect of your fluid handling system. You will get process-improving answers.

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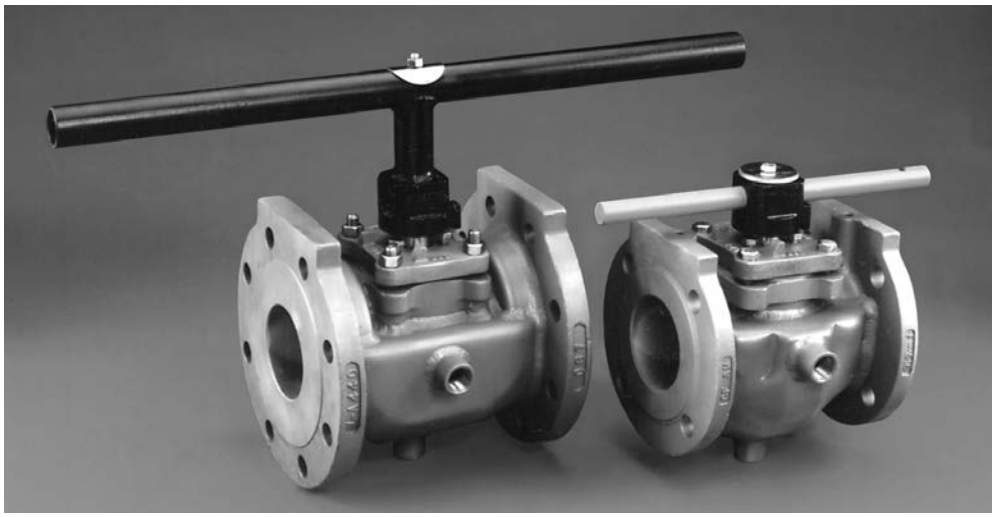
Xomox strives to fully understand your unique needs, and cost-effectively fulfill your requirements.

Processors know they can depend on Xomox for trouble-free fluid control equipment and superior service.

Jacketed Sleeved Plug Valves



Tufline Jacketed Sleeved Plug Valves offer all the attributes of Standard Tufline Sleeved Plug Valves.

360° lips break up and remove adhering, scaly deposits from the outer surface of the plug as it rotates.

Tufline Sleeved Plug Valves provide superior sealing, exceptional emissions control, ease of automation, and long-term reliability . . . all at a standard valve price.

For superior in-line sealing, the locked-in PTFE sleeve completely surrounds the plug. Tight sealing is assured because of the concentrated compression of the sleeve's large circumferential sealing surface against high-pressure ribs.

Tufline Sleeved Plug Valves provide primary and secondary sealing elements to prevent leakage along the stem to the atmosphere.

These valves can be operated with simple, standard quarter-turn actuators. Because of the lubricity of the PTFE sleeve, they open and close easily, even after not being operated for greatly extended periods of time.

No. of Ports	Jacket Type	ANSI Class	Size Range	Operator	Figure Number
2	Partial Jacket	150	1 - 4	Wrench	067PJ
			4 - 12	Enclosed Gear	067PJ-EG
		300	1 - 4	Wrench	0367PJ
			4 - 12	Enclosed Gear	0367PJ-EG
	Full Jacket	150	2x1x2 - 6x4x6	Wrench	067FJ
			6x4x6 - 12x10x12	Enclosed Gear	067FJ-EG
		300	2x1x2 - 6x4x6	Wrench	0367FJ
			6x4x6 - 12x10x12	Enclosed Gear	0367FJ-EG
3	Partial Jacket	150	1 - 4	Wrench	037PJ
			4 - 12	Enclosed Gear	037PJ-EG
		300	1 - 4	Wrench	0337PJ
			4 - 12	Enclosed Gear	0337PJ-EG

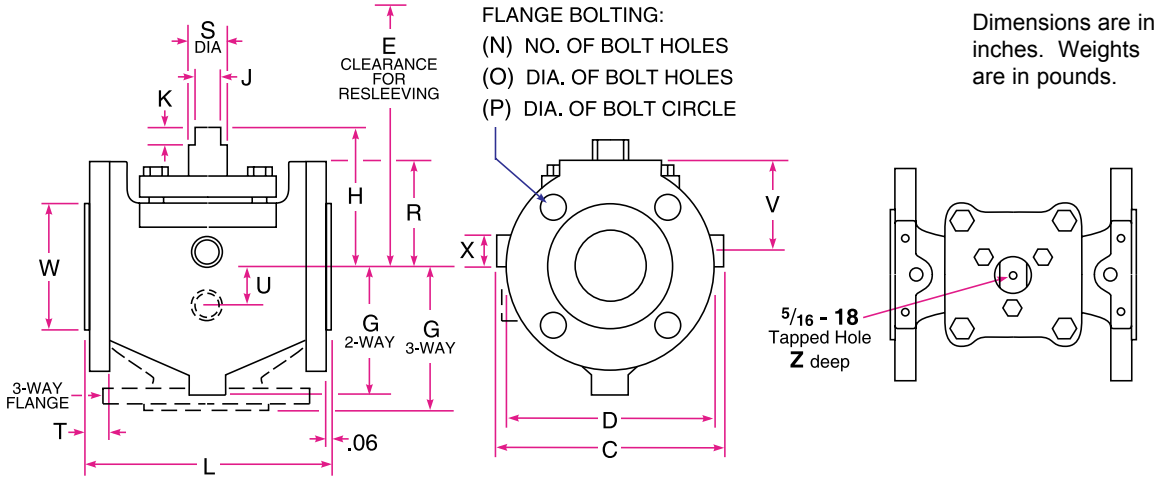
All jackets are rated at 235 psi to 400°F. Standard jacketed valve bodies are available in carbon steel or 316 stainless steel.

Dimensional data is on the following page.

Jacketed Sleeved Plug Valves **Dimensions**

For actuator mounting dimensions, other additional dimensions, and full specifications, see the Tufline Sleeved Plug Catalog #329703.

Additional information is also available at www.xomox.com. You can also contact your nearest Xomox representative.



Dimensions are in inches. Weights are in pounds.

Partial Jacket - Class 150 . . . 2-Way: Figure No. 067PJ . . . 3-Way: Figure No. 037PJ

Size	L	D	W	C	T	R	N	O	P	H	S	J	K	E	V	X**	U 3-Way	G 2-Way	G 3-Way	Weight 2-Way	Weight 3-Way
1	5.00	4.25	2.00	4.80	.44	2.13	4	.63	3.13	2.50	.63	.438	.32	7.00	2.72	3/8	-	3.04	3.50	8.5	11
1½	6.50	5.00	2.88	6.22	.56	2.50	4	.63	3.88	3.06	.88	.563	.44	8.00	2.66	½	-	3.54	4.13	16	20
2	7.00	6.00	3.63	7.00	.63	3.00	4	.75	4.75	3.56	1.13	.750	.53	9.13	3.28	½	-	4.01	4.50	24	30
2½†	8.00	7.50	4.13	7.86	.75	3.75	4	.75	5.50	4.13	1.13	.750	.53	10.13	3.22	½	-	4.70	5.13	36	47
3	8.00	7.50	5.00	7.86	.75	3.75	4	.75	6.00	4.13	1.13	.750	.53	10.13	3.22	½	1.47	4.70	5.13	36	47
4	9.00	9.00	6.19	9.76	.94	4.63	8	.75	7.50	5.22	1.25	.875	.78	22.00	4.10	½	3.47	5.51	6.00	62	77
6	10.50	11.00	8.50	9.94	1.00	5.50	8	.88	9.50	7.35	2.00	1.389	1.00	25.00	4.35	1	4.85	6.86	7.50	105	129
8	11.50	13.50	10.63	10.58	1.13	6.75	8*	.88	11.75	9.32	2.00	1.389	1.00	28.00	3.05	1	-	8.68	9.00	190	-
10	13.00	16.00	12.75	13.99	1.19	8.00	12*	1.00	14.25	10.81	2.50	1.673	1.00	29.00	7.38	1	-	9.18	11.00	280	-
12	14.00	19.00	15.00	13.99	1.25	9.50	12*	1.00	17.00	11.81	3.00	1.968	1.00	35.00	7.77	1	-	11.27	-	380	-

Partial Jacket - Class 300 . . . 2-Way: Figure No. 0367PJ . . . 3-Way: Figure No. 0337PJ

Size	L	D	W	C	T	R	N	O	P	H	S	J	K	E	V	X**	U 3-Way	G 2-Way	G 3-Way	Weight 2-Way	Weight 3-Way
1	6.50	4.88	2.00	4.80	.69	2.44	4	.75	3.50	2.50	.63	.438	.32	7.00	3.03	3/8	-	3.04	3.75	13	17
1½	7.50	6.13	2.88	6.22	.81	3.06	4	.88	4.50	3.06	.88	.563	.44	8.00	3.22	½	-	3.54	4.38	24	32
2	8.50	6.50	3.63	7.00	.88	3.25	8	.75	5.00	3.56	1.13	.750	.53	9.13	3.53	½	-	4.01	4.75	32	41
2½†	11.13	8.25	4.13	7.86	1.13	4.13	8	.88	5.88	4.13	1.13	.750	.53	10.13	3.60	½	-	4.70	5.56	43	58
3	11.13	8.25	5.00	7.86	1.13	4.13	8	.88	6.63	4.13	1.13	.750	.53	10.13	3.60	½	1.47	4.70	5.56	43	58
4	12.00	10.00	6.19	9.76	1.25	5.13	8	.88	7.88	5.22	1.25	.875	.78	22.00	4.60	½	3.47	5.51	6.75	88	113
6	15.88	12.50	8.50	9.94	1.44	6.25	12	.88	10.63	7.35	2.00	1.389	1.00	25.00	5.10	1	4.85	6.86	8.50	175	217
8	16.50	15.00	10.63	10.58	1.63	7.50	12	1.00	13.00	9.32	2.00	1.389	1.00	28.00	3.80	1	-	8.68	-	282	-
10	18.00	17.50	12.75	13.99	1.88	8.75	16	1.13	15.25	10.81	2.50	1.673	1.00	29.00	8.13	1	-	9.18	-	415	-
12	19.75	20.50	15.00	13.99	2.00	10.25	16	1.25	17.25	11.81	3.00	1.968	1.00	35.00	8.52	1	-	11.27	-	565	-

* On the valves where the "N" dimension is asterisked, the two top holes only are tapped as follows:
8-inch valves: 3/4-10UNC-2B . . . 10-inch & 12-inch valves: 7/8-9UNC-2B

† 2½-inch valves are machined from 3-inch castings, but the flanges are machined to 2½-inch dimensions.

** X - NPT - 3 steam ports.
3-Way 1, 2, & 2½ inch valves have only 2 steam ports.

Jacketed Sleeved Plug Valves **Dimensions**

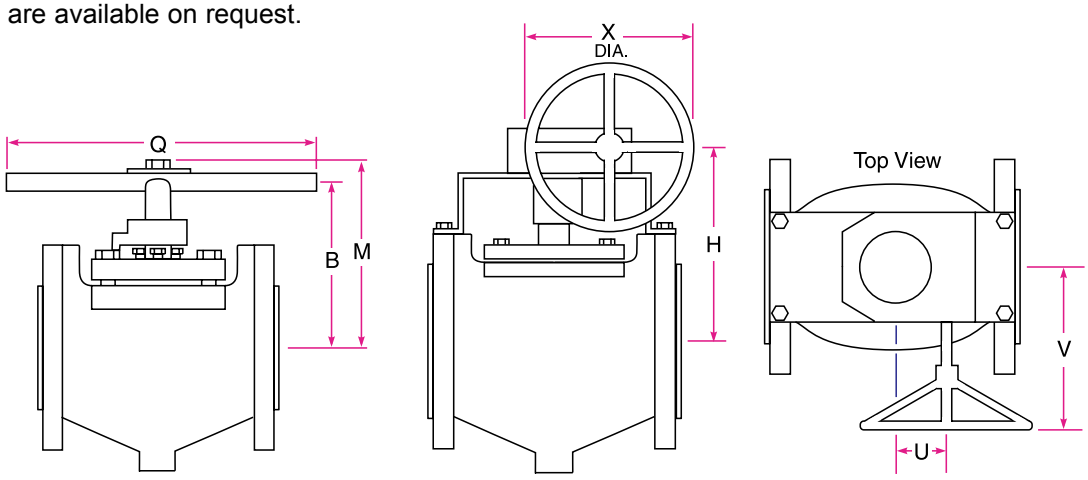
Full Jacket - Class 150 . . . 2 Way: Figure No. 067FJ

Size	L	D	W	C	T	R	N	O	P	H	S	J	K	E	V	X	G 2-Way	Weight 2-Way
2 x 1 x 2	7.00	6.00	3.63	5.92	.62	3.00	4	.75	4.75	2.50	.63	.438	.32	7.00	3.16	½	3.15	22
2½ x 1½ x 2½	7.50	7.00	4.13	6.44	.68	3.50	4	.75	5.50	3.06	.88	.563	.44	8.00	4.09	½	3.69	32
3 x 2 x 3	8.00	7.50	5.00	7.78	.75	3.75	4	.75	6.00	3.56	1.13	.750	.53	9.13	3.73	½	3.70	35
4 x 3 x 4	9.00	9.00	6.19	7.40	.94	4.63	8	.75	7.50	4.13	1.13	.750	.53	10.13	4.60	½	4.63	58
6 x 4 x 6	10.50	11.00	8.50	8.18	1.00	5.50	8	.88	9.50	5.22	1.25	.875	.78	22.00	5.43	1	5.77	102
8 x 6 x 8	11.50	13.50	10.63	9.56	1.13	6.75	8	.88	11.75	7.35	2.00	1.40	1.00	25.00	5.48	1	5.29	185
10 x 8 x 10	13.00	16.00	12.75	11.00	1.19	8.00	12	1.00	14.25	9.32	2.00	1.389	1.00	28.00	5.56	1	8.12	247
12 x 10 x 12	14.00	19.00	15.00	11.00	1.25	9.50	12	1.00	17.00	10.81	2.50	1.673	1.00	29.00	4.72	1	8.38	355

Full Jacket - Class 300 . . . 2 Way: Figure No. 0367FJ

Size	L	D	W	C	T	R	N	O	P	H	S	J	K	E	V	X	G 2-Way	Weight 2-Way
2 x 1 x 2	7.50	6.50	3.63	5.92	.88	3.25	8	.75	5.00	2.50	.63	.438	.32	7.00	3.41	½	3.15	30
2½ x 1½ x 2½	8.13	7.58	4.13	6.44	1.00	3.75	8	.88	5.88	3.06	.88	.563	.44	8.00	4.34	½	3.69	38
3 x 2 x 3	8.75	8.25	5.00	7.78	1.13	4.13	8	.88	6.63	3.56	1.13	.750	.53	9.13	4.11	½	3.70	42
4 x 3 x 4	9.63	10.00	6.19	7.40	1.25	5.00	8	.88	7.88	4.13	1.13	.750	.53	10.13	4.98	½	4.63	84
6 x 4 x 6	11.38	12.50	8.50	8.18	1.44	6.25	12	.88	10.63	5.22	1.25	.875	.78	22.00	6.18	1	5.77	170
8 x 6 x 8	12.50	15.00	10.63	9.56	1.63	7.50	12	1.00	13.00	7.35	2.00	1.40	1.00	25.00	6.23	1	5.29	265
10 x 8 x 10	16.50	17.50	12.75	13.50	1.88	8.75	16	1.12	15.25	9.32	2.00	1.389	1.00	28.00	5.50	1	8.94	377
12 x 10 x 12	18.00	20.50	15.00	11.50	2.00	10.25	16	1.25	17.75	10.81	2.50	1.673	1.00	29.00	5.57	1	10.25	508

Both larger and smaller sizes
are available on request.



Wrench & Enclosed Gear Operator Dimensions

These operator dimensions apply to fully jacketed 2-way and 3-way valves only. Partially jacketed valve operator dimensions are the same as a non-jacketed standard valves. See Catalog #329703.

Size	B	M	Q
2 x 1 x 2	6.50	7.43	12.00
2½x1½x2½	7.12	8.05	16.00
3 x 2 x 3	7.88	9.01	24.00
4 x 3 x 4	8.44	9.50	24.00
6 x 4 x 6	9.60	10.91	36.00

Size	H	U	V	X
6 x 4 x 6	8.75	2.06	8.00	12.00
8 x 6 x 8	11.50	2.62	10.38	18.00
10x8x10	13.50	2.62	10.38	18.00
12x10x12	15.25	3.53	12.31	24.00

More information.

In the Tufline Sleeved Plug Valve catalog you will find:

- Pressure-temperature ratings
- Cv factors
- Operating torques
- Actuator mounting dimensions
- A comprehensive listing of options, body materials, plug materials, sleeve materials, and operators
- Comprehensive ordering guidelines

XOMOX®

Metal Jacketed Sleeved Plug Valves

These valves are normally supplied non-lubricated with metal-to-metal hand lapped seating. There are no liners or separable seats in which fluids can lodge and degrade. Two, three, and four-way valves are available. Lubricated models are also available.

This extra heavy plug shank protects against damage from excessive torque.

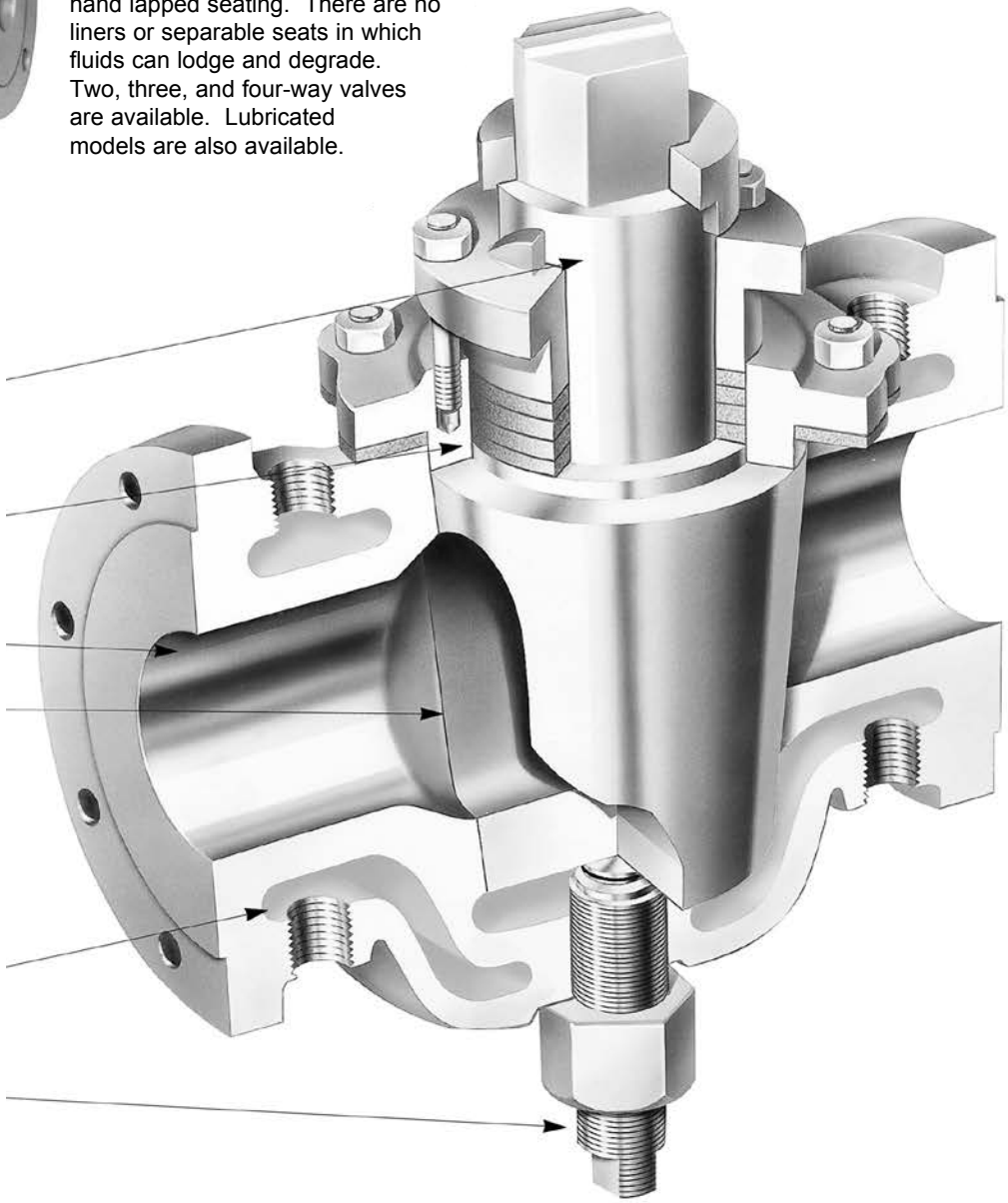
Extra deep stuffing boxes with more packing provide better sealing.

Smooth internal contours and 100% flow area minimize pressure drop.

A tight metal-to-metal seal. (Media must have a viscosity of 500 centipoise or greater to assure a tight seal.)

The full jacket extends from flange to flange and fully around all fittings. This maximum heat transfer area assures rapid consistent heating.

The external adjusting screw regulates plug seating and allows easy disassembly.



Metal Jacketed Sleeved Plug Valves

Typical applications:

pitch
sulfur
resins
adhesives
foods
molten nylon
polypropylene
polyesters
polymers

Materials:

WCB with stainless steel trim.
Other materials available upon request.

Pressure classes:

ANSI B16.34 Classes 125, 150, and 300 are standard. Other classes are available upon request.

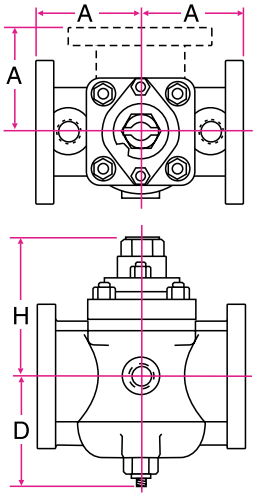
Temperature rating: Up to 650°F.

Sizes:

1-inch to 8-inches are standard.
Other sizes available.

Operators:

Wrench handle to 4 inches.
Geared, 6 inches and above.
Air and electric actuation available.



Dimensional Data (inches)

Class 125 & 150, 2-Way Valves

Size	A	D	H
1 x 2	4.50	4.88	5.44
1¼ x 2	4.50	4.88	5.44
1½ x 2½	5.00	5.50	6.38
2 x 3	5.50	6.12	7.25
3 x 4	6.50	8.38	9.88
4 x 6	8.00	8.88	11.50
6 x 8	9.00	11.62	13.44
8 x 10	11.00	14.62	19.19

Class 300, 2-Way Valves

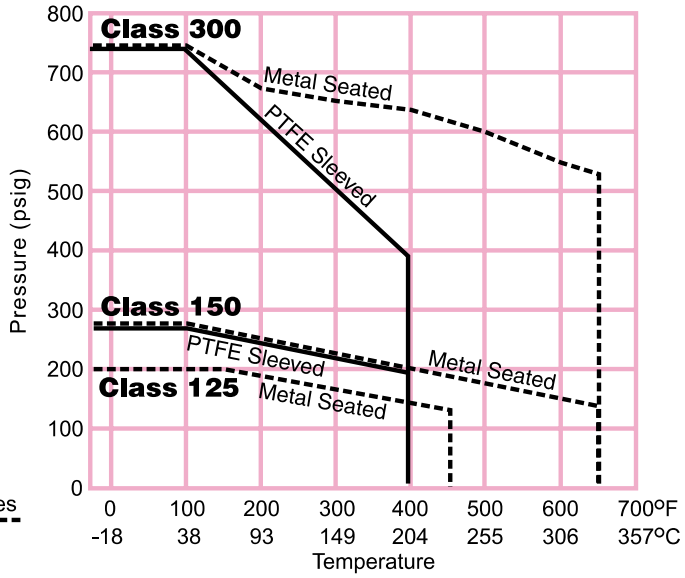
Size	A	D	H
1 x 2	4.62	4.88	5.44
1¼ x 2	4.62	4.88	5.44
1½ x 2½	5.25	5.50	6.38
2 x 3	5.75	6.12	7.25
3 x 4	6.75	8.38	9.88
4 x 6	8.31	8.88	11.50
6 x 8	9.44	11.62	13.44
8 x 10	11.50	14.62	19.19

How to order:

Specify size, figure no., CB, pressure class, material, operator, and any special features required.
Example:
2x3 - CB125 - WCB/316 - Wrench

Valve type selection:

Within its temperature and pressure limits the jacketed sleeved plug valve performs better than the metal seated valve. The chart at the right shows the general operating parameters for both valve types.



Steam Traced Butterfly Valves

Patented design.

A number of patents make this valve unique and unmatched for handling temperature sensitive fluids.

Accumulation of sulfur and similar fluids is virtually eliminated.

Triple-point protection.

The Tufline Steam Traced Valve is the only valve that provides triple-point prevention of media solidification:

- Both the shaft and bearing area are fully heated.
- The steam is channeled from the shaft, around the full perimeter of the disc, and out the bottom shaft.
- A separate steam path circulates through each side of the body assuring complete and maximum temperature control.

Integral jacket.

The Tufline integral body jacket assures more efficient and economical heating.

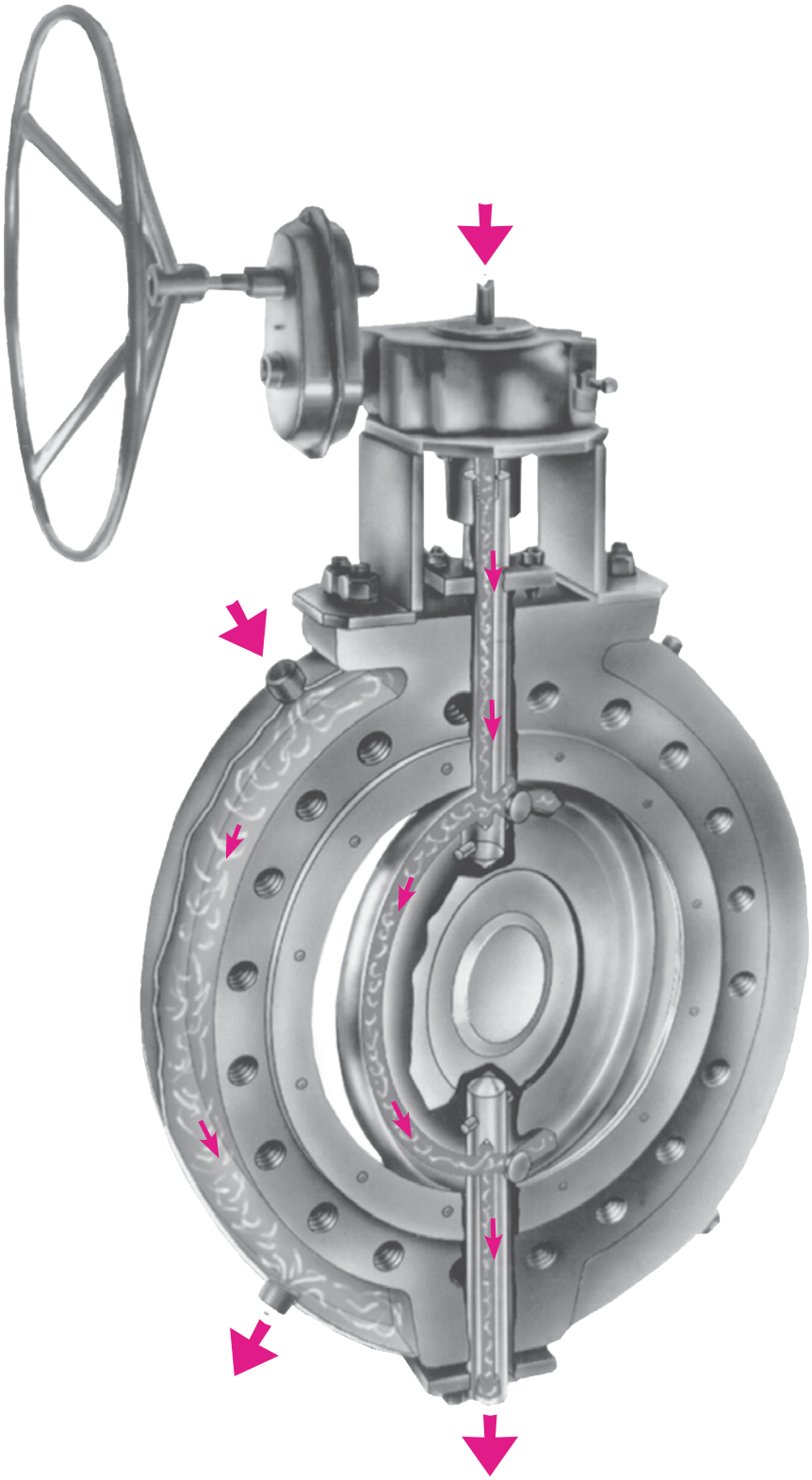
Because the jacket is integral there is no chance of faulty field installation of the jacket.

Conventional jacketing failure.

Add-on jackets often have air spaces (cold spots) between the jacket and the valve body. These cold spots can allow media to solidify and accumulate.

Shafts and discs are far from the heat source, so media buildup is prevalent on these surfaces.

Conventional jacketing is grossly inefficient because of poor heat transfer.

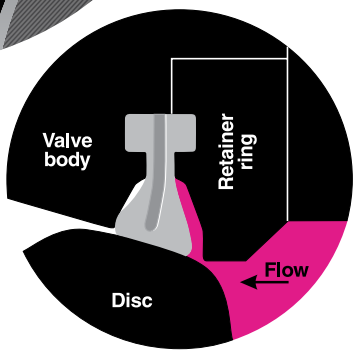


Steam Traced Butterfly Valves

Unique features in a wide range of configurations and options.

- Sizes 6 through 72 inch
- ANSI B16.34 Class 150, 150DR, 300, and 600
- Integral, full-body steam jacket
- Integral steam tracing of shafts and disc circumference
- Optional NACE trim
- Optional bearing purge (steam or alternate media)
- Optional sealed bearings
- Optional double-packed stems with lantern rings
- Optional live loaded packing
- Optional fire tested and high-temperature seat designs

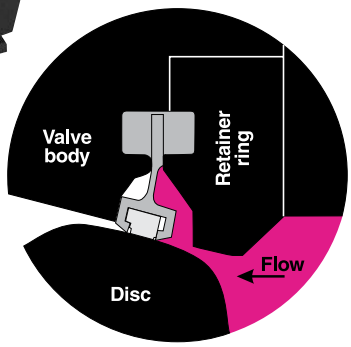
The patented seat is axially pliant. Unlike other seats, there is no radial stretch. When the valve opens, the seat flexes axially, returning to its original compact shape.
It does not "relax" into the flow path.



More information.

In the Tufline High Performance Butterfly Valve Catalog you will find:

- Pressure temperature ratings
- Breakaway torques
- Component materials of construction
- A full selection of options
- Ordering instructions



The seat is also available in fire-tested and high-temperature models.

Dimensions are on the following page.

Steam Traced Butterfly Valves **Dimensions**

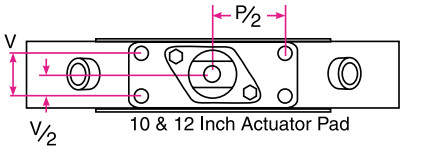
2-inch through 4-inch valves are steam jacketed around the body only.

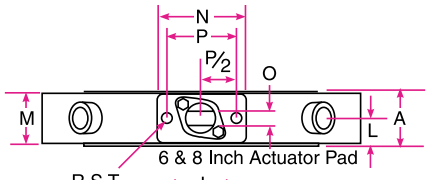
Valves 6-inches and larger are steam traced both around the body as well as through the shaft and around the disc.

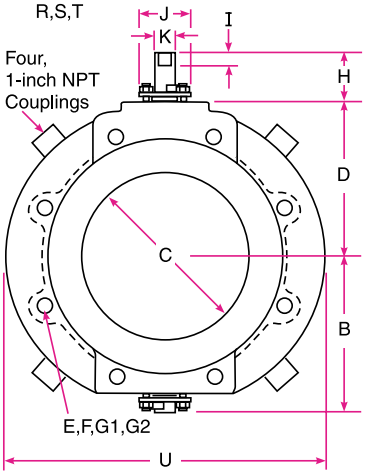
E: Diameter of flange bolt circle.
F: Number of flange bolts.
G1: Flange bolt size.
G2: Flange bolt drill through size for wafer mounting.

R: Number of actuator mounting holes.
S: Size of actuator mounting holes.
T: Depth of actuator mounting holes.

Weights (Wt.) are in pounds.



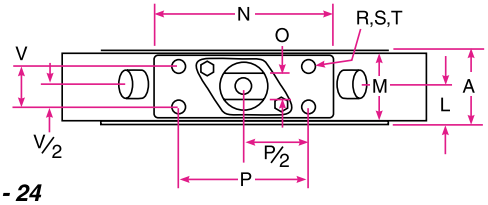




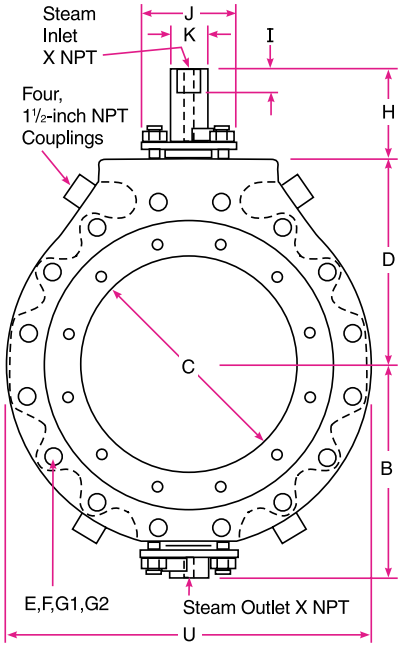
6 - 12 inch valves

Size	A	B	C	D	E	F	G1	G2	H	I	J	K
6	2.25	5.94	5.77	6.00	9.50	8	3/4 -10	7/8	3.25	1.00	1.98	.75
8	2.50	7.19	7.45	7.12	11.75	8	3/4 -10	7/8	3.25	1.00	2.31	1.00
10	2.81	8.78	9.27	9.00	14.25	12	7/8 -9	1	3.50	1.00	2.43	1.25
12	3.19	9.88	11.05	10.00	17.00	12	7/8 -9	1	3.50	1.50	3.45	1.50

Size	L	M	N	O	P	R	S	T	U	V	Wt.
6	1.19	2.00	4.00	.56	3.13	2	1/2 -13	.75	12.1	---	52
8	1.31	2.25	4.00	.69	3.13	2	1/2 -13	.75	14.3	---	80
10	1.53	2.44	6.25	.81	5.00	4	1/2 -13	.88	17.2	1.50	114
12	1.77	2.62	6.25	1.00	5.00	4	1/2 -13	.88	19.8	1.50	169



14 - 24 inch valves

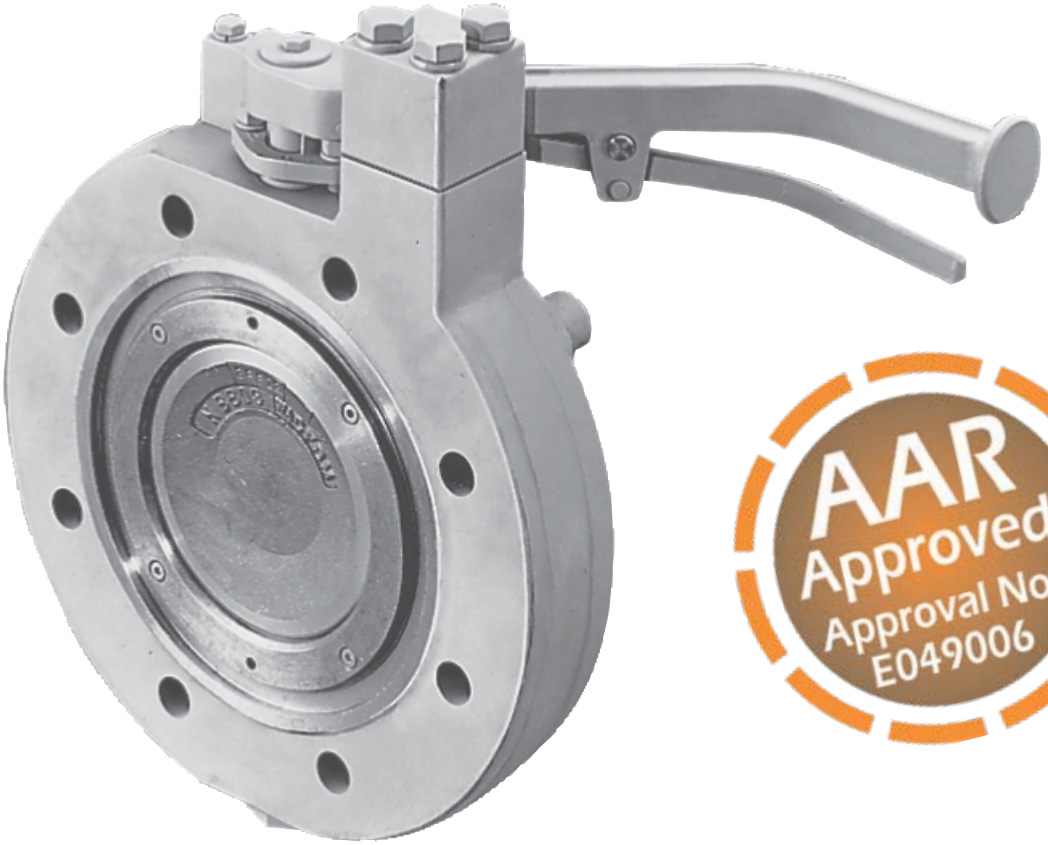


Size	A	B	C	D	E	F	G1	G2	H	I	J	K
14	3.63	12.44	13.04	12.00	18.75	12	1 - 8	1.13	3.50	1.50	3.88	1.50
16	4.00	13.31	14.68	13.25	21.25	16	1 - 8	1.13	3.50	1.50	4.00	1.75
18	4.50	13.94	1650	14.38	22.75	16	1 1/8 -8	1.25	3.50	1.50	4.00	1.75
20	5.00	17.44	18.47	15.56	25.00	20	1 1/8 -8	1.25	5.75	2.00	5.50	2.00
24	6.06	19.25	22.02	17.75	29.50	20	1 1/4 -8	1.38	5.75	2.50	6.00	2.50

Size	L	M*	N	O	P	R	S	T	U**	V	X	Wt.
14	1.66	2.81	9.50	1.00	8.00	4	5/8 -11	Thru	23.00	1.38	1/4 -18	235
16	1.83	2.81	9.50	1.12	8.00	4	5/8 -11	Thru	25.00	1.38	3/8 -18	334
18	2.00	3.00	10.00	1.12	8.00	4	5/8 -11	Thru	26.50	1.38	3/8 -18	430
20	2.19	3.62	16.00	1.50	13.00	4	1 - 8	2.00	29.00	2.00	1/2 -14	551
24	2.62	4.00	16.00	1.75	13.00	4	1 - 8	2.00	33.50	2.00	1/2 -14	885

M* - For valves with carbon steel bodies, M = A.
U** - Valves with cast bodies may weigh less.

High Performance Butterfly Valves For Rail Tank Car Service



These bottom-mounted, bottom operated valves provide safe, reliable, and economical service in rail tank cars.

Choose from three styles:

- Fully steam traced - body, shaft, and disc.....STV-6
- Steam jacketed - body only.....SJV-6
- Standard - non-steam traced TBFV-6

Designed specifically for tank car service.

The low profile significantly reduces skidding costs. The patented design is compact and light weight.

Operating costs are reduced because this unique design drains the tank car rapidly and totally.

A spring latch locking mechanism is built into the valve handle. This protects against accidental valve opening and automatically locks in the closed position.

Installation is fast and easy. This valve has proven itself with years of low maintenance extended service life.

Specifications.

Size . . . . . .6 inch
Body . . . .Carbon or stainless steel
Disc . . . . . .Stainless steel
Shaft . . . . . .17-4 stainless steel
Seat (standard) . .Glass-filled PTFE
Seat (optional) . . . . . .PTFE
. . . . . .UHMWPE
Seat (fire tested).....316SS/PTFE

Other sizes and materials are available upon application.

Dimensions are on the following page.

For more details about unique and patented features request the comprehensive Tufline High Performance Butterfly Valve Catalog.

XOMOX®

High Performance Butterfly Valves For Rail Tank Car Service

Fully Steam Traced Rail Tank Car Valves . . . STV-6

Fully Steam Traced STV-6 Valves are designed to facilitate the handling of condensible, solidifying or highly viscous commodities such as sulfur, tar, and pitch.

These valves incorporate steam traced shafts and discs as well as integral steam heating of the valve body perimeter.

This highly efficient heating system prevents buildup on the sealing edge of the disc.

Also prevented are accumulation and solidifying in the shaft bearing area which could cause binding and high operating torques.

Steam Jacketed Rail Tank Car Valves - Body Jacketed Only . . . SJV-6

Integral steam traced jackets facilitate handling moderately viscous commodities.

This includes commodities such as caustic soda, phthalic anhydride, heavy crude vegetable oil and heavy petroleum fuels.

These valves increase unloading efficiency of commodities shipped from warm climates to colder climates.

The SJV has only body steam tracing. There is no disc steam tracing or disc steam connections at the shaft ends.

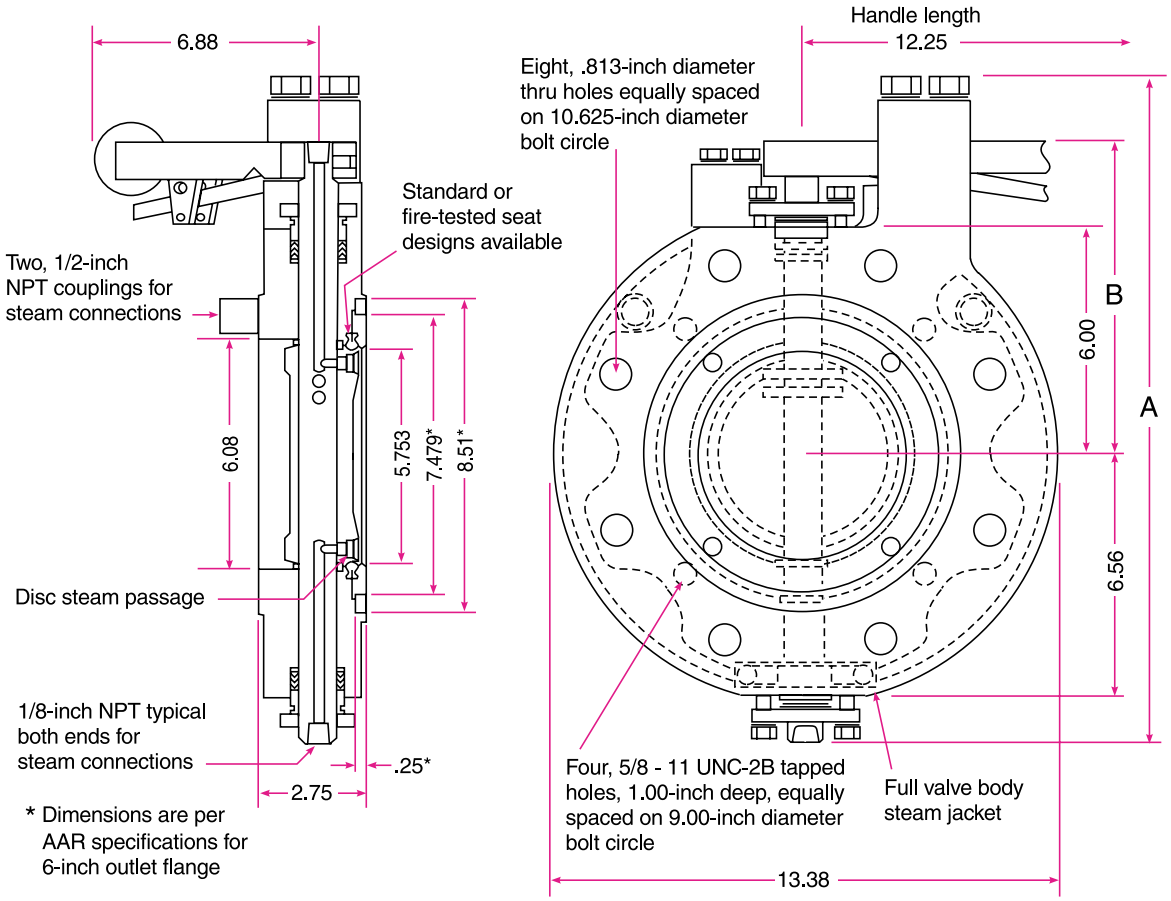
Unmatched performance.

These offer unique and patented features found in no other valve. (U.S. Patent Nos. 4,542,763 and 4,688,594.)

AAR Approved Approval No. E049006

Differing Dimensions for the two models:

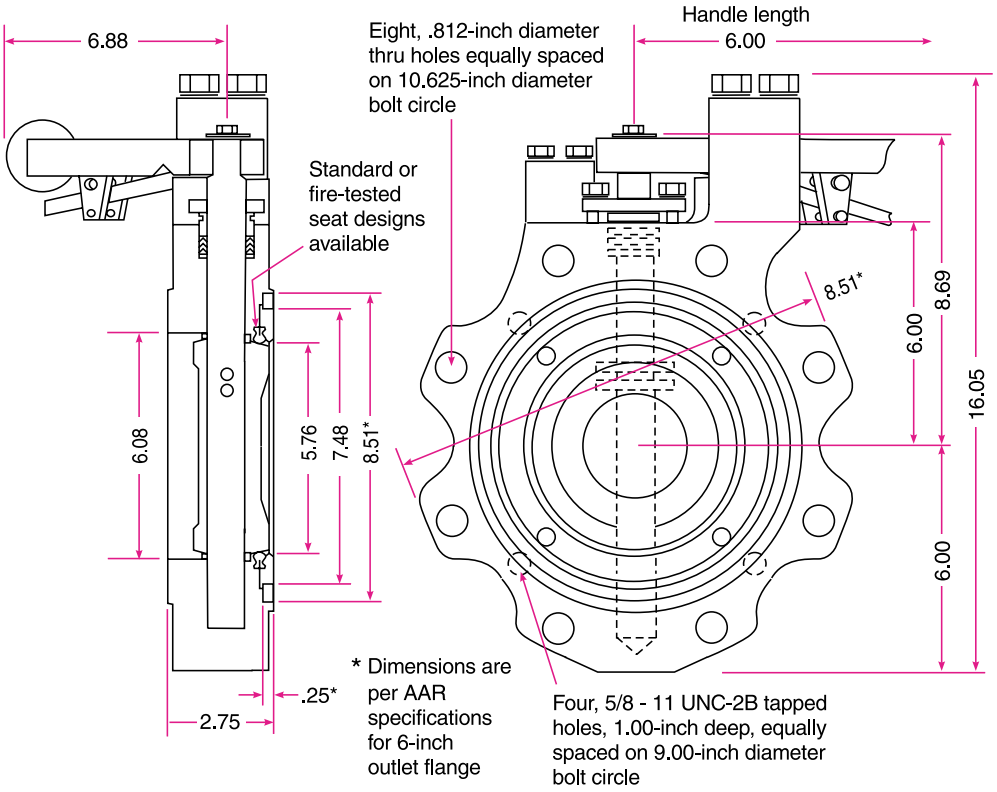
	A	B
STV	17.84	8.63
SJV	16.59	8.69



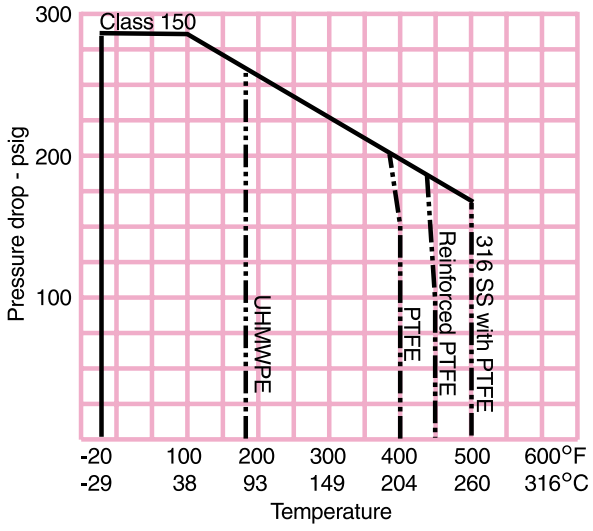
High Performance Butterfly Valves For Rail Tank Car Service

Non-Steam Traced Rail Tank Car Valves . . . **TBFV-6**

For non-viscous commodities.



Pressure / Temperature Ratings



Steam Traced Rail Tank Car Valves
How to Specify

Steam Traced Rail Tank Car Valves - How To Specify

Size
6 inches

Model Figure No.
SJV
STV
TBFV

Body Material
Carbon Steel . . . **2**
316SS **6**
Other (Specify) . **X**

Disc Material
316SS **6**
Other (Specify) . **X**

Shaft Material
17-4PH **7**
Cond. 1075
Other (Specify)** . . **X**

Actuation
None . . . . . **N**
Lever . . . . . **L**
(Locking devise is standard)
Gear* . . . . . **G**

Seat Material
PTFE **ST1**
Glass filled PTFE . . **ST2**
316SS/PTFE **FT1**
316SS **HT1**
Other (Specify) . . . . **X**

Packing Material
PTFE V-rings . . . **T**
Graphite . . . . . **G**
PTFE
Live Loaded . . . . .**L**

Bearing Material
PTFE / 316SS . . . . . **T**
316SS / TM Treated . . **S**

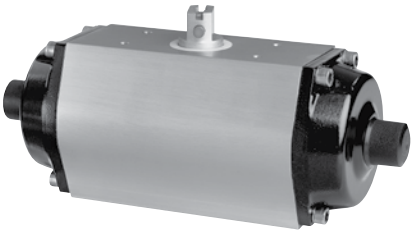
* Aluminum hear maximum 300°F line temperature. Use DI above 300°F.

** Consult factory for △P limitations on shaft materials other than 17-4PH.

XOMOX® Special Products Group

The Xomox Special Products Group.

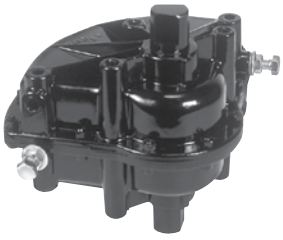
The Xomox Special Products Group custom designs, manufactures, and modifies valves. Tufline Special Products valves are used in unusual, complex, or especially difficult applications. Processors find that investing in these special valves pays off with greatly extended service life, improved overall operating efficiency, and reduced maintenance requirements.



Xomox XRP™ Actuators

The unique features of Xomox XRP Pneumatic Rack & Pinion Actuators include:

- A balanced pinion which does not require an external retaining clip to prevent the pinion from blowing out.
- Individual single point adjustment for both the CW and CCW directions.
- 98 degrees of total travel on the most popular sizes.
- Vertically aligned air passages allow increased air flow minimizing cycle time.

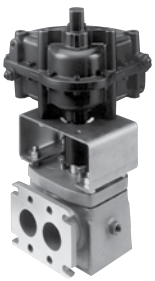


Matryx® Vane Actuators

Matryx Vane Actuators provide reliable and efficient remote control of any type of rotary operation. They are used for ball, plug, and butterfly valves as well as other mechanisms such as dampers, switches, and safety devices. They are available up to 30,000 in-lbs of torque.

Xomox Limit Switches

A wide variety of switching options and other automation accessories are available.



Xomox Automation & Service Centers are located throughout the United States. They provide:

- Automated valve packages
- Valve modifications
- Valve repair
- Application assistance
- On-site inventories of valves, actuators, and accessories assure fast turn-around.
- A new-valve factory warranty backs every automated, modified, and repaired valve.

Xomox Sizing Program will help you design a more efficient and economical processing system and assure proper actuator size selection.

XOMOX®

Crane ChemPharma & Energy
CRANE Energy Global Headquarters
4526 Research Forest Drive, Suite 400
The Woodlands, Texas 77381 U.S.A.
Tel.: (1) 936-271-6500
Fax.: (1) 936-271-6510
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NOZ-CHEK® PV® RESISTOFLEX® revo® Saunders® the science inside

STOCKHAM® Triangle® UNI-CHEK® wta® XOMOX®

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XLB - Lined Ball Valves

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XLB Lined Ball Valve **Lower Torque - Smaller Actuators**

Lower torque
smaller actuators, reduced costs, space and weight saving

Actuator mounting
fully compliant with ISO 5211 allowing use of standardized mounting kits

Compact design
allows installation in space restricted areas in parallel piping systems

Valve pressure classes
EN PN16 and ASME Class 150
JIS 10kg

Size range
½" / DN15 through
6" / DN150 Full Port
1½" through 8" Standard Port
Other sizes available up to 12" / DN300

Temperature range
ASME: -20°F (-29°C) to 400°F (204°C)
EN: -10°C (14°F) to 204°C (400°F)
Above data is for ductile iron lined valves, see pressure temperature ratings in our Technical Datasheet brochure for extended temperature capabilities with alternative materials

All wetted components
are fully lined with permeation resistant PFA material as a barrier to corrosion.

PVDF and Anti-static PFA also available see page.....

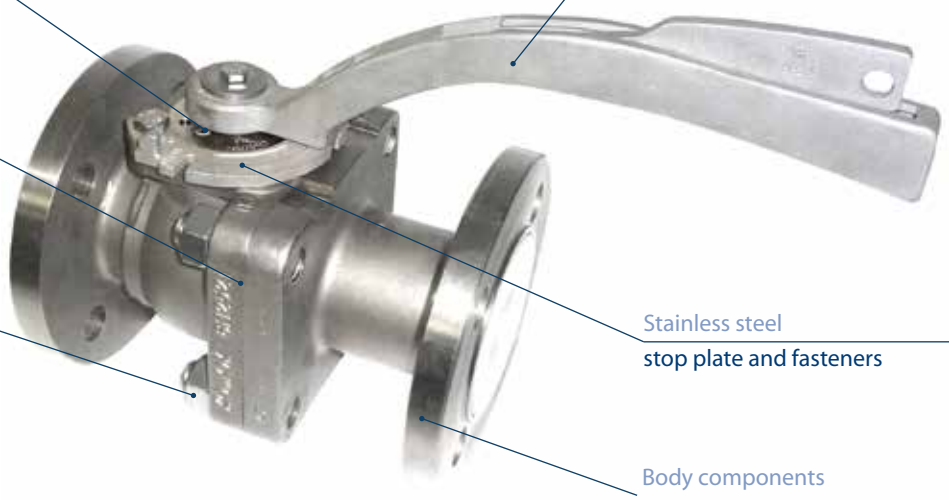
Full Port XLB valves are also available in stainless steel construction with bodies in EN 1.4408 / ASTM CF8M material. Stainless steel valves are designed to maximize cleanliness and minimize areas where contamination could occur.

All stainless steel lever
assembly with latching and locking facility

Duplex stainless steel
integral lined ball and stem

Crevice-free
body joint connection

Body joint fasteners
in stainless steel



Stainless steel
stop plate and fasteners

Body components
in stainless steel

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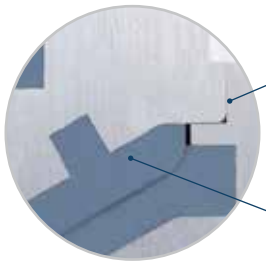
XLB Lined Ball Valve Innovative Stem Sealing System

Stainless steel lever
latching device minimizes possibility of accidental operation. Locking capability as standard. Made of stainless steel material ideal for corrosive environments.

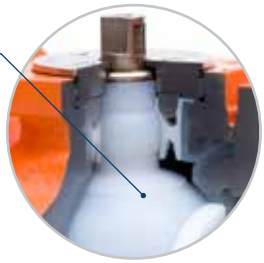


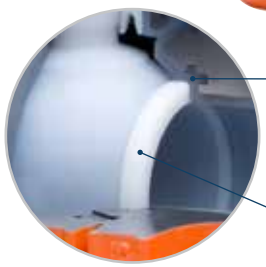
Metal-to-metal contact
at the body joint ensures that no parts of the lining can be crushed or deformed because of forces within the piping system.

Wide conical plastic connection
designed to maintain total seal even under extreme thermal cycling.

Atmospheric seal
innovative "pressure assisted" SX seal device provides the highest protection against fugitive emissions.

Anti blow-out integral ball and stem
retains positive control and minimizes the danger of stem/ball failures due to liner damage at wear points.





Locked in fluoroplastic liner
resists shrinkage and collapse, and permits vacuum applications.

Chemically modified PTFE (CMP) seats
provide greater pressure stability at higher temperatures than conventional PTFE.

ENHANCED DUAL SPECIFICATION DUCTILE IRON MATERIAL	
Standard / Grade	EN 1563 / JS 1049 ASTM A395 / 60-40-18
Chemical Requirements	C min. 3%, SI max. 2.5%, P max. 0.08%
Perlit Content	max. 5%*
Spheroidal Graphite	min. 90%*
Tensile Strength [N/mm^2]	min. 415
Yield Strength [N/mm^2]	min. 275
Elongation [%]	min. 18
Hardness [HB]	143-187
Impact Test [Joules]	min. 14 @ -20°C*
Impact Test [Joules] Single Valve	min. 11 @ -20°C*

*Requirement of PAS1085

Source: PAS 1085: 2008-08

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XLB Lined Ball Valve Dynamic Body Joint Design

When valves are closed under pressure, the ball is able to float with line pressure and pressurize the downstream seat to further enhance the in-line seal. However, the stem will tend to tilt and can side load conventional packing, leading to potential wear and eventual leakage. The SX seal in the XLB valve moves in conjunction with the spherical portion of the stem, maintaining a constant seal.

Fig.1

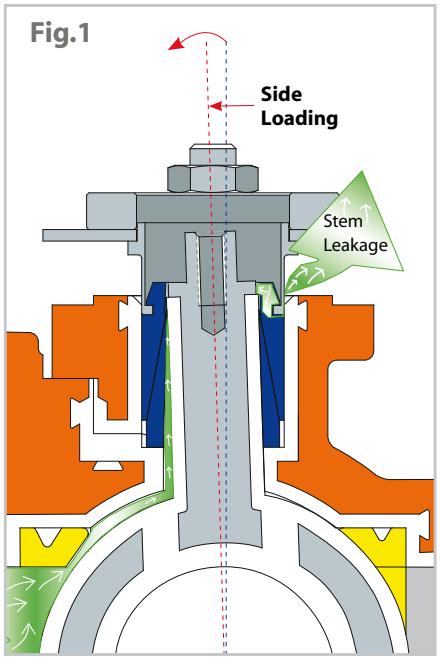


Fig.1:
In a conventional valve, moderate stem side loading can lead to significant emissions issues.

Other situations where side loading can occur during valve actuation include heavy manual operation, actuation loads, and misalignment, and abusive contact.

Fig.2

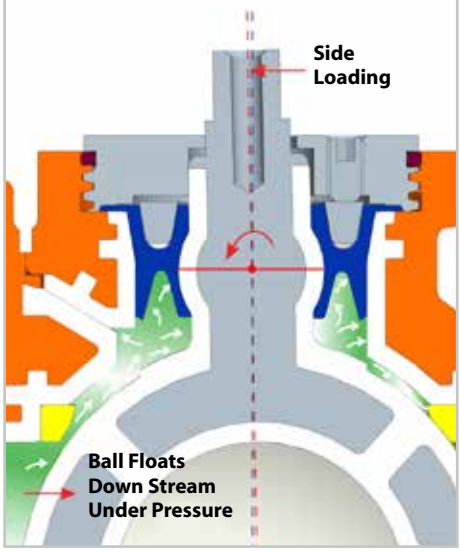
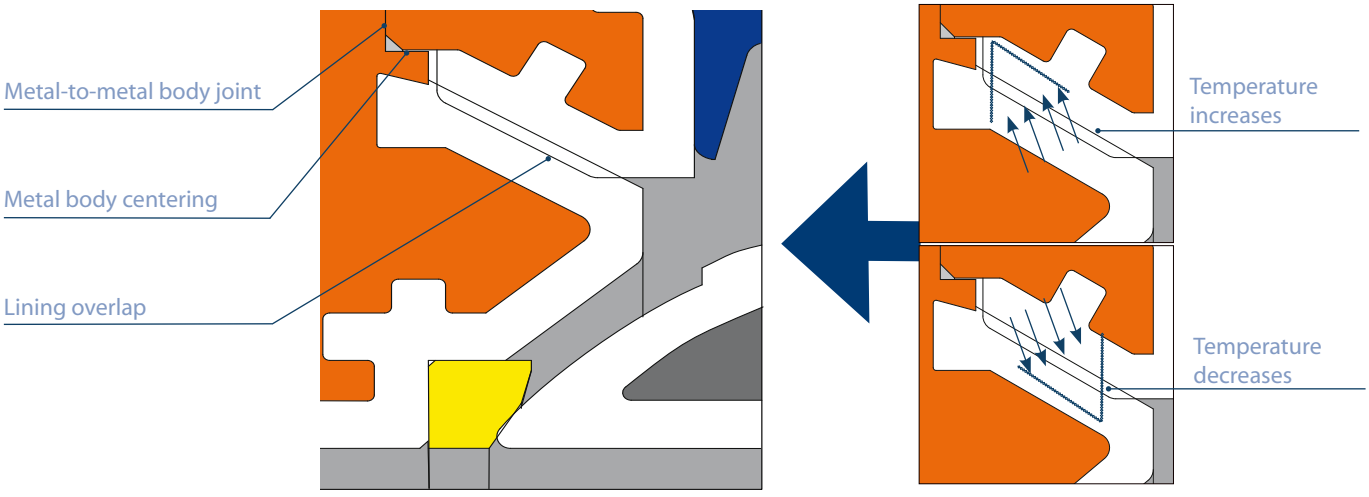


Fig.2:
The XLB valve's pressure assisted SX seal stays in constant contact with stem spherical seal surface to significantly reduce the chance of atmospheric leakage.

XLB dynamic body joint design retains pressure boundary during thermal cycles

The body assembly has metal-to-metal connection that offers resistance against forces that may be created in the pipework. This feature is designed to alleviate deformation and damage to the lining, even under pressure induced stresses. Also, the body joint sealing is provided with taper lining overlap, which is especially effective under high internal pressure and temperature variations.



XLB Lined Ball Valve Options and Accessories

Material and Liner Options

Low Temperature Carbon Steel Body

- All full port configurations available
- Low service temperatures below -20°F/-29°C
- Extremely cold environments below -20°F/-29°C

Antistatic-PFA Lining

- All sizes and configurations available
- Applications that cause potential electrostatic
- Complies with ATEX, European Directive 94/9/EC

PVDF-Lining

- All sizes and configurations available
- Halogen applications
- Service temperatures limited to 130°C/266°F

Other Ball Valve Designs

Glass Pipe Design

- DN25-DN50 with and without flanges available
- Compact design adapted to the needs of glass piping systems
- Low weight and break torques

Bottom Discharge Valve

- DN25 (1")-DN150 (6") available
- Tank connection flanges through DN 250 (10")
- Allow efficient discharge of corrosive fluids from liquid tanks.

Compact Ball Valve

- DN25 (1")-DN80 (3") available
- All stainless steel construction
- Available with combined EN and ASME flange connections for maximum flexibility

Operator Options

Standard Locking Lever

- Stainless steel for corrosive environments
- Lockable as standard
- Spring-loaded latching mechanism

Oval Handle

- Optional for sizes up to DN40 (1 1/2")
- Stainless steel for corrosive environments
- Compact design discourages accidental operation

Stem Extension

- Standard stem extensions in stainless steel
- Provides necessary clearance for operators in insulated pipeline installations
- Used with lever, gear or automated packages

Automated Valve

- XLB valves can be automated with manual, pneumatic or electric actuators.
- Actuator mounting dimension in accordance with ISO 5211
- Low torque allows for economical automation solutions

Flow Characterization

Characterized Valve

- Available for all sizes
- One piece ball and stem design of XLB provides more positive rotational control than 2-piece designs
- Offered with standard V port characterization or customized solutions

XOMOX®

XLB Lined Ball Valve **Applications**

XLB valves offer economical solutions for the vast majority of chemical applications while maintaining the highest possible degree of performance in terms of in-line leakage and fugitive emissions.

They are commonly used within the following industries:

- Chlor-Alkali
- Industrial Inorganic Chemicals
- Metal and Mining
- Nitrogen and Phosphatic Fertilizers
- Petroleum Refining
- Pharmaceutical

Within these industries, XLB valves have superior performance in the following applications

- Chlorine
- Benzene
- Bromine
- Sulfuric Acid
- Nitric Acid
- Hydrochloric Acid
- Phosphoric Acid
- Sea Water

CRANE ChemPharma, Xomox® XLB Lined Ball Valve - Performance Chart

FUNCTION			MEDIA TYPES										APPLICATION REQUIREMENTS										
On / Off	Throttling	Diversion	Clean Liquids & Gases	Dirty Liquids & Gases	Corrosive Liquids & Gases	Hazardous Liquids & Gases	Viscous Liquids	Scaling Liquids & Slurries	Abrasive Slurries	Fibrous Slurries	Dry Materials	Vacuum Service	High Flow Capacity	Low Torque	Fugitive Emissions Control	Reduced Maintenance	Extended Service Life	Sizes	Pressure Ratings	High Temperature (ASME/EN)	Low Temperature (EN)	Low Temperature (ASME)	Key Benefit
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	½ " - 6" DN15 - DN150	Class 150 / PN16	400°F / 204°C	-10°C / 14°F	-20°F / -29°C	Safety / Economy

Source: CRANE Engineering

● Superior Performance ● Limited Application ● Not Applicable

Visit our website, www.cranecpe.com, to view these and other lined products, applications, brochures, certification, documents and more.

XLB Lined Ball Valve Other Lined Products from XOMOX

LINED ACCESSORIES

Fully lined sampling valves

Fully lined sight glass

Fully lined strainer and filters

In-line ball check valves

LINED CHECK VALVES

Y Pattern ball check valves

Vertical and horizontal poppet check valves

Spring assisted check valves

Swing check valves

LINED PLUG VALVES

Stainless steel lined plug valves

3 Way lined plug valves

Lined plug valve with ISO 5211 mounting

Lined plug valves, PN 16, class 150 and 300

LINED BUTTERFLY VALVES

Fully PFA lined butterfly valves

Fully rated lined butterfly valves for off-shore applications

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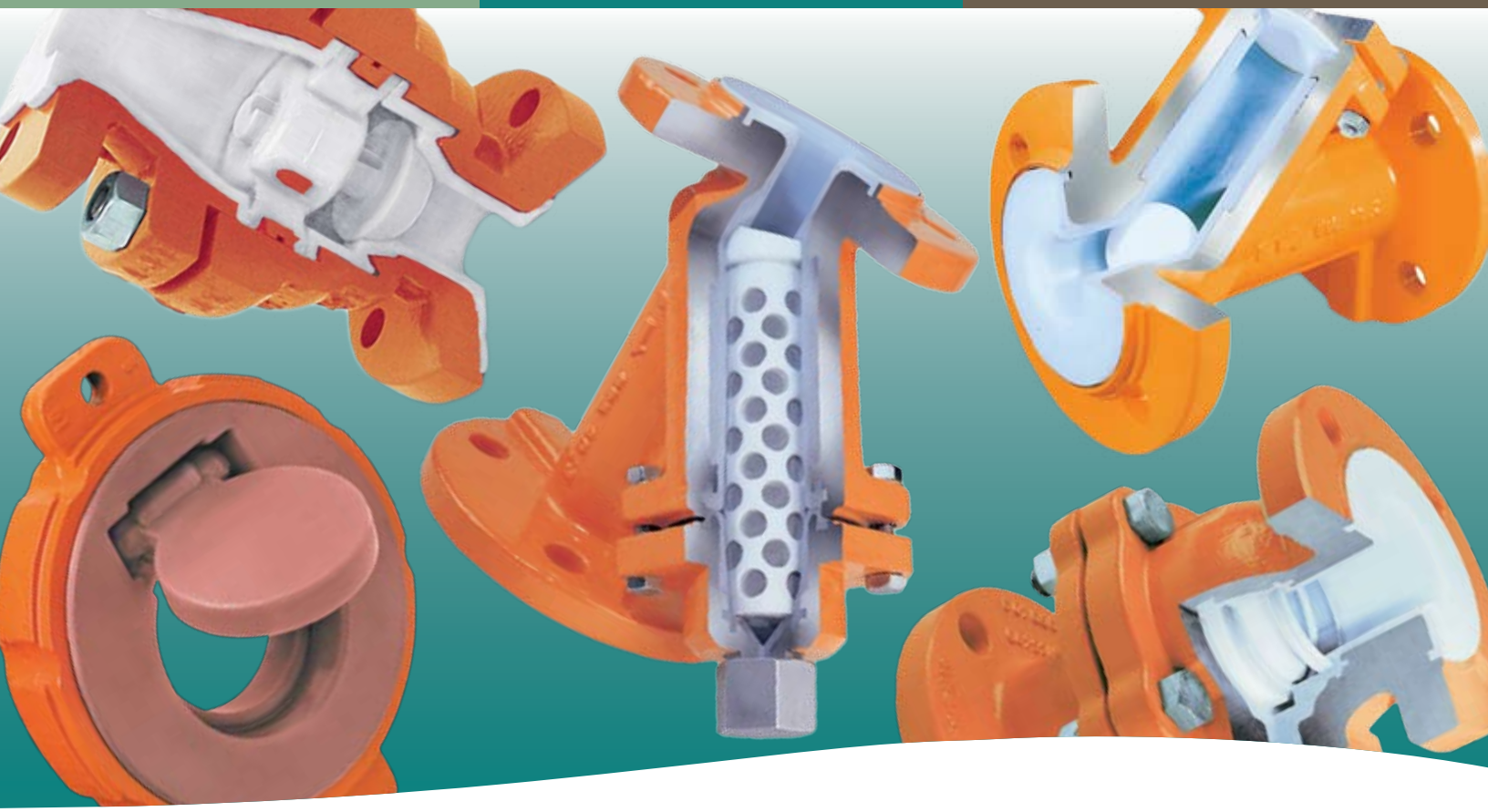

Tufline® Lined Accessories

CRANE

ChemPharma Flow Solutions

www.cranechempharma.com

For your most demanding applications . . .

Xomox worldwide capabilities pay off for you. With facilities in a dozen countries around the world, Xomox offers unique capabilities for global sourcing of the latest technologies, the best materials, and the most sophisticated manufacturing techniques. Your Xomox team turns these resources into problem solving valves for your most demanding applications.

Problem-solving and cost-cutting valves.

Xomox valves reduce downtime, cut maintenance costs, and provide longer service life. Your long-term cost of valve ownership is dramatically reduced.

More information.

For a listing of Xomox Regional Offices, and Authorized Distributors, visit our web site **www.xomox.com.**

Tufline® Lined Accessories:

- Wafer Swing Check Valves
- 45° Ball Check Valves
- Ball Check Valves
- Piston Check Valves
- Poppet Check Valves
- Sight Flow Indicators
- Basket Filters
- Strainers
- Tank Bottom Valves
- PTFE Clamp Valves
- Short Face-To-Face Ball Valves

Lining materials and methods.

The choice of lining materials and the method of lining are critical.

We begin with the purest fluorocarbon materials.

To assure lining integrity and maximum corrosion resistance, Xomox uses only PFA fluoro-carbons.*

* Poppet Check Valves are available with polypropylene and PVDF liners in addition to PFA.

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Locked-in linings.

Tufline Lined Accessories have cast dovetail recesses and machined grooves that lock the lining to the body casting.

Blow-out or liner collapse are virtually impossible.

PFA

PFA is the standard lining material for all Tufline Lined Accessories.

PFA is a fluoropolymer with extended temperature limits. It is a copolymer that combines the carbon-fluorine backbone of fluorocarbons with a perfluoroalkoxy side chain.

PFA offers a variety of attributes and benefits:

- Handles a wide range of fluids
- Chemically inert
- Heat resistant
- Weather resistant
- Stress-cracking resistant
- Negligible moisture absorption

- Better sealing and wear resistance between parts - because it is moldable and machinable to close tolerances.

- PFA is a true thermoplastic and is melt processible, so it can be locked to the valve components. Blow-out or liner collapse are virtually impossible.

Physical Properties

	PFA Perfluoroalkoxy	
Property	ASTM method	Value
Melting point	-	575° - 590°F
Tensile strength @ 73°F	D638	3,800 psi
Elongation @ 73°F	D638	300%
Flexural modulus @ 73°F	D790	100,000 psi
Impact strength @ 73°F	D256	No break
Coefficient of linear thermal expansion per °F	D696	6.7×10^{-5} (70° to 212°F)
Flammability	D635	Nonflammable
Weather and chemical resistance	-	Excellent

070 Wafer Swing Check Valve

Sizes 3 through 12 inch, ANSI Class 150

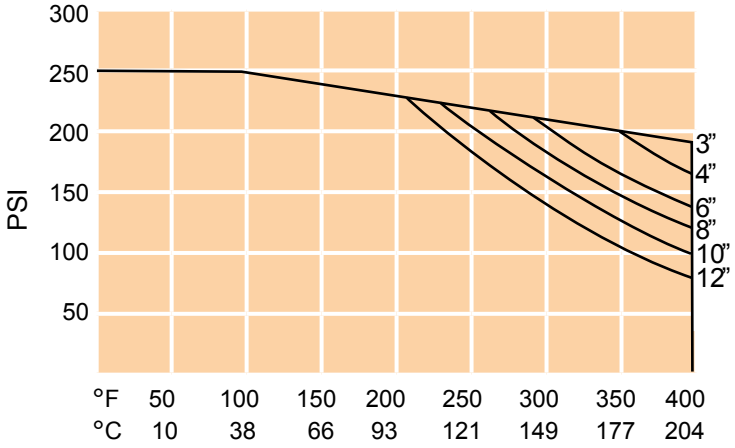
Consult factory for Class 300 applications.

Fully lined wafer swing check valves are ideal for use in totally lined piping systems or to replace costly high alloy valves in corrosion applications. The valve can be mounted horizontally or vertically with upward flow.

Tufline wafer swing check valves are of two piece construction with only one moving part. Integral hinge pins fit into the valve body recess. There are no springs or pins to corrode or wear.

Pressure-Temperature Ratings

(Valves with PFA linings)



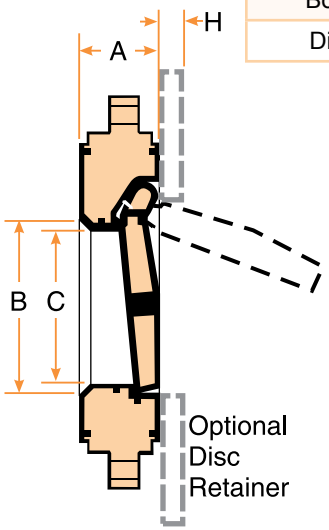
Maximum allowable △P = 250 psi.

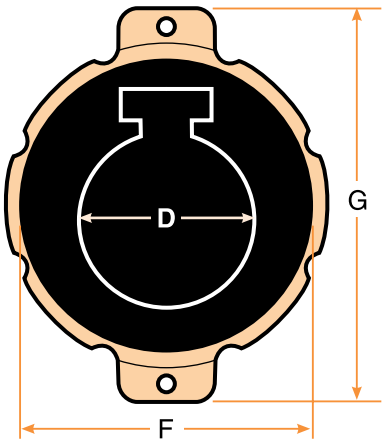
Leak Rate

△P (psi)	Leak Rate
0 - 40	5 - 10 cc/min.
41 - 74	3 - 5 cc/min.
75 and over	0

Materials Of Construction

Body	PFA lined ductile iron
Disc	PFA lined ductile iron





Dimensions (inches)

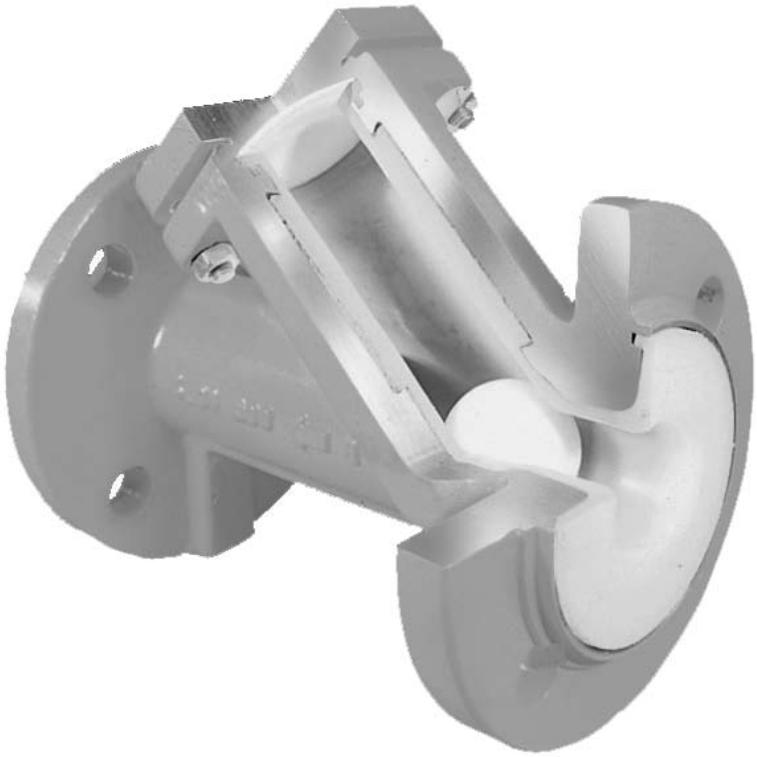
Size	A	B	C	D	F	G	H	Wt.lbs.	Mating Pipe I.D.* Min.	Max.	Cv Factors
3	1.81	2.28	1.65	2.20	5.04	7.00	.375	7	2.88	3.23	100
4	1.81	3.31	2.56	3.20	6.38	8.88	.375	13	3.74	4.17	234
6	2.25	5.02	4.37	4.90	8.35	11.00	.375	28	5.71	6.22	667
8	2.63	6.91	5.24	6.77	10.51	13.50	.375	50	7.56	7.87	1404
10	2.67	8.74	7.24	8.70	12.48	15.50	.375	63	9.53	10.23	1955
12	3.07	10.71	9.13	10.50	14.45	17.40	.375	93	11.50	12.20	3106

* Required to retain disc in valve body. If pipe I.D. exceeds maximum, use optional disc retainer.
Pressure to unseat (△P) in horizontal or vertical pipeline: less than 1 psi.

071 45° Ball Check Valve

Sizes 1 through 4 inch, ANSI Class 150

The unique construction of the Tufline 45° ball check valve permits unobstructed flow through the valve as the ball rides in a 45° guide, out of the path of the media. The valve provides a large Cv coefficient. A tight seal against backflow is assured. It can be mounted horizontally or vertically with upward flow.

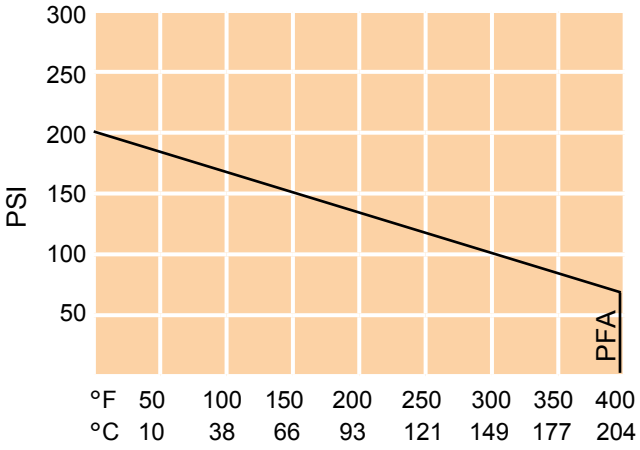


Materials Of Construction

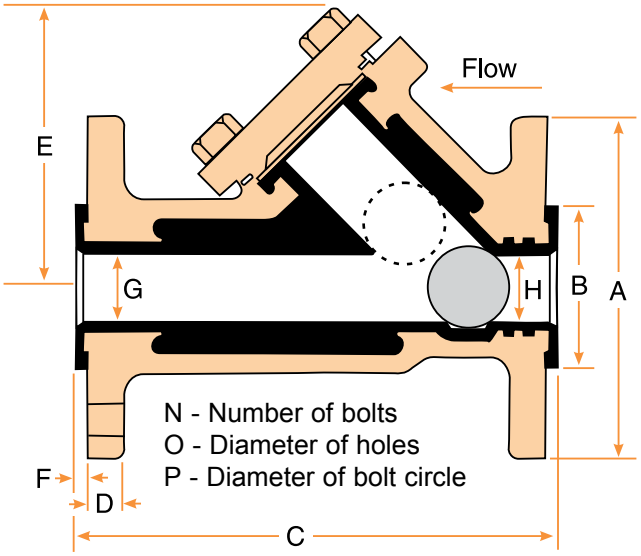
Body	PFA lined ductile iron
Cover	Ductile iron
Diaphragm	PTFE
Ball	Glass-filled PTFE
Cover bolts	B7 Carbon steel

Pressure-Temperature Ratings

(Valves with PFA linings)



Maximum allowable △P = 200 psi.



Cv Factors

Size	1	1½	2	3	4
	23	54	87	222	525

Dimensions (inches)

Size	A	B	C	D	E	F	G	H	N	O	P	Wt. lbs.	Approximate pressure (psi) to unseat (△P) Horz. pipe	Approximate pressure (psi) to unseat (△P) Vert. pipe	Approximate pressure (psi) to seat (△P) Horz. pipe	Approximate pressure (psi) to seat (△P) Vert. pipe	Back pressure (psi) to seal (△P)	Allowable leakage rate @ 80 psi
1	4.25	2.00	6.00	.44	3.50	.13	.88	.78	4	.63	3.13	8	0	Less than 1 psi	10	0	50	30 bubbles /minute
1½	5.00	2.88	7.00	.56	4.00	.13	1.25	1.13	4	.63	3.88	13	0		20	0	50	
2	6.00	3.63	8.69	.63	5.25	.13	1.63	1.63	4	.75	4.75	23	0		30	0	50	60 bubbles /minute
3	7.50	5.00	10.00	.75	6.38	.15	2.50	2.25	4	.75	6.00	42	0		50	0	50	
4	9.00	6.18	13.78	.75	8.86	.27	3.74	3.70	8	.75	9.00	52	0		55	0	50	

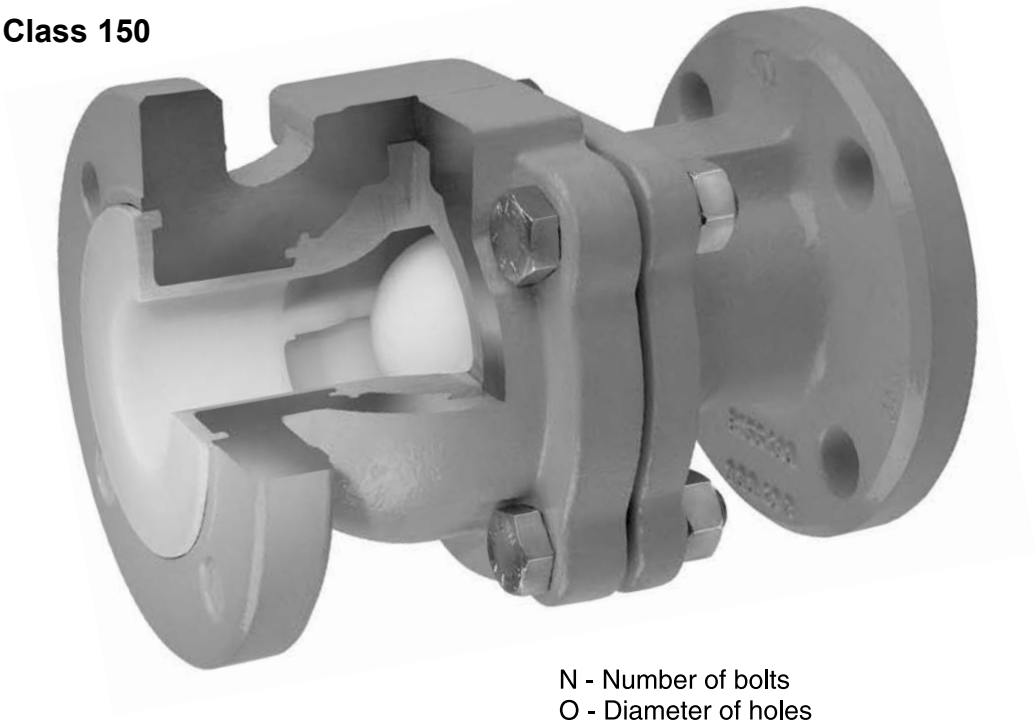
B202 Ball Check Valve

Formerly 072

Sizes ½ through 6 inch, ANSI Class 150

This valve can be installed in vertical pipe with upward flow. The patented ball seating design also provides for horizontal installation.*

Refer to page 18 for pressure-temperature ratings.

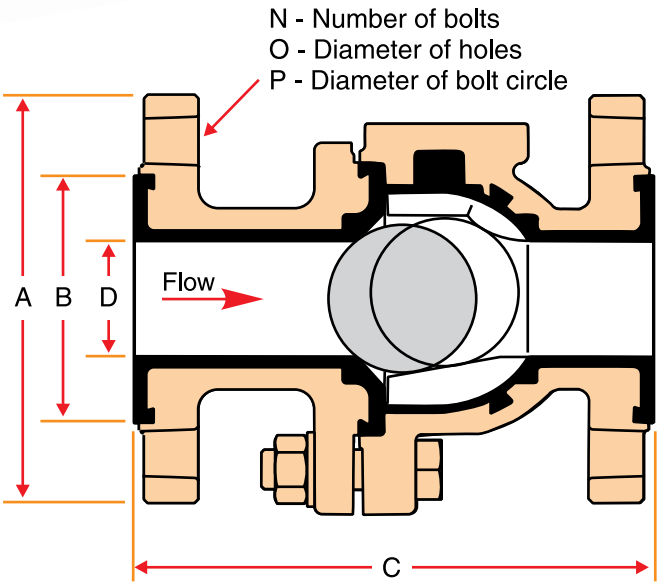


Materials of construction

Body	PFA lined ductile iron
Ball	Solid PTFE
Bolting	B7 carbon steel

Other lining materials available upon request.

Leak Rate:
EN 12266-1 Rate C



Dimensions (inches)

Size	A	B	C	D	N	O	P	Wt.lbs.	Opening Pressure Vertical Installation psi	Cv Values
1/2	3.50	1.57	5.12	0.59	4	0.62	2.36	9	0.28	0.8
3/4	3.86	1.97	5.91	0.79	4	0.62	2.72	11	0.16	1.1
1	4.25	2.01	6.00	0.91	4	0.62	3.11	11	0.13	2.2
1 1/2	5.00	2.87	7.00	1.42	4	0.62	3.86	23	0.17	50
2	5.98	3.62	8.00	1.85	4	0.75	4.72	29	0.17	87
3	7.52	4.92	9.50	3.07	4	0.75	5.98	68	0.32	235
4	9.02	6.18	11.50	3.74	8	0.75	7.50	103	0.46	263
6	10.98	8.27	14.00	5.71	8	0.88	9.49	189	0.54	302

* U.S. Patent No. 5,971,015

C202 Piston Check Valve

Formerly 073

Sizes ½ through 6 inches, ANSI Class 150

Tufline lined piston check valves feature a spring loaded plug to provide an automatic tight shut-off seal against backflow. It is especially well suited for low pressure applications and can be installed in any orientation.

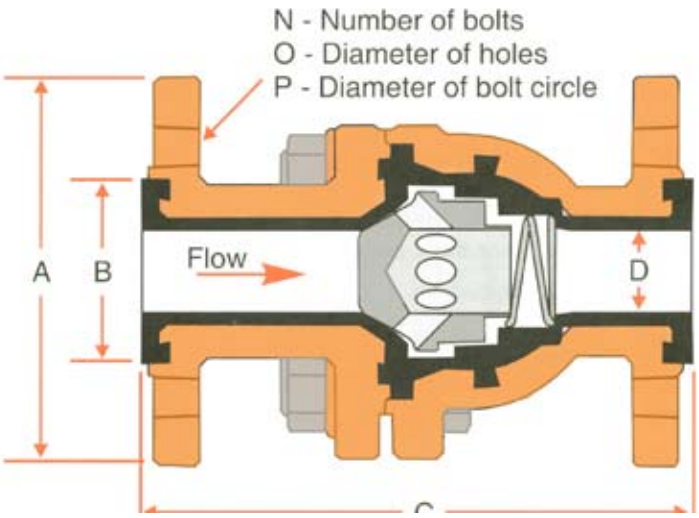
Refer to page 18 for pressure-temperature ratings.

Materials of construction

Body	PFA lined ductile iron
Piston	PTFE
Piston holder	PTFE
Seat ring	PTFE
Spring	PTFE lined stainless steel
Bolting	B7 carbon steel plated

Other lining materials available upon request.

Leak Rate:
No visible leakage at 80 psi test pressure.



Dimensions (inches)

Size	A	B	C	D	N	O	P	Wt. lbs.	Opening Pressure Horizontal Position psi	Opening Pressure Vertical Position ↑ psi	Opening Pressure Vertical Position ↓ psi	Cv Values
1/2	3.50	1.57	5.12	0.59	4	0.62	2.36	9	0.54	0.58	0.16	6.20
3/4	3.86	1.97	5.91	0.79	4	0.62	2.72	11	0.54	0.58	0.16	8.66
1	4.25	2.01	6.00	0.91	4	0.62	3.11	11	0.54	0.58	0.16	17.55
1 1/2	5.00	2.87	7.00	1.42	4	0.62	3.86	23	0.70	0.74	0.65	29.84
2	5.98	3.62	8.00	1.85	4	0.75	4.72	29	0.61	0.67	0.55	44.46
3	7.52	4.92	9.50	3.07	4	0.75	5.98	68	0.80	1.04	0.55	101.21
4	9.02	6.18	11.50	3.74	8	0.75	7.50	103	0.80	1.00	0.61	139.46
6	10.98	8.27	14.00	5.71	8	0.88	9.49	189	0.58	0.81	0.35	161.46

074 & 075 Poppet Check Valves

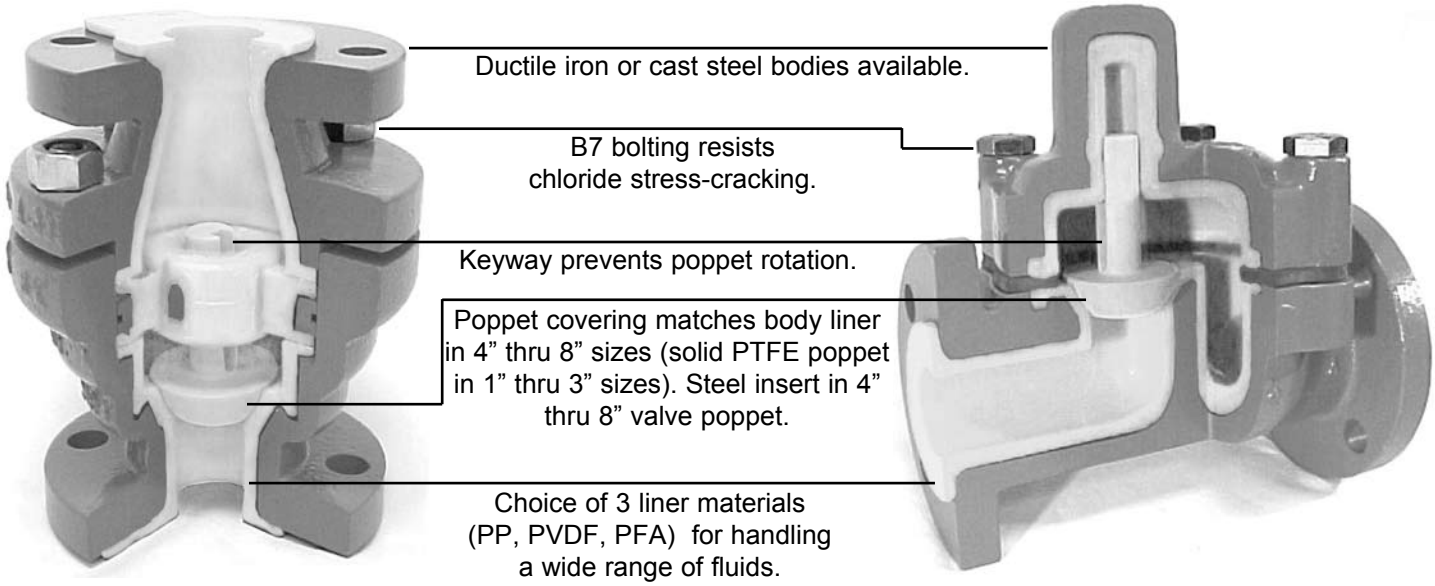


Figure 074

Figure 075

Tufline Plastic-Lined Poppet Check Valves handle various corrosive media at temperatures from -20°F to 300°F (-28°C to 149°C) by combining the best properties of two different materials of construction.

On the outside, a metal body provides strength, shock resistance, ease of installation, and a high pressure handling capability.

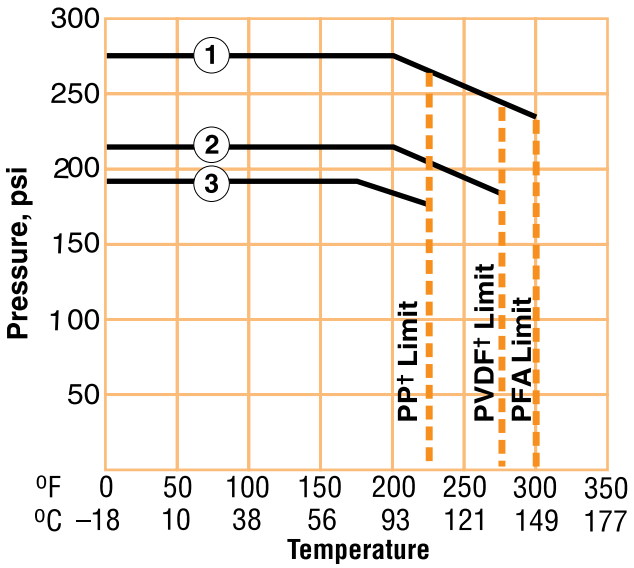
On the inside, a plastic lining offers corrosion resistance that stainless steel and high alloy metal valves can’t match. The thick plastic lining also prevents contamination of high purity fluids.

Poppet-type check valves.

Horizontal and vertical check valves are plastic lined for handling corrosives and high-purity fluids. They are extremely effective in preventing back-pressure or backflow, featuring a low 0.5 psi (0.03 bar) cracking pressure differential, and are capable of handling pressures to 275 psi (19 bar).

Since Tufline Check Valves have only one moving part, they are less likely to need maintenance. Because every surface in contact with the fluid is made of, or covered with, a thick layer of plastic, corrosion and contamination are virtually eliminated. They also have full pipe diameter ports and provide minimal obstruction in the flow path. The poppet-type design eliminates problems that occur in some check valves with pockets that can trap fluid.

Pressure/temperature ratings



Class 150 Cast Steel 1” - 4” Valves

Class 150 Cast Steel 6” & 8” Valves

Class 150 Ductile Iron

† Maximum allowable temperature of liner/gasket may be lower based on the aggressiveness of the fluid being handled. Contact Xomox for further details.

Available size, body material, and lining combinations for both 074 and 075 valves

Size (in.)	1		1½		2		2½		3		4		6		8	
Body Material	DI	CS	DI	CS	DI	CS	DI	CS	DI	CS	DI	CS	DI	CS	DI	CS
PP	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PVDF		●		●		●				●		●		●		*
PFA		●		●		●				●		●				

*Vertical Check Valve (074) only

Poppets.

Valves 1” through 3” sizes feature a solid PTFE poppet. Larger sizes use a steel reinforced poppet molded of the same material as the valve liner.

Cv Factors

Size	Horizontal	Vertical
1	5	8
1½	22	60
2	30	130
2½	N/A	N/A
3	80	320
4	150	500
6	450	1100
8	800	1500

Body bolting torques.

To ensure optimum performance in the presence of thermal cycling, it is essential that the body nuts be torqued to the values shown in the table below.

Torquing should only be done on the system in the ambient, cooled state, never at elevated temperature. Otherwise, excessive force could be applied to the plastic faces. Xomox recommends retorquing body bolts immediately before installation of the valve.

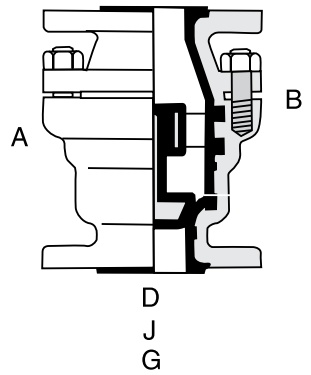
Body bolt torque values (ft-lbs)

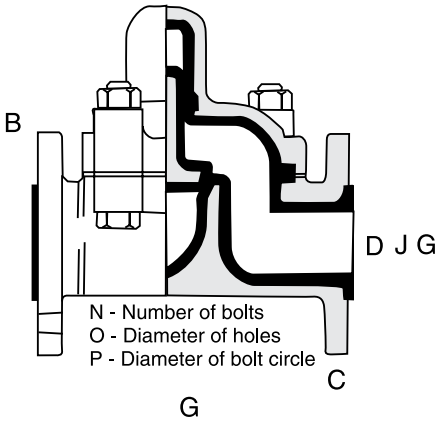
Size	Horizontal		Vertical
	Elastometric gaskets	PTFE gaskets	
1	30	30	35
1½	30	30	35
2	30	40	45
2½	30	N/A	60
3	55	120	60
4	40	60	50
6	65	110	75
8	80	125	120

Check valve dimensions & weights (All dimensions in inches)

		1	1½	2	2½	3	4	6	8
A	Horizontal Face To Face	7.00	7.63	8.63	8.88	10.75	14.50	18.50	23.13
A	Vertical Face To Face	6.38	7.13	8.13	8.50	9.75	12.00	14.50	17.13
B	Horizontal Center To Top	4.38	5.38	6.50	7.38	8.63	11.00	15.25	18.44
B	Vertical Center To Top	5.38	5.63	6.75	7.00	8.38	9.75	12.75	16.20
C	Flange Thickness	.44	.56	.63	.063	.75	.94	1.00	1.13
D	Plastic ID (PP, PVDF)	.69	1.25	1.63	2.09	2.69	3.50	5.56	7.25
D	Plastic ID (PFA)	.69	1.31	1.75	N/A	2.81	3.69	N/A	N/A
N	No. Of Bolt Holes	4	4	4	4	4	8	8	8
O	Size Of Bolt Holes	.63	.63	.75	.75	.75	.75	.88	.88
P	Bolt Circle Diameter	3.20	3.88	4.75	5.50	6.00	7.50	9.50	11.75
G	Flange Diameter	4.20	5.00	6.00	7.00	7.50	9.00	11.00	13.50
J	Face Diameter	1.88	2.69	3.44	3.94	4.63	5.94	8.00	10.06
K	Horizontal Approx. Weight, lbs.	15	19	31	37	56	92	200	330
K	Vertical Approx. Weight, lbs.	16	19	31	38	52	88	142	225

NA=Not Available



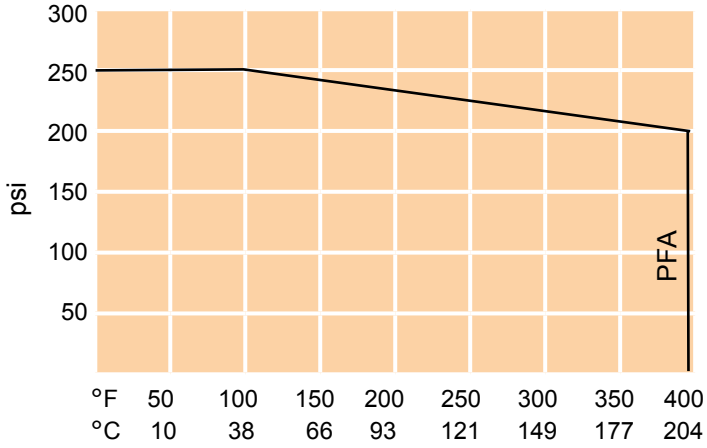


081 Sight Flow Indicator

Sizes 1 through 6 inch, ANSI Class 150

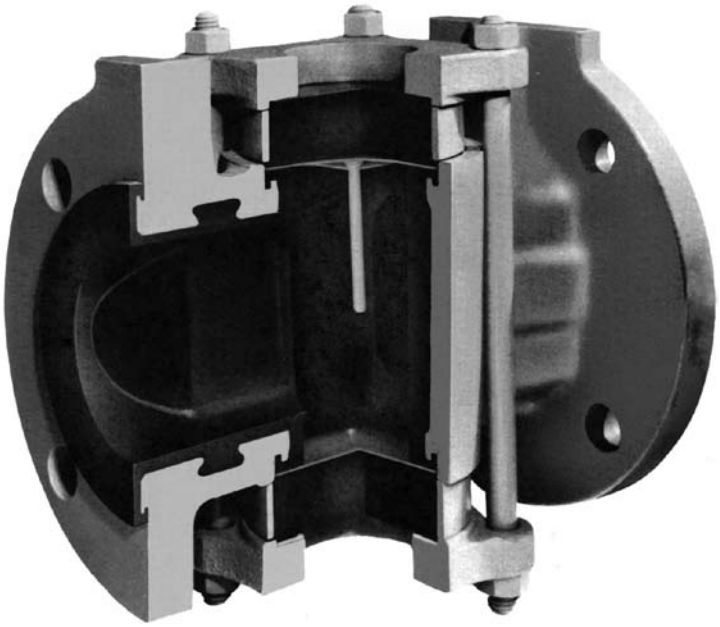
Tufline sight flow indicators provide reliable indication of flow on any corrosive service. Safe and shatter-proof, each window consists of two tempered lime glasses cemented together by a proprietary adhesive. The glasses are encased with a steel circumferential band. Fluid flow can be viewed from either top or bottom. Drip-lip feature is incorporated into the liner for immediate flow indication on low-pressure applications.

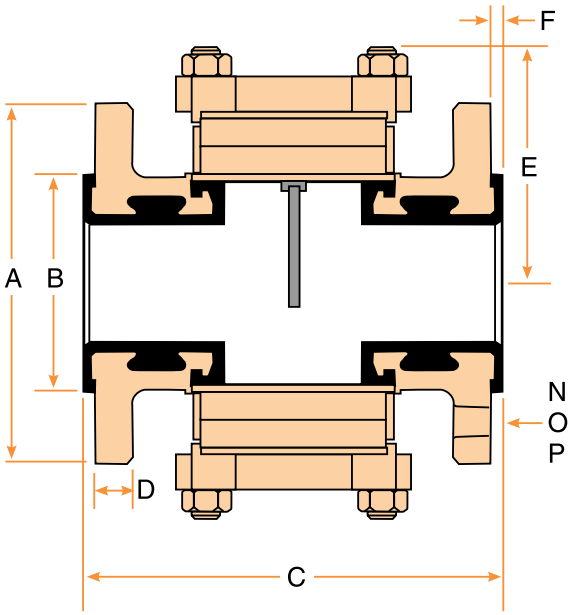
Pressure-Temperature Ratings



Materials of construction

Body	PFA lined ductile iron
Top and bottom covers	Ductile iron
Top and bottom seal discs	PFA
Top and bottom glass cushions	PTFE
Cover bolts and nuts	B7 carbon steel
Indicator rod support	PTFE
Indicator rod	PTFE
Top and bottom lens assembly	Tempered glass





N - Number of bolts
O - Diameter of holes
P - Diameter of bolt circle

Dimensions (inches)

Size	A	B	C	D	E	F	N	O	P	Wt. lbs.	Cv Factors
1	4.25	2.88	5.00	.44	2.88	.13	4	.63	3.13	8	39
1½	5.00	3.25	6.50	.56	3.25	.13	4	.63	3.88	13	80
2	6.00	4.00	7.00	.63	4.00	.15	4	.75	4.75	20	155
3	7.50	4.50	8.00	.75	4.50	.15	4	.75	6.00	30	265
4	9.00	5.25	9.00	.94	5.25	.15	8	.75	7.50	50	493
6	11.00	5.69	10.50	1.00	5.69	.15	8	.88	9.50	84	967

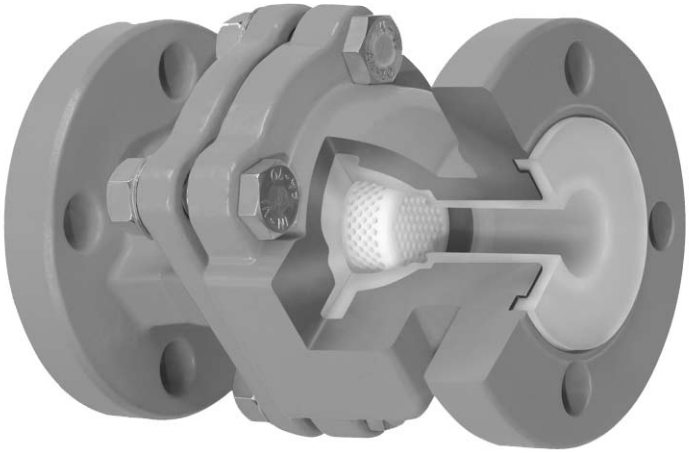
F202 Basket Filter

Formerly 083

Sizes ½ through 6 inch, ANSI Class 150

Tufline fully lined basket filters are used in a variety of corrosive services for the removal of debris from the pipeline or solid particles from the media.

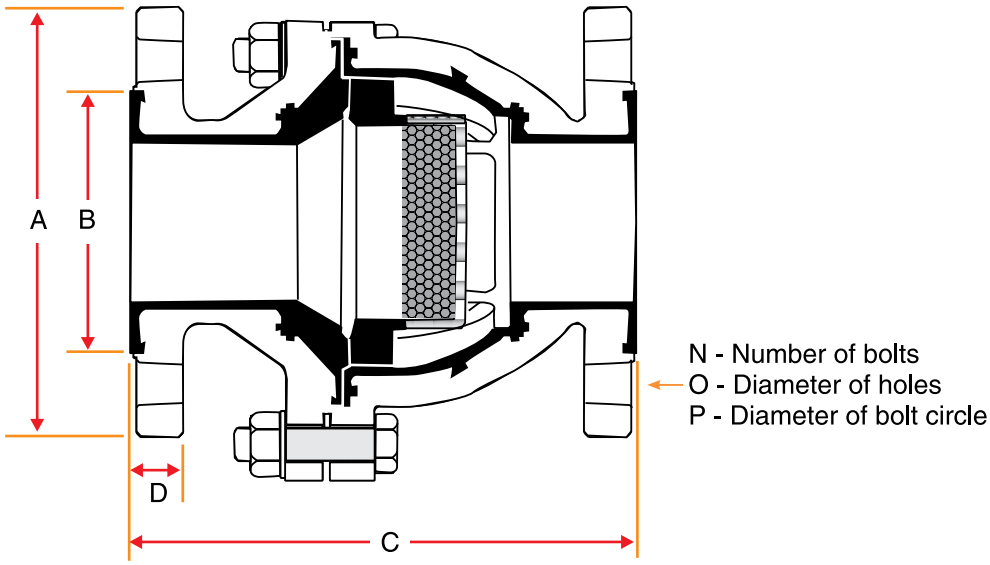
Refer to page 18 for pressure-temperature ratings.



Materials of construction

Body	PFA lined ductile iron
Filter	PTFE
Bolting	B7 Carbon steel

Other lining materials available upon request.



Dimensions (inches)

Size	A	B	C	D	N	O	P	Wt. lbs.	Opening Pressure Vertical Installation psi
1/2	3.50	1.57	5.12	0.59	4	0.62	2.36	9	0.28
3/4	3.86	1.97	5.91	0.79	4	0.62	2.72	11	0.16
1	4.25	2.01	6.00	0.91	4	0.62	3.11	11	0.13
1 1/2	5.00	2.87	7.00	1.42	4	0.62	3.86	23	0.17
2	5.98	3.62	8.00	1.85	4	0.75	4.72	29	0.17
3	7.52	4.92	9.50	3.07	8	0.75	5.98	68	0.32
4	9.02	6.18	11.50	3.74	8	0.75	7.50	103	0.46
6	10.92	8.27	14.00	5.71	8	0.88	9.49	189	0.54

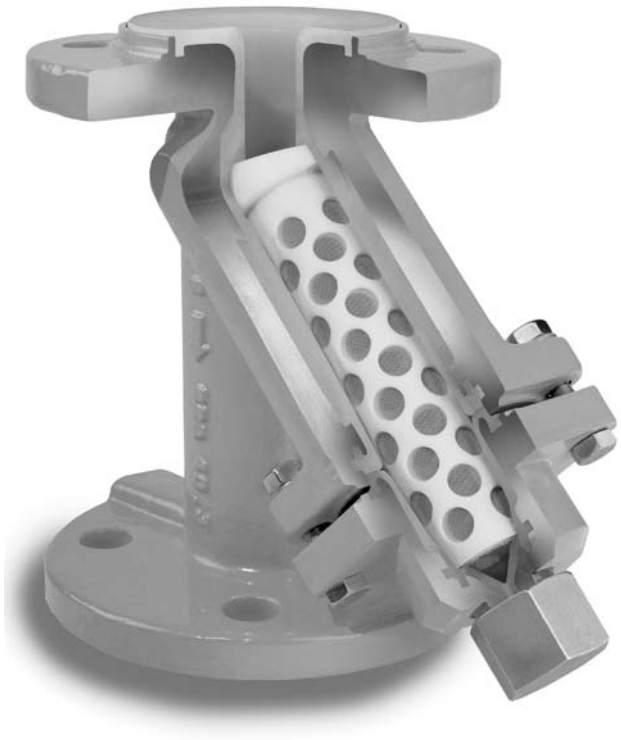
Y102 Y Strainer

Formerly 084

Sizes 1/2 through 4 inches*, ANSI Class 150

Tufline Y strainers are used in a variety of corrosive services for the removal of debris from the pipeline or solid particles from the media. The unique design allows the strainer to be easily removed for cleaning or replacement.

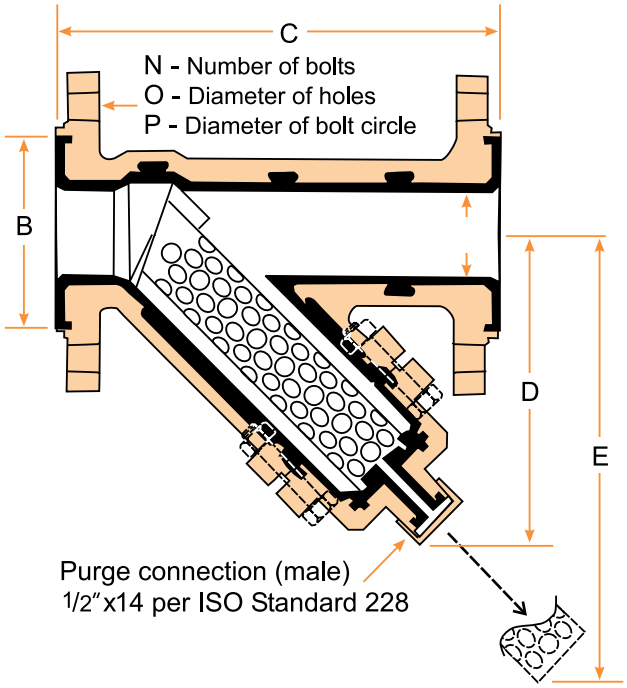
Refer to page 18 for pressure-temperature ratings.



Materials of construction

Body	PFA lined ductile iron
Filter	PTFE
Flange cover	PFA lined steel
Cap	PTFE lined steel

Other lining materials available upon request.



Dimensions (inches)

Size	B	C	D	E	N	O	P	Wt. lbs.	Cv Factors
1/2	1.57	5.91	3.94	5.2	4	0.62	2.36	8.14	0.23
3/4	2.24	5.91	3.94	5.2	4	0.62	2.72	8.14	0.25
1	2.60	6.30	4.09	5.5	4	0.62	3.11	9.46	6.13
1 1/2	3.43	7.87	5.63	7.1	4	0.62	3.86	17.38	13.87
2	3.94	9.06	6.34	9.5	4	0.75	4.72	22.00	23.81
3	5.35	12.20	10.08	13.4	8	0.75	5.98	43.56	49.48
4	6.18	13.78	11.18	16.5	8	0.75	7.50	58.30	93.17

*Other sizes on request.

085 PTFE Clamp Valve

Tufline Plastic-Lined Clamp Valves handle varieties of corrosives at temperatures from –20°F to 400°F (–28°C to 204°C) by combining the best properties of two different materials of construction.

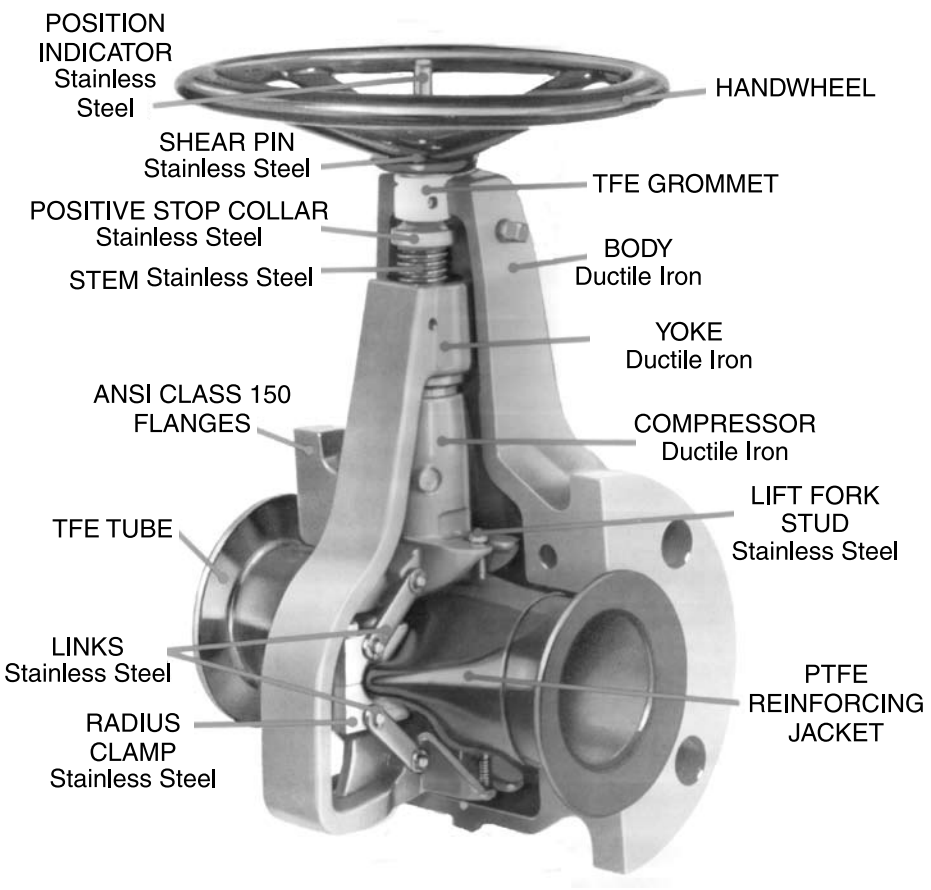
On the outside, a metal body provides strength, shock resistance, ease of installation, and a high pressure handling capability.

On the inside, the PTFE tube offers corrosion resistance that stainless steel and high alloy metal valves can't match.

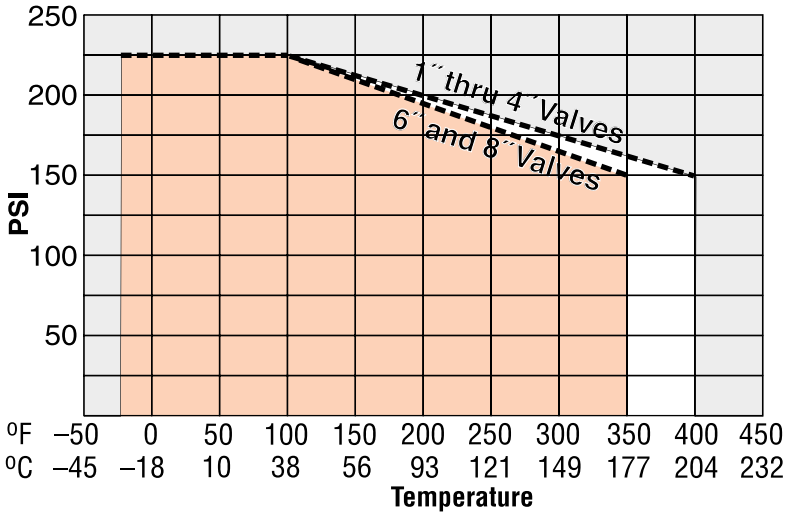
The Teflon®* PTFE Clamp Valve with its full-flow, straight-through packless design, is capable of bubble-tight shutoff and fine throttling. These features coupled with minimum maintenance and unexcelled corrosion resistance, makes the PTFE clamp valve the most economical valve available for tough CPI applications.

The clamp valve consists of a flexible PTFE tube and a clamp. Unlike pinch valves, the tubing is never kinked, creased or pinched. PTFE Clamp Valves are available in sizes 1" through 8" in various configurations and with a number of optional accessories.

Because all wetted surfaces are PTFE, the clamp valves offer unsurpassed chemical resistance at temperatures up to 400°F (350°C) for 6" and 8" valves. The minimum burst pressure for sizes 1" through 8" at 70°F is 900 psi and at 400°F is 600 psi.



Pressure / temperature ratings

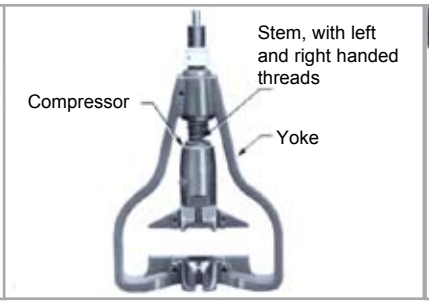


Note: Contact Xomox for applications beyond maximum nominal pressure and temperature ratings.

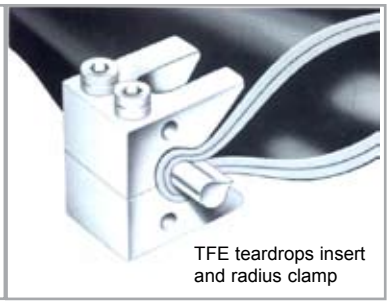
*Teflon® is a registered trademark of DuPont.

The Clamp valve is a flexible tube and a clamp. The tubing is made from Teflon PTFE.

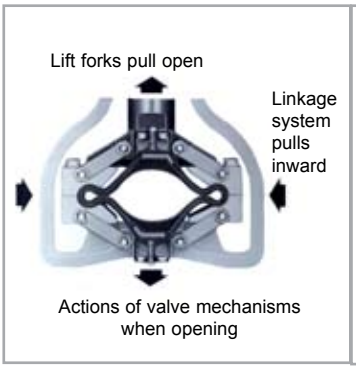
A Teflon PTFE reinforcing jacket heat shrunk over the tube element increases strength without sacrificing flexibility.

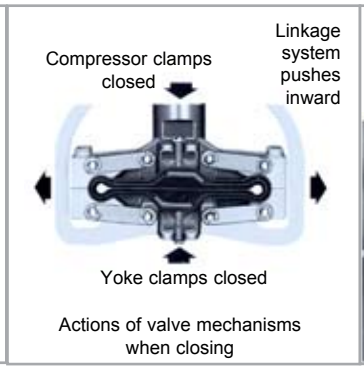


The clamping mechanism consists of a compressor which travels down a stem with rotation of the hand-wheel or power operator, and a yoke which travels up the stem at the same time. Together these components clamp off flow bubble-tight.



Teflon inserts - teardrop shaped in cross section - on each side of the Teflon tube prevent the tube element from being overstressed. All flexing takes place on the center line of the valve between the teardrops, insuring long life for the valve.



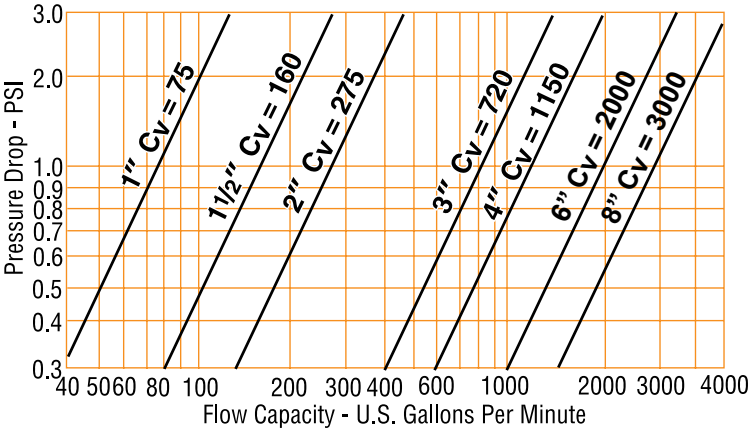


The radius clamps are connected to the yoke and to the compressor by means of links and link pins. These components, working together, provide a scissor-jack action which pushes the tube element inward during the opening cycle and pulls it outward during closing.

Four lift forks imbedded top and bottom in the tube element on each side of the clamp act as powerful fingers which work with the links and link pins to pull the sealing surfaces apart even under full vacuum conditions.

Operating parts are encased in a ductile iron body with Standard ANSI Class 150 flanges. Because the valve is symmetrical and completely bi-directional, either end can be placed upstream.

Pressure drop vs. flow at full open position for rotary operated valves.



C_v is a coefficient which relates the rate of fluid flow through a valve to the pressure drop across the valve. Valves with higher values of C_v will provide higher rates of flow for a given pressure drop. C_v values for PTFE Clamp Valves are dependent upon inlet pressure. C_v values shown above were determined with inlet pressure of 65 psi or higher.

Valve sizing coefficient, C_v and liquid pressure recovery factor, F_L for linear valves.

Valve Size	C_v	F_L
1”	35	0.610
1 1/2”	112	0.420
2”	163	0.439
3”	396	0.330
4”	527	0.514

F_L is a coefficient which permits calculation of valve flow capacity at low inlet pressures.

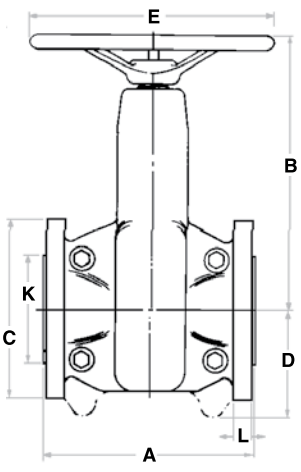
$$C_v = \frac{q}{\sqrt{\Delta P/G}}$$

C_v = Valve sizing coefficient
q = Flow rate, gal/min
ΔP = Pressure drop, psi.
G = Specific gravity of fluid

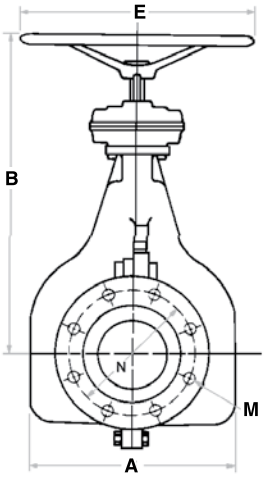
$$F_L = \frac{q\ max.}{C_v\sqrt{P_1 - r_c P_v}}$$

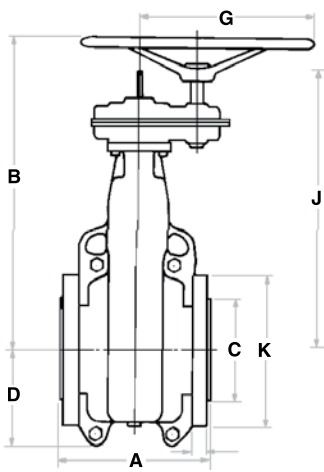
F_L = Liquid pressure recovery factor
q max. = Maximum flow rate
C_v = Valve sizing coefficient
P_1 = Valve inlet pressure, psi.
P_v = Vapor pressure of fluid
r_c = Critical pressure ratio

085 PTFE Clamp Valve Dimensions

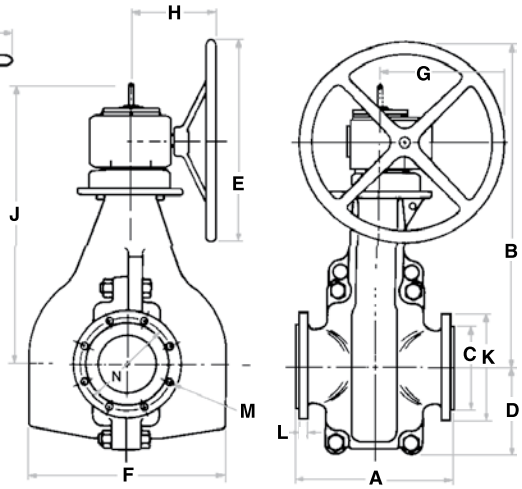


1" through 4"
Handwheel Operated





3" and 4"
Gear Operated



6" and 8" valves

Valve Size	Face To Face	To Top Of Hand-Wheel	Flare Dia.	To Bottom Of Valve	Hand-Wheel Dia.	Width Of Body	To Extreme Edge Of Hand-Wheel	To Outside Face Of Hand-Wheel	To Top Of Position Indicator	Nominal Torque To Seat Ft. Lbs.	Wt. Lbs.	Flange Dimensions, 150 lb., ANSI				
												Flange Dia.	Flange Thick-ness	No. Of Bolt Holes	Bolt Hole Dia.	Bolt Circle Dia.
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**J****			**K**	**L**		**M**	**N**
1	5.00	6.63	2.00	2.50	4.25	5.06	–	–	–	20	15	4.25	.44	4	.63	3.13
1½	6.50	8.06	2.88	–	7.00	6.69	–	–	–	30	27	5.00	.56	4	.63	3.88
2	7.00	9.19	3.63	–	8.00	7.38	–	–	–	35	35	6.00	.63	4	.75	4.75
3	8.00	14.88	5.00	4.50	14.00	10.88	–	–	–	65	75	7.50	.75	4	.75	6.00
3*	8.00	17.81	5.00	4.50	14.00	10.88	6.44	–	–	35	78	7.50	.75	4	.75	6.00
4	9.00	15.50	6.19	5.63	14.00	12.13	–	–	–	70	107	9.00	.94	8	.75	7.50
4*	9.00	18.44	6.19	5.63	14.00	12.13	10.44	–	–	50	113	9.00	.94	8	.75	7.50
6†	16.00	35.75	8.50	9.00	24.00	20.25	15.00	9.31	29.75	90	400	11.00	1.00	8	.88	9.50
6‡	16.00	35.75	8.50	9.00	24.00	20.25	15.00	9.31	29.75	125	400	11.00	1.00	8	.88	9.50
8†	19.00	35.75	10.63	9.00	24.00	20.25	15.00	9.31	29.75	100	430	13.50	1.13	8	.88	11.75
8‡	19.00	35.75	10.63	9.00	24.00	20.25	15.00	9.31	29.75	130	430	13.50	1.20	8	.88	11.75

Notes:

All flange bolt holes straddle the center lines.

All valve flange dimensions conform to ANSI B16.42. The face-to-face dimensions in valve sizes through 4" conform to ANSI B163.10, Class 150.

* Recommended in 3" size for line pressure over 50 psi and in 4" size for line pressure over 75 psi. An enclosed gear box is included.

** **J** is less than **B** on handwheel operated valves

† Recommended for use with line pressure up to 75 psi, these models furnished with 3-to-1 gear reducers.

‡ Recommended for use with line pressure over 75 psi, these models are furnished with 5-to-1 gear reducers.

K202 Tank Bottom Valve

Formerly 092

Sizes 1 through 6 inch, ANSI Class 150

Tufline lined tank bottom valves allow efficient discharge of corrosive fluids from bulk liquid tanks.

Refer to page 18 for pressure-temperature ratings.

Tank Connection Flange

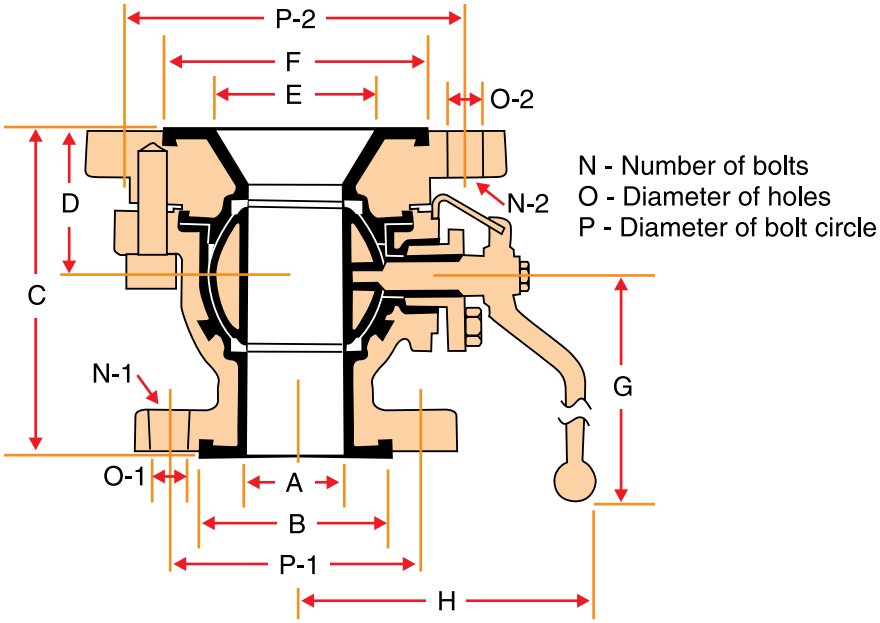
The tank connection flange can be supplied in various sizes per the table below:

	Connection Size (inches)
1	1½ or 2
1½	2
2	3 or 4
3	4
4	6
6	8

Materials of construction

Body	PFA lined ductile iron
Ball	PFA lined ductile iron
Stem	PFA lined stainless steel
Gland	Stainless steel
Handle	Cast ductile iron
Flange	PFA lined ductile iron
Bolting	B7 carbon steel
Stem packing	PTFE
Seat	PTFE

Other lining materials available upon request.



Size	A	B	C	D	E	F	G	H	N-1	O-1	P-1	N-2	O-2	P-2
1	1	2.01	4.80	2.44	1.50	2.87	6.61	4.53	4	0.75	3.13	4	0.63	3.87
1	1	2.01	4.80	2.44	2	3.78	6.61	4.53	4	0.75	3.13	4	0.74	4.74
1½	1.50	2.87	6.50	2.52	2	3.78	6.61	5.31	4	0.75	3.87	4	0.74	4.74
2	2	3.62	7.48	4.06	3	4.92	7.87	5.71	4	0.75	4.75	4	0.74	6.00
2	2	3.62	6.22	2.79	4	6.18	7.87	5.71	4	0.75	4.75	8	0.74	7.50
3	3	4.92	9.49	4.84	4	6.18	11.50	7.72	4	0.75	6.10	8	0.74	7.50
4	4	6.18	10.20	4.88	6	8.27	19.69	8.86	8	0.75	7.50	8	0.91	9.45
6	6	8.27	12.20	5.51	8	11.31	19.69	10.04	8	0.87	9.49	8	0.91	11.42

R40XL Short Face To Face Ball Valve

Formerly 093

Sizes 1 1/2 through 3 inch, ANSI Class 150

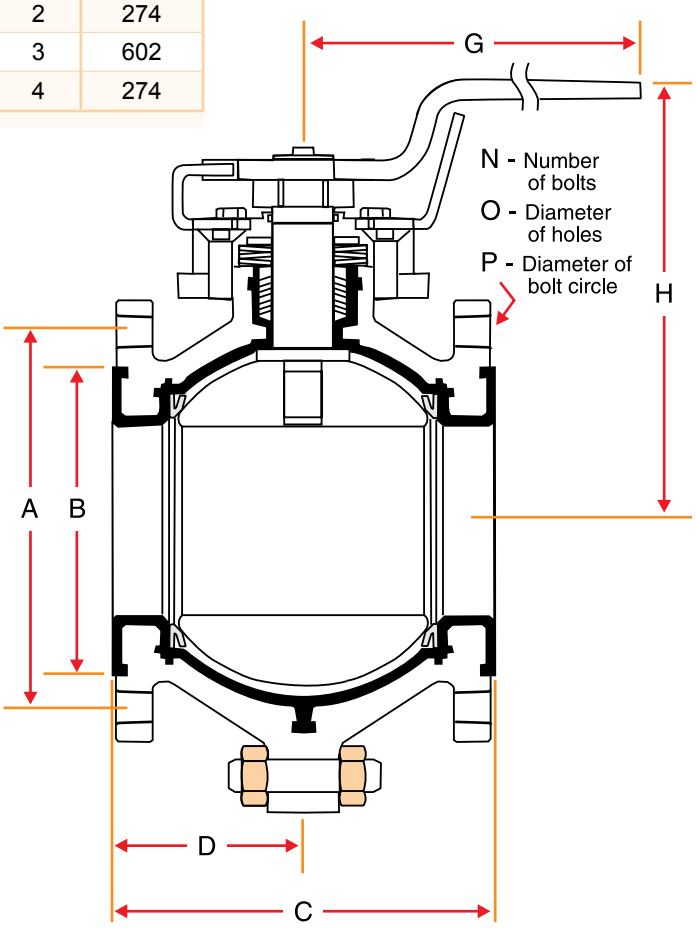
Tufline fully lined short face-to-face valves provide efficient, reliable service in corrosive applications where space is an important consideration.

Refer to page 18 for pressure-temperature ratings.

Actuation Torques

(Max. breakaway, inch-pounds)

Size	in/lb
1½	137
2	274
3	602
4	274



Materials of construction

Body	PFA lined stainless steel
Ball	PFA lined stainless steel
Stem	PFA lined stainless steel (CD4MCu)
Handle	Stainless steel
Fasteners	Stainless steel
Stem packing	PTFE
Seats	PTFE

Other lining materials available upon request.

Size	A	B	C	D	G	H	N	O	P	Wt. lbs.	Cv Values
1 1/2	4.33	3.54	3.94	1.97	7.85	5.26	4	0.62	3.86	15	213
2	4.92	4.02	4.33	2.17	7.85	5.73	4	0.75	4.72	22	295
3	6.30	5.43	5.91	2.95	11.42	7.52	8	0.75	5.98	47	629
4	7.09	6.30	7.48	3.74	15.75	8.66	8	0.75	7.50	86	1395

How To Order

Specify to following:	Size,	Figure Number,	Material
Example	2”,	071 Check Valve,	PFA Lined

Vacuum service
Tufline fully lined products perform well in vacuum service.

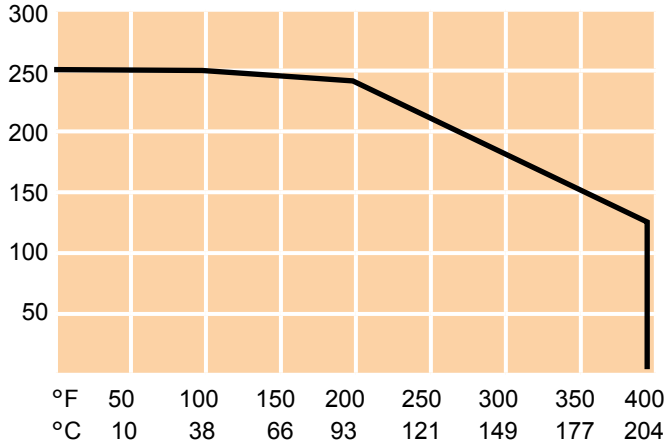
Oxygen and chlorine valves.
Valves designated for oxygen or chlorine service are thoroughly cleaned, tested, and dried per internal Xomox oxygen and chlorine standards. The flanges are then sealed and valves are packaged in plastic containers.

Quality assurance.
Tufline lined valves are used successfully in numerous applications throughout the chemical process industries. Xomox quality control procedures assure lining integrity, seat leak tightness, and absence of external leaks. Liners are dielectrically spark tested at 20,000 volts in accordance with ASTM D5162 specifications. Valves are available specifically tested and tagged to indicate conformity to ANSI B16.34 or B16.42 shell tests and MSS SP-61 seat test requirements.

Deviations from standard.
Certain products and components in this catalog may be obtained upon application in additional sizes and other than standard materials.

Products may also be supplied in special sizes and configurations from the Xomox Special Products Group. This group offers design, engineering, and manufacturing services for custom products.

Pressure-Temperature Ratings
(Valves with PFA linings)

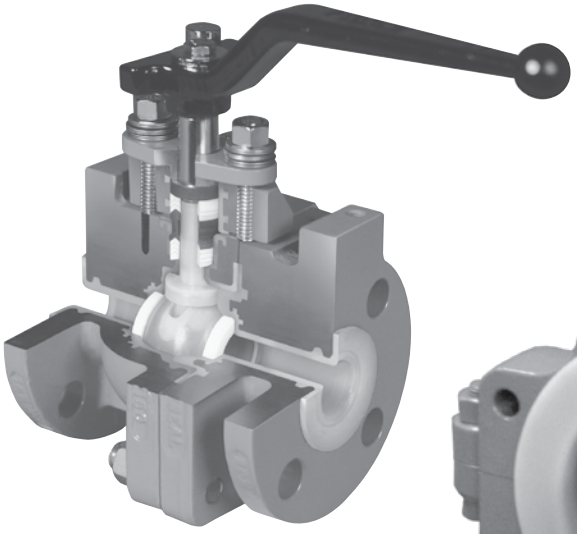


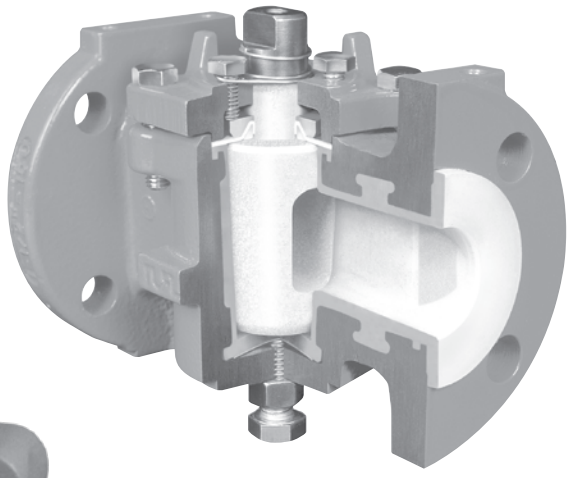
Xomox offers a broad range of lined valves.

For superior assured sealing, the metal-to-metal body joint of the Tufline Lined Ball Valve controls compression of the liner.

Tufline Lined Butterfly Valves have a continuous disc/shaft lining and a body lining that extends well beyond the secondary seal area.

Tufline Lined Plug Valves are an economical alternative to high alloy valves.



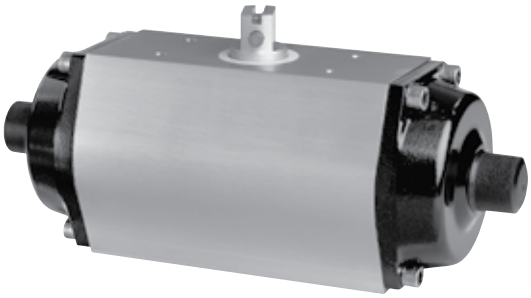


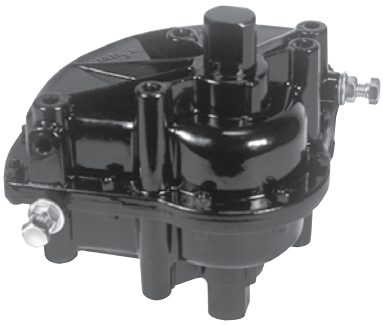
Single source responsibility for actuation and control.

Valves are available with Xomox XRP™ Actuators and Matryx® Vane Actuators.

Xomox switches and other control accessories are also available.

Let your regional Xomox Automation & Service Center take full responsibility for automation of your complete valve package.





XOMOX®

CRANE ChemPharma Flow Solutions™

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XLD - Lined Butterfly Valve Series

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XOMOX®

PERFORMANCE We listened to our most demanding critics: Our customers. Here's our response.

ANSI Class 150/PN10 valve design!

- **Temperature Range**

  -20° C to 200° C
  253 K to 473 K
  -4° F to 392° F

- **Pressure Range**

  Suitable for vacuum service
  (3 mbar / 0.043 psi)
  Shut-off Pressure max. 150 psi/10 bar

- **Lower torque ratings**

  enable the use of smaller, less expensive actuators

- **ISO 5211 Mounting Pad**

  Allows the option of bracket or direct mounting of operators.
  Direct mounting ensures robust performance while providing compact system design.

- **The seal to atmosphere**

  is assured by using the triple FKM O-rings around the base of the shaft

- **Both the body and the shaft lining**

  continue past the FKM-ring stem sealing components. The shaft and the seal components are protected from the flow media .

- **A wide sealing face**

  prevents leakage at the flange

- **Better atmospheric corrosion resistance**

  through high-end surface coating.

- **Improved disc design**

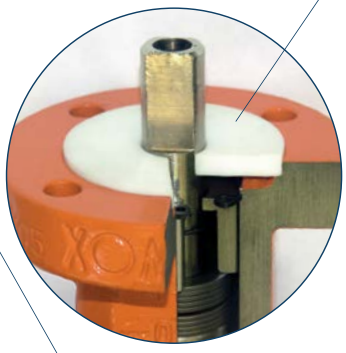
  assures better stability

- **Materials**

  Body: EN-JS1049 / ASTM A395 PFA lined
  Disc: 2"-12" EN-JS1049 / ASTM A395 & SS/Ti PFA lined
  14"-24": Fabricated Disc in SS Duplex+ CS PFA lined

SAFETY You benefit… when experience meets design

The revolutionary PTFE atmosphere seal
protects the top seal components and the shaft from atmospheric corrosion.

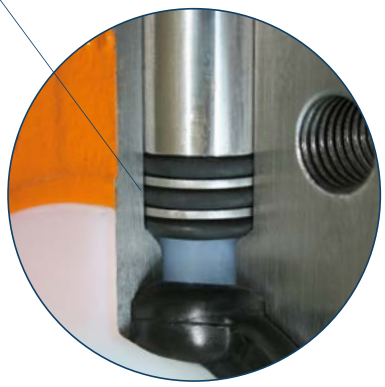


Safety adjustment Packing Option
Upon request.

Belleville disc springs
provide live loading to ensure a tight top seal.

Blow-out proof design
Stem and disc are one simple part combined with the anti-blow-out system. (API 609 compliant.)

Triple FKM-ring backup-seals
provide a second, third and fourth line of protection against atmospheric leakage.



The extended body lining
assures optimum protection of the FKM-rings from corrosive media. These components are located behind the body liner extension. They are isolated from the media.

The in-line resilient seal assembly
assures optimum pressure distribution of the body liner to the disc assembly, providing tight sealing under all operating conditions. The wider seal-band provides a broader sealing area.

Product naming

XLD Series	Body	Flange
XLD11	WAFER	ANSI
XLD12		DIN
XLD13		JIS
XLD21	LUG	ANSI
XLD22		DIN
XLD23		JIS

Fully lined bottom shaft
assures optimum corrosion resistance and eliminates a potential leakage path.

XOMOX®

DIMENSIONS Butterfly Valve XLD

All dimensions in inches

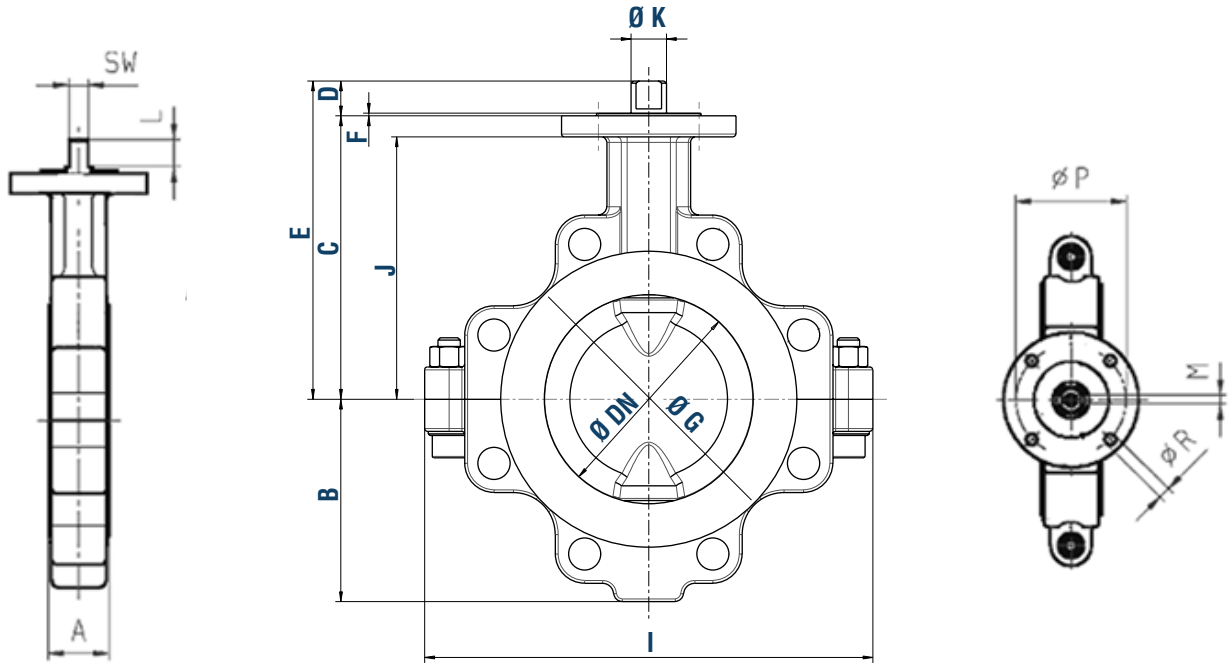
Valve Size	A	B	C	D	E	F	ØG	I	J	ØK	L	M	ØP	ØR	SW	ISO 5211
2"	1.69	3.19	5.24	1.18	6.42	0.12	3.94	6.61	4.69	0.63	0.98	M6	2.76	0.35	0.44	F07
3"	1.81	4.02	6.30	0.87	7.17	0.12	5.00	8.78	5.43	0.63	0.67	M6	2.76	0.35	0.44	F07
4"	2.05	4.72	6.69	1.02	7.72	0.12	6.02	10.51	6.06	0.63	0.83	M6	2.76	0.35	0.44	F07
5"	2.20	5.31	7.28	1.14	8.43	0.12	7.24	11.61	6.54	0.63	0.94	M6	2.76	0.35	0.44	F07
6"	2.20	5.71	7.99	0.98	8.98	0.12	8.35	12.64	7.09	1.00	0.79	M8	4.02	0.43	0.69	F10
8"	2.36	7.48	9.06	1.02	10.08	0.12	10.43	15.51	8.27	1.25	0.83	M8	4.02	0.43	0.81	F10
10"	2.68	9.17	10.16	1.02	11.18	0.12	12.76	18.19	9.09	1.25	0.83	M8	4.02	0.43	0.81	F10
12"	3.07	10.16	11.34	1.18	12.52	0.12	14.72	21.73	10.47	1.25	0.98	M8	4.92	0.55	0.81	F12
14"	3.62	13.90	16.42	1.50	17.91	0.12	16.33	22.68	13.58	1.42	1.38	M8	5.51	0.71	1.06	F14
16"	4.02	15.51	17.80	1.50	19.29	0.12	18.89	25.20	14.96	1.42	1.38	M8	5.51	0.71	1.06	F14
18"	4.49	16.14	18.50	2.36	20.87	0.20	20.86	26.61	15.47	1.89	2.17	M12	6.50	0.87	1.42	F16
20"	5.00	18.11	19.68	2.36	22.05	0.20	22.83	29.13	16.65	1.89	2.17	M12	6.50	0.87	1.42	F16
24"	6.06	20.47	22.05	2.56	24.61	0.20	26.92	34.65	18.43	2.36	2.44	M12	6.50	0.87	1.81	F16

All dimensions in mm

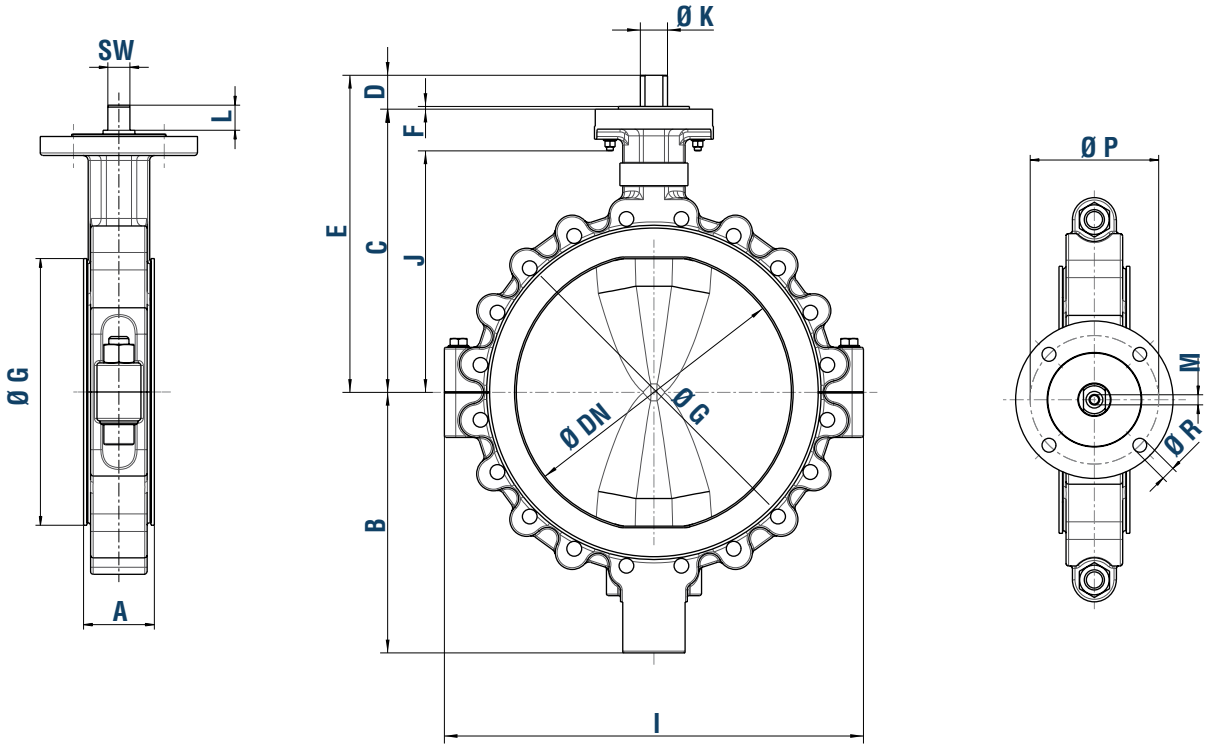
Valve Size	A	B	C	D	E	F	ØG	I	J	ØK	L	M	ØP	ØR	SW	ISO 5211
DN 50	43	81	133	30	163	3	100	168	119	15.9	25	M6	70	9	11.1	F07
DN 65	46	87	146	30	176	3	128	175	135	15.9	25	M6	70	9	11.1	F07
DN 80	46	102	160	22	182	3	127	223	138	15.9	17	M6	70	9	11.1	F07
DN 100	52	120	170	26	196	3	153	267	154	15.9	21	M6	70	9	11	F07
DN 125	56	135	185	29	214	3	184	295	166	15.9	24	M6	70	9	11.05	F07
DN 150	56	145	203	25	228	3	212	321	180	25.4	20	M8	102	11	17.5	F10
DN 200	60	190	230	26	256	3	265	394	210	31.8	21	M8	102	11	20.6	F10
DN 250	68	233	258	26	284	3	324	462	231	31.8	21	M8	102	11	20.6	F10
DN 300	78	258	288	30	318	3	374	552	266	31.8	25	M8	125	14	20.5	F12
DN 350	92	353	417	38	455	3	415	576	345	36	35	M8	140	18	27	F14
DN 400	102	394	452	38	490	3	480	640	380	36	35	M8	140	18	27	F14
DN 450	114	410	470	60	530	5	530	676	393	48	55	M12	165	22	36	F16
DN 500	127	460	500	60	560	5	580	740	423	48	55	M12	165	22	36	F16
DN 600	154	520	560	65	625	5	684	880	468	60	62	M12	165	22	46	F16

DIMENSIONS Butterfly Valve XLD

DN 50-300
2" - 12"



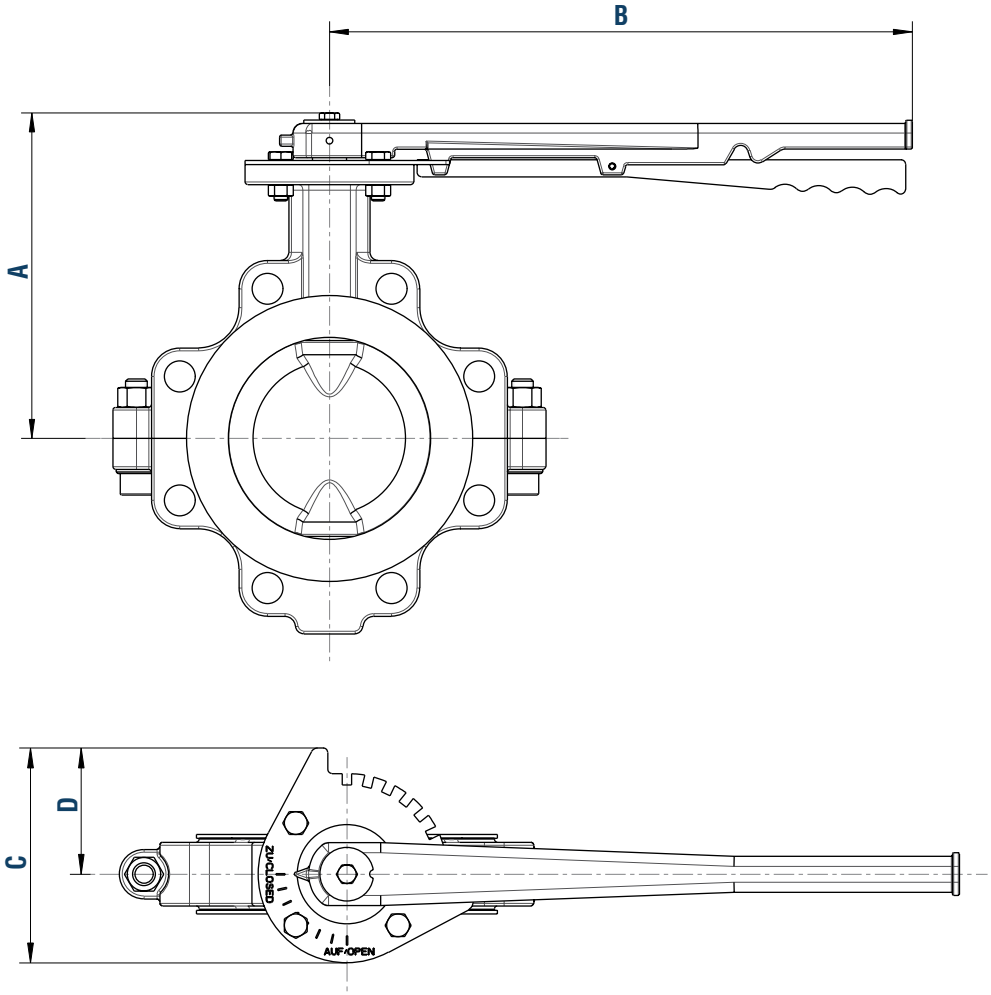
DN 350-600
14" - 24"



DIMENSIONS with latching lever

All Dimensions in mm/inches

DN/Size	50/2"	65/2.5"	80/3"	100/4"	125/5"	150/6"	200/8"
A	173/6.81	186/7.32	192/7.56	208/8.19	225/8.86	245/9.65	301/11.85
B	356/14.02	356/14.02	356/14.02	356/14.02	356/14.02	432/17.01	432/17.01
C	134/5.28	134/5.28	134/5.28	134/5.28	134/5.28	134/5.28	134/5.28
D	89/3.50	89/3.50	89/3.50	89/3.50	89/3.50	89/3.50	89/3.50
weight in kg/lbs	8.5/18.74	9/19.84	9.5/20.94	11.5/25.35	14/30.86	17.5/38.58	27.5/60.63



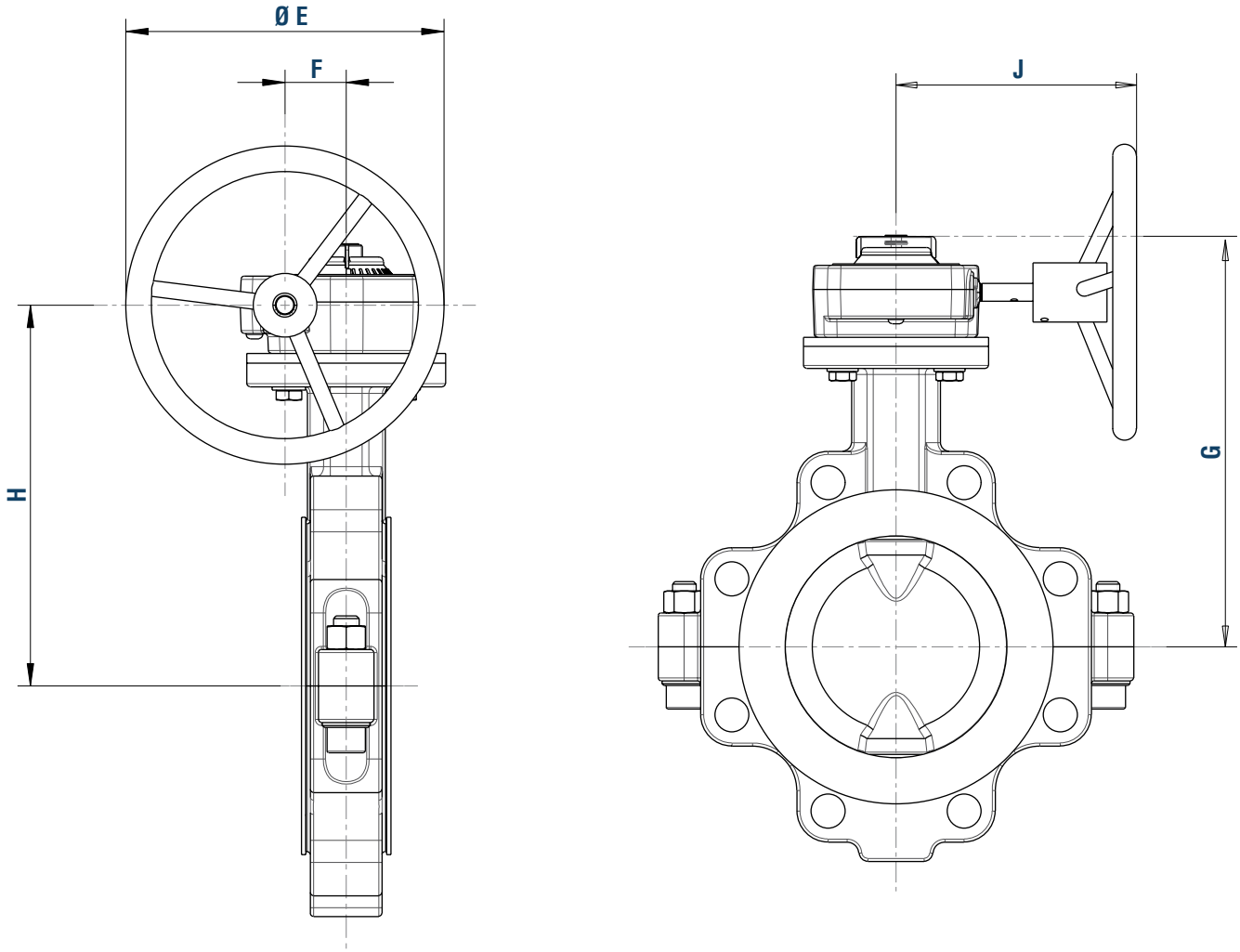
DIMENSIONS with gear

All Dimensions in mm/inches

DN/Size	50/2"	65/2.5"	80/3"	100/4"	125/5"	150/6"	200/8"	250/10"	300/12"
ØE	125/4.92	125/4.93	125/4.94	125/4.95	125/4.96	203/7.99	203/7.100	203/7.101	203/7.102
F	38.5/1.52	38.5/1.53	38.5/1.54	38.5/1.55	38.5/1.56	46.5/1.83	60/2.36	60/2.37	60/2.38
G	188/7.40	201/7.91	207/8.15	223/8.78	241/9.49	260/10.24	289/11.83	314/12.36	401/15.79
H	163/6.42	173/6.81	179/7.05	196/7.72	211/8.31	228/8.98	257/10.12	283/11.14	369/14.53
J	134/5.28	134/5.29	134/5.30	134/5.31	134/5.32	180/7.09	205.5/8.09	205.5/8.09	205.5/8.09
weight in kg/lbs	8/17.64	8.5/18.74	9/19.84	11/24.25	13.5/29.76	17.5/38.58	29.3/64.60	36/79.37	58/127.87

Dimensions with gear

DN 50-300, NPS 2" - 12"

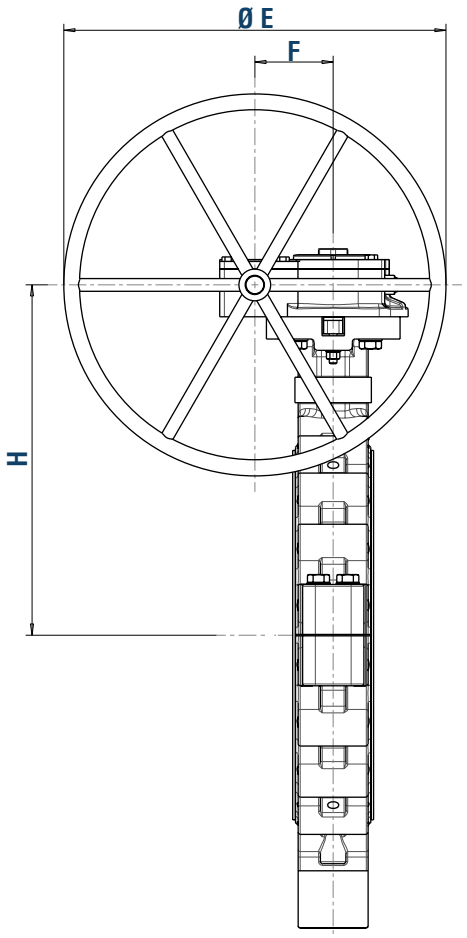


DIMENSIONS with gear

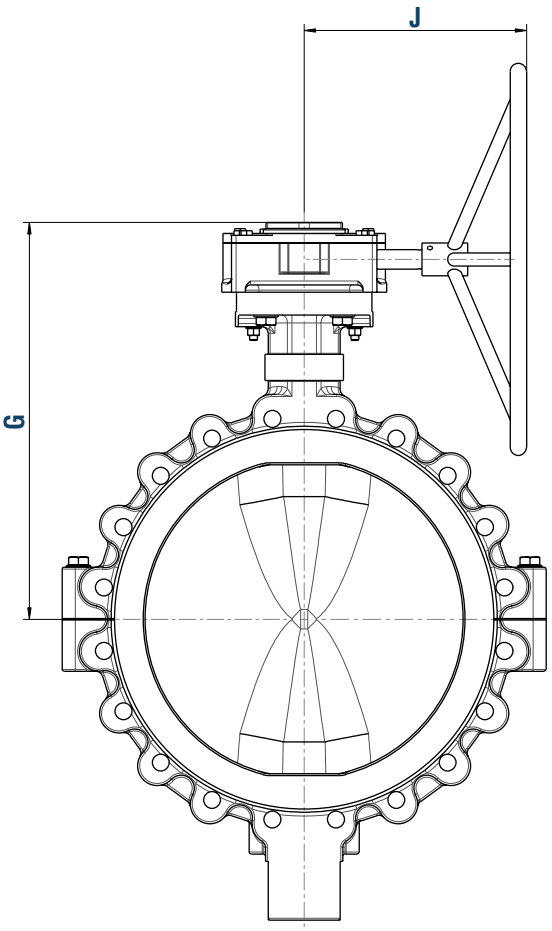
All Dimensions in mm/inches

DN/Size	350/14"	400/16"	450/18"	500/20"	600/24"
ØE	457/17.99	457/17.100	457/17.101	610/24.02	610/24.02
F	66.7/2.63	66.7/2.64	89.5/3.52	123/4,84	123/4,84
G	498/19.61	533/20.98	563.5/22.19	605,5/23.83	665.5/26.2
H	459/18.07	494/19.44	520/20.47	550/21.65	610/24.02
J	223/8.78	223/8.78	278/10.94	310/12.20	310/12.20
weight in kg/lbs (incl.MG)	115/253,53	140/308,65	195/429.9	238/524,7	341/751,78

Dimensions with gear



DN 350 - 600 NPS 14" - 24"



XLD Flow Characteristics

K_v values in m^3/h, C_v=1.156 K_v

ANGLE of aperture	0°	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°
ANGLE of aperture (%)	0	10	20	30	40	50	60	70	80	90	100
DN / NPS											
50 / 2"	0	0.62	2.6	12	30	65	95	135	165	170	180
80 / 3"	0	0.82	3.6	14.4	38	70	112	166	212	228	233
100 / 4"	0	1.5	5.8	22	55	102	177	296	408	464	486
125 / 5"	0	4.6	13	40	92	164	267	413	564	698	790
150 / 6"	0	12.12	31	82	183	296	415	595	834	1115	1445
200 / 8"	0	18.4	44	130	280	435	640	910	1282	1705	2227
250 / 10"	0	27.3	65	200	410	660	958	1345	1912	2550	3320
300 / 12"	0	40.7	99	295	596	965	1396	1975	2827	3795	4908
350 / 14"	0	68	216	413	720	1225	1944	2890	4104	5520	7200
400 / 16"	0	90	268	518	895	1535	2416	3663	5100	6960	8950
450 / 18"	0	116	340	660	1135	1934	3065	4610	6470	8810	13350
500 / 20"	0	164	415	822	1390	2400	3750	5670	7925	10700	13900
600 / 24"	0	231	570	1060	1900	3250	5130	7790	10830	14440	19000

DN 65 NPS 2.5" on request

Valve coefficients for process control: DN 50-200 / NPS 2-8

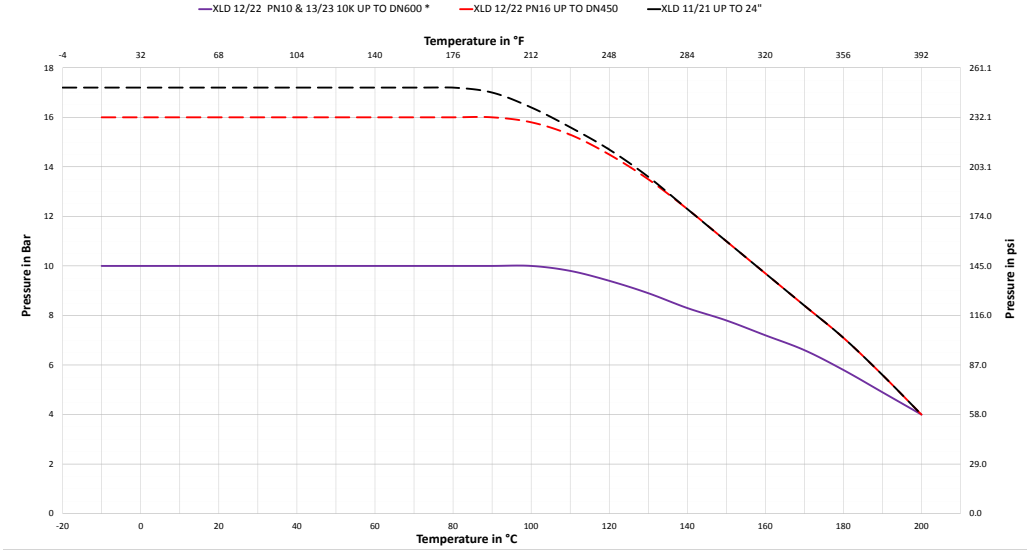
ANGLE of aperture	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°
Rated travel	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Recovery Factor F_L	0.85	0.85	0.85	0.85	0.81	0.73	0.67	0.61	0.59	0.55
Factor F_L^2	0.72	0.72	0.72	0.72	0.66	0.53	0.45	0.37	0.35	0.30
Valve characteristic z_y	0.47	0.47	0.47	0.47	0.43	0.37	0.33	0.28	0.27	0.24
Pressure differential ratio $_{K\tau}$	0.61	0.61	0.61	0.61	0.55	0.45	0.38	0.31	0.29	0.25
Valve style modifier F_d	0.08	0.15	0.23	0.31	0.38	0.45	0.52	0.58	0.64	0.70

Valve coefficients for process control: DN 250 - 600 / NPS 10-24

ANGLE of aperture	9°	18°	27°	36°	45°	54°	63°	72°	81°	90°
Rated travel	0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00
Recovery Factor F_L	0.80	0.82	0.82	0.82	0.78	0.67	0.56	0.51	0.48	0.42
Factor F_L^2	0.64	0.67	0.67	0.67	0.61	0.45	0.31	0.26	0.23	0.18
Valve characteristic z_y	0.43	0.44	0.44	0.44	0.41	0.33	0.25	0.22	0.20	0.16
Pressure differential ratio $_{K\tau}$	0.54	0.56	0.56	0.56	0.51	0.38	0.26	0.22	0.19	0.15
Valve style modifier F_d	0.08	0.15	0.23	0.31	0.38	0.45	0.52	0.58	0.64	0.70

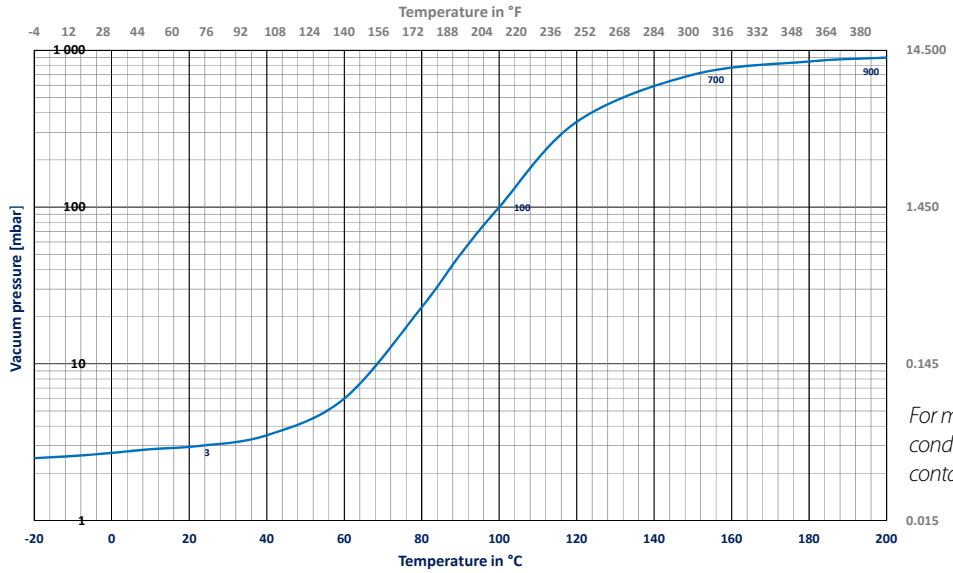
XLD Pressure/Temperature Ratings & Valve Torques

XLD Pressure/Temperature Rating



Note: Max. differential operating pressure limited to maximum of 10bar for all sizes
* XLD 13 / 23 10K UPTO DN500

All XLD in Vacuum Condition



For more details of vacuum conditions for specific sizes, contact site

Valve Size		DN 50/2"	DN 80/3"	DN 100/4"	DN 125/5"	DN 150/6"	DN 200/8"	DN 250/10"	DN 300/12"	DN 350/14"	DN 400/16"	DN 450/18"	DN 500/20"	DN 600/24"
Break-away Torque *1	Nm	35	35	50	62	94	209	242	308	900	1300	1700	2700	4000
	in. lbs	310	310	443	549	832	1850	2142	2726	7966	11506	15046	23897	35403
Max. allowable Torque *2	Nm	162	162	162	162	296	628	628	628	2432	2432	5655	5765	11649
	in.lbs	1434	1434	1434	1434	2620	5558	5558	5558	21525	21525	50051	51024	103093

DN 65 NPS 2.5» on request
*1 Identical torque at opening and closing, running torque = 40% of break away torque.
*2 Max. permissible torque with Material EN-JS1049 up to DN300 & with 1.4462 SS from DN 350 onwards.

XLD Lined Butterfly Valve Applications

CRANE ChemPharma & Energy, XOMOX® XLD Lined Butterfly Valve - Performance Chart

FUNCTION	On / Off	●
	Throttling	●
	Diversion	●
MEDIA TYPES	Clean Liquids & Gases	●
	Dirty Liquids & Gases	●
	Corrosive Liquids & Gases	●
	Hazardous Liquids & Gases	●
	Viscous Liquids	●
	Scaling Liquids & Slurries	●
	Abrasive Slurries	●
	Fibrous Slurries	●
	Dry Materials	●
	Vacuum Service	●
APPLICATION REQUIREMENTS	High Flow Capacity	●
	Low Torque	●
	Fugitive Emissions Control	●
	Reduced Maintenance	●
	Extended Service Life	●
	Sizes	2"-24" DN50-DN600
	Pressure Ratings	Class 150 / PN 10 PN 20
	High Temperature (ASME/EN)	200°C / 392°F
	Low Temperature (EN)	-10°C / 14°F
	Low Temperature (ASME)	-20°C / -4°F
	Key Benefit	Safety / Economy

● Superior Performance
● Limited Application
● Not Applicable

Source: CRANE Engineering

XLD valves offer economical solutions for the vast majority of chemical applications while maintaining the highest possible degree of performance in terms of in-line leakage and fugitive emissions.

XLD valves are commonly used within the following industries:

- Chlor-Alkali
- Industrial Inorganic Chemicals
- Metal and Mining
- Nitrogen and Phosphatic Fertilizers
- Petroleum Refining
- Pharmaceutical

Within these industries, XLD valves have superior performance in the following applications:

- Chlorine
- Benzene
- Bromine
- Sulfuric Acid
- Nitric Acid
- Hydrochloric Acid
- Phosphoric Acid
- Sea Water

Visit our website, www.cranecpe.com, to view these and other lined products, applications, brochures, certification, documents and more.

XOMOX®

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CRANE®

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D-88131 Lindau/Bodensee
Tel.: (49) 8382-702-0
Fax. (49) 8382-702-144

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NOZ-CHEK® PACIFIC VALVES® RESISTOFLEX® revo® Saunders® the science inside
STOCKHAM® Triangle® UNI-CHEK® wta® XOMOX®

CPE-XOMOX-XLD-BU-EN-LT-2017_08_09

XOMOX®

NEW
& IMPROVED!

Xomox® Fully Lined Ball Check Valve

CRANE®

www.cranecpe.com

XOMOX®

Features and Benefits

The NEW Xomox® Fully Lined Ball Check Valve Offers:

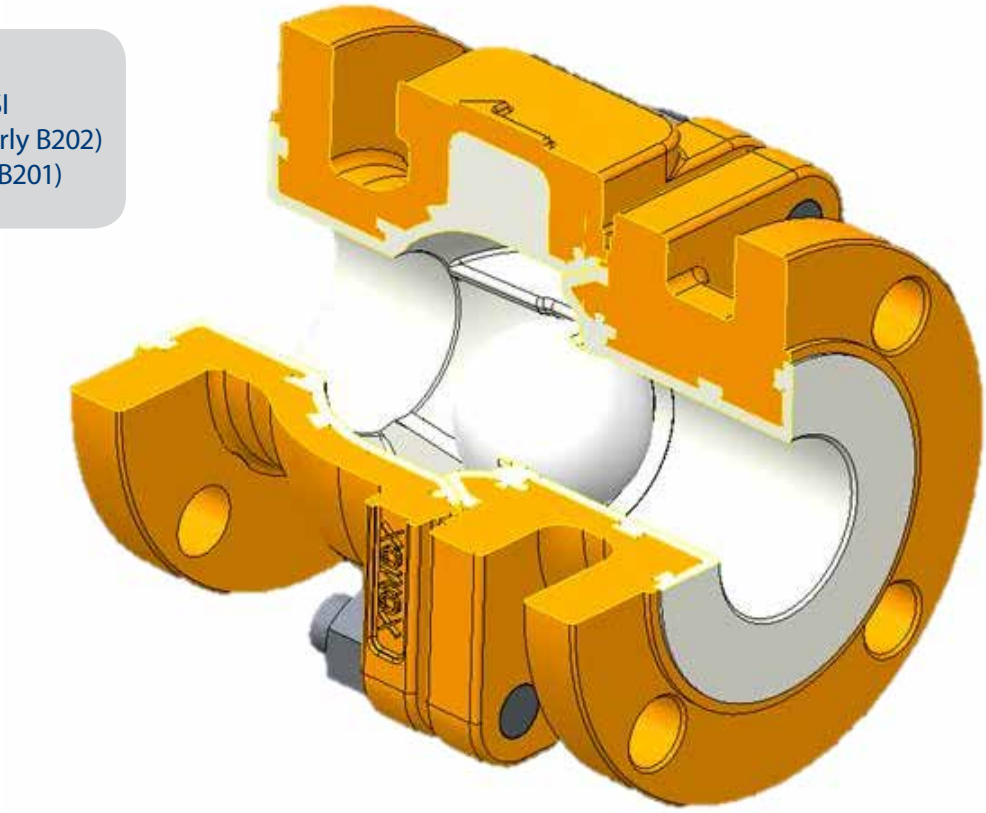
1. **Equipment and Process Protection:** Improve protection of your critical equipment and avoid process cross contamination by reducing backflow through the lined ball check valve. The XLC's unique flexible seat enables Class A and API-598 sealing, a first for lined ball check valves.

   * Standard for test procedure: Shell test acc. to EN-12266-1, Seat leakage test acc. to EN-12266-1, and Functional test acc. to EN-12266-2

2. **Low Cost Option for Horizontal Mounting:** While most horizontal mounted applications require a more expensive check valve, you can reduce both capital costs and inventory variation by standardizing a single ball check valve for both vertical or horizontal positions. Even in the horizontal position, the XLC's angled ribs guide the ball tightly into the seat, resulting in an excellent seal at pressures greater than 3 bar (>45 psi).

3. **Safety from External Leaks and Corrosion:** Avoid high maintenance and replacement costs that result from body joint leaks during extreme thermal cycling. The XLC's metal-to-metal contact at the joint seal and wide conical plastic connection dramatically reduce the risk of dangerous external leaks.

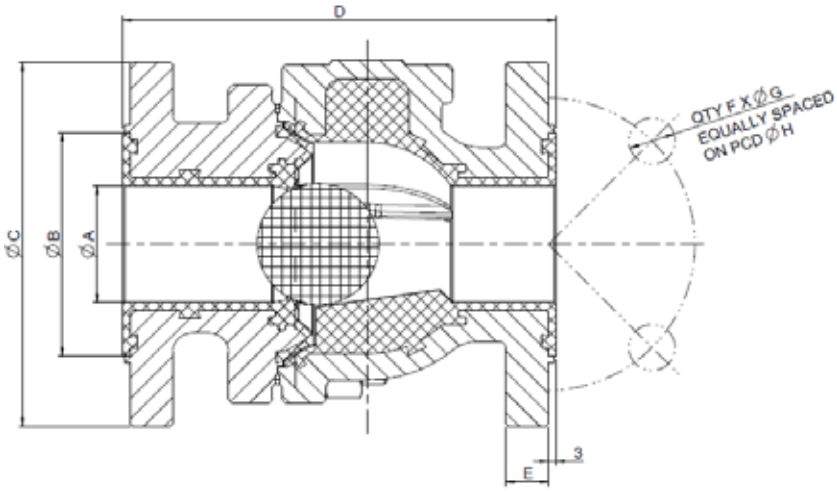
Now Available!
XLC 12B Short Pattern ANSI
XLC 13B Long Pattern ANSI (formerly B202)
XLC 24B DIN Pattern (formerly B201)



XLC Lined Ball Check Valve ASME Dimensions

Xomox XLC 12B-Short Pattern

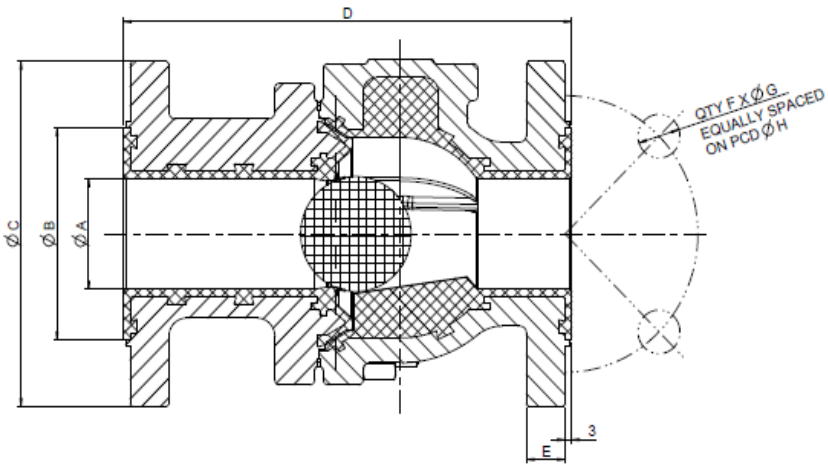
Fully Lined
Flange Connections ASME B16.5-Class 150
Face-to-face Dimensions Short Pattern (B16.10)



SIZE	A		B		C		D		E		F	G		H		Weight	
	in	mm	in	mm	in	mm	in	mm	in	mm		in	mm	in	mm	lb	kg
1"	0.91	23	2.00	51	4.25	108	5.00	127	0.50	12.7	4	0.63	16	3.12	79.4	8.7	3.9
1 ½"	1.46	37	2.88	73	5.00	127	6.50	165	0.63	15.9	4	0.63	16	3.88	98.4	17.3	7.8
2"	1.85	47	3.62	92	6.00	152	7.00	178	0.69	17.5	4	0.75	19	4.75	121	22.7	10.3
3"	2.95	75	5.00	127	7.50	191	8.00	203	0.88	22.3	4	0.75	19	6.00	152	45.8	20.8
4"	3.82	97	6.19	157	9.00	229	9.00	229	0.88	22.3	8	0.75	19	7.50	191	71.5	32.5
6"	5.71	145	8.50	216	11.0	279	10.5	267	0.88	22.3	8	0.91	23	9.50	241	111	50.6

Flow Coefficient						
Size	1"	1 ½"	2"	3"	4"	6"
C_V	20	67	73	163	251	464
K_V [m3/h]	17	58	64	140	216	400

XLC Lined Ball Check Valve ASME Dimensions



Xomox XLC 13B-Long Pattern

Fully Lined
Flange Connections ASME B16.5-Class 150
Face-to-face Dimensions Long Pattern
Formerly B202

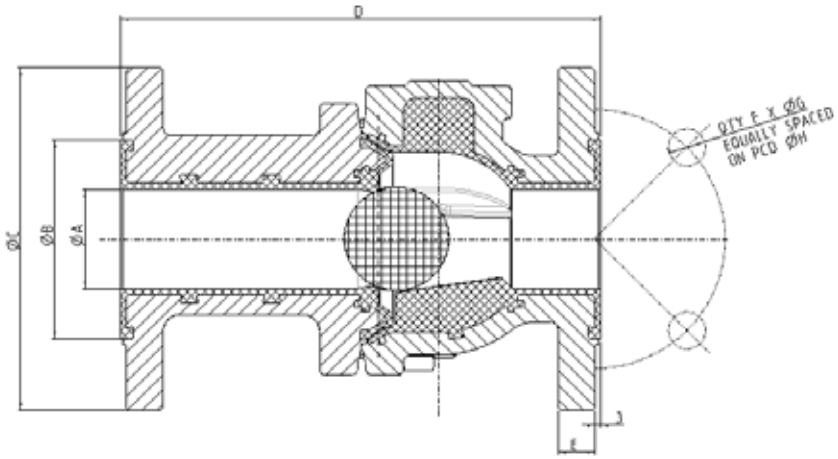
SIZE	A		B		C		D		E		F	G		H		Weight	
	in	mm	in	mm	in	mm	in	mm	in	mm		in	mm	in	mm	lb	kg
½''	0.59	15	1.38	35	3.50	89	5.12	130	0.38	9.6	4	½ -13 UNC-2B		2.38	60.3	7.6	3.4
¾''	0.79	20	1.69	43	3.88	98	5.91	150	0.44	11.2	4	½ -13 UNC-2B		2.75	69.9	8.7	3.9
1''	0.91	23	2.00	51	4.25	108	6.00	152.3	0.50	12.7	4	0.63	16	3.12	79.4	9.2	4.2
1 ½''	1.46	37	2.88	73	5.00	127	7.01	178	0.63	15.9	4	0.63	16	3.88	98.4	17.7	8.0
2''	1.85	47	3.62	92	6.00	152	7.99	203	0.69	17.5	4	0.75	19	4.75	121	23.6	10.7
3''	2.95	75	5.00	127	7.50	191	9.49	241	0.88	22.3	4	0.75	19	6.00	152	48.4	22.0
4''	3.82	97	6.19	157	9.00	229	11.50	292	0.88	22.3	8	0.75	19	7.50	191	76.2	34.6
6''	5.71	145	8.50	216	11.0	279	14.02	356	0.88	22.3	8	0.91	23	9.50	241	127	57.6

Flow Coefficient						
Size	1''	1 ½''	2''	3''	4''	6''
C_V	20	67	73	163	251	464
K_V [m3/h]	17	58	64	140	216	400

XLC Lined Ball Check Valve EN Dimensions

Xomox XLC 24B-DIN Pattern

Fully Lined
Flange Connections EN 1092-2 PN16
Face-to-face Dimensions acc. to EN 558
Table 2, Row 1
Formerly B201



SIZE	A	B	C	D	E	F	G	H	Weight
	mm	mm	mm	mm	mm		mm	mm	kg
15	15	40	95	130	13	4	14	65	3.5
20	20	52	105	150	15	4	14	75	4.1
25	23	62	115	160	15	4	14	85	4.8
40	37	82	150	200	15	4	18	110	9.5
50	47	96	165	230	15	4	18	125	12.2
80	75	132	200	310	17	8	18	160	25.2
100	97	152	220	350	17	8	18	180	36.6
150	145	206	285	480	18.5	8	23	241	57.6

Flow Coefficient						
Size	1''	1 ½''	2''	3''	4''	6''
C_v	20	67	73	163	251	464
K_v [m3/h]	17	58	64	140	216	400

XOMOX®

Application

Xomox® XLC valves offer economical solutions for the vast majority of chemical applications while maintaining the highest possible degree of performance in terms of in-line leakage.

XLC valves are commonly used within the following industries:

- Chlor-Alkali
- Industrial Inorganic Chemicals
- Metal and Mining
- Nitrogen and Phosphatic Fertilizers
- Petroleum Refining
- Pharmaceutical

Within these industries, XLC valves have superior performance in the following applications:

- Chlorine
- Benzene
- Bromine
- Sulfuric Acid
- Nitric Acid
- Hydrochloric Acid
- Phosphoric Acid
- Sea Water

Xomox® XLC Lined Ball Check Valve - Performance Chart

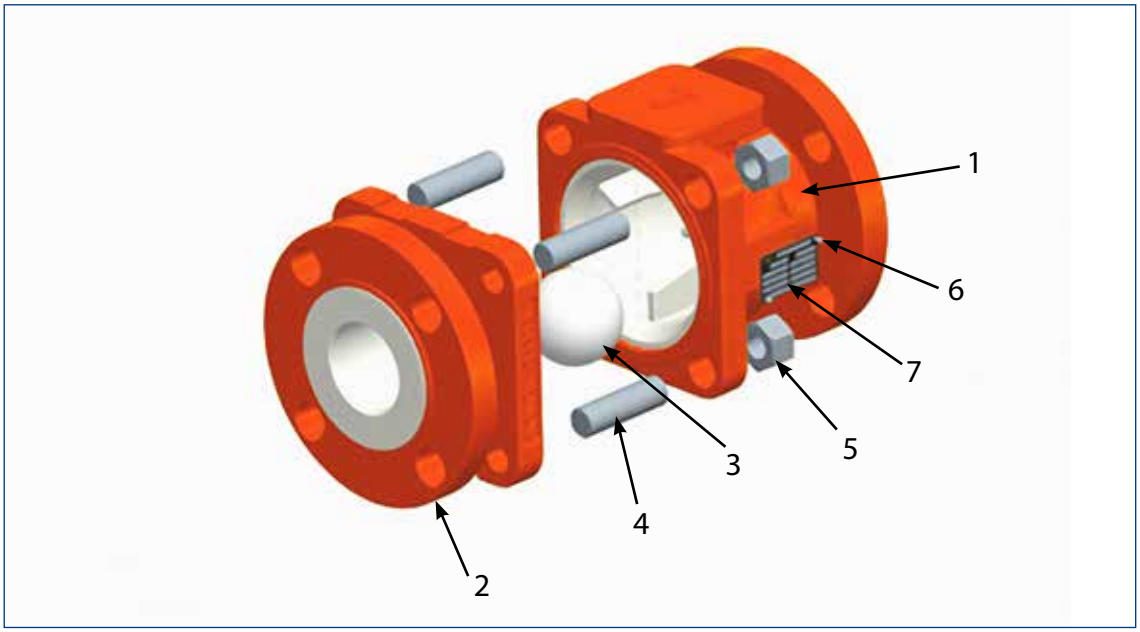
MEDIA TYPES										APPLICATION REQUIREMENTS									
Clean Liquids & Gases	Dirty Liquids & Gases	Corrosive Liquids & Gases	Hazardous Liquids & Gases	Viscous Liquids	Scaling Liquids & Slurries	Abrasive Slurries	Fibrous Slurries	Dry Materials	Vacuum Service	Horizontal Mounting	Vertical Mounting	Tight In-line Seal	Reduced Maintenance	Extended Service Life	Sizes	Pressure Ratings	High Temperature (ASME/EN)	Low Temperature (EN)	Low Temperature (ASME)	Key Benefit
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	½ " - 6" DN15 - DN150	Class 150 / PN16	400°F / 204°C	-10°C / 14°F	-20°F / -29°C	Safety / Economy

Source: Crane Engineering

● Superior Performance

● Limited Application (Consult Factory)

Materials of Construction



Item	Quantity	Part	Material
1	1	Body	Ductile Iron EN-JS 1049/60-40-18, ASTM A395, PFA Teflon® Lined
2	1	Flange	Ductile Iron EN-JS 1049/60-40-18 ASTM A395, PFA Teflon® Lined
3	1	Ball	Teflon® PTFE solid ball
4	4/6/8	Stud	EN and JIS Valves: A4-70, ASME Valves: A193 Grade B7
5	4/6/8	Nut	EN and JIS Valves: A4-70, ASME Valves: A194 Grade 2H
6	1	Tag	Stainless Steel
7	2	Tag Pin	Stainless Steel

XOMOX®

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Tufline® Lined Plug Valves

CRANE

ChemPharma Flow Solutions

www.cranechempharma.com

Contents **Page**

Tufline® 2-way and 3-way fully lined plug valves feature an encapsulated plug rotating in a fully lined body.

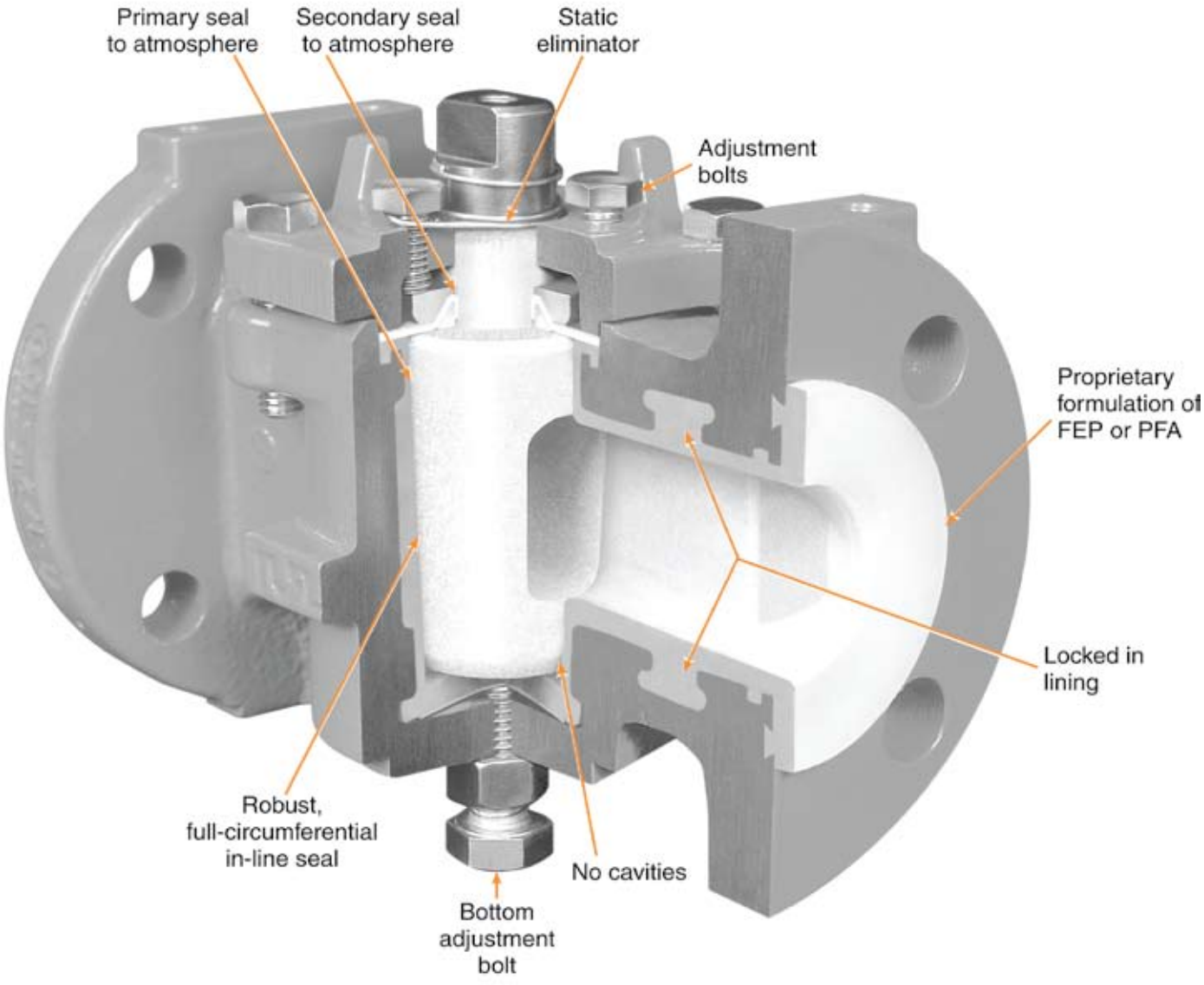
Superior PFA linings economically handle the most corrosive fluids.

Locked in lining.

Tufline lined valve bodies and plugs incorporate dovetail recesses. With these recesses and machined grooves, linings are locked to the body and plug.

The locked in lining resists shrinkage, collapse, and blow-out. Higher pressures and vacuums are easily handled.

(See page 4 for comparisons of various lining methods.)



Primary sealing.

A continuous primary seal results from the interaction of the tapered plug and the tapered body bore.

Cast-in ribs behind the body lining concentrate compression of the lining between the ribs and the plug. This assures a full circumferential in-line seal. There is also a full circumferential seal around the plug, both above and below the flow passage.

There are no cavities where flow media can accumulate or contaminate.

Easily adjusted seal.

The three adjusting bolts in the cover and the bottom adjustment bolt work together to assure a maximum sealing capability and an extended service life.

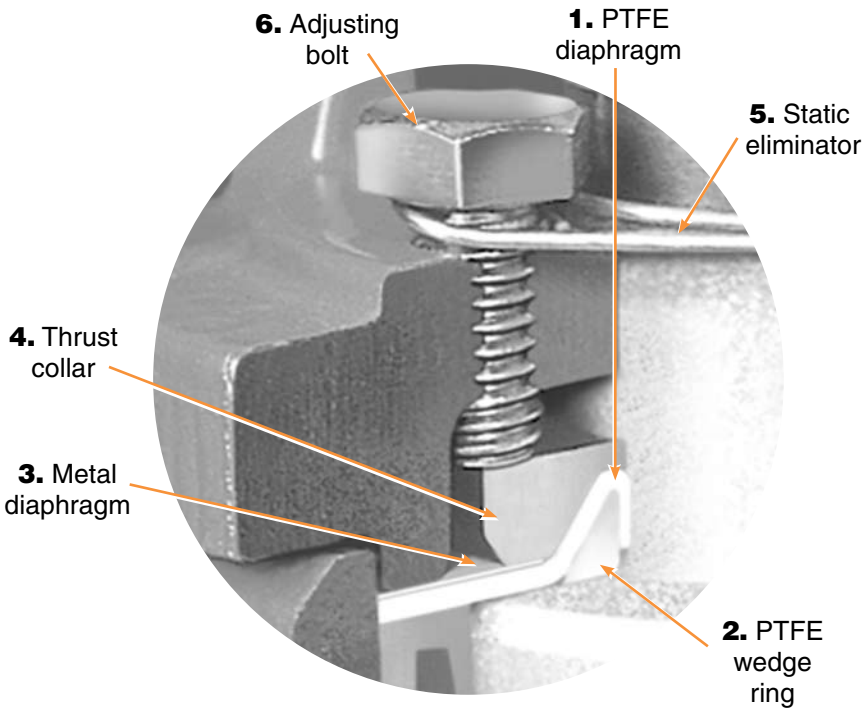
More information.

Application & Corrosion Data.
Xomox publishes a comprehensive, 12-page brochure which lists nearly 500 chemicals and the relative appropriateness of various valve materials.

This and much more in-depth information about the full line of Xomox valves and accessories is available on-line at **www.xomox.com.**

Xomox Regional Offices, and Authorized Distributors are also listed on the web site.

Secondary seal.



In addition to the primary seals, there is a secondary seal system consisting of interacting components.

The secondary stem seals, located above the plug, protect against external leakage up to 400°F.

1. The PTFE diaphragm is shaped into an inverted V at its inner circumference. It seals at the cover joint and against the plug shank.

2. To help assure positive sealing and easy adjustment, the PTFE wedge ring fits into the V-formed inner circumference of the PTFE diaphragm. Sealing force is transmitted from the thrust collar (4) through the wedge ring.

3. A metal diaphragm is above the PTFE diaphragm and wedge ring. This metal diaphragm provides metal-to-metal contact at the cover joint. This prevents cold-flow of the PTFE diaphragm.

This configuration provides two independent compression seals between the body and the cover. One seal is plastic; the second is metal.

4. On top of the metal diaphragm is a floating thrust collar which acts to assure uniform pressure on all sealing surfaces.

5. Above the cover, on the plug shank of wrench operated valves, is a static eliminator which provides a positive electrical ground between the body and the plug.

6. Three adjusting bolts in the cover impart downward force through the thrust collar (4), to the wedge ring (2), then to the inner leg of the inverted "V" of the PTFE diaphragm (1).

This, together with the opposing force of the plug, provides a pressure assisted seal which is not adversely affected by plug movement. The adjusting bolts also facilitate quick and easy adjustment of in-line sealing.

2-way, ANSI Class 150, fully lined plug valve.
Figure No. 061
½ - 12 inch . . . PFA lined.

2-way, ANSI Class 300, fully lined plug valve.
Figure No. 0361
1 - 6 inch . . . PFA lined.

3-way, ANSI Class 150, fully lined plug valve.
Figure No. 031
1 - 4 inch . . . PFA lined.

Most international flange ratings and drilling are available. Contact factory for more information.

Lining materials and methods.

For corrosive applications, both the choice of lining materials and the method of lining are critical considerations.

PFA lining material is melt-processible. Melt-processibility means that this lining material can be locked to the valve body and plug using cast-in dovetail recesses and machined grooves. (PTFE cannot be locked in.)

PFA's temperature ranges is:
PFA is rated to 400°F.

PFA properties include:
- Chemical inertness
- Excellent permeation resistance
- Negligible moisture absorption
- Stress-cracking resistance
- Low coefficient of friction
- Insolubility in solvents
- Low adhesion properties
- Wide service temperature range
- Toughness
- Flexibility

PFA.

PFA is a class of perfluoropolymers that offers the processing ease of conventional thermoplastics but substantially extends its temperature limits. It is a copolymer that combines the carbon-fluorine backbone of fluorocarbons with a perfluoroalkoxy side chain.

PFA is a true thermoplastic and is melt processible, allowing it to be molded to complex shapes.

PFA resin has a branched polymer chain that provides good mechanical properties at melt viscosities much lower than those of PTFE.

However, the unique branch in PFA is longer and more flexible, leading to improvements in high temperature properties, higher melting point, and greater thermal stability. The strength and stiffness of PFA at high operating temperatures are equivalent to or better than those of PTFE, and creep resistance is better than PTFE over a wide temperature range.

In addition to properties in common with PFA has been found to be better in handling some monomers, such as butadiene.

It can be molded and machined to close tolerances for excellent seal and wear resistance between parts.

Compare lining methods.

There are two ways to line valves, molding and forming. The lining method depends upon the lining material used.

PFA.

PFA is melt processible. This means that it can be precisely molded to the valve body and locked into place. Locking is accomplished by molding the lining into dovetail recesses or grooves in the valve body. The locking resists liner collapse.

PTFE.

Because of the limitations involved in conforming PTFE to the shape of the valve passage way, it is more vulnerable to failure.

PTFE is not melt processible. It does not become molten at elevated temperatures. Consequently, it cannot be molded in the same way as PFA. As a valve liner, PTFE is limited to the blow-molding method.

With blow-molding, PTFE cannot be "locked" into the valve body. PTFE is susceptible to separation from the valve body in several ways including blow-out, collapse, and creep.

PTFE at 2,000X

PFA at 10,000X

Compare porosity.

In PTFE, microscopic pores are present due to imperfect particle fusion during processing.

To compensate for PTFE's greater porosity, thicker linings must be applied. Because of PTFE's greater lining thickness, the lining is less flexible and sealing is less reliable.

More flexible, less porous PFA linings assure better sealing.

Picture proof.

The scanning electron microscope fractographs above illustrate the difference in valve lining materials.

PTFE.

In the photo at the left above, PTFE is magnified just 2,000 times.

The PTFE microscopic fissures are large enough to easily allow a wide variety of media to migrate through to the base metal.

PFA

In the photo at the right above, PFA is enlarged to 10,000X. This is five times greater magnification than the PTFE, yet no fissures are visible.

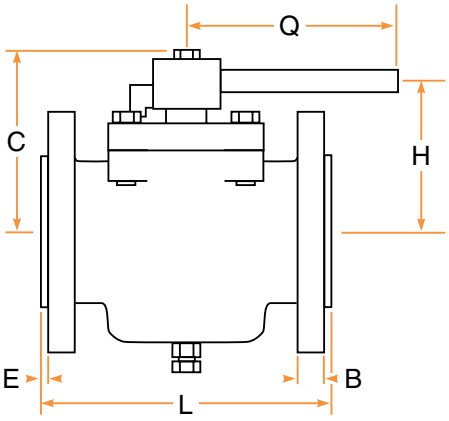
Tufline PFA is a proprietary formulation. Minute amounts of PTFE are added to enhance lubricity and assure free turning.

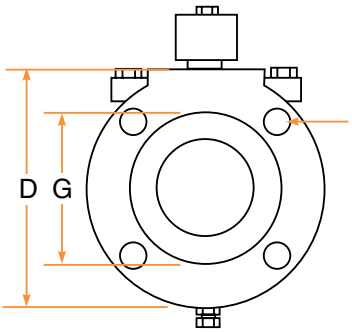
This small amount of PTFE has little or no affect on the superior lining characteristics of PFA.

Physical properties

	PFA Perfluoroalkoxy	
Property	ASTM method	Value
Melting point	-	575 - 590°F
Tensile strength, 73°F	D638	3,800 psi
Elongation, 73°F	D638	300%
Flexural modulus, 73°F	D790	100,000 psi
Impact strength, 73°F	D256	No break
Coefficient of linear thermal expansion per °F	D696	6.7×10^{-5} (70° to 212°F)
Flammability	D635	Nonflammable
Weather and chemical resistance	-	Excellent

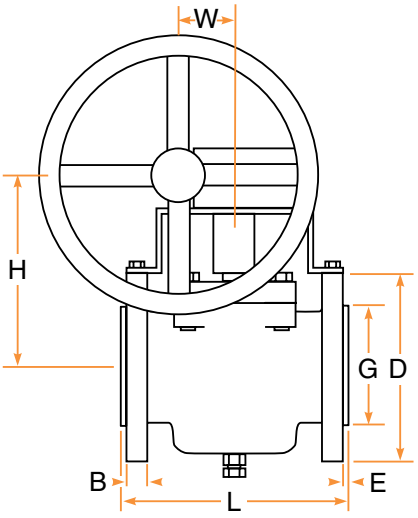
Class 150, 2-way, Fig. No. **061**
Class 300, 2-way, Fig. No. **0361**



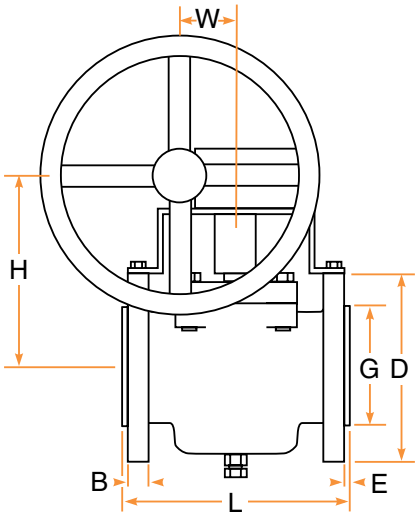


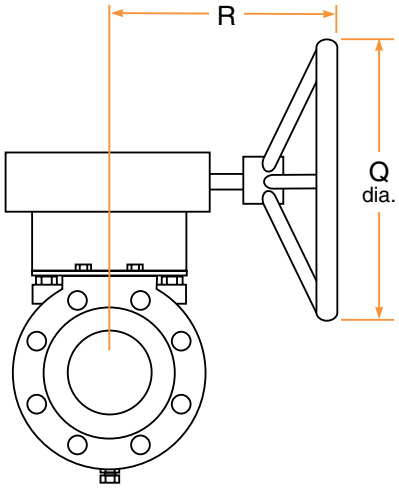
Flange bolting:
(N) Number of bolt holes
(O) Dia. of bolt holes
(P) Dia. of bolt circle

Class 150, 2-way, Fig. No. **061**
with enclosed gear

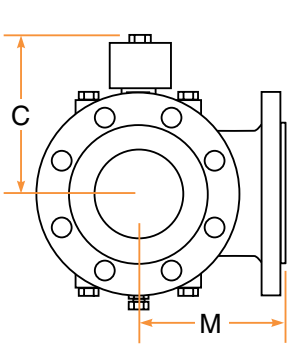


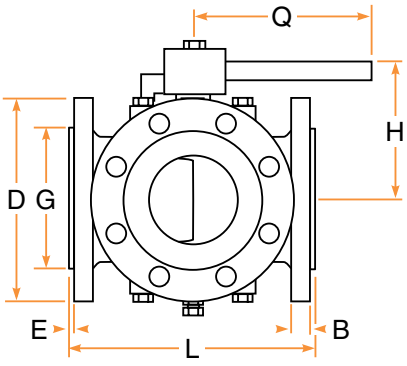
Class 300, 2-way, Fig. No. **0361**
with enclosed gear

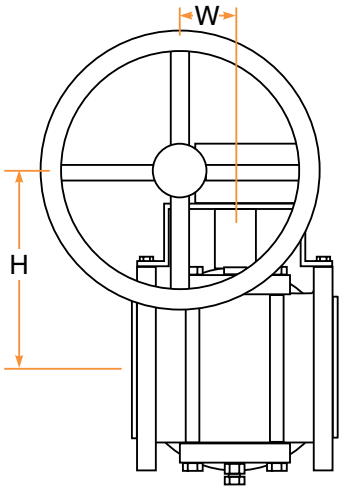




Class 150, 3-way, Fig. No. **031**







Dimensions with manual operators

Dimensions are in inches. Dimensions are nominal. For certified drawings contact factory.

Class 150, 2-way, Fig. No. **061** - with wrench

Size	L	C	H	D	B	G	E	Q	N	O	P	Wts.
1/2	4.25	4.03	3.09	3.50	.38	1.38	.09	7.75	4	.63	2.38	8
3/4	4.63	4.03	3.09	3.88	.41	1.68	.09	7.75	4	.63	2.75	9
1	5.00	3.75	2.88	4.25	.44	2.00	.19	7.75	4	.63	3.12	9
11/2	6.50	4.56	3.63	5.00	.56	2.88	.19	11.25	4	.63	3.88	15
2	7.00	5.13	4.00	6.00	.63	3.63	.19	17.00	4	.75	4.75	24
3	8.00	5.69	4.50	7.50	.75	4.75	.22	23.00	4	.75	6.00	30
4	9.00	7.06	5.75	9.00	.94	6.19	.22	29.00	8	.75	7.50	62

Class 150, 2-way, Fig. No. **061** - with enclosed gear

Size	L	H	D	B	G	E	Q	R	W	N	O	P	Wts.
4	9.00	8.75	9.00	.94	6.19	.22	12.00	8.00	2.06	8	.75	7.50	83
6	10.50	11.50	11.00	1.00	8.50	.15	18.00	10.38	2.62	8	.88	9.50	135
8	11.50	13.75	13.50	1.13	10.63	.16	18.00	10.38	2.62	8*	.88	11.75	229
10	13.00	13.38	16.00	1.19	12.75	.25	24.00	11.82	5.38	12*	1.00	14.25	362
12	14.00	15.13	19.00	1.25	15.00	.10	24.00	18.75	5.45	12*	1.00	17.00	516

*The 2 top and the 2 bottom flange holes are tapped for 3/4-10 UNC threads for 8" valves - 7/8-9 UNC threads for 10" & 12" valves.

Class 300, 2-way, Fig. No. **0361** - with wrench

Size	L	C	H	D	B	G	E	Q	N	O	P	Wts.
1	6.50	3.75	2.88	4.88	.69	2.00	.13	7.75	4	.75	3.50	13
11/2	7.50	4.56	3.63	6.12	.81	2.88	.13	11.25	4	.88	4.50	23
2	8.50	5.13	4.00	6.50	.88	3.63	.15	17.00	8	.75	5.00	32
3	11.13	5.69	4.50	8.25	1.12	5.00	.15	23.00	8	.88	6.63	42
4	12.00	7.06	5.75	10.00	1.25	6.19	.15	29.00	8	.88	7.88	88

Class 300, 2-way, Fig. No. **0361** - with enclosed gear

Size	L	H	D	B	G	E	Q	R	W	N	O	P	Wts.
4	12.00	8.75	10.00	1.25	6.19	.15	12.00	8.00	2.06	8	.88	7.88	117
6	15.88	11.50	12.50	1.44	8.50	.15	18.00	10.38	2.62	12	.88	10.63	221

Class 150, 3-way, Fig. No. **031** - with wrench

Size	L	C	H	D	B	G	E	Q	M	N	O	P	Wts.
1	5.00	3.75	2.88	4.25	.44	2.00	.13	7.38	3.50	4	.63	3.13	16
11/2	6.50	4.56	3.63	5.00	.56	2.88	.13	11.25	4.13	4	.63	3.88	21
2	7.00	5.13	4.00	6.00	.63	3.63	.15	23.00	4.50	4	.75	4.75	33
3	8.00	5.69	4.50	7.50	.75	4.75	.15	29.00	5.13	4	.75	6.00	47

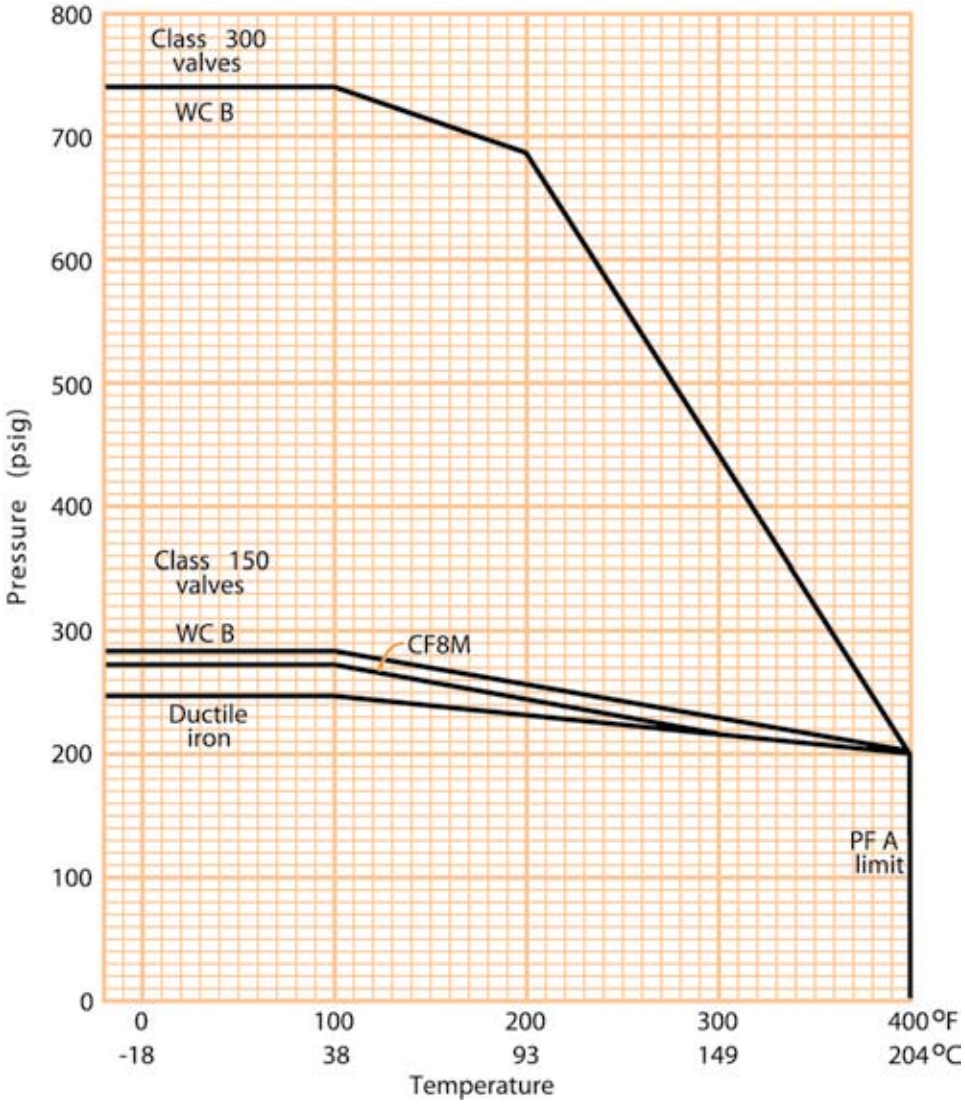
Class 150, 3-way, Fig. No. **031** - with enclosed gear

Size	L	H	D	B	G	E	Q	R	M	W	N	O	P	Wts.
4	9.00	9.06	9.00	.94	6.19	.15	12.00	8.88	6.53	2.62	8	.75	7.50	96

2-way operating torques (inch-lbs) & Cv factors for sizing 2-way valves.

Size	061, 0361 Break Torques	Cv Factors
1/2	260	9
3/4	260	9
1	400	43
1 1/2	600	89
2	800	172
3	1200	294
4	1800	548
6	4800	1075
8	15000	1591
10	17000	2159
12	21000	3200

Pressure-temperature ratings.



Methods of operation.

Wrench handles.

For valves 1-inch through 4-inch, a wrench handle is standard. The handle can be positioned for one-hand operation or as a “T” wrench for two-hand operation.

45° hubs.

Hubs can be supplied with the handle hole drilled at a 45° angle. This permits free movement of handles when valves are installed close together, as in a manifold.

The 45° angle is also useful for chain operation when the valve is installed in an elevated position on its side.

Hubs can be adapted to receive extended wrenches of desired heights for applications such as pit installations.

Wrench - hub configuration.
The wrench hub slips over the plug shank. It is keyed in place horizontally by the machined parallel flats at the top of the shank. It is locked in place by a vertical bolt through the hub cap and the wrench handle into the plug shank. The hub cap provides additional shielding protection for the valve and adjusting screws and also holds the wrench handle firmly in place. A nameplate is secured to the hub cap. It indicates the valve figure number, manufacture date, body material, plug material, valve size, ANSI class, maximum PSI/@max°F. On multiport valves, the direction of flow and type of plug are indicated.

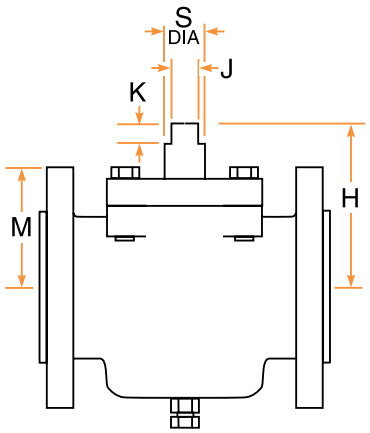
Enclosed gear actuators.

Six and eight inch valves (and smaller valves if requested) are supplied with enclosed worm gear actuators. The figure numbers have the suffix “EG” to indicate enclosed gear actuation. This actuator includes a robust ductile iron housing, right angle gearing, factory lubrication, adjustable travel stops, and a handwheel. A crank handle is also available.

Actuators.

Tufline lined valves are easily adapted to various modes of remote pneumatic or electrical actuation. Flat mounting pads are cast in the top of each flange, making mounting of actuators easy and secure. Matryx® rack & pinion, vane, and electric actuators provide efficient quarter turn operation of Tufline lined valves.

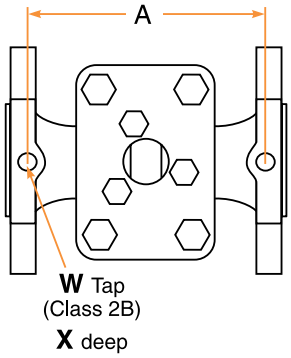
Actuator mounting dimensions



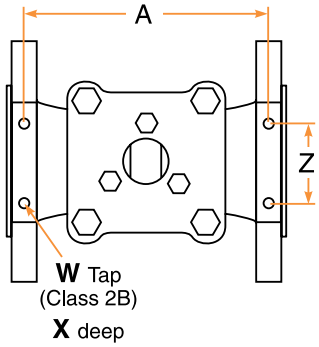
Size	H	K	J	S
1/2	2.75	.50	.438	.62
3/4	2.75	.50	.438	.62
1	2.50	.32	.438	.63
11/2	3.06	.44	.563	.88
2	3.56	.53	.750	1.13
3	4.13	.53	.750	1.13
4	5.03	.78	.875	1.25
6	7.35	1.00	1.398	2.00
8	9.44	1.00	1.673	2.50
10	10.81	1.00	1.673	2.50
12	11.75	1.00	1.968	3.00

Size	Fig. No. **061** M	Fig. No. **0361** M	Fig. No. **031** M
1/2	2.06	–	–
3/4	2.06	–	–
1	2.13	2.44	2.13
11/2	2.50	3.06	2.50
2	3.00	3.25	3.00
3	3.75	4.13	3.75
4	4.63	5.13	4.63
6	5.50	6.25	–
8	6.75	–	–
10	8.00	–	–
12	9.50	–	–

2 hole actuator mounting



4 hole actuator mounting



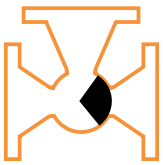
	Size	W	X	Z
2 Hole Pattern	1/2	5/16-18	.50	–
	3/4	5/16-18	.50	–
4 Hole Pattern	1	5/16-18	.38	1.75
	11/2	5/16-18	.47	1.75
	2	5/16-18	.47	2.25
	3	3/8-16	.56	3.50
	4	7/16-14	.63	4.00
	6	7/16-14	.63	4.00
	8	1/2-13	.63	6.00
	10	1/2-13	1.00	6.00
	12	1/2-13	1.00	6.00

Size	Fig. No. **061** A	Fig. No. **0361** A	Fig. No. **031** A
1/2	3.62	–	–
3/4	3.75	–	–
1	4.19	5.75	4.19
11/2	5.63	6.63	5.63
2	6.19	7.56	6.19
3	7.13	9.94	7.13
4	7.88	10.69	7.88
6	9.44	14.00	_
8	10.19	–	_
10	11.06	–	_
12	12.53	–	_

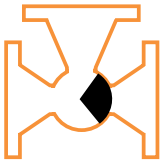
Full dimensions for valve and actuator assemblies are available.

Operating torques, port arrangements, and Cv factors for sizing **031** 3-way valves.

Size	Break Torques (inch-lbs)
1	800
11/2	1200
2	1600
3	2400
4	3600

C	Position 1, 0° 	Position 2, 90° 	Position 3, 180° 
Size	Cv factors	Cv factors	Cv factors
1	25	31	25
11/2	47	52	47
2	87	105	87
3	123	160	123
4	211	335	211

AX	Position 1, 0° 	Position 2, 90° 
Size	Cv factors	Cv factors
1	28	28
11/2	50	50
2	90	90
3	164	164
4	275	275

D	Position 1, 0° 	Position 2, 90° 	Position 3, 180° 
Size	Cv factors	Cv factors	Cv factors
1	25	27	25
11/2	47	50	47
2	87	94	87
3	123	133	123
4	211	228	211

Quality assurance.

Tufline liners are dielectrically spark tested at 20,000 volts in accordance with ASTM D5162 specifications.

Valves are available specifically tested and tagged to indicate conformity to ANSI B16.34 or B16.42 shell tests and MSS SP-61 seat test requirements.

Actuators.

Tufline fully lined valves can be supplied with a variety of manual, pneumatic or electric actuators.

Vacuum service.

Tufline fully lined valves are satisfactory for vacuum service as low as .01 microns in absolute pressure. However, special cleaning is required to achieve this rating. Vacuum ratings have been established by independent laboratories using helium leak tests on mass spectometers.

Custom designs and modifications.

The products featured in this catalog may be obtained in other sizes and materials from the Tufline Special Products Group, which offers design, engineering and manufacturing services for custom products and modifications.

Oxygen and chlorine valves.

Valves designated for oxygen or chlorine service are thoroughly cleaned, tested and dried per internal Tufline oxygen and chlorine standards. Flanges are then sealed and valves are packaged in plastic containers.

Locking device.

Tufline lined plug valves can be supplied with a variety of locking devices: plate locking device (PLD), extended locking device (ELD), and low profile locking device (LLD).

Quick reference selection table.

No. of Ports	ANSI Class	Liner	Size Range	Body*	Plug*	Figure Number
2	150	PFA	1/2 - 12	316SS	316SS	061
			1/2 - 3/4	DI	CD4MCu	061
			1 - 8	DI	DI	061
			10 - 12	WCB	DI	061
	300	PFA	1 - 6	WCB	DI	0361
3	150		1 - 4	DI	DI	031

* Contact factory for alternative materials.

How To Specify

Size | Figure No. | Options | Body | Body Liner | Plug | Plug Liner | Operator | Service

3″ - 061 - TFM - 1 - P6 - 1 - P6 - L - C

Size & Figure No.

ANSI 150 1/2″ -12″. **061**
ANSI 300 1/2″ -10″. . . . **0361**
ANSI 150, 3-Way 1″ - 4″. **031**

Options

Port Arrangements
for 3-way valves
(See page 10) . . **AX, C,** or **D**
Tertiary Top Seal. . . . . **TS**
Tufline-475 Top Seal . . . **TFM**
Ends prepared for
Resistoflex HIF system . . **HIF**
No Options . . . . . **Blank**

Body

Ductile Iron . . . **1**
Carbon Steel . . **2**
316 Stainless . . **6**
Alloy 20 . . . . . **0**
D4MCu **27**
Other . . . . . **X**

Body Liner

PFA **P6**
PFA (Unpigmented) . **P6X**

Plug

Alloy 20 . . . . . **0**
Ductile Iron . . . **1**
Carbon Steel . . **2**
316 Stainless . . **6**
Hastelloy B . . . **8**
Hastelloy C . . . **9**
CD4MCu **27**
Titanium **33**
Other . . . . . **X**

Plug Liner

PFA **P6**
PFA (Unpigmented) . **P6X**
Unlined plug **0**

Operator

No operator . . **N**
Wrench . . . . **W**
Wrench with extended hub . . . . **EH**
Wrench with locking device . . . **WY**
Wrench with extended locking device . **ELD**
Gear . . . . . **G**
Gear with locking device . . . . . **GZ**
Actuator* . . . **A**
Other . . . . . **X**

* Specify actuator type and air supply.

Service

Chlorine . . **C**
Oxygen . . **O**
Vacuum . . **V**
General Service . . . **Blank**
Other . . . **X**

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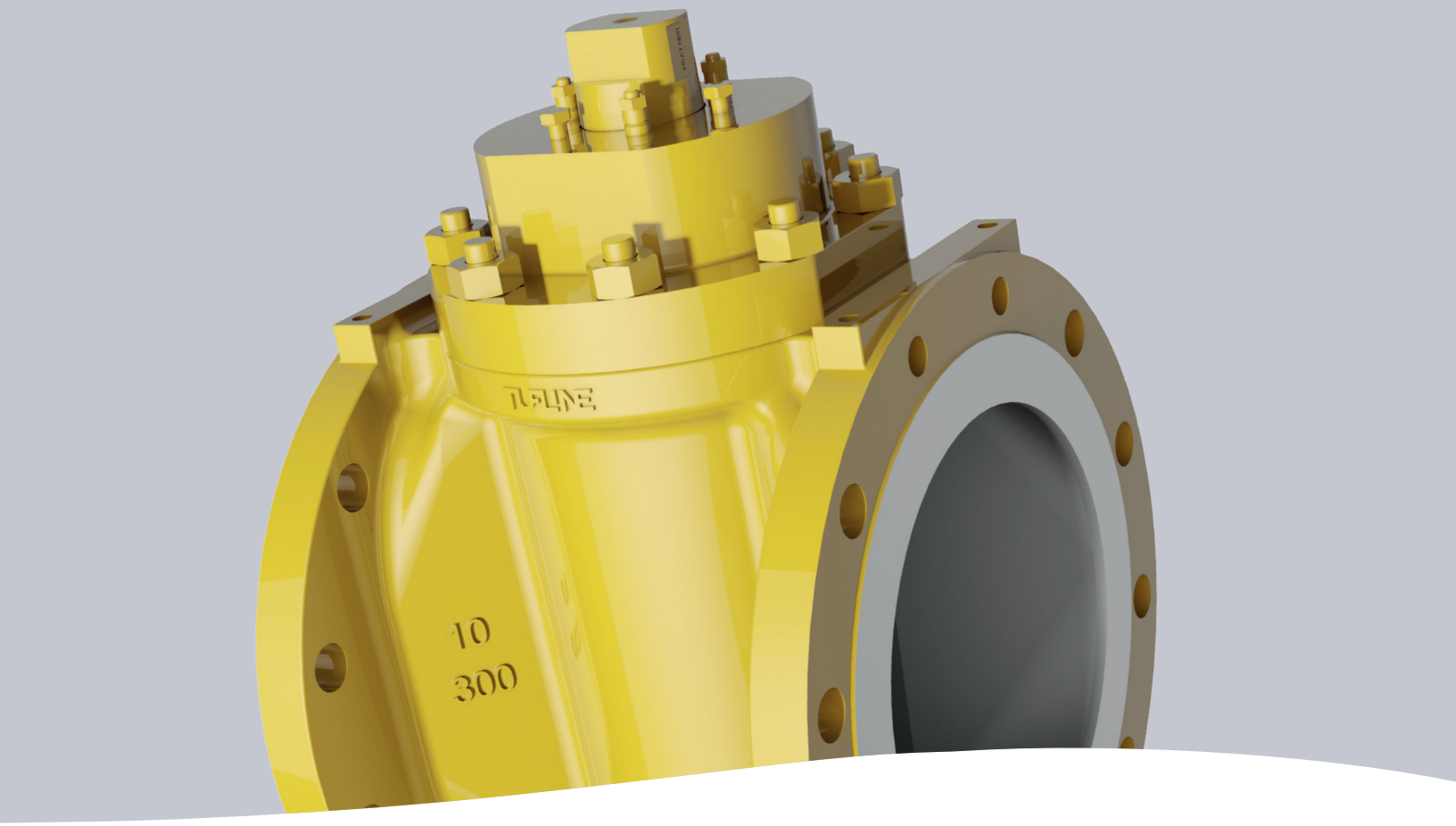

XOMOX® Sleeved Plug Valves
Hydrofluoric Alkylation (HF) Valves

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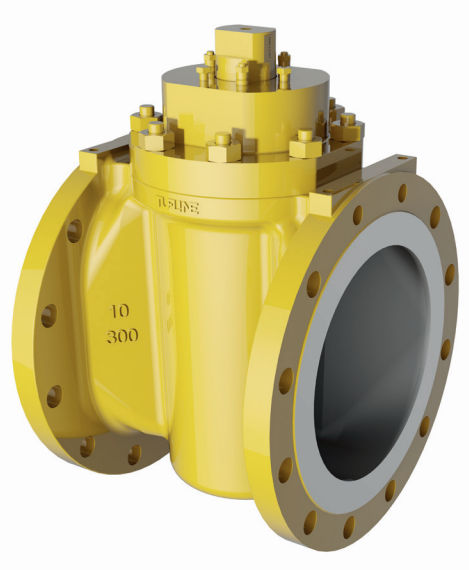
XOMOX® Hydrofluoric Alkylation Valves

XOMOX® Tufline® Sleeved Plug Valves (SPV)

XOMOX® Tufline® SPV HF valves have a long and successful history in HF refineries around the world. Tight and secure in-line sealing, cavity freeness and self-cleaning characteristics have enabled successful performance throughout the years.

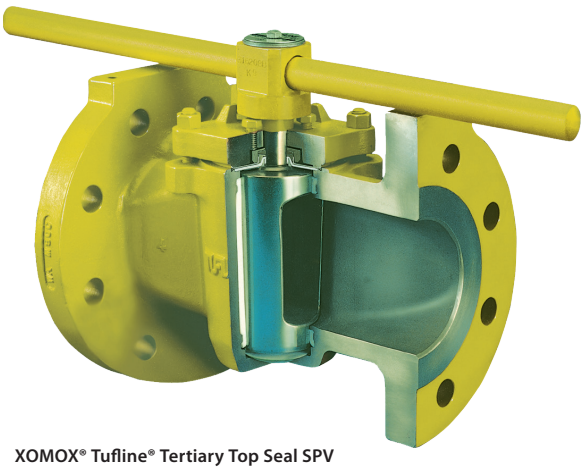
Along with our existing XOMOX® Tufline® Tertiary Top Seal design our latest XOMOX® HF4D Low Emission SPV provides higher and more reliable emissions performance for these demanding applications.



XOMOX® HF4D Low Emission SPV

XOMOX® HF4D Low Emission SPV meets the highest emission standards in the industry for HF applications:

- API 641 Class B & E certified under 100 ppm
- ISO 15848-1 BH CO3 392°F/200°C SSA 0



XOMOX® Tufline® Tertiary Top Seal SPV

XOMOX® Tufline® Tertiary Top SPVs

Are listed in UOP & ConocoPhillips Petroleum Company's HF Alkylation Process Design Specification Manual. This Top Seal design meets EPA Method 21

ISO 15848 Standard Introduction

International Organization for Standardization

INTERNATIONAL .....ISO
STANDARD 15848-1

ISO 15848-1 is an International standard for fugitive emissions issued by the ISO Organization. It contains both dynamic life cycles and thermal cycles and is considered one of the most demanding fugitive emission standards for soft seated valves. This standard contains different levels of acceptance based on the number of thermal and mechanical cycles, temperature, and number of adjustments. The objective of ISO 15848-1 is to enable classification of performance in different designs and constructions of valves to reduce fugitive emissions.

Example Description Tables

(200°C)

ISO 15848 – 1 BH CO3 392°F – SSA 0

Part Composition	
Part 1: Design • **System of classification and procedures of qualification for the tests of the valve type**	Part 2: Industrial (Production) • Acceptance tests in production of the valves • Non-destructive

Number of Adjustments
0 / 1 / 2 / 3

Temperature Classes				
(T -196 °C)	**(T -40 °C)**	**(T RT)**	**(T 200 °C)**	**(T 400 °C)**
-320°F	-40°F	Room temperature, °F	**392°F**	752°F
-196°C	-40°C	Room temperature, °C	**200°C**	400°C

Class	Measured Leak Rate [a] mg s^{-1} m^{-1}	Remarks
A[b]	$\leq 10^{-6}$	Typically achieved with bellow seals or and equivalent stem (shaft) sealing system for quarter turn valves
B	**$\leq 10^{-4}$**	**Typically achieved with PTFE based packings or elastomeric seals**
C	$\leq 10^{-2}$	Typically achieved with flexible graphite based packings

[a] Expressed in mg s-1 m-1 measured with total leakage method
[b] Class A can be measured only with helium using the vacuum method

Classification	Minimum number of mechanical cycles
C01	500 cycles, with two thermal cycles (except for RT)
C02	1,500 cycles, with three thermal cycles
C03	**2,500 cycles, with four thermal cycles**

Test Fluid	Class
H - Helium	**AH, BH, CH**
M - Methane	BM, CM

When the test fluid is **helium**, classes are identified as **AH, BH** and **CH**.
When the test fluid is **methane**, classes are identified as **BM** and **CM**.

Manufacturing valves will be subjected to the ISO 15848-2 test as described in the norm. This is a non-destructive test that intends to address the performance of the valves (Please refer to ISO 15848 norm).

XOMOX

API 641 Standard Introduction

energy API
AMERICAN PETROLEUM INSTITUTE

API 641 standard specifies the requirements and acceptance criteria for fugitive emission type testing of quarter-turn valves, issued by API Organization. Type testing requirements contained are based on elements of EPA Method 21.

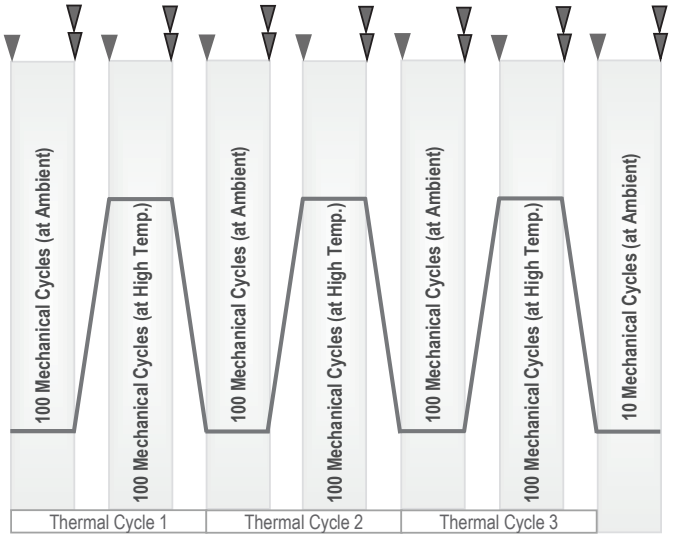
API 641 Class B & E

Class A	Valve pressure rating at 260° C (500° F) is ≥ 41.1 barg (600psig)	Valve Temperature Rating ≥ 260° C (500° F)
Class B	**Valve pressure rating at 260° C (500° F) is < 41.1 barg (600 psig) and ≥ 6.89 barg (100 psig)**	
Class C	Valve with a temperature rating ≥ 260° C (500° F) and does not comply with the requirements of Group A or Group B	
NOTE Valves with a pressure rating less than 6.89 barg (100 psig) at ambient temperature are outside the scope of this standard		

Class D	Valve pressure rating at its maximum-rated temperature is ≥ 41.1 barg (600 psig)	Valve Temperature Rating < 260° C (500° F)
Class E	**Valve pressure rating at its maximum-rated temperature is < 41.1 barg (600 psig) and ≥ 6.89 barg (100 psig)**	
Class F	Valve with temperature rating < 260° C (500° F) and does not comply with the requirements of Group D or Group E	
NOTE Valves with a pressure rating less than 6.89 barg (100 psig) at ambient temperature are outside the scope of this standard		

API 641 will always consider cycles:

- Valves shall be subjected to a total of 610 mechanical cycles and 3 thermal cycles
- Mechanical and thermal cycling shall begin with the valve at ambient level.
- Test has been performed by using Methane as the test medium.



XOMOX® Tufline® HF4D
Low Emission Sleeved Plug Valves (SPV)

The first Sleeved Plug Valve for HF applications capable of passing four (4) thermal cycles with ZERO packing adjustments.

Key Features & Benefits

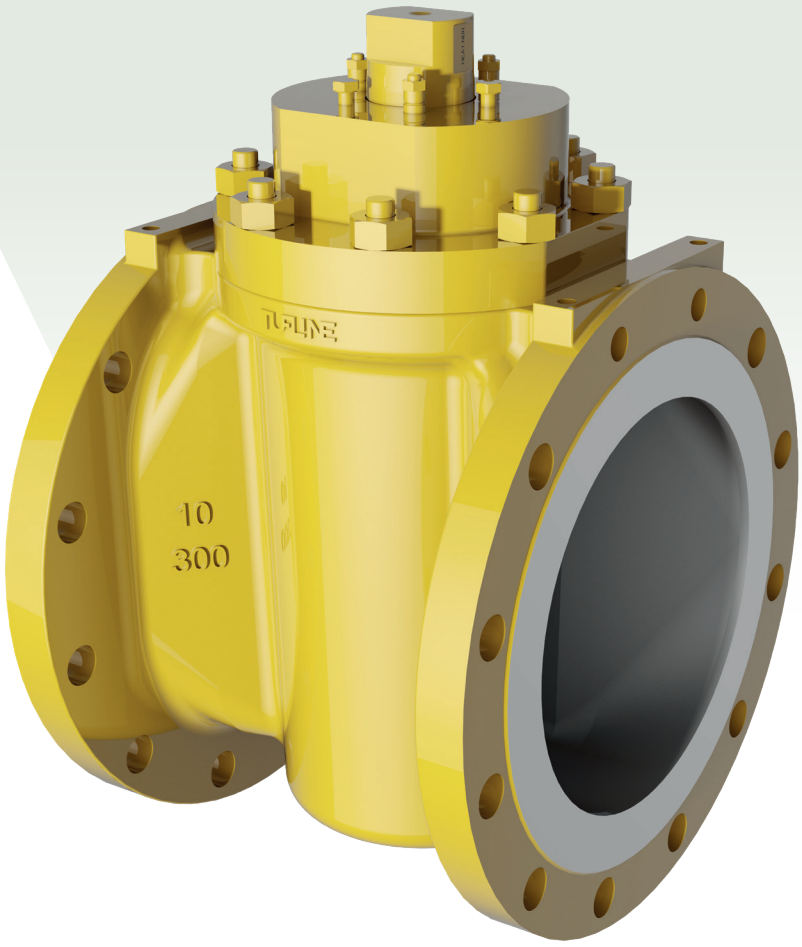
1. Innovative stem seal design permits best in class FUGITIVE EMISSIONS CONTROL (ISO 15848-1 BH CO3 392°F or 200°C SSA 0).
2. Live-loaded design optimizes sealing performance (self-adjusted) and extended service life with ZERO PACKING ADJUSTMENTS through thermal cycling.
3. MAINTENANCE and CAVITY FREE: No costly lubrication, no sticking, and no contamination of process media.
4. ADDITIONAL 4D STEM PACKING ensures manual adjustment capabilities on the 4th sealing barrier to atmosphere.

XOMOX® HF4D LIVE-LOADED STEM CARTRIDGE SEAL

The new XOMOX® HF4D Soft Seated Sleeved Plug Valve incorporates a Live-loaded Stem Cartridge which enables to meet the most stringent emissions standards in the industry.

Options:

- All current XOMOX® sleeve material options are available – PTFE, Tufline-475, XeniTh.
- Full port configuration available.
- Firetest according to API 607 7th edition.
- HF4D is certified to API 641 Class B and E and ISO 15848-1 BH CO3 392°F/200°C SSA 0 .



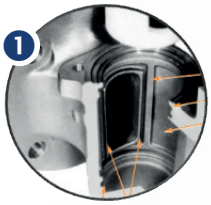
XOMOX® Tufline® HF4D
Low Emission SPV Features and Benefits

HF4D Sleeved Plug Valves are the first valves capable to pass all four thermal cycles without any packing adjustments, while meeting the ISO 15848-1 standard at the BH CO3 392°F/200°C SSA 0. The XOMOX® HF4D Sleeved Plug Valves contain the same live loaded stem cartridge as the XP3 design, while also adding fourth adjustable stem seal. This additional set of packing allows for a manual override of the seal to atmosphere which can be achieved with the adjustable 4D stem seal adjustment studs and nuts at the cover.

The HF4D design incorporates the same features and benefits of the standard XOMOX® Sleeve Plug Valve by being maintenance and cavity-free. These valves require no costly lubrication and prevent accumulation or contamination of process media, reducing maintenance costs and the cost of ownership over time.

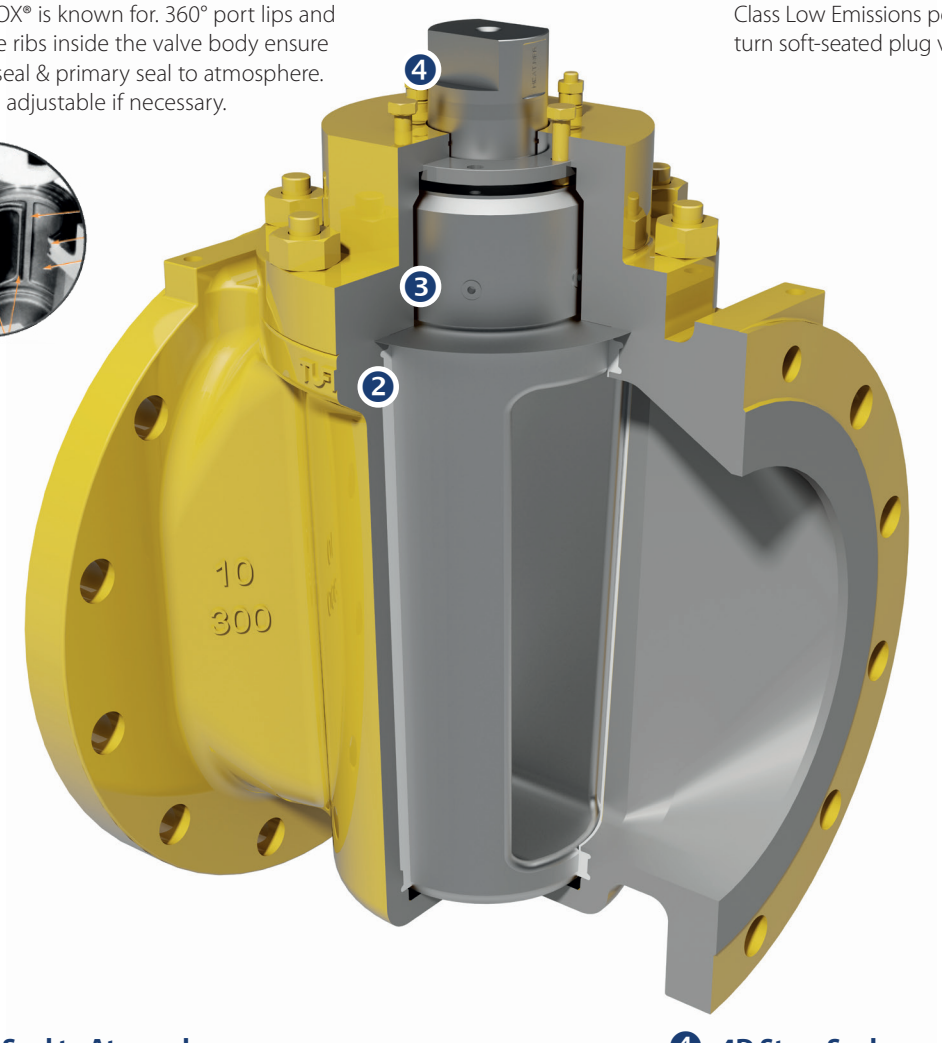
1 Primary Seal to Atmosphere

The HF4D utilizes the same proven sleeve & body design XOMOX® is known for. 360° port lips and high pressure ribs inside the valve body ensure tight in-line seal & primary seal to atmosphere. Plug remains adjustable if necessary.



3 Tertiary Seal to Atmosphere

NEW Live-Loaded Stem Cartridge delivers World Class Low Emissions performance in a quarter-turn soft-seated plug valve.



2 Secondary Seal to Atmosphere

NEW Reinforced spiral wound gasket together with the wedge ring & plastic diaphragm, that are in place on our existing product, ensure another layer of protection to stem seal and body cover joint.

4 4D Stem Seal

NEW Manual override for atmospheric sealing. 4D Stem Seal is to answer some customer requirements in the industry.

XOMOX® Tufline® HF4D
Low Emission SPV Features and Benefits

5 Patented live-loaded stem cartridge design

Optimizes sealing integrity to atmosphere and extended service life. 4D stem packing design for manual override capabilities

HF4D maintains all design features of current XOMOX® Tufline® SPV

- Re-inforced body cover joint gasket for emissions-proof valves.
- 360° port lips on body prevent cold flow and deformation of the sleeve, eliminating the chances that the sleeve will rotate during thermal cycling.
- End connection options available – flanged, threaded or socket weld end.
- All sleeve materials are available.

MEETING BEST IN CLASS FUGITIVE EMISSION STANDARDS

ISO 15848-1 BH CO3 200°C/392°F

- Tightness class BH (<0-4 mg/(s x m))
- Endurance class CO3
- Temperature class RT to 200°C/392°F
- Adjustments: SSA 0 (zero packing adjustments)

ISO International Organization for Standardization

Option:
API 641 Class B and E
(200°C/392°F) (260°C/ 500°F)

energy API
AMERICAN PETROLEUM INSTITUTE

XOMOX® Tufline® HF4D
Low Emission SPV for every HF Application

XOMOX® HF4D valves can be ordered with different options, such as end connections or in full port, depending on your applications.

HF4D is offered in Monel which is particularly designed for HF application requirements.

Standard Materials of Construction

Part	Material	Additional Material Notes
4D Packing Adjustment Studs / Nuts	ASTM B164 Monel 400 / ASTM B164 Monel 405	
Plug Adjusting Bolts	ASTM B164 Monel 400	
Cover	ASTM A216, Grade WCB w/ S16 supplemental requirements	Radiography per ASTM E446 & ASTM E186. Impact Tested at -29°C
Cover Bolts / Studs & Nuts	ASTM A193, Grade B7M / ASTM A194, Grade 2HM	100% Indentation Hardness Tested
Weatherseals	EPDM	
Live Loaded Device	AISI 6150 (1.8159) with Geomet 321 Coating	
Fire Tested Cartridges	ASTM A494, Grade M-35-1 / (2.4360.10 & N04400)	
Metal Diaphragm	(Monel) Alloy 400	
Stem Seal Ring	Braided Graphite	
Formed Diaphragm	Virgin PTFE	
Wedge Ring	Virgin PTFE	
Body-Cover Joint Gasket	Graphite/PTFE Blend with (Monel) Alloy 400 Trim Band	
Plug	ASTM A494, Grade M-35-1	Liquid Penetrant Examination per ASTM A165
Sleeve	All XOMOX® sleeve materials	
Body	ASTM A494, Grade M-35-1	Radiography per ASTM E446 and ASTM E186
Paint	HF Acid Detection Paint	
Tag	304 Stainless Steel	
Plastic Cable Tie	Plastic	
Mounting Kit	Painted Carbon Steel	
Stem Drive Compensators / Adaptors	Carbon Steel	
Hub / Wrench	ASTM A216, Grade WCB / Painted C.R.S.	

XOMOX® SPV HF4D –
Valve components view

Reference of Available Configurations*

Size (in.)	ASME Class	Figure Number	Flanged End	Threaded End
1/2 to 12	300	0367HF4D	x	
1/2 to 1	300	0366HF4D-SE		x
2 to 12	300	20367HF4D	x	

*Consult factory for additional configurations

XOMOX® HF4D
Full Port

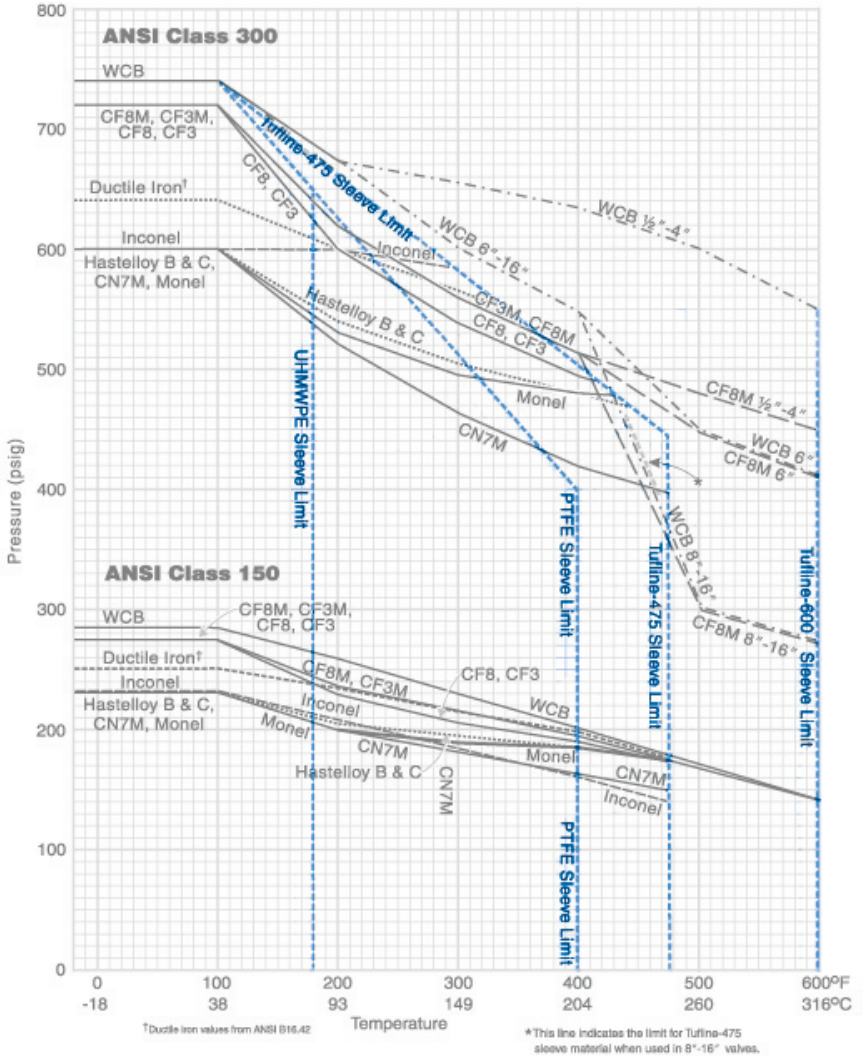
XOMOX® HF4D
Threaded End

XOMOX® Tufline® HF4D
Low Emission SPV Properties and Characteristics

HF4D Break Torque - Class 300 [in*lbs]

Size	PTFE/PTFEX		%R-PTFE Sleeve		PTFEXC/XeniTh Sleeve		UHMWPE/PFA Sleeve	
	Std	Built Dry	Std	Built Dry	Std	Built Dry	Std	Built Dry
½" & ¾"	163	244	204	305	214	326	326	478
1"	458	692	580	865	621	936	916	1384
1 ½"	916	1384	1150	1730	1242	1863	1842	2758
2"	1262	1893	1578	2372	1710	2565	2534	3797
3"	1384	2066	1730	2585	1863	2799	2758	4143
4"	2758	4143	3450	5181	3725	5588	5517	8285
6"	5751	8621	7186	10779	7766	11644	11502	17252
8"	8967	13456	11217	16815	12112	18168	17944	26912
10"	16560	24845	20703	31054	22352	33538	33120	49681
12"	24153	36225	30189	45284	32601	48907	48296	72450

If any additional information is required, please contact your sales representative or customer service.



XOMOX® Tufline® HF4D
Low Emission SPV Dimensional Data

Bare Stem Operated

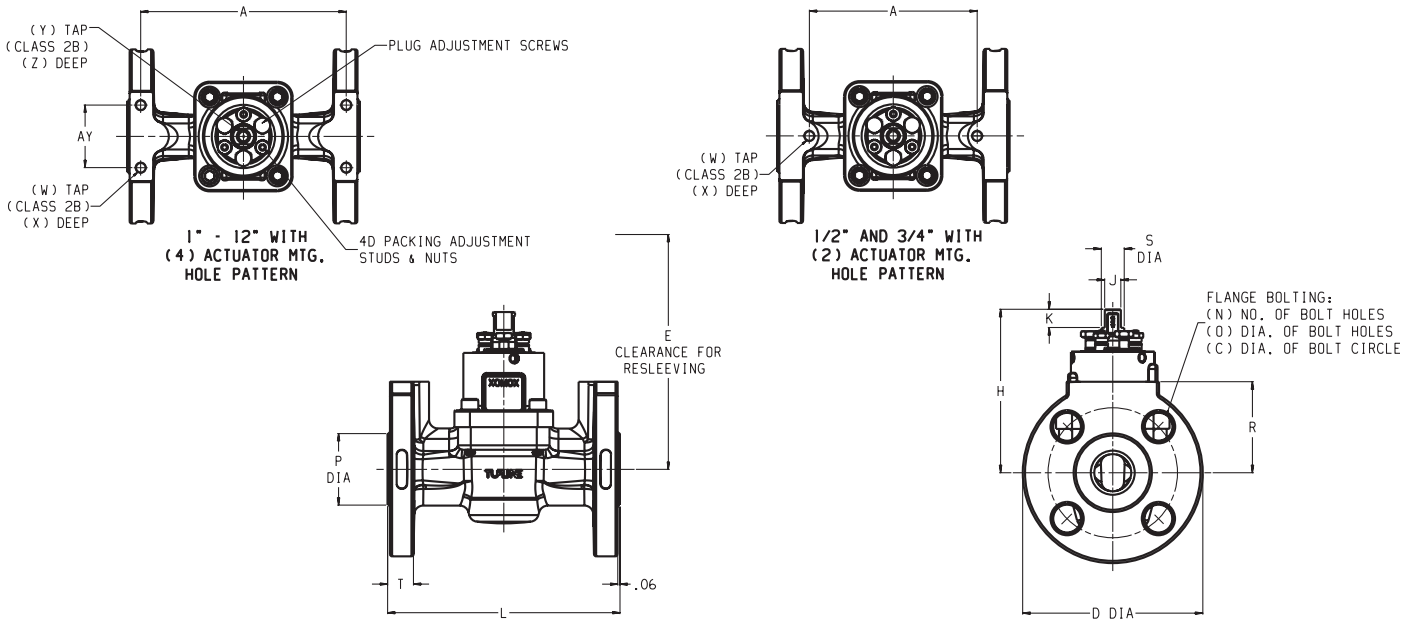


Figure 0367HF4D Class 300

SIZE	L	D	T	R	N	O	C	W
1/2"	5.50	3.75	.56	1.88	4	.63	2.63	6.6
3/4"	6.00	4.63	.63	2.31	4	.75	3.25	9.9
1"	6.50	4.88	.69	2.44	4	.75	3.50	12
1-1/2"	7.50	6.13	.81	3.06	4	.88	4.50	22
2"	8.50	6.50	.88	3.25	8	.75	5.00	29
3"	11.13	8.25	1.13	4.13	8	.88	6.63	40
4"	12.00	10.00	1.25	5.13	8	.88	7.88	84
6"	15.88	12.50	1.44	6.25	12	.88	10.63	170
8"	16.50	15.00	1.63	7.50	12	1.00	13.00	275
10"	18.00	17.50	1.88	8.75	16	1.13	15.25	407
12"	19.75	20.50	2.00	10.25	16	1.25	17.75	556

(4) ACT. MTG. HOLE PATT.			
A	AY	W	X
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5.570	1.750	5/16 - 18	.38
6.625	1.150	5/16 - 18	.47
7.563	2.250	5/16 - 18	.47
9.938	3.500	3/8 - 16	.56
10.688	4.000	7/16 - 14	.63
14.000	4.000	7/16 - 14	.63
14.625	6.000	1/2 - 13	.63
15.688	6.000	1/2 - 13	.63
17.375	6.000	1/2 - 13	.63

(2) ACT. MTG. HOLE PATT.		
A	W	X
4.375	5/16 - 18	.47
3.750	5/16 - 18	.47
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Figure 0367HF4D Class 300

SIZE	H	S	J	K	P	E	Y	Z
1/2"	4.591	.537	.437	.500	1.38	8.68	1/4 - 20	.91
3/4"	4.591	.537	.437	.500	1.69	8.68	1/4 - 20	.91
1"	4.433	.620	.437	.500	2.00	8.93	1/4 - 20	.91
1-1/2"	5.456	.848	.563	.530	2.88	10.43	5/16 - 18	.91
2"	6.067	1.102	.755	.748	3.63	11.63	5/16 - 18	.91
3"	6.598	1.102	.755	.748	3.63	11.63	5/16 - 18	.91
4"	8.054	1.260	.880	1.000	6.19	24.83	5/16 - 18	.91
6"	9.590	2.008	1.398	1.000	10.63	30.47	5/16 - 18	.91
8"	11.795	2.008	1.398	1.000	10.63	30.47	5/16 - 18	.91
10"	13.291	2.500	1.673	1.000	12.75	31.47	1/2 - 13	.91
12"	14.315	2.992	1.968	1.000	15.00	37.53	1/2 - 13	.91

All dimensions in inches. Weight of valve in pounds. All weights are estimated.

XOMOX® Tufline® HF4D
Low Emission SPV Dimensional Data

Wrench Operated

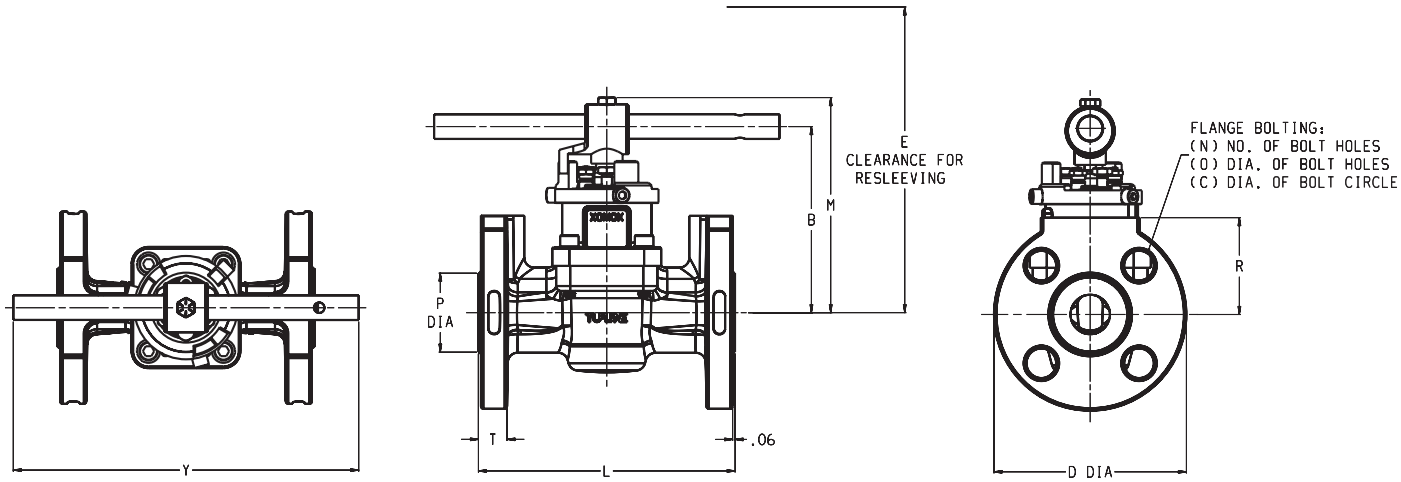


Figure 0367HF4D Class 300

SIZE	L	D	T	P	R	N	O	C	E	M	B	Y	W
1/2"	5.50	3.75	.56	1.38	1.88	4	.63	2.63	8.68	5.61	4.89	8.75	8.6
3/4"	6.00	4.63	.63	1.69	2.31	4	.75	3.25	8.68	5.61	4.89	8.75	12
1"	6.50	4.88	.69	2.00	2.44	4	.75	3.50	8.93	5.45	4.73	8.75	14
1-1/2"	7.50	6.13	.81	2.88	3.06	4	.88	4.50	10.43	6.62	5.79	12.50	25
2"	8.50	6.50	.88	3.63	3.25	8	.88	5.00	11.63	7.44	6.61	18.00	32
3"	11.13	8.25	1.13	5.00	4.13	8	.88	6.63	12.63	7.96	7.13	24.00	44
4"	12.00	10.00	1.25	6.19	5.13	8	.88	7.88	24.83	9.76	8.68	30.00	92

All dimensions in inches. Weight of valve in pounds. All weights are estimated.

XOMOX® Tufline® HF4D
Low Emission SPV Dimensional Data

Gear Operated

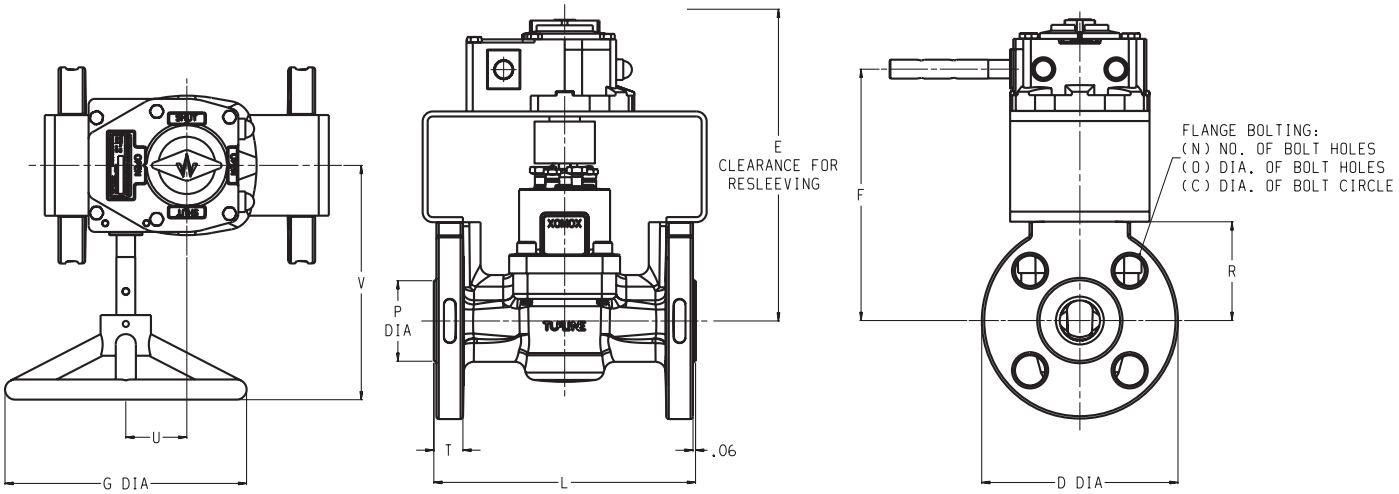


Figure 0367HF4D Class 300

SIZE	L	D	T	P	R	N	O	C	E	F	G	U	V	W
3"	11.13	8.25	1.13	5.00	4.13	8	.88	6.63	12.63	10.38	12.00	2.05	7.77	64
4"	12.00	10.00	1.25	6.19	5.13	8	.88	7.88	24.83	11.57	12.00	2.05	7.77	110
6"	15.88	12.50	1.44	8.50	6.25	12	.88	10.63	27.25	13.78	18.00	2.53	10.30	218
8"	16.50	15.00	1.63	10.63	7.50	12	1.00	13.00	30.47	16.03	18.00	3.53	10.96	349
10"	18.00	17.50	1.88	12.75	8.75	16	1.13	15.25	31.47	17.78	24.00	4.84	14.26	515
12"	19.75	20.50	2.00	15.00	10.25	16	1.25	17.75	37.53	18.78	30.00	4.84	15.76	674

All dimensions in inches. Weight of valve in pounds. All weights are estimated.

XOMOX® HF4D Full Port
Low Emission SPV Dimensional Data

Bare Stem Operated

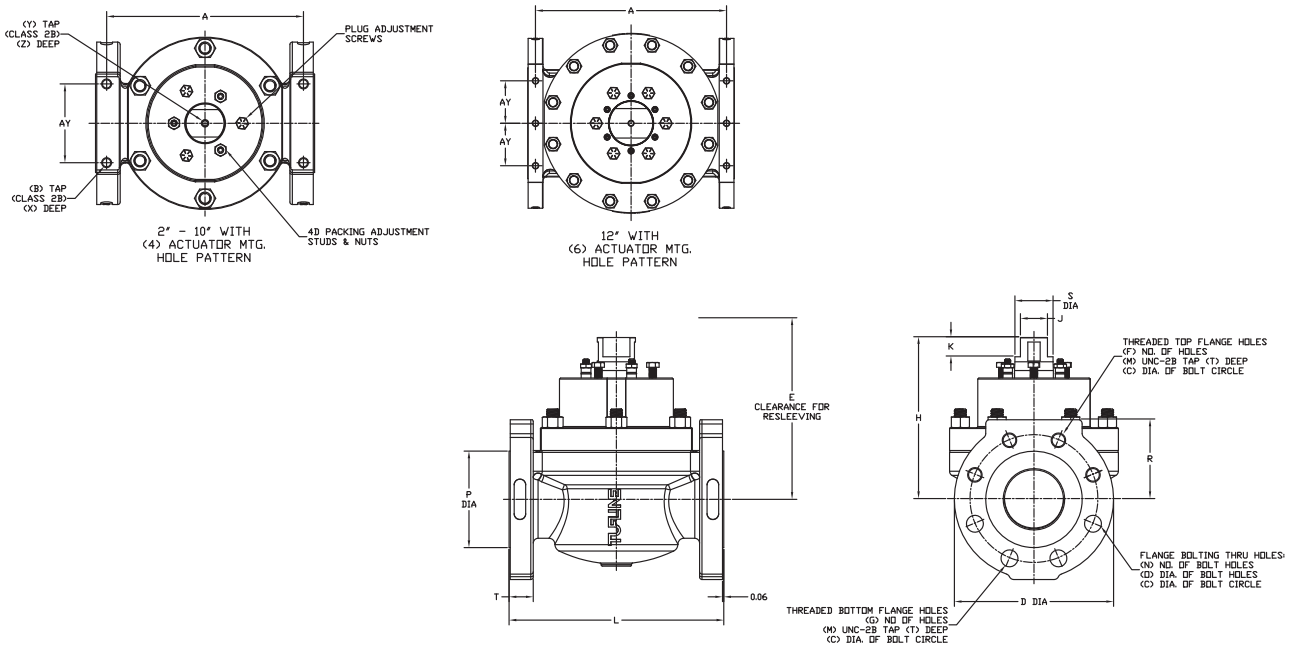


Figure 20367HF4D

SIZE	L	D	T	R	N	O	C	F	G	M	W
2"	8.50	6.50	.94	3.16	8	.75	5.00	—	—	—	60
3"	11.13	8.25	1.25	4.13	4	.88	6.63	4	0	3/4—10	134
4"	12.00	10.00	1.43	5.00	6	.88	7.88	2	0	3/4—10	207
6"	15.88	12.50	1.50	6.44	4	.88	10.63	4	4	3/4—10	443
8"	19.75	15.00	1.73	7.56	6	1.00	13.00	4	2	7/8—9	901
10"	22.38	17.50	2.03	8.84	8	1.13	15.25	6	2	1—8	1472
12"	28.00	23.00	2.06	11.56	8	1.25	17.75	4	4	1—1/4—8*	2834

* UN-8 THREAD

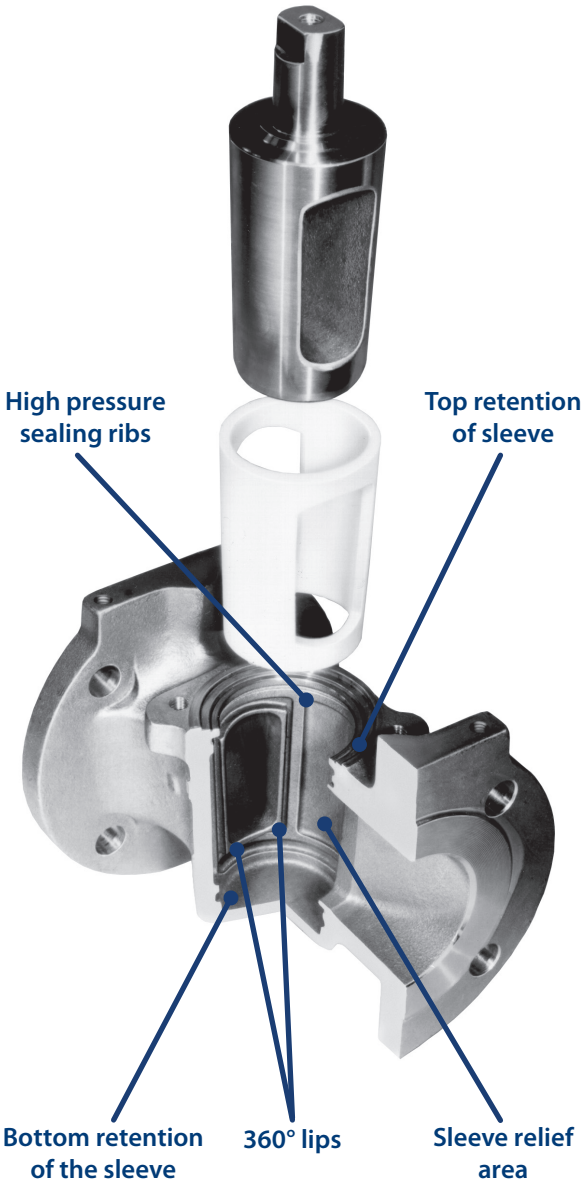
SIZE	H	S	J	K	P	E	Y	Z	A	AY	B	X
2"	7.414	1.258	.874	.984	3.63	11.38	5/16—18	.88	7.50	4.00	7/16—14	.69
3"	8.388	2.008	1.398	1.000	5.00	13.50	5/16—18	.88	10.00	4.00	1/2—13	.63
4"	8.956	2.500	1.673	1.000	6.19	15.38	1/2—13	.75	10.69	4.00	1/2—13	.63
6"	10.575	2.992	1.969	1.000	8.50	19.25	1/2—13	.75	14.38	5.50	5/8—11	1.00
8"	14.789	3.937	2.000	1.575	10.63	26.00	1/2—13	.75	18.06	8.00	3/4—10	1.13
10"	16.897	6.000	4.000	2.000	12.75	30.38	3/4—10	1.00	20.44	8.00	3/4—10	1.13
12"	18.221	6.000	4.000	2.000	15.00	24.25	3/4—10	1.00	25.88	5.75	7/8—9	1.31

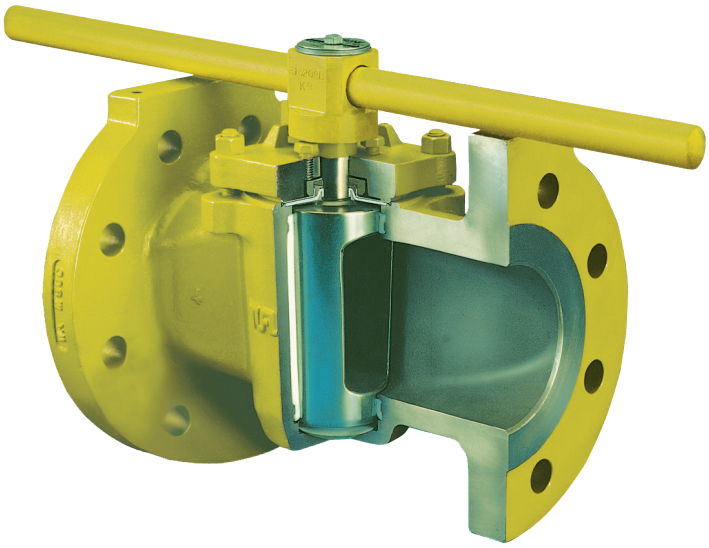
Notes:
1. All dimensions in inches.
2. Weight of valve in pounds. All weights are estimated.
3. 12" 20367HF4D uses bottom cover design.

XOMOX® Tufline® SPV Tertiary Top Seal Design Features & Benefits

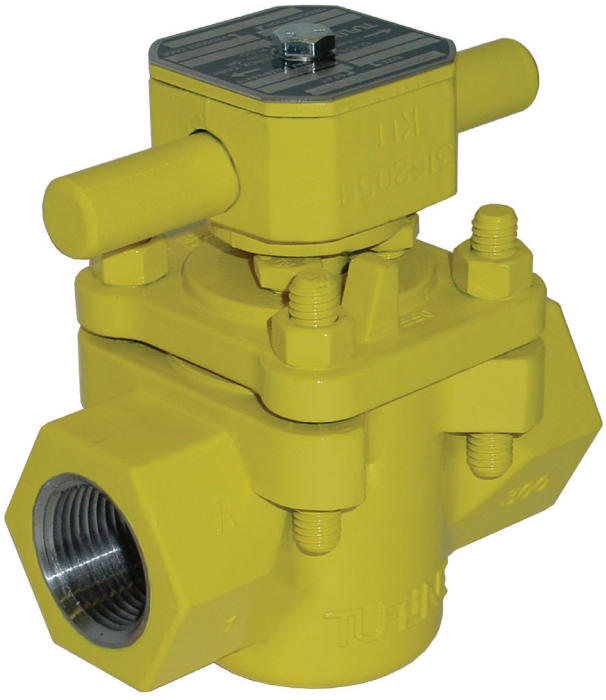
Features & Benefits

1. Superior, longer lasting in-line sealing
2. Secure sealing with no cold-flow, deformation, or rotation of the sleeve due to iron fluoride buildup
3. No cavities, reduced risk of contamination





HF Flanged End Sleeved Plug Valve

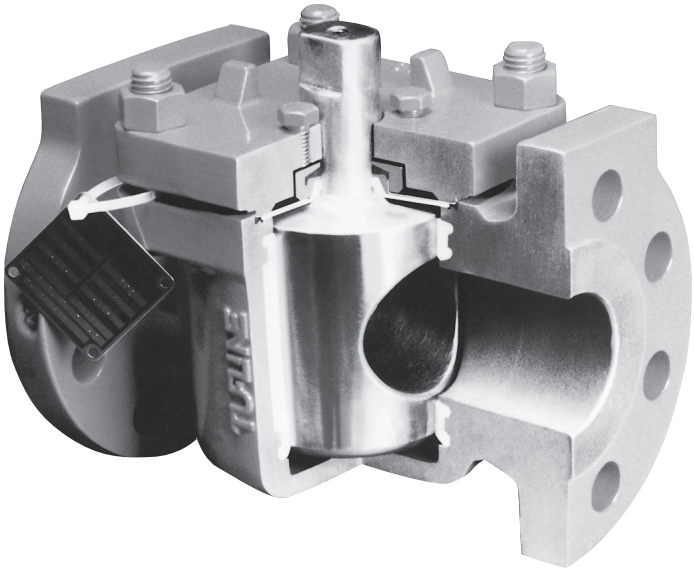


HF Screwed End Sleeved Plug Valve

XOMOX® Tufline® SPV Tertiary Top Seal Applications & Full Port Options

Two-Way Full Port Sleeved Plug Valves

Approved for the most demanding HF requirements
The UOP & ConocoPhillips Petroleum HF Alkylation Process Specifications provide the standards for valves being installed in most new alkylation systems, worldwide. Tufline valves manufactured for the UOP & ConocoPhillips HF processes are listed by UOP & ConocoPhillips Petroleum for use in their licensed systems. You can specify Tufline HF valves that meet these special UOP & ConocoPhillips Petroleum design and material requirements and testing criteria for your application.



Tufline valves for other HF applications and processes
Tufline HF valves are available to meet a variety of alternate design specifications. You can also choose from a number of optional features. These valves are designed to meet the requirements for commercial HF Alkylation processes and hydrofluoric acid applications.

Full port design advantages
With the full-area round port there is no diminished or constricted flow. Ideal wherever low pressure-drop and high-flow efficiency are important such as rapid evac systems. This is a true pipe bore full port. The CV values on average is 3-4 times that of a full area type design plug.

Self cleaning
Metal lips completely surround the valve ports. With each rotation of the valve, any scale which may have collected on the plug seal surface is broken up and wiped away.

UOP Approved!

XOMOX®

XOMOX® Tufline® SPV Tertiary Top Seal for Petroleum Alkylation Processes

Tufline HF Valves are listed in UOP & ConocoPhillips Petroleum Company's HF Alkylation Process Design Specification Manual and meet UOP specifications.

Tufline valves ordered for the UOP & ConocoPhillips Petroleum HF Alkylation process are manufactured in strict accordance with the approved assembly and testing procedures; with no deviation from material and design specifications.

Finish requirements

All finished valve assemblies, excluding actuator fasteners and actuator mounting hardware, are painted with one coat of HF acid detection paint.

Testing requirements

All valve body castings are subjected to 100% radiography of all critical areas of each casting. Each valve body is shell tested with Helium at 400 psig. Completed valve assemblies are hydrostatically shell tested with kerosene at 1 ½ times their rated working pressure, and seat tested at 80 psig air.

Ordering procedures

UOP & ConocoPhillips Valves must be ordered by drawing number. There can be no deviations from specifications and no other options are available. The following table references conventional sizes and figure numbers with the UOP & ConocoPhillips listed drawing numbers.

ASME Class 300

Size (in.)	Figure No.	Phillips Listed Drawing No.	UOP Approved Drawing No.
½	0366HF	FP0694-E	FP1238-E
¾	0366HF	FP0695-E	FP1238-E
1	0366HF	FP0696-E	FP1238-E
1½	0366HF	FP0697-E	FP1238-E
2	0367HF	FP0703-E	FP1243
3	0367HF	FP0704-E	FP1243
4	0367HF	FP0705-E	FP1243
4	0367EG-HF	FP0706-E	FP1244
6	0367EG-HF	FP0707-E	FP1244
8	0367EG-HF	FP0708-E	FP1244-E
10	0367EG-HF	FP0709-E	FP1244-E
12	0367EG-HF	FP0710-E	FP1244-E
14x12x14	0367EG-HF	FP1956-E	FP3709*
14x16x14	0367EG-HF	FP0711-E	FP1244-E
16x16x16	0367EG-HF	FP0712-E	FP1244-E
18x16x18	0367EG-HF	FP0713-E	FP1244-E
20x24x20	0367EG-HF	FP2110-E	FP3708*

ASME Class 600 DR

Size (in.)	Figure No.	Phillips Listed Drawing No.	UOP Approved Drawing No.
2	0667DR-HF	FP1091-E	FP3705*
3	0667DR-HF	FP1092-E	FP3706*
4	0667DR-HF	FP1093-E	FP3707*

ASME Class 300 Full Port

Size (in.)	Figure No.	Phillips Listed Drawing No.	UOP Approved Drawing No.
1	20367HF	FP1703	FP1912
1½	20367HF	FP1704	FP1912
2	20367HF	FP1705	FP1912
3	20367HF	FP1707	FP1913
4	20367HF	FP1708	FP1913
6	20367HF	FP1709	FP1913
8	20367HF	FP1710	FP1913
10	20367HF	FP1711	FP1913
12	20367HF	FP1712	FP1914

*At time of printing, drawing submitted for review but not currently approved or listed by UOP.

XOMOX® Tufline® SPV Tertiary Top Seal for Every HF Application

Valve Components

Adjusting bolts

Cover nut

Cover

Cover stud

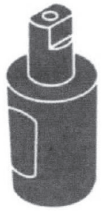
Fire tested cartridge

Formed PTFE diaphragm

PTFE wedge ring

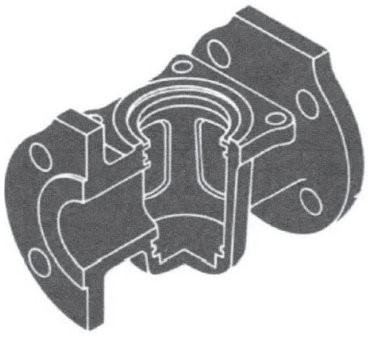
Cover seal ring

Plug



PTFE Sleeve

Body



For other HF acid processing applications. Tufline offers choices of body materials and design options. Tufiine HF valves can be ordered in the same sizes, end connections, and pressure classes that are available in standard Tufline plug valves.

Monel® or carbon steel bodies are available. (All carbon steel bodies are sprayed with fluorocarbon behind the sleeve to protect against the build-up of iron fluoride scale.)

UOP & ConocoPhillips HF Valves Materials of Construction

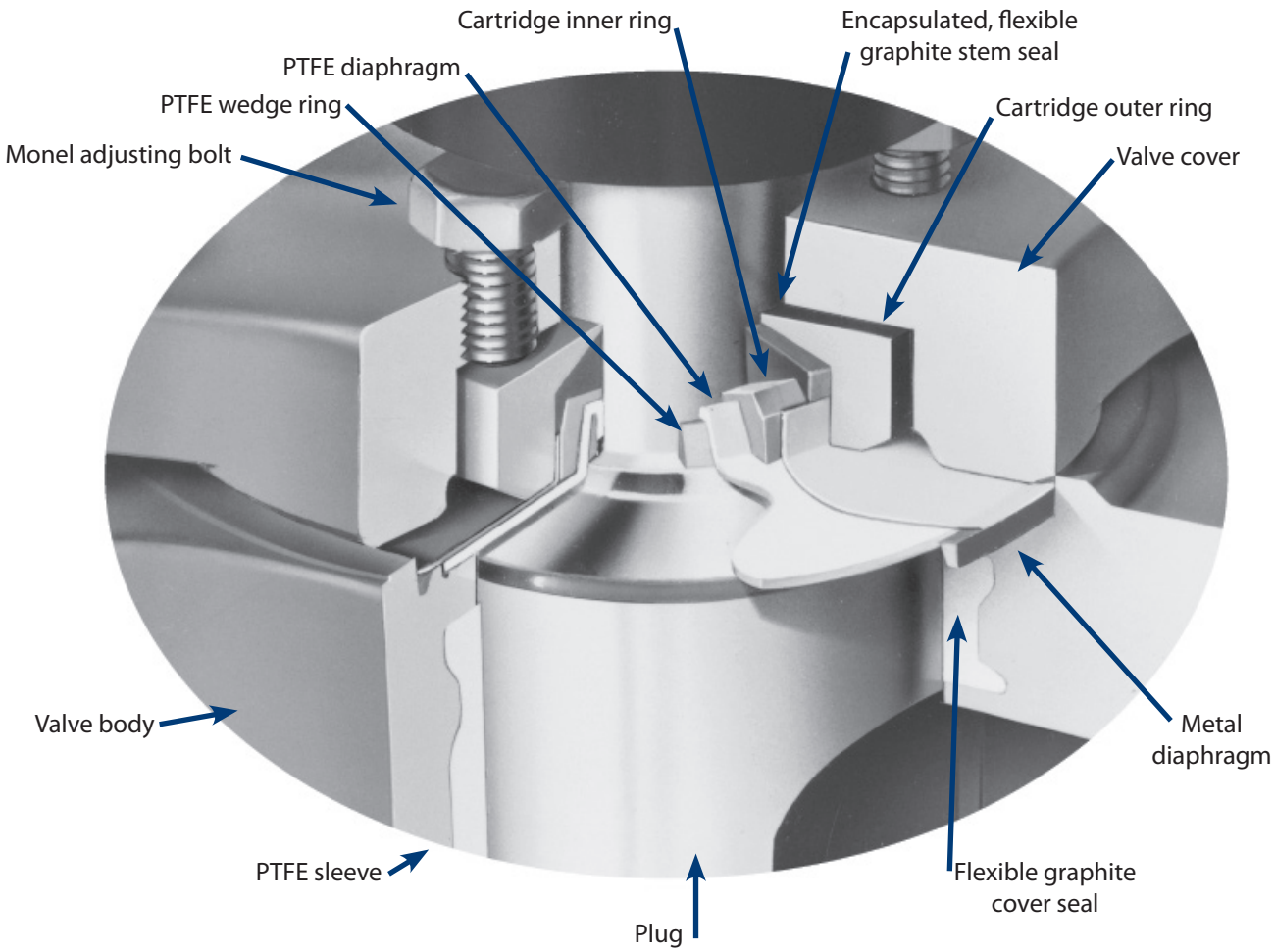
Part	Material
Adjusting Bolts	ASTM B164. Monel
Cover	ASTM A216, Grade WCB Carbon Steel
Cover Nut	ASTM A194, Grade 2HM Carbon Steel
Cover Stud	ASTM A193. Grade B7M Carbon Steel
Fire Tested Cartridges	ASTM B127, Monel
Stem Seal Ring	Flexible Graphite
Formed Diaphragm	Virgin PTFE
Wedge Ring	Virgin PTFE
Cover Seal Ring	Flexible Graphite
Plug	ASTM A494, Grade M-35-1
Sleeve	Virgin PTFE
Body	ASTM A494, Grade M-35-1
Paint	HF Acid Detection Paint
Tag	304 Stainless Steel
Plastic Cable Tie	Plastic

During the assembly process the plug is coated with HF lubricant.

Quick reference of available configurations

Size (in.)	ASME Class	Figure Number	Screwed End	Flanged End
½ to 2	150	066HF	X	
½ to 2	300	0366HF	X	
½ to 4	150	067HF		X
½ to 4	300	0367HF		X
4 to 24	150	067EG-HF		X
4 to 20	300	0367EG-HF		X
½ to 16	600DR	0667/DR-HF		X

XOMOX® Tufline® SPV Tertiary Top Seal
Isolate HF Processes



Control fugitive emissions

This top seal package provides exceptional control of fugitive emissions. It meets or exceeds the most stringent current regulatory requirements EPA Method 21.

Triple sealed for extra protection

Under normal conditions, there are three active seals between the flow media and the atmosphere. Primary sealing is provided by the interaction of the plug, sleeve, and body. Secondary sealing is provided by the PTFE and metal diaphragms. Tertiary sealing is provided at the stem by the encapsulated, flexible graphite stem seal and at the body/cover joint by the graphite cover seal ring.

This Simple system assures stem sealing

This simple, compact, design harnesses complex dynamic forces to assure effective sealing to atmosphere. The metallic cartridge totally encapsulates the flexible graphite tertiary dynamic stem seal. At its outer edge, the metal diaphragm overlaps the graphite static seal ring to reinforce the tertiary seal at the body-to-cover joint. The PTFE wedge ring concentrates the sealing force of the PTFE diaphragm radially against the valve stem for more reliable prevention of external leakage at this secondary seal.

API-607 Standards

The Tufline Tertiary Top Seal Sleeved Plug valve exceeds API-607 - Third Edition Section 4.2 - Specifications for External Leakage. It is available in a broader range of sizes than the standard fire tested model.

XOMOX® Tufline® Sleeved Plug Valves
Tufline-475 & XeniTh for Higher Temperatures

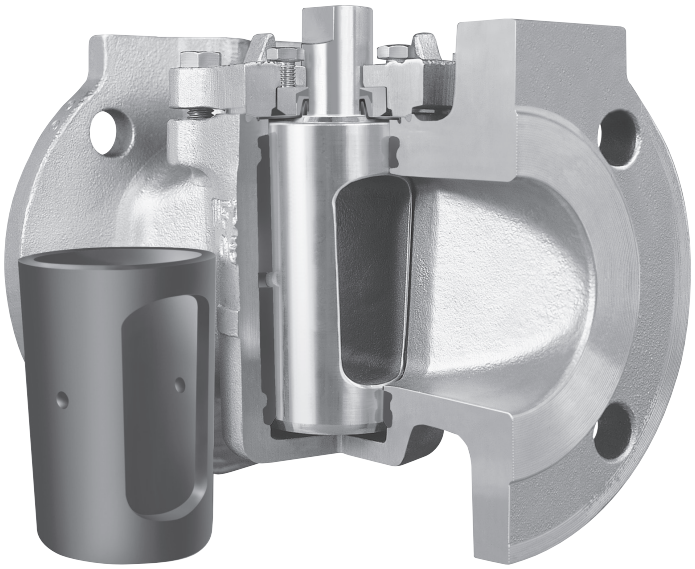
Tufline-475 and XeniTh High Temperature Sleeved Plug Valves provide a higher performance alternative to traditional PTFE sleeves.

Tufline-475 High Temperature Sleeved Plug Valve greatly extends the pressure/temperature range of sleeved plug valves. It even exceeds the operating range of glass-filled PTFE. This greater pressure/temperature operating range is the result of improved thermo-mechanical properties, improved cold-flow properties and improved toughness.

The XeniTh High Temperature Sleeved Plug Valve offers bi-directional flow, simple actuation, and lightweight and compact design in a variety of 2-way and multi-port configurations. This versatility expands the range of possibilities when designing a new processing system or improving an existing system.

Features & Benefits

1. A greater range of operating pressures and temperatures enables use of the more reliable and preferred sleeved plug valve in more applications
   - Tufline-475 up to 475°F
   - XeniTh up to 600°F
2. Reduced cold-flow at elevated temperatures
3. Greater stability helps reduce down-time
4. A smoother surface means better sealing
5. Lower porosity and greater density assure sleeve integrity
6. Enhanced strength and resistance to abrasion and wear



XeniTh Sleeved Plug Valve

Difficulties with other alternative sleeve materials

There are other resins which also work well at elevated temperatures, but they sacrifice sealing capability.

Alternative sleeve materials also dramatically increase torque.

They do not offer the exceptional sealing characteristics and low torque ratings of Tufline-475.

XOMOX®

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brands you trust.

ALOYCO® CENTER LINE® COMPAC-NOZ® CRANE® DEPA®

ELRO® DUO-CHEK® FLOWSEAL® SINCE 1864 JENKINS® FK® KROMBACH ARMATUREN

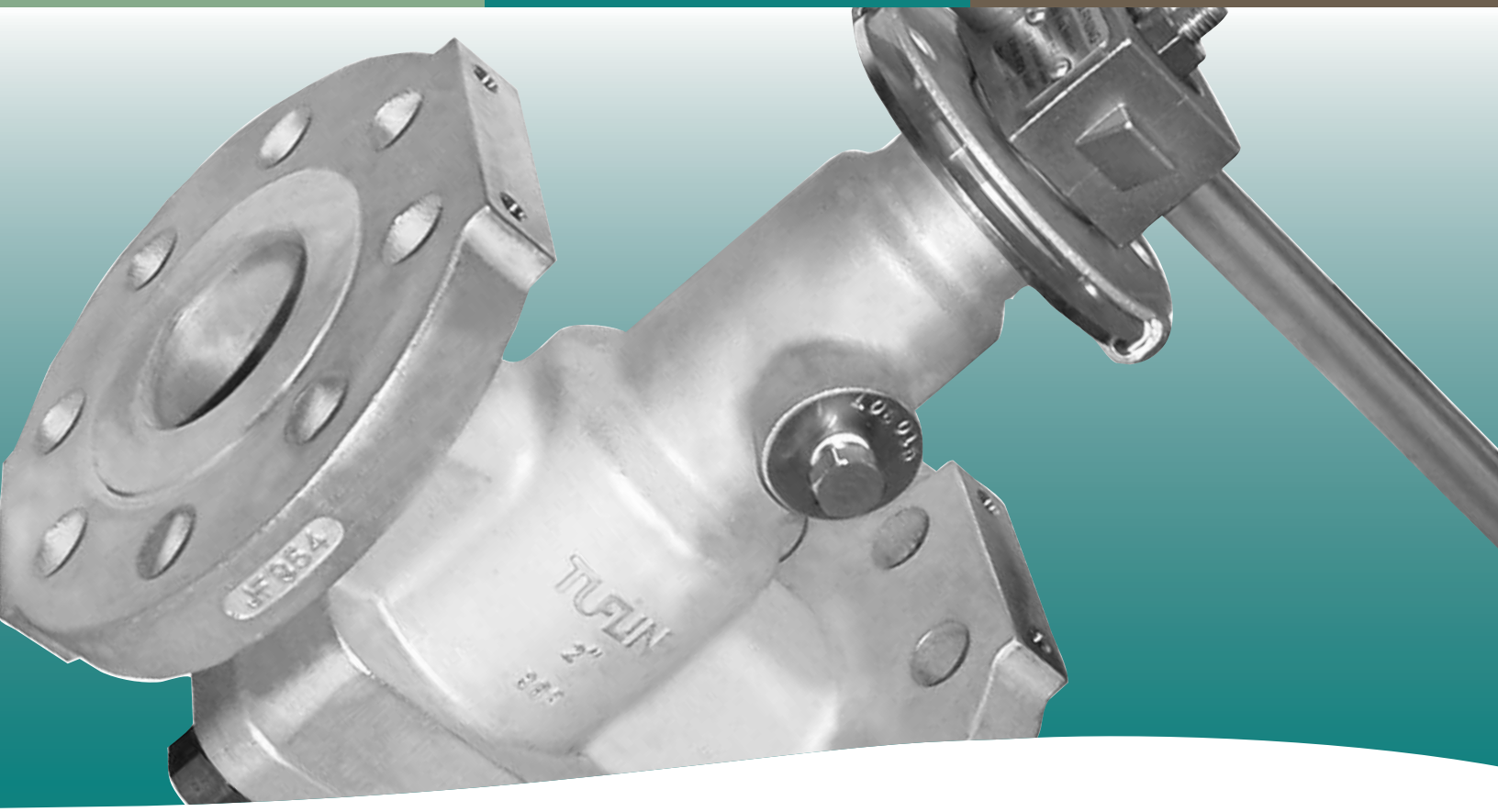
NOZ-CHEK® PV® RESISTOFLEX® revo® Saunders® the science inside

STOCKHAM® UNI-CHEK® WESTLOCK CONTROLS w.t.a.® XOMOX®

CPE-XOMOX-SPV-HF_ALKYLATION-BU-EN-LT-2020_09_23

XOMOX®

brands you trust.



Tufline® Severe Service Valves

CRANE

ChemPharma Flow Solutions

www.cranechempharma.com

Tufline Severe Service Valves

You are assured of superior sealing in hazardous applications, even with extreme thermal cycling conditions.

More Tufline valves which have been specifically designed for hazardous applications and fugitive emissions control have been in service longer than those of any other manufacturer.

Breathe easier.

Xomox offers the broadest line of valves for handling hazardous media and controlling fugitive emissions.

With this breadth of selection, Tufline can provide optimum and economical valving to meet your specific requirements.

More importantly, Tufline valving is designed to pay off with long-term, reliable, low-maintenance service life.

Built through processor partnerships.

The Tufline Severe Service valve was developed by working in close cooperation with major processors of hazardous materials. Continuing cooperation has lead to further improvements.

Designed, not adapted.

This unique valve was designed from the ground up specifically for the most demanding applications.

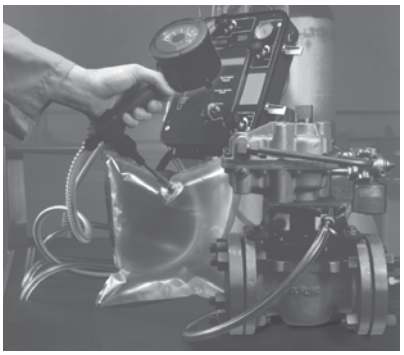
While it employs numerous aspects of the best available technology, its distinctive design puts it in a class by itself.

Patented and proven.

This patented valve has proven itself with years of reliable performance in the most carefully monitored processing applications in the world.

Put Tufline Valves to the test

For valves in demanding processing applications, real value is . . . performance over time.

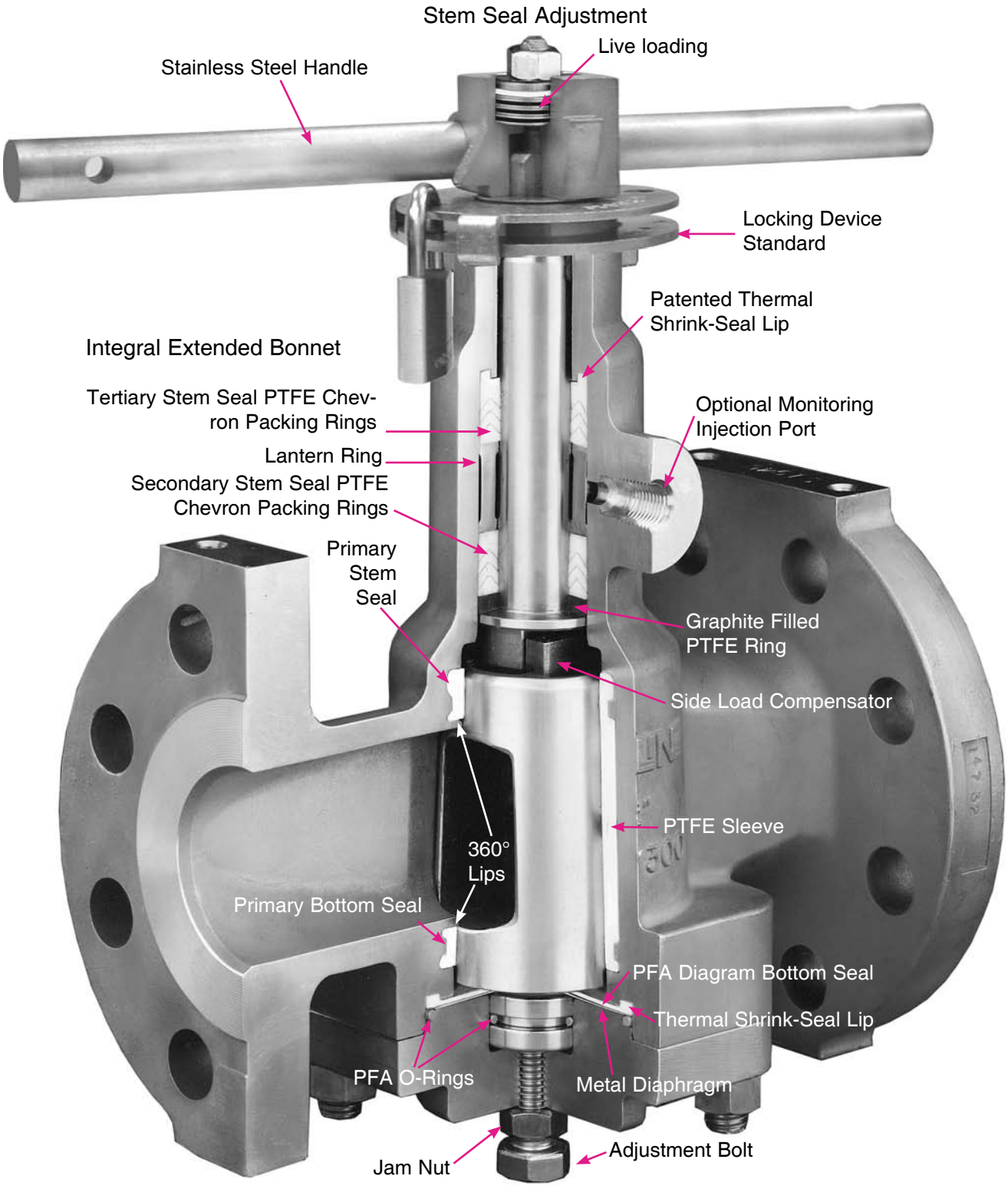


Emissions control leadership.

Xomox strongly champions testing procedures that will precisely evaluate valve emissions control performance, over time, in realistic applications.

Problem solvers. Talk with a Xomox Sales Engineer about any aspect of your fluid handling system. You will get process-improving answers.

Your Xomox Sales Engineer has the proven products and is backed by the technical expertise to help solve your toughest fluid handling problems.



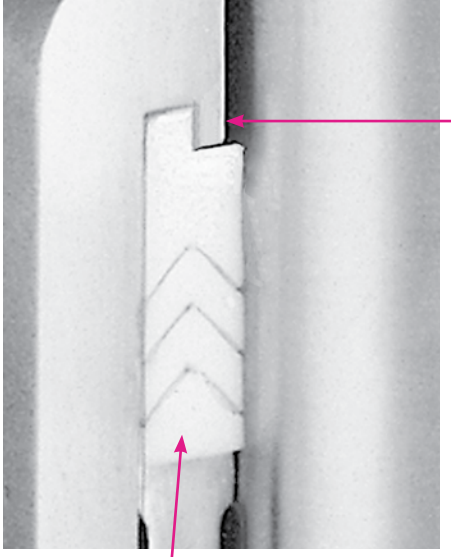
In-Line Seal Adjustment

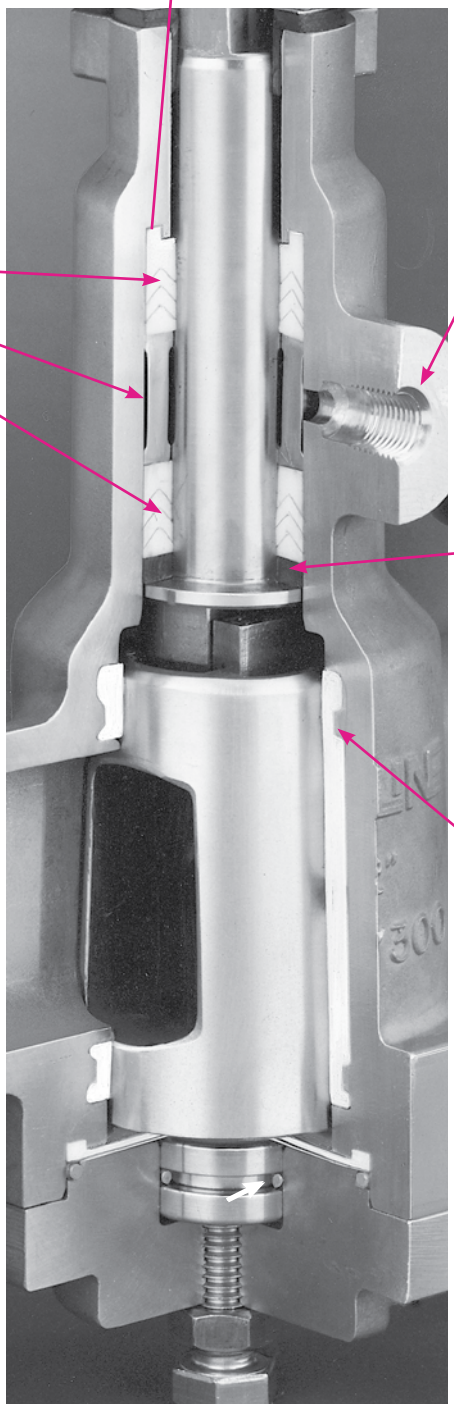
Patented external sealing system.

An exceptionally tight and continuous external seal is a must when processing hazardous media in rigorous thermal cycling conditions.

The unique, integral extended bonnet enhances sealing.

In extreme frigid or thermal cycling conditions PTFE packing will shrink. Packing shrinkage is minimized in this valve because the packing is located up in the bonnet, away from the media flow path.





Secondary and tertiary stem sealing.

Double packing sets of PTFE chevron rings are separated by a lantern ring.

The packing is placed away from the flow media to minimize the effects of thermal cycling.

Easy to insulate.

The extended bonnet allows several inches of insulation to be placed around all valve sizes while packing adjustment remains fully accessible.

A patented shrink-seal lip helps stop fugitive emissions.

Temperature changes cause unequal expansion and contraction of valve components and sealing elements. With thermal cycling, packing shrinkage often leads to leakage along the stem.

With the patented Tufline design, radial shrinkage of the packing actually tightens the seal. An overhanging lip is machined into the interior bore of the body.

Radial shrinkage of the packing causes the packing to tighten inward against the lip, preventing leakage to the atmosphere.

Monitoring/Injection port.

As an option, the packing chamber is available with a port for monitoring packing integrity or for grease injection.

Graphite-filled PTFE ring.

A graphite-filled PTFE ring prevents extrusion of the PTFE packing. It acts as a bearing between the packing and the stem base as well as between the stem and bonnet wall.

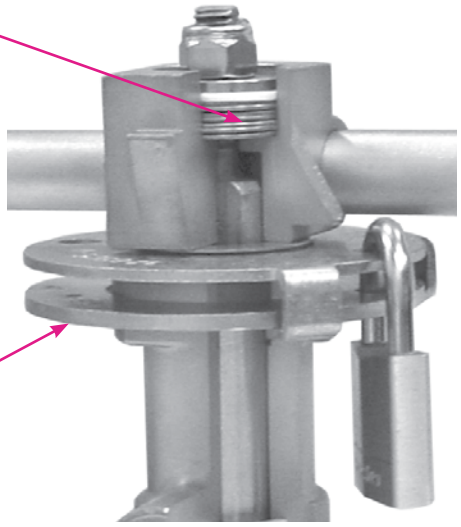
Primary stem sealing.

The first seal against stem leakage is accomplished by the PTFE sleeve, where it encircles the top of the plug. This means that the two stem packing sets are actually secondary and tertiary external seals.

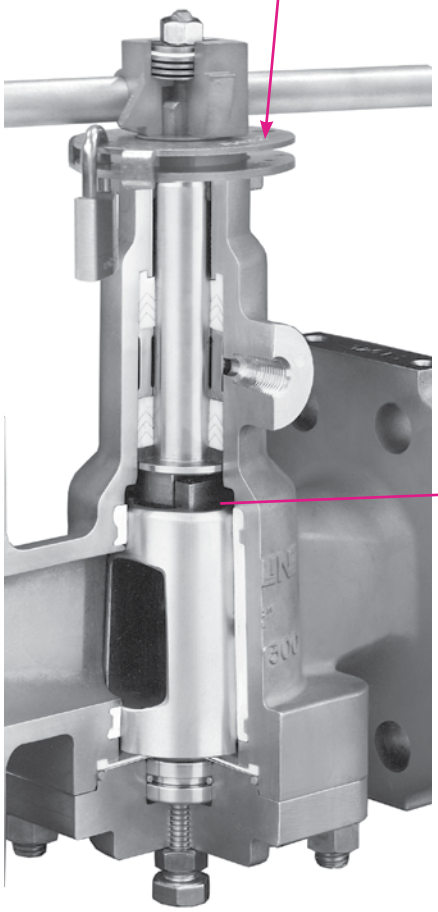
Live loading for continuous sealing.

The set of spring washers, located in the valve hub, provide a constant, uniform load on the packing.

Live loading compensates for expansion and contraction of the PTFE packing that is caused by temperature fluctuations.



Locking Device Standard



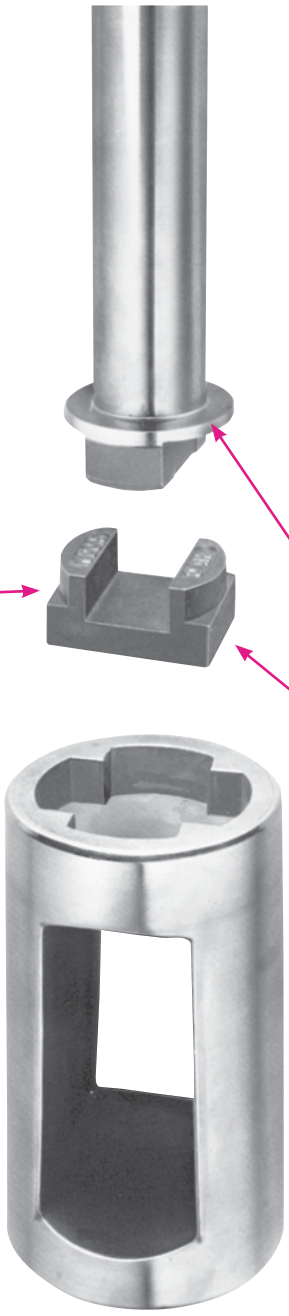
Separate, accessible, easy sealing adjustment.

Individual adjustment of the in-line seal and the stem seal assure maximum control, flexibility, and longer service life.

An independent plug and stem eliminate side loading on the packing.

In valves with a one-piece plug and stem, differential pressure against the plug of a valve can cause the stem to lose concentricity within the packing. This causes uneven stem pressure against the packing and leak paths can develop.

In this valve, the stem is independent of the plug. A compensator, located between the stem and plug, keeps any differential pressure on the plug from affecting the stem's concentricity.



Stem

Compensator

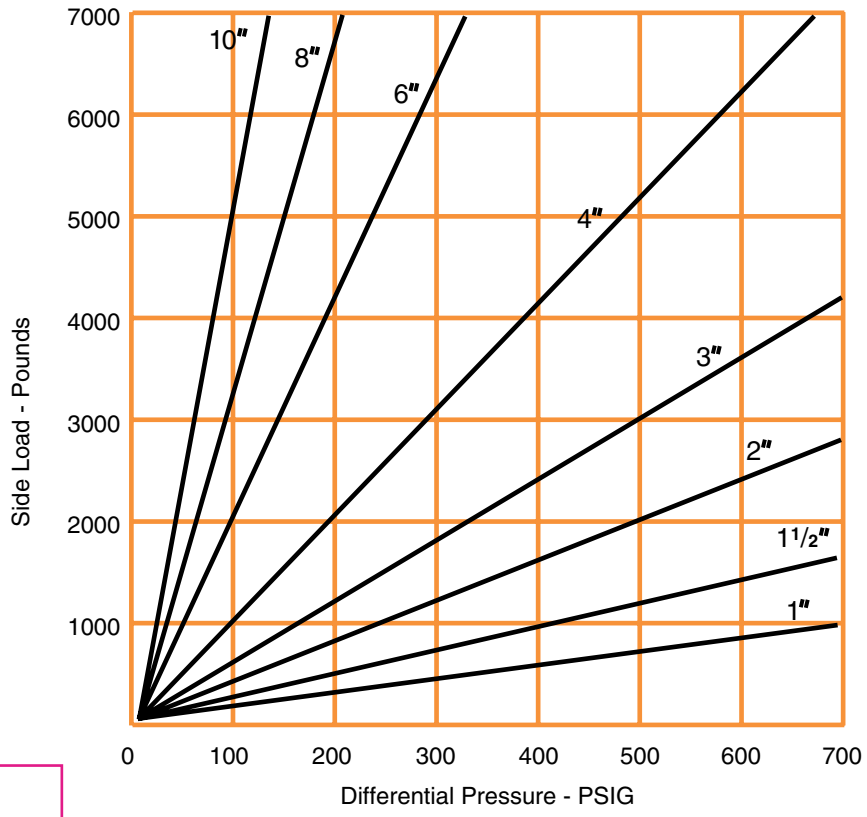
Plug

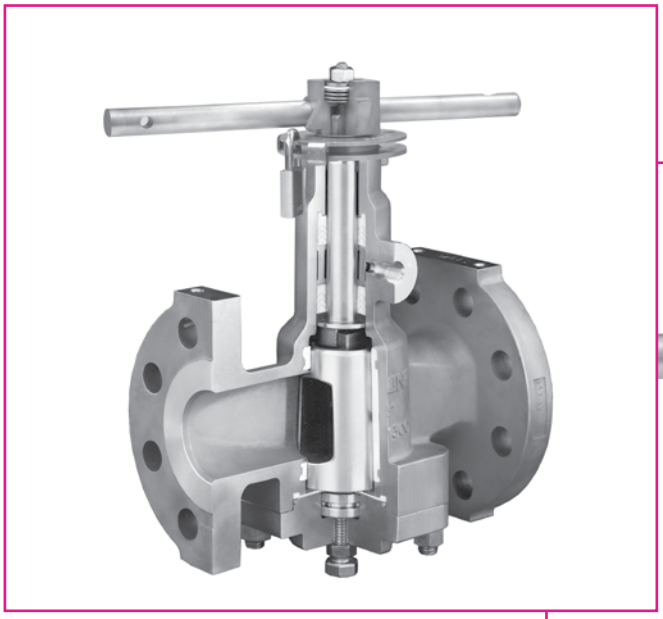
There is no side loading of the stem against the packing so leakage to the atmosphere is less likely to occur.

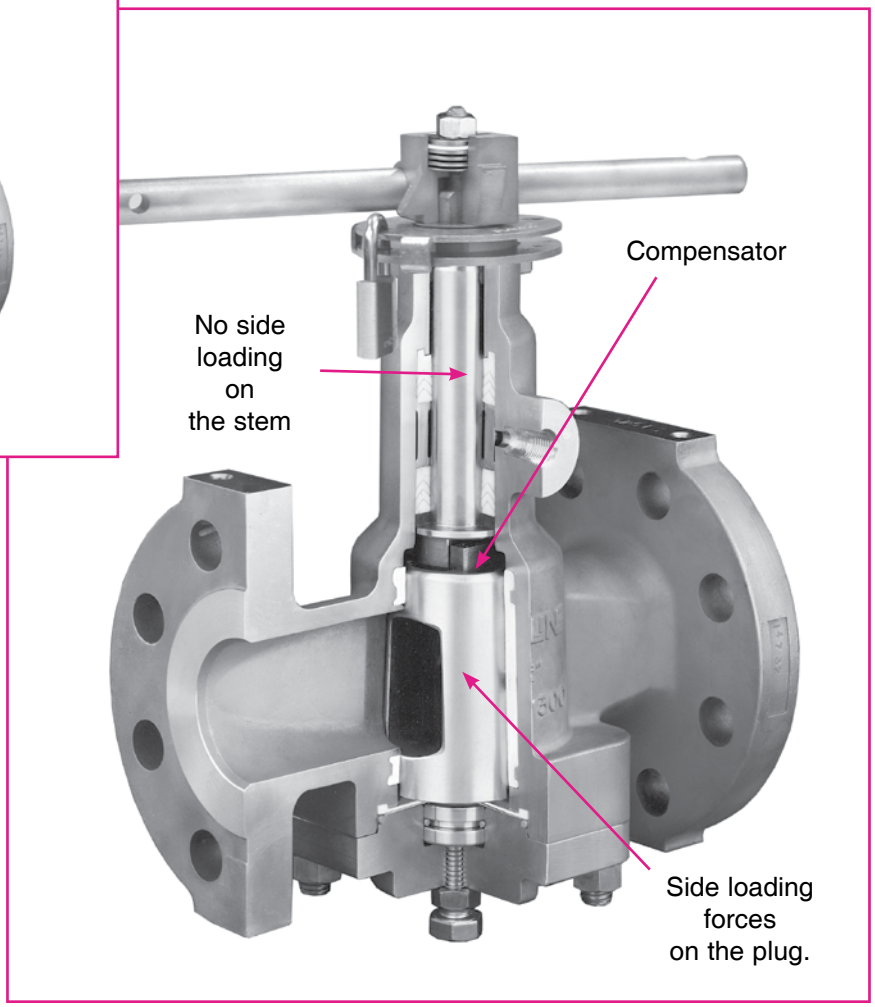
Overcoming powerful side loading forces that create leak paths.

This chart illustrates the typical side loading forces created on a one-piece plug and stem. This force can compress and deform the stem packing, causing leak paths to develop.

The Tufline Severe Service valve overcomes this problem







Redundant sealing assures integrity of the bottom cover seal.

Where the sleeve encircles the plug, the primary bottom seal is established.

The PFA diaphragm provides a secondary seal.

The machined counter-bore of the valve body provides a wide, serrated surface for extended sealing contact with the diaphragm.

The compression of the diaphragm between the body and the bottom cover is precisely controlled.

The edge of the diaphragm and the valve body have interlocking thermal shrink-seal lips. Temperature changes cause unequal expansion and contraction of the body and the diaphragm.

Because of the interlocking lips in the Tufline Severe Service valve, differential shrinkage of the body and diaphragm actually tighten the seal.

A metal diaphragm supports the PFA diaphragm and provides the contact for the plug adjustment button.

Two PFA encapsulated silicone O-rings are tertiary sealing elements. They are located at the cover-to-body joint and in a groove in the plug adjustment button.

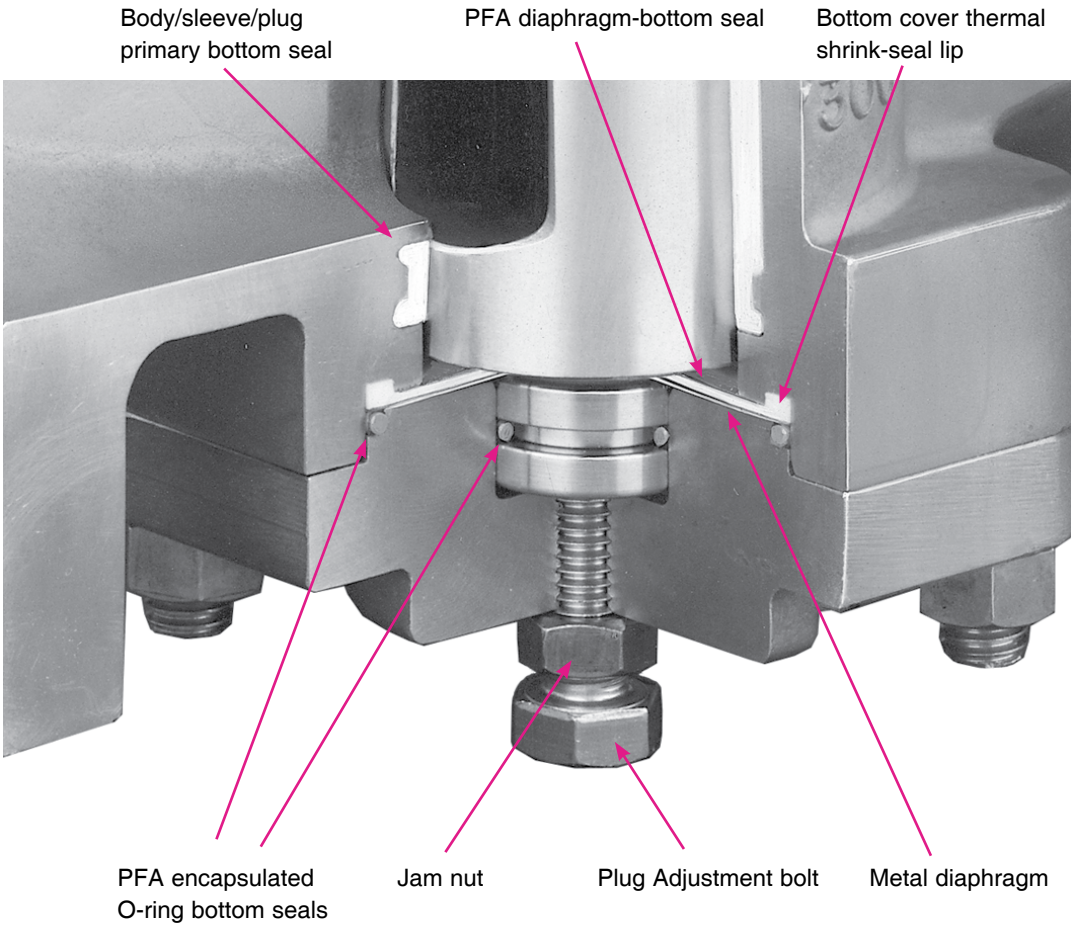
Metal to metal contact between the cover and body helps assure tightness of cover bolts under thermal cycling.

Easily adjusted in-line sealing.

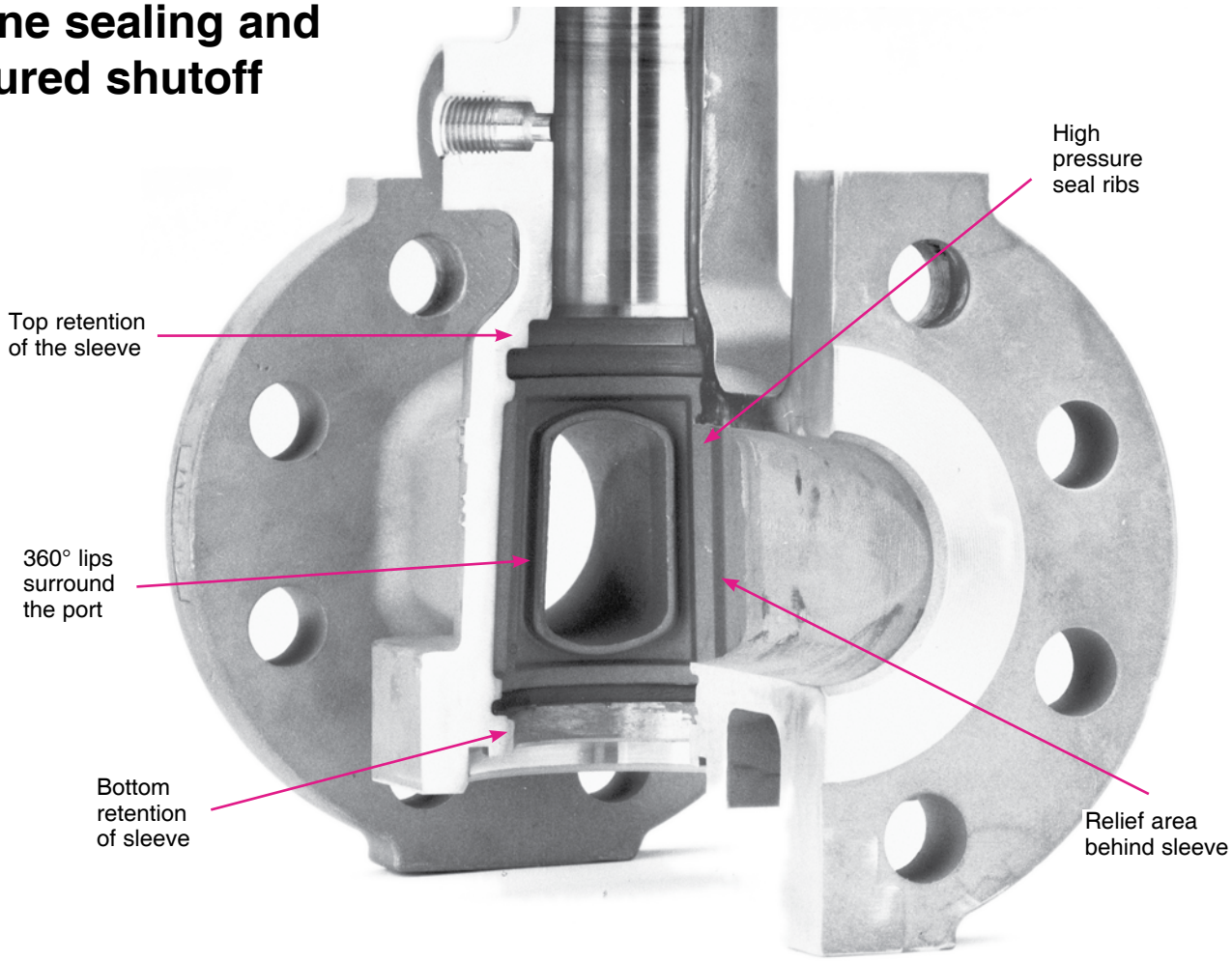
To adjust the in-line seal, loosen the jam nut on the valve bottom and turn the adjusting bolt clockwise. This action puts upward pressure on the tapered plug.

The upward thrust of the plug concentrates compression of the sleeve between the plug and body ribs.

The plug acts as a wedge, pressing the sleeve against the body, assuring a uniformly tight seal.



In-line sealing and assured shutoff



Body, plug, and sleeve work together for a tight in-line seal.

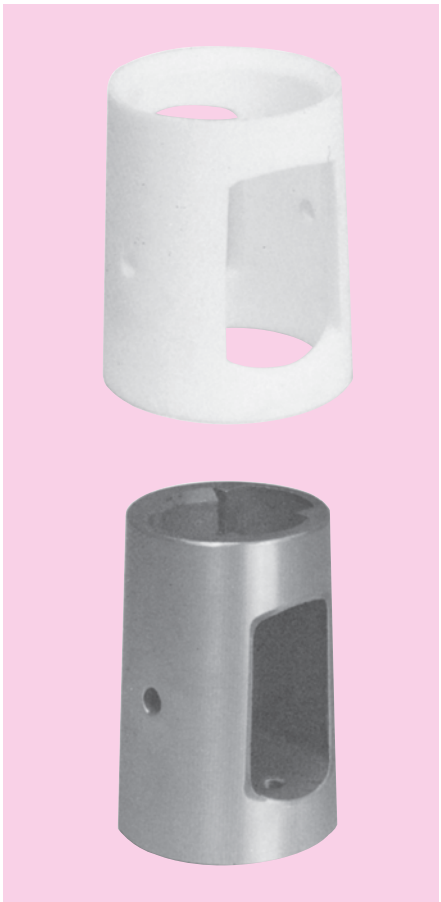
The PTFE sleeve completely surrounds the plug. The sleeve provides a fully circumferential, port-to-port sealing surface.

Self lubrication.

The PTFE sleeve has a low coefficient of friction, allowing it to act like a lubricant.

Enhanced shutoff reliability.

Even after being left open or closed without maintenance for extended periods of time, this self-lubricating design provides assurance that the valve will virtually never "stick". This operating reliability can be vital in emergency shutoff situations.



360° lips clean and protect

These lips surround the valve ports and are an integral part of the precision body casting. These port defining lips improve valve performance and extend service life by:

- Breaking up and removing adhering, scaly deposits from the outer surface of the plug as it rotates.
- Protecting the sleeve from erosion.
- Preventing cold flow deformation and blowout.
- Eliminating sleeve rotation.

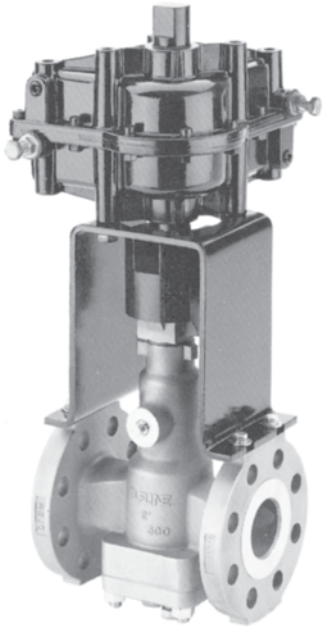
Ribs enhance in-line sealing.

For improved sealing, compression of the sleeve is concentrated between the raised rib areas and the plug. Relief areas are cast into the body between the ribs to allow for expansion of the sleeve.

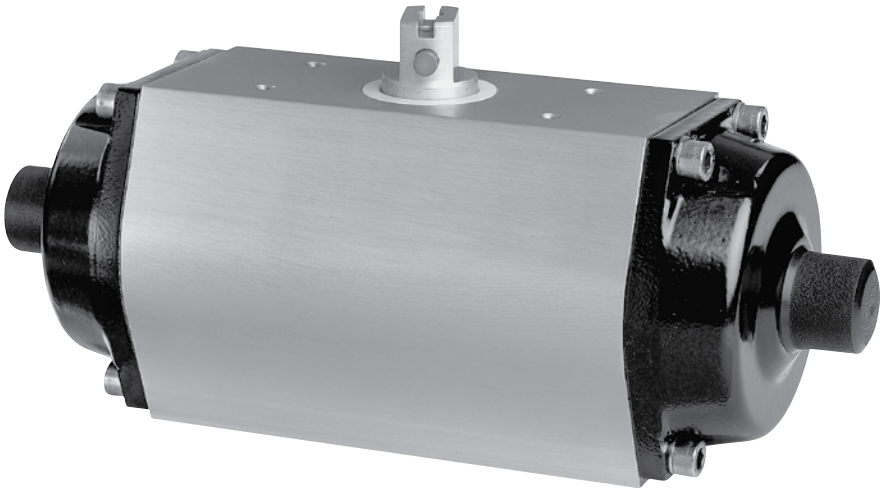
Methods of operation.

Quarter-turn Tufline Severe Service valves are easy to actuate and automate. Valve sizes 1/2 through 3 inch are supplied as wrench operated with locking devices. Enclosed gear actuators are optional on these sizes.

On sizes 4 inch and larger, gear operators with locking devices are standard. A variety of on/off actuating systems are available in pneumatic, hydraulic, or electric models. Actuators are easily and securely mounted on the flanges.



Matryx vane double acting actuators.



Matryx Rack & Pinion actuators

Matryx limit switch module.

Technical data.

Typical applications.

- Chlorine
- Hydrochloric acid
- Hydrofluoric acid
- Phosgene

For other applications, consult factory.

Chlorine service.

Tufline Severe Service valves designated for chlorine service will be supplied with vented plugs. These valves are thoroughly cleaned and dried per internal Xomox chlorine cleaning standards, and are sealed and packaged in plastic containers. The valves will meet requirements of the Chlorine Institute.

Vacuum service.

Tufline Severe Service valves are suitable for vacuum service to as low as .01 microns in absolute pressure. However, special cleaning is required to achieve this rating.

End connections.

ANSI Class 150, Class 300 and Class 600 raised face flanges.

Optional features.

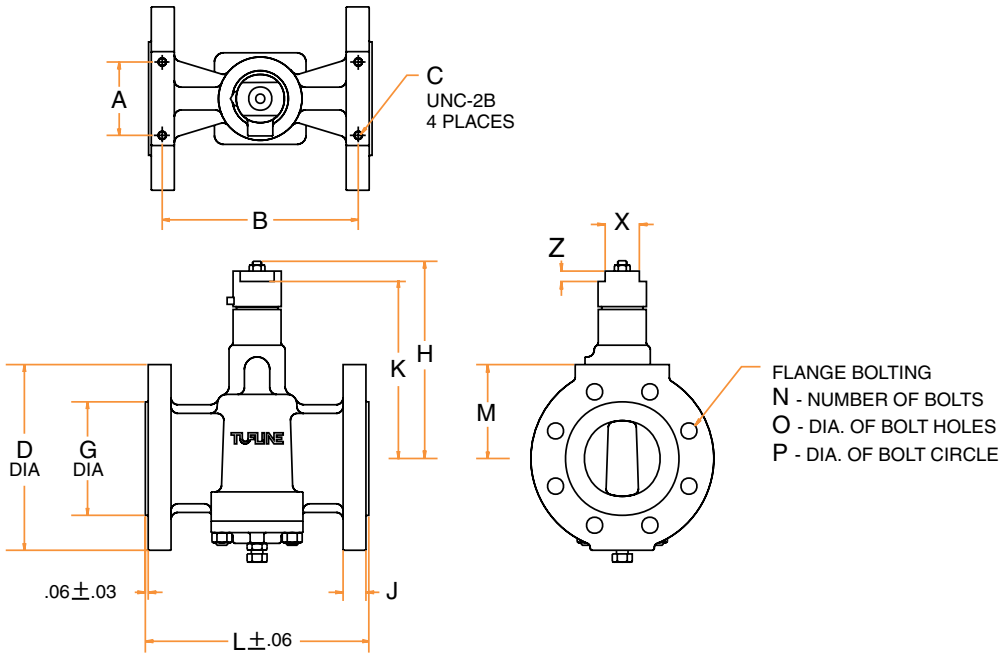
Grease injection connection in packing area. Leak detection port above packing area. Lantern ring purge connection.

Custom designs and modifications.

The products in this catalog may be obtained in other sizes and materials from the Xomox Special Products Group, which offers design, engineering and manufacturing services for custom products and modifications.

Severe Service Sleeved Plug Valve Dimensions

Dimensions are in inches.
Weights (Wt.) are in pounds
and are approximate.



Class 150 . . . Figure **097**

Size	L	D	G	H	K	J	M	X	Z	N	O	P	A	B	C	Wt.
½	4.63	3.88	1.38	4.91	3.50	.41	1.94	1.874	0.56	4	.63	2.38	1.750	4.063	¼ - 20 x .63	14
¾	4.63	3.88	1.69	4.91	3.50	.41	1.94	1.874	0.56	4	.63	2.75	1.750	4.063	¼ - 20 x .63	14
1	5.00	4.25	2.00	8.09	6.50	.44	2.13	1.874	0.56	4	.63	3.13	1.750	4.438	5/16 - 18 x .63	18
1½	6.50	5.00	2.88	8.43	6.84	.56	2.50	1.874	0.56	4	.63	3.88	1.750	5.750	5/16 - 18 x .63	25
2	7.00	6.50	3.62	8.81	7.22	.88	3.25	1.874	0.56	4	.75	4.75	2.250	6.312	5/16 - 18 x .63	36
3	8.00	7.50	5.00	9.47	7.88	.75	3.75	1.874	0.56	4	.75	6.00	3.500	7.125	3/8 - 16 x .63	75
4	9.00	9.00	6.19	11.00	9.66	.94	4.50	1.864	0.56	8	.75	7.50	4.000	8.000	7/16 - 14 x .63	82
6	10.50	11.00	8.50	12.12	10.71	1.00	5.50	1.864	0.56	8	.91	9.50	4.000	9.44	7/16 - 14 x .63	105
8	11.50	13.50	10.63	13.58	12.06	1.12	6.75	1.990	0.56	8*	.88	11.75	5.500	10.188	½ - 13 x .63	185
10	13.00	16.00	12.75	14.80	13.30	1.25	8.00	1.990	0.56	12†	1.00	14.25	5.500	11.562	½ - 13 x .63	285
12	14.00	19.00	15	17.44	15.33	1.25	9.50	1.990	1.25	12†	1.00	17.00	6.00	12.530	½ - 13 x 1.00	425

* 2 top and 2 bottom holes in each flange are tapped for ¾ - 10 UNC threads.
† 2 top and 2 bottom holes in each flange are tapped for ⅞ - 9 UNC threads.

ASTM designations

Monel	ASTM A494 M-30C
Hastelloy C	ASTM A494 CW6M
Alloy 20	ASTM A351 CN7M
Carbon Steel	ASTM A352 LCB
316SS	ASTM A351 CF8M

Cv factors for valve sizing

Size	½	¾	1	1½	2	3
Cv	9	9	43	89	172	294

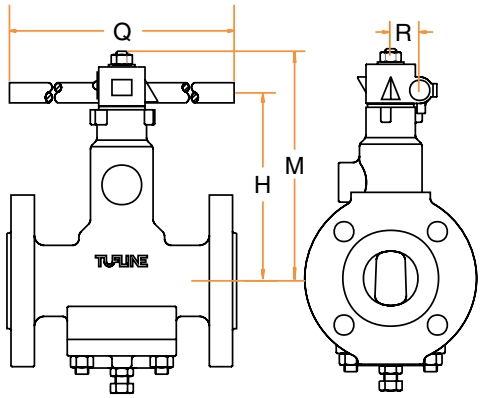
Size	4	6	8	10	12
Cv	548	1075	1591	2159	3200

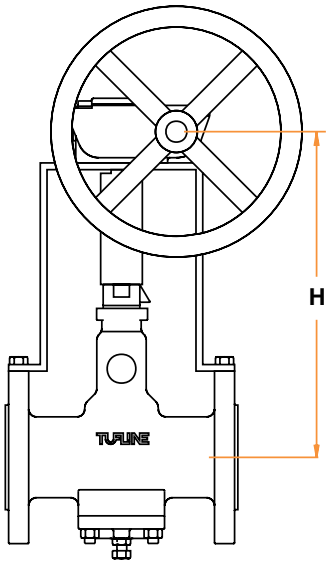
Class 300 . . . Figure **0397**

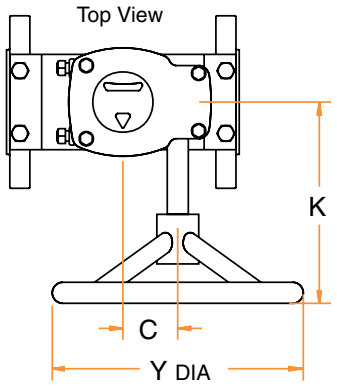
Size	L	D	G	H	K	J	M	X	Z	N	O	P	A	B	C	Wt.
½	6.00	4.63	1.38	4.91	3.50	.63	2.31	1.874	.56	4	.62	2.62	1.750	5.312	¼ - 20 x .63	17
¾	6.00	4.63	1.69	4.91	3.50	.63	2.31	1.874	.56	4	.75	3.25	1.750	5.312	¼ - 20 x .63	17
1	6.50	4.88	2.00	8.09	6.50	.69	2.44	1.874	.56	4	.75	3.50	1.750	5.750	5/16 - 18 x .63	22
1½	7.50	6.12	2.88	8.43	6.84	.81	3.06	1.874	.56	4	.88	4.50	1.750	6.625	5/16 - 18 x .63	31
2	8.50	6.50	3.62	8.81	7.22	.88	3.25	1.874	.56	8	.75	5.00	2.250	7.562	5/16 - 18 x .63	44
3	11.13	8.25	5.00	9.47	7.88	1.12	4.12	1.874	.56	8	.88	6.62	3.500	9.937	3/8 - 16 x .63	87
4	12.00	10.00	6.19	11.00	9.66	1.25	5.13	1.864	.56	8	.88	7.88	4.000	10.688	7/16 - 14 x .63	97
6	15.88	12.50	8.50	12.12	10.71	1.44	6.25	1.864	.56	12	.88	10.62	4.000	14.000	7/16 - 14 x .63	175
8	16.50	15.00	10.63	13.25	12.06	1.63	7.50	1.990	.56	12*	1.00	13.00	5.500	14.630	½ - 13 x .63	275
10	18.00	17.50	12.75	14.50	13.31	1.88	8.75	1.990	.56	16†	1.13	15.25	5.500	15.690	½ - 13 x .63	420
12	19.75	20.50	15	17.44	15.33	2.00	10.38	1.990	1.25	16**	1.25	17.75	6.000	17.380	5/8 - 11 x 1.00	605

* 2 top and 2 bottom holes in each flange are tapped for ⅞ - 9 UNC threads.
† 2 top and 2 bottom holes in each flange are tapped for 1 - 8 UNC threads.
** 2 top and 2 bottom holes in each flange are tapped for 1⅛ - 8 UNC threads.

Manual Operator Dimensions 097 and 0397



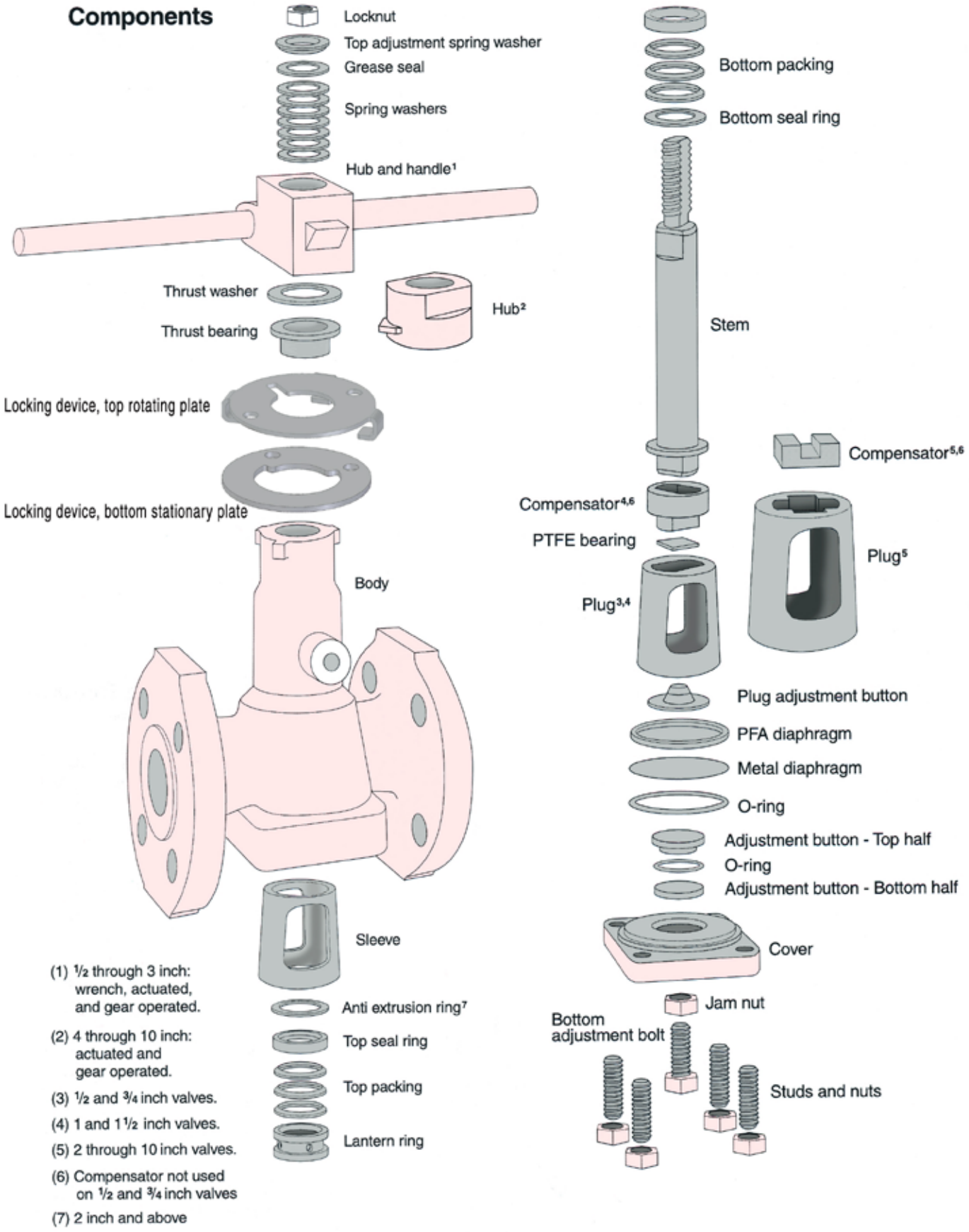




Size	H	M	Q	R
½	3.50	4.91	11.25	.75
¾	3.50	4.91	11.25	.75
1	6.50	8.09	12.50	1.16
1½	6.84	8.43	12.50	1.16
2	7.22	8.81	18.00	1.28
3	7.88	9.47	24.00	1.28

Size	H	K	C	Y
1	11.76	9.63	2.62	12.00
1½	12.11	9.63	2.62	12.00
2	12.52	9.63	2.62	12.00
3	13.18	9.63	2.62	12.00
4	14.57	11.13	3.50	18.00
6	15.88	13.43	3.50	24.00
8	17.37	13.43	3.50	30.00
10	18.62	14.25	5.38	30.00
12	24.00	18.58	5.50	24.00

Components



(1) ½ through 3 inch: wrench, actuated, and gear operated.

(2) 4 through 10 inch: actuated and gear operated.

(3) ½ and ¾ inch valves.

(4) 1 and 1½ inch valves.

(5) 2 through 10 inch valves.

(6) Compensator not used on ½ and ¾ inch valves

(7) 2 inch and above

Materials of construction

Valve Part	WCB/316/316/WCB	HC/HC/HC (Chlorine)	MO/MO/HC (Chlorine)	LCB/MO/HC (Chlorine)	A20/HC/HC	316/MO/HC	316/316/316
Body*	WCB	Hastelloy C	Monel	LCB	Alloy 20	316SS	316SS
Plug	316SS	Hastelloy C	Monel	Monel	Hastelloy C	Monel	316SS
Stem	316SS	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	316SS
Cover	WCB	Hastelloy C	Monel	LCB	Alloy 20	316SS	316SS
Cover bolting †	B7**	B7**	B7**	B7**	B7**	B7**or B8	B8
Lantern ring	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Metal diaphragm	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C	Hastelloy C
Bottom adjustment button	304SS	Hastelloy C	Monel	Carbon Steel	Alloy 20	304SS	304SS
Bottom adjustment bolt	304SS	Monel	Monel	Monel	304SS	304SS	304SS
Jam nut	304SS	Monel	Monel	Monel	304SS	304SS	304SS

* Optional connection for grease injection - lantern ring port will be furnished as 1/4-inch NPT female with solid pipe plug of similar material to valve body with PTFE tape thread sealant.

** PTFE coated.

† Other material combinations and cover bolting materials are available upon request.

Locknut	Hastelloy C or 316 stainless steel
Top adjustment spring washer	Stainless steel
Grease seal	PTFE
Spring washers	Inconel
Hub	CD4MCu
Thrust bearing	35% graphite PTFE
Sleeve	PTFE
Top seal ring	PTFE
Packing rings	PTFE
Bottom seal ring	35% graphite PTFE
Compensator	Hastelloy C
Compensator bearing	PTFE
Plug adjustment button	PTFE
Diaphragm	PFA
Locking Device	Stainless Steel

Operating Torques*

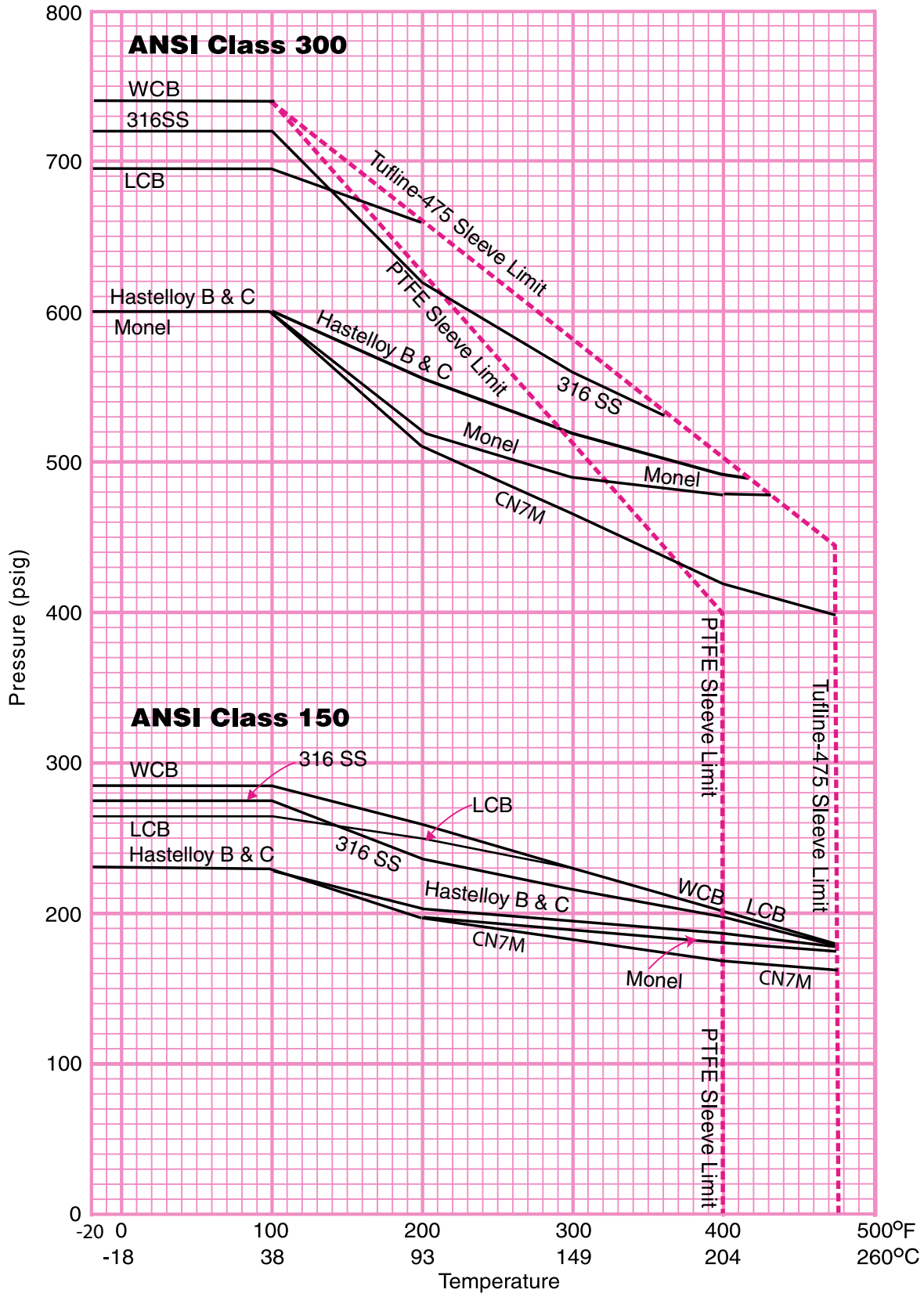
Severe Service valves with PTFE sleeves

Valve Size	Break Torque ft-lb	Seat Torque ft-lb	Run Torque ft-lb
1/2	19	11	10
3/4	19	11	10
1	55	34	28
1 1/2	110	69	55
2	151	89	76
3	165	96	83
4	330	199	165
6	688	413	344
8	1073	646	536
10	1980	1183	990
12	2888	1733	1444

*Since most Tufline Severe Service valves are cleaned for chlorine service, torque values may be higher.

Pressure Temperature Ratings

Based on ANSI B16.34, 2004 Edition



How to order

Size | Figure No. | Body | Plug | Stem | Sleeve | Operator | Service | Options

1" - 0397 - 6 - 6 - 6 -P1-WX - C - XX

Size & Figure No.

Body

Alloy 20 . . . . . **0**
WCB **2**
Monel **3**
316SS. **6**
Hastelloy C. **9**
LCB **2X**
Other (Specify) . . . . **X**

Plug

Alloy 20 . . . . . **0**
Monel **3**
316SS **6**
Hastelloy C **9**
Other (Specify) . **X**

Stem

316SS **6**
Hatelloy C . . **9**

Sleeve

PTFE **P1**
Tufline 475. . **P16**
Other
(Specify . . . **PX**

Options

Lantern ring
monitoring port . . . . **GP**
Special flange
facing (specify). . . . . **XX**
Special flange
drilling (specify) . . . . **XX**

Valve specifications may include multiple options.

Service

Chlorine . . . . . **C**
Phosgene . . . . **P**
General
Service . . . . . **Blank**
Other**
(Specify) . . . . **X**

Operator

Less Operator . . . . . **N**
Wrench with
locking device . . . . . **WX**
Gear with
locking device . . . . . **GX**
Actuator**. . . . . **A**

* Specify actuator type and available air supply.

** Consult your Xomox Sales Engineer for a wide variety of other available service options.

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XOMOX®

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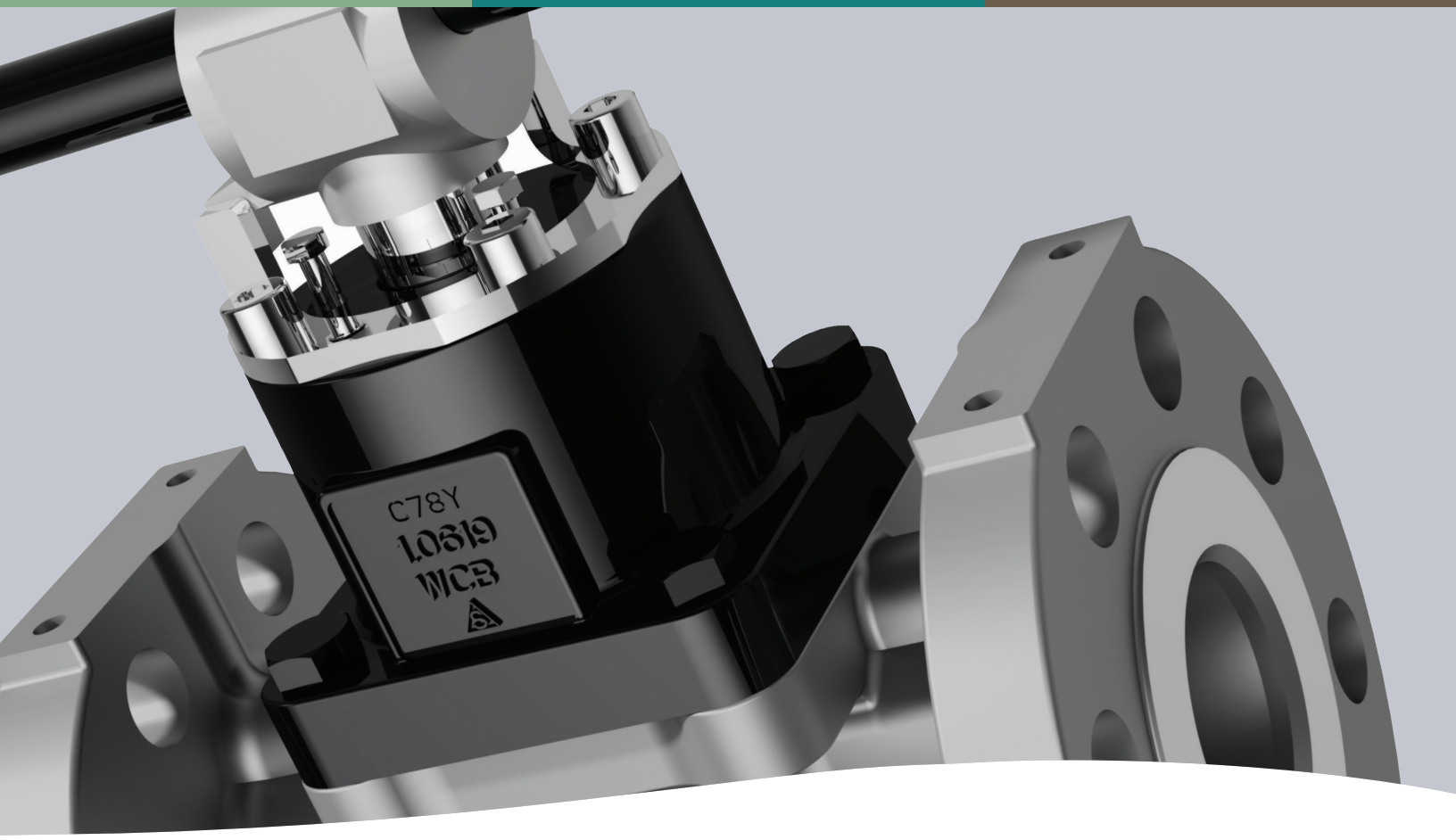
XOMOX®

THE FIRST SLEEVED PLUG VALVE ABLE TO PASS FOUR (4) THERMAL CYCLES WITH ZERO PACKING ADJUSTMENTS

brands you trust.



XOMOX® XP3
Low Emission Sleeved Plug Valves

CRANE

Crane ChemPharma & Energy

www.cranecpe.com

XOMOX®

ISO 15848 Standard Introduction

International Organization for Standardization

INTERNATIONAL ..... **ISO**
STANDARD **15848-1**

ISO 15848-1 is an International standard for fugitive emissions issued by the ISO Organization. It contains both dynamic life cycles and thermal cycles and is considered one of the most demanding fugitive emission standards for soft seated valves. This standard contains different levels of acceptance based on the number of thermal and mechanical cycles, temperature, and number of adjustments. The objective of ISO 15848-1 is to enable classification of performance in different designs and constructions of valves to reduce fugitive emissions.

Example Description Tables

(200°C)
ISO 15848 – 1 BH CO3 392°F – SSA 0

Part Composition	
Part 1: Design • **System of classification and procedures of qualification for the tests of the valve type**	Part 2: Industrial (Production) • Acceptance tests in production of the valves • Non-destructive

Number of Adjustments
0 / 1 / 2 / 3

Temperature Classes				
(T -196 °C)	**(T -40 °C)**	**(T RT)**	**(T 200 °C)**	**(T 400 °C)**
-320°F	-40°F	Room temperature, °F	**392°F**	752°F
-196°C	-40°C	Room temperature, °C	**200°C**	400°C

Class	Measured Leak Rate [a] mg s^{-1} m^{-1}	Remarks
A[b]	$\leq 10^{-6}$	Typically achieved with bellow seals or and equivalent stem (shaft) sealing system for quarter turn valves
B	**$\leq 10^{-4}$**	**Typically achieved with PTFE based packings or elastomeric seals**
C	$\leq 10^{-2}$	Typically achieved with flexible graphite based packings

[a] Expressed in mg s-1 m-1 measured with total leakage method
[b] Class A can be measured only with helium using the vacuum method

Classification	Minimum number of mechanical cycles
C01	500 cycles, with two thermal cycles (except for RT)
C02	1,500 cycles, with three thermal cycles
C03	**2,500 cycles, with four thermal cycles**

Test Fluid	Class
H - Helium	**AH, BH, CH**
M - Methane	BM, CM

When the test fluid is **helium**, classes are identified as **AH, BH** and **CH**.
When the test fluid is **methane**, classes are identified as **BM** and **CM**.

Manufacturing valves will be subjected to the ISO 15848-2 test as described in the norm. This is a non-destructive test that intends to address the performance of the valves (Please refer to ISO 15848 norm).

XOMOX® XP3 Low Emission Sleeved Plug Valves (SPV)

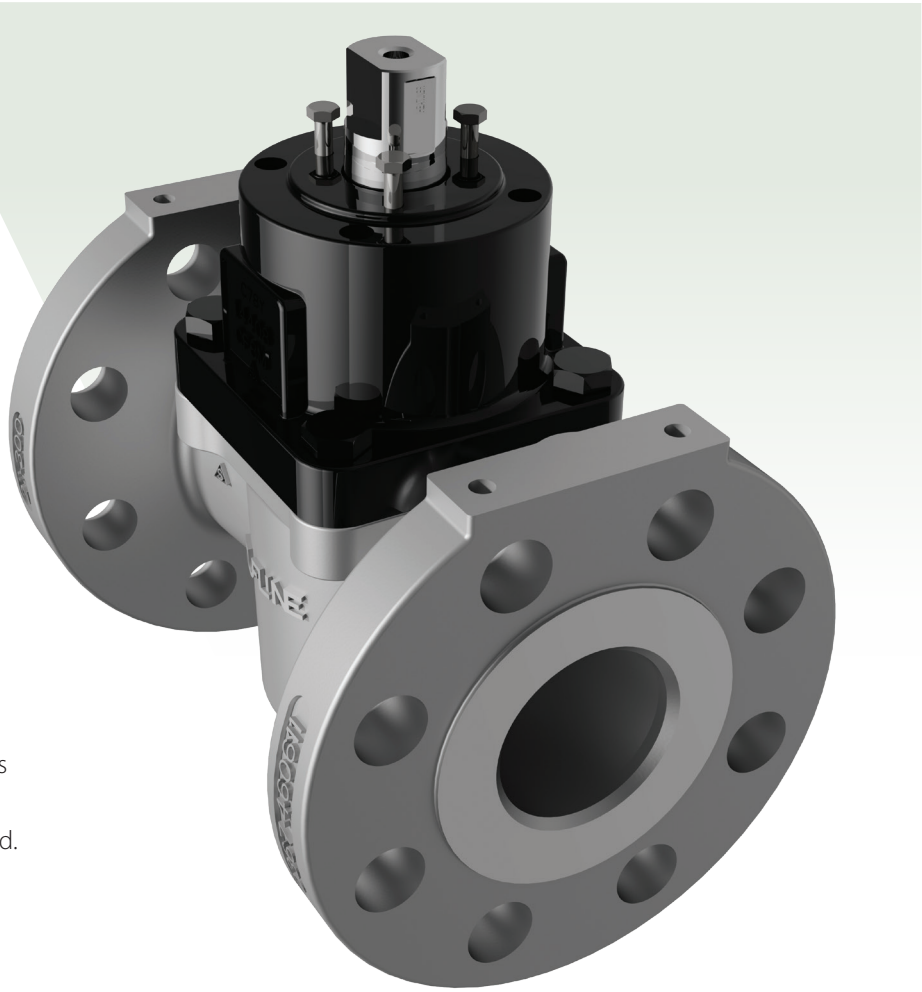
The first sleeved plug valves capable of passing four (4) thermal cycles with ZERO packing adjustments.

Key Features & Benefits

1. **Innovative stem seal design permits best in class FUGITIVE EMISSIONS CONTROL (ISO 15848-1 BH CO3 392°F or 200°C SSA 0).**
2. **Live-loaded design optimizes sealing performance (self-adjusted) and extended service life with ZERO PACKING ADJUSTMENTS through thermal cycling.**
3. **MAINTENANCE and CAVITY FREE: No costly lubrication, no sticking, and no contamination of process media.**

XOMOX® XP3 LIVE-LOADED STEM CARTRIDGE SEAL

The new XOMOX® XP3 Soft Seated Sleeved Plug Valve incorporates a Live-loaded Stem Cartridge which enables to meet the most stringent emissions standards in the industry.



Options:

- Options for different packing materials to suit different temperatures and applications (392°F/200°C or 500°F/260°C); PTFE & graphite packing.
- All current XOMOX® sleeve material options are available.
- XP4D design; Option for an additional manual 4D stem seal which provides the same emissions performance as the XP3 configuration.
- XP3 and XP4D are API 641 Class B and E approved.
- Firetest according to API 607 7th edition.

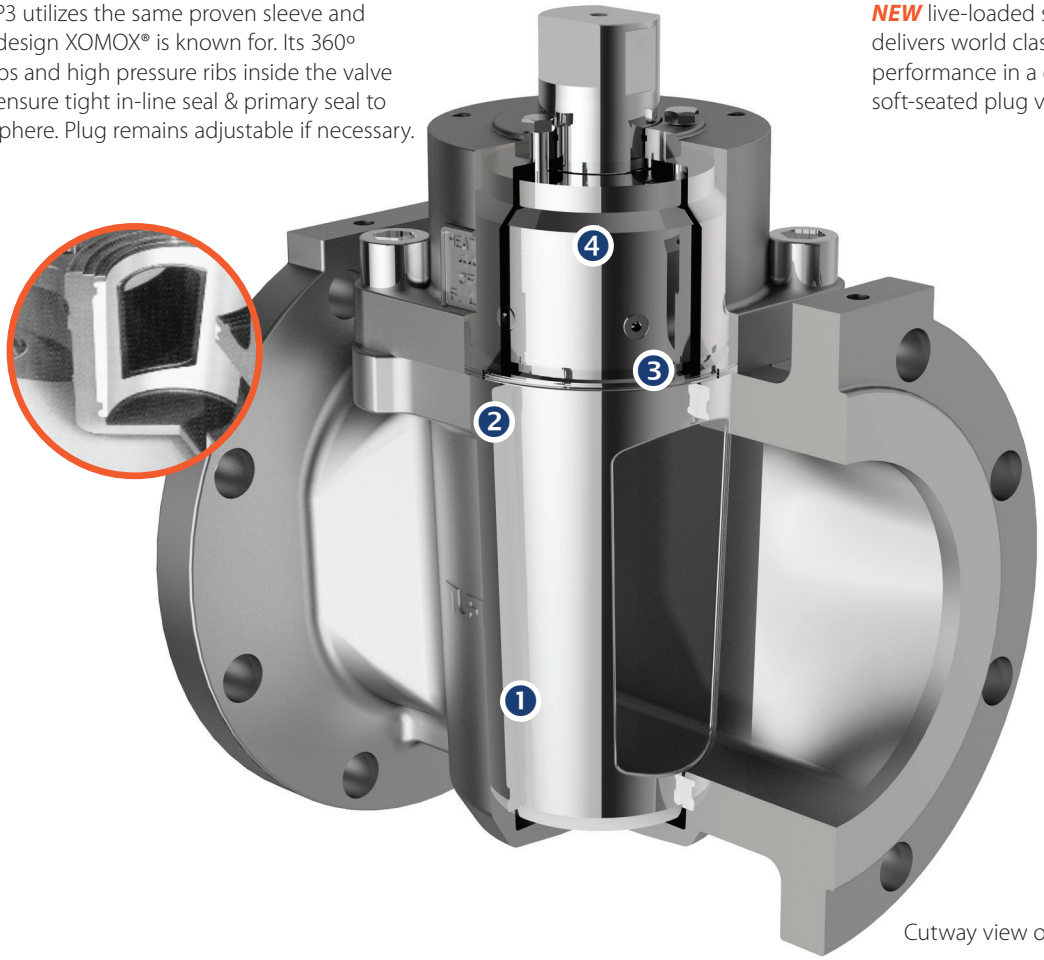
XOMOX® XP3 Low Emission SPV Features and Benefits

XP3 Sleeved Plug Valves are the first valves capable to pass all four thermal cycles without any packing adjustments, while meeting the ISO 15848-1 standard at the BH CO3 200°C/392°F SSA 0. The new XOMOX® valve top seal technology is able to perform in its entire temperature range even under thermal cycle conditions. This is achieved by the patented Live-loaded stem cartridge.

The XP3 design incorporates the same features and benefits of the standard XOMOX® Sleeve Plug Valve by being maintenance and cavity-free. These valves require no costly lubrication and prevent accumulation or contamination of process media, reducing maintenance costs and the cost of ownership over time.

1 Primary Seal to Atmosphere
The XP3 utilizes the same proven sleeve and body design XOMOX® is known for. Its 360° port lips and high pressure ribs inside the valve body ensure tight in-line seal & primary seal to atmosphere. Plug remains adjustable if necessary.

3 Tertiary Seal to Atmosphere
NEW live-loaded stem cartridge delivers world class low E performance in a quarter-turn soft-seated plug valve.



Cutway view on XP3

2 Secondary Seal to Atmosphere
Enabled by the same wedge ring and plastic diaphragm design that is in place on our existing product, ensuring another layer of protection to stem seal and body cover joint.

4 Packing Options
Stem packing can be changed depending on operating conditions. Various packing options are available.

XOMOX® XP3 Low Emission SPV Features and Benefits

5 Patented live-loaded stem cartridge design
Optimizes sealing integrity to atmosphere and extended service life.

MEETING BEST IN CLASS FUGITIVE EMISSIONS STANDARDS

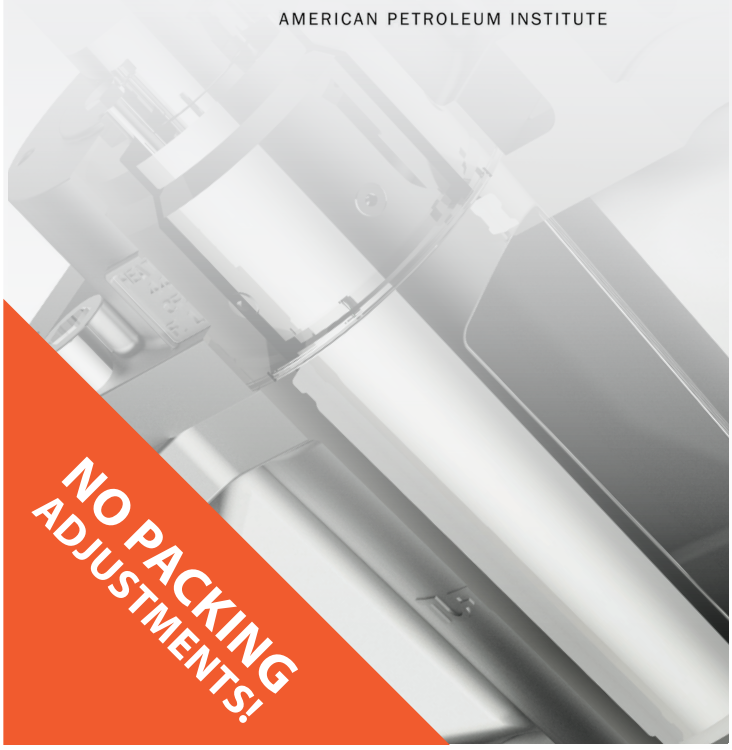
ISO 15848-1 BH CO3 200°C/392°F SSA 0

- Tightness class BH (<0-4 mg/(s x m))
- Endurance class CO3
- Temperature class RT to 200°C/392°F
- Adjustments: SSA 0 (zero packing adjustments)

ISO International Organization for Standardization

Option:
API 641 Class B and E
(200°C/392°F) (260°C/ 500°F)

energy API AMERICAN PETROLEUM INSTITUTE



XP3 maintains all design features of current XOMOX® SPV

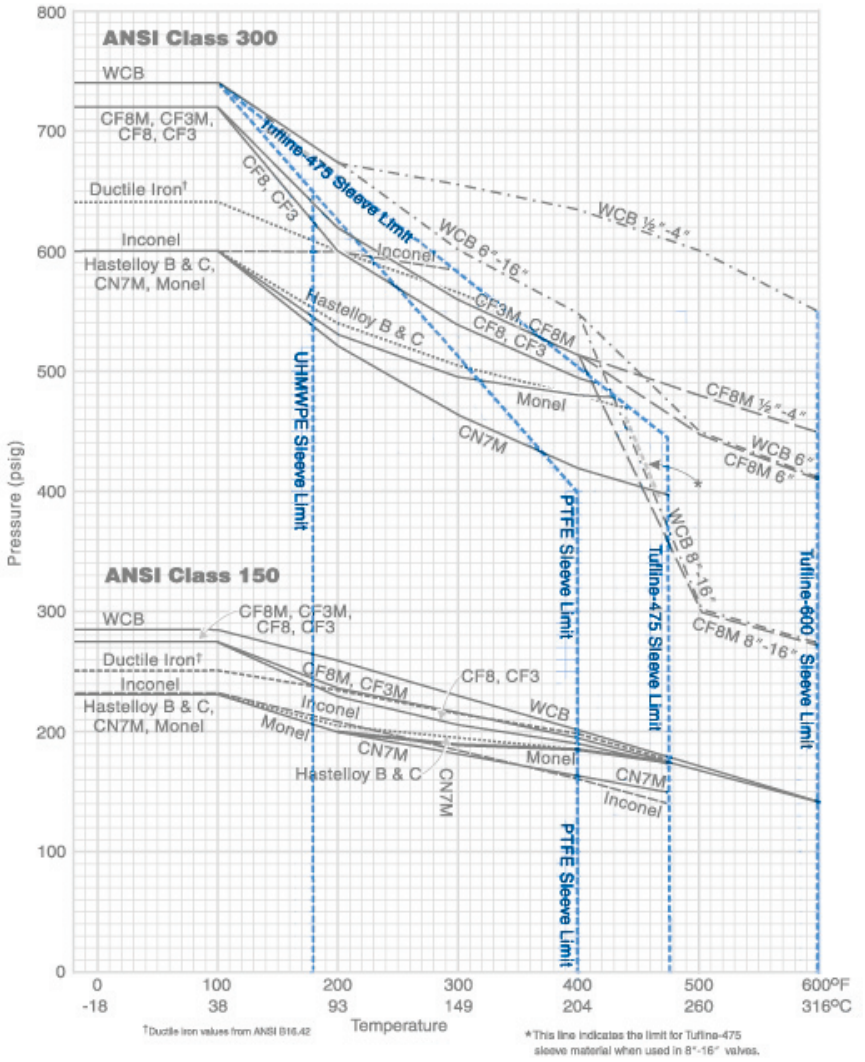
- **Re-inforced** body cover joint gasket for emissions-proof valves.
- **360° port lips** on body prevent cold flow and deformation of the sleeve, eliminating the chances that the sleeve will rotate during thermal cycling.
- **Plug vent hole** options depending on different service conditions.
- **Actuator mounting** capabilities per ISO 5211.
- **Flange pad design** remains available per the standard configuration.
- All **sleeve materials** are available.
- **Current material** selection on body and plug are available.

XOMOX® XP3 Low Emission SPV Properties & Characteristics

XP3 Break Torque - Class 150 and 300 [in*lbs]

Size	PTFE/PTFEX		%R-PTFE Sleeve		PTFEXC/XeniTh Sleeve		UHMWPE/PFA Sleeve	
	Std	Built Dry	Std	Built Dry	Std	Built Dry	Std	Built Dry
½" & ¾"	163	244	204	305	214	326	326	478
1"	458	692	580	865	621	936	916	1384
1 ½"	916	1384	1150	1730	1242	1863	1842	2758
2"	1262	1893	1578	2372	1710	2565	2534	3797
3"	1384	2066	1730	2585	1863	2799	2758	4143
4"	2758	4143	3450	5181	3725	5588	5517	8285
6"	5751	8621	7186	10779	7766	11644	11502	17252
8"	8967	13456	11217	16815	12112	18168	17944	26912
10"	16560	24845	20703	31054	22352	33538	33120	49681
12"	24153	36225	30189	45284	32601	48907	48296	72450

If any additional information is required, please contact your sales representative or customer service.



XOMOX® XP3 Low Emission SPV Dimensional Data

Bare Stem Operated

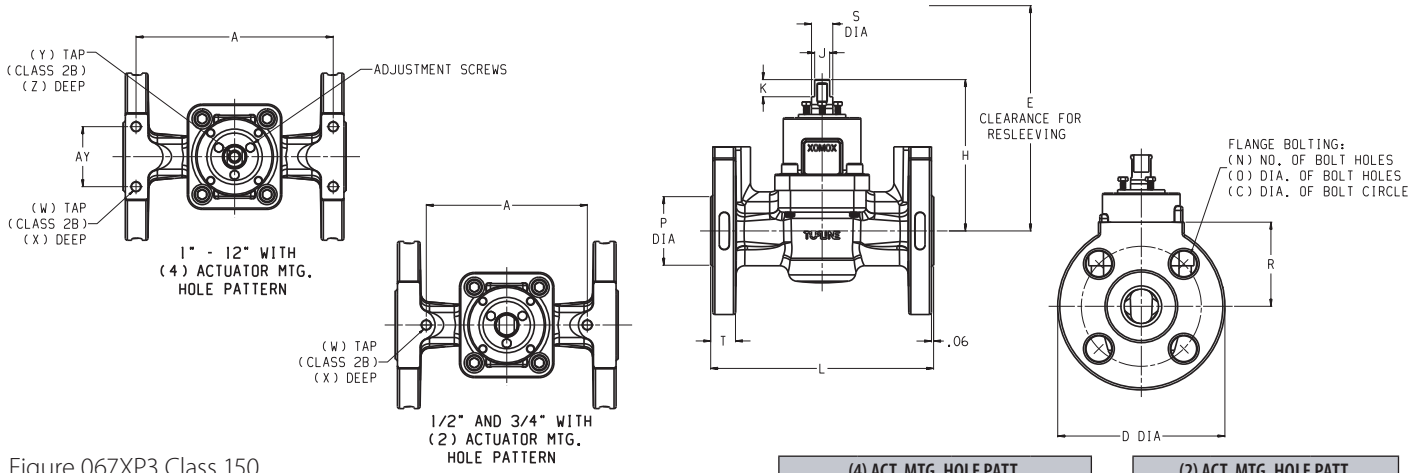


Figure 067XP3 Class 150

SIZE	L	D	T	R	N	O	C	W
1/2"	4.25	3.50	.38	1.75	4	.63	2.38	3.1
3/4"	4.63	3.88	.41	1.94	4	.63	2.75	3.6
1"	5.00	4.25	.44	2.13	4	.63	3.13	7.2
1-1/2"	6.50	5.00	.56	2.50	4	.63	3.88	14
2"	7.00	6.00	.63	3.00	4	.75	4.75	21
3"	8.00	7.50	.75	3.75	4	.75	6.00	33
4"	9.00	9.00	.94	4.63	8	.75	7.50	57
6"	10.50	11.00	1.00	5.50	8	.88	9.50	98
8"	11.50	13.50	1.13	6.75	8*	.88	11.75	180
10"	13.00	16.00	1.19	8.00	12*	1.00	14.25	268
12"	14.00	19.00	1.25	9.50	12*	1.00	17.00	366

(4) ACT. MTG. HOLE PATT.			
A	AY	W	X
----	----	------	---
----	----	------	---
3.625	5/16 - 18	.47	.38
3.750	5/16 - 18	.47	.47
6.313	2.250	5/16 - 18	.47
7.125	3.500	3/8 - 16	.56
8.000	4.000	7/16 - 14	.63
9.438	4.000	7/16 - 14	.63
10.188	6.000	1/2 - 13	.63
11.562	6.000	1/2 - 13	.63
12.532	6.000	1/2 - 13	.63

(2) ACT. MTG. HOLE PATT.		
A	W	X
3.625	5/16 - 18	.47
3.750	5/16 - 18	.47
----	------	---
----	------	---
----	------	---
----	------	---
----	------	---
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----	------	---
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Figure 0367XP3 Class 300

SIZE	L	D	T	R	N	O	C	W
1/2"	5.50	3.75	.56	1.88	4	.63	2.63	6.6
3/4"	6.00	4.63	.63	2.31	4	.75	3.25	9.9
1"	6.50	4.88	.69	2.44	4	.75	3.50	12
1-1/2"	7.50	6.13	.81	3.06	4	.88	4.50	22
2"	8.50	6.50	.88	3.25	8	.75	5.00	29
3"	11.13	8.25	1.13	4.13	8	.88	6.63	40
4"	12.00	10.00	1.25	5.13	8	.88	7.88	84
6"	15.88	12.50	1.44	6.25	12	.88	10.63	170
8"	16.50	15.00	1.63	7.50	12	1.00	13.00	275
10"	18.00	17.50	1.88	8.75	16	1.13	15.25	407
12"	19.75	20.50	2.00	10.25	16	1.25	17.75	556

(4) ACT. MTG. HOLE PATT.			
A	AY	W	X
----	----	------	---
----	----	------	---
5.570	1.750	5/16 - 18	.38
6.625	1.150	5/16 - 18	.47
7.563	2.250	5/16 - 18	.47
9.938	3.500	3/8 - 16	.56
10.688	4.000	7/16 - 14	.63
14.000	4.000	7/16 - 14	.63
14.625	6.000	1/2 - 13	.63
15.688	6.000	1/2 - 13	.63
17.375	6.000	1/2 - 13	.63

(2) ACT. MTG. HOLE PATT.		
A	W	X
4.375	5/16 - 18	.47
3.750	5/16 - 18	.47
----	------	---
----	------	---
----	------	---
----	------	---
----	------	---
----	------	---
----	------	---
----	------	---

*see note 1

Figure 067XP3 (Class 150) & 0367XP3 (Class 300)

SIZE	H	S	J	K	P	E	Y	Z
1/2"	4.591	.537	.437	.500	1.38	8.68	1/4 - 20	.91
3/4"	4.591	.537	.437	.500	1.69	8.68	1/4 - 20	.91
1"	4.433	.620	.437	.500	2.00	8.93	1/4 - 20	.91
1-1/2"	5.456	.848	.563	.530	2.88	10.43	5/16 - 18	.91
2"	6.067	1.102	.755	.748	3.63	11.63	5/16 - 18	.91
3"	6.598	1.102	.755	.748	3.63	11.63	5/16 - 18	.91
4"	8.054	1.260	.880	1.000	6.19	24.83	5/16 - 18	.91
6"	9.590	2.008	1.398	1.000	10.63	30.47	5/16 - 18	.91
8"	11.795	2.008	1.398	1.000	10.63	30.47	5/16 - 18	.91
10"	13.291	2.500	1.673	1.000	12.75	31.47	1/2 - 13	.91
12"	14.315	2.992	1.968	1.000	15.00	37.53	1/2 - 13	.91

NOTES

1. 2 top holes in the flanges of 8" Fig. 067XP3 are tapped 3/4 - 10unc -2b threads
   2 top holes in the flanges of 10", 12 " Fig. 067XP3 are tapped for 7/8 - 9unc - 2b
2. Weight of valve in pounds. All weights are estimated

XOMOX® XP3 Low Emission SPV Dimensional Data

Wrench Operated

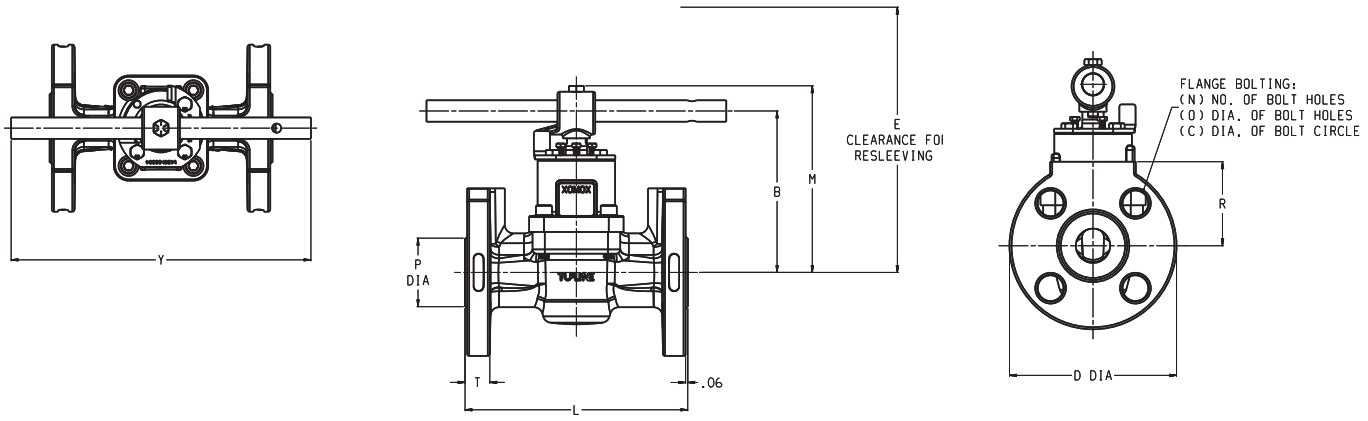


Figure 067XP3 Class 150

SIZE	L	D	T	P	R	N	O	C	E	M	B	Y	W
1/2"	4.25	3.50	.38	1.38	1.75	4	.63	2.38	8.68	5.61	4.89	8.75	5.1
3/4"	4.63	3.88	.41	1.69	1.94	4	.63	2.75	8.68	5.61	4.89	8.75	5.6
1"	5.00	4.25	.44	2.00	2.13	4	.63	3.13	8.93	5.45	4.73	8.75	9.2
1-1/2"	6.50	5.00	.56	2.88	2.50	4	.63	3.88	10.43	6.62	5.79	12.50	17
2"	7.00	6.00	.63	3.63	3.00	4	.75	4.75	11.63	7.44	6.61	18.00	24
3"	8.00	7.50	.75	5.00	3.75	4	.75	6.00	12.63	7.96	7.13	24.00	37
4"	9.00	9.00	.94	6.19	4.63	8	.75	7.50	24.83	9.76	8.68	30.00	65

Figure 0367XP3 Class 300

SIZE	L	D	T	P	R	N	O	C	E	M	B	Y	W
1/2"	5.50	3.75	.56	1.38	1.88	4	.63	2.63	8.68	5.61	4.89	8.75	8.6
3/4"	6.00	4.63	.63	1.69	2.31	4	.75	3.25	8.68	5.61	4.89	8.75	12
1"	6.50	4.88	.69	2.00	2.44	4	.75	3.50	8.93	5.45	4.73	8.75	14
1-1/2"	7.50	6.13	.81	2.88	3.06	4	.88	4.50	10.43	6.62	5.79	12.50	25
2"	8.50	6.50	.88	3.63	3.25	8	.88	5.00	11.63	7.44	6.61	18.00	32
3"	11.13	8.25	1.13	5.00	4.13	8	.88	6.63	12.63	7.96	7.13	24.00	44
4"	12.00	10.00	1.25	6.19	5.13	8	.88	7.88	24.83	9.76	8.68	30.00	92

All dimensions in inches. Weight of valve in pounds. All weights are estimated.

XOMOX® XP3 Low Emission SPV Dimensional Data

Gear Operated

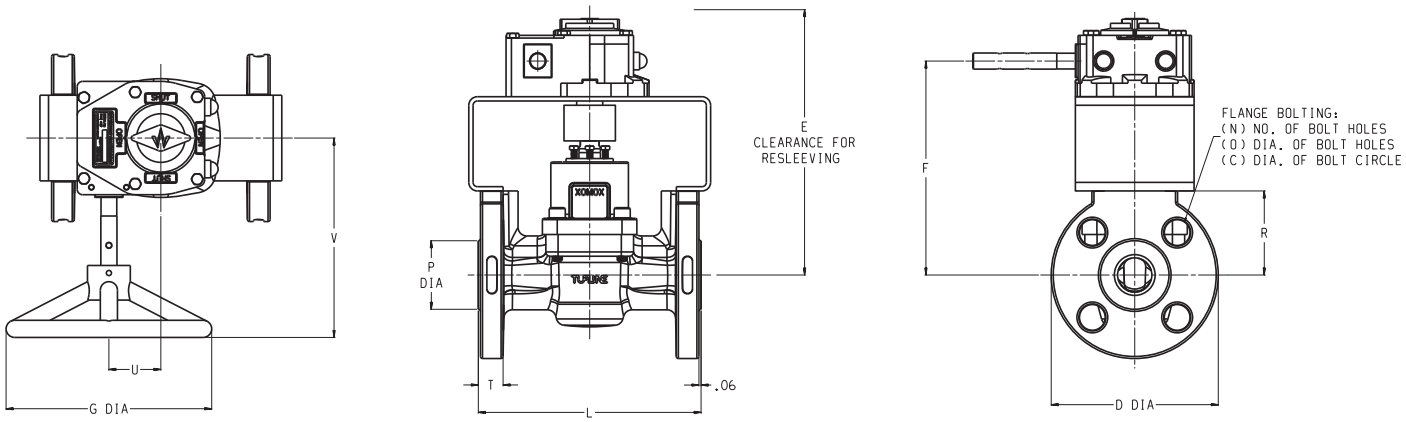


Figure 067XP3 Class 150

SIZE	L	D	T	P	R	N	O	C	E	F	G	U	V	W
3"	8.00	7.50	.75	5.00	3.75	4	.75	6.00	12.63	10.38	12.00	2.05	7.77	56
4"	9.00	9.00	.94	6.19	4.63	8	.75	7.50	24.83	11.57	12.00	2.05	7.77	82
6"	10.50	11.00	1.00	8.50	5.50	8	.88	9.50	27.25	13.78	18.00	2.63	10.30	142
8"	11.50	13.50	1.13	10.63	6.75	8*	.88	11.75	30.47	16.03	18.00	3.52	10.96	250
10"	13.00	16.00	1.19	12.75	8.00	12*	1.00	14.25	31.47	17.78	24.00	4.84	14.26	372
12"	14.00	19.00	1.25	15.00	9.50	12*	1.00	17.00	37.53	18.78	30.00	4.84	15.76	480

Figure 0367XP3 Class 300

SIZE	L	D	T	P	R	N	O	C	E	F	G	U	V	W
3"	11.13	8.25	1.13	5.00	4.13	8	.88	6.63	12.63	10.38	12.00	2.05	7.77	64
4"	12.00	10.00	1.25	6.19	5.13	8	.88	7.88	24.83	11.57	12.00	2.05	7.77	110
6"	15.88	12.50	1.44	8.50	6.25	12	.88	10.63	27.25	13.78	18.00	2.53	10.30	218
8"	16.50	15.00	1.63	10.63	7.50	12	1.00	13.00	30.47	16.03	18.00	3.53	10.96	349
10"	18.00	17.50	1.88	12.75	8.75	16	1.13	15.25	31.47	17.78	24.00	4.84	14.26	515
12"	19.75	20.50	2.00	15.00	10.25	16	1.25	17.75	37.53	18.78	30.00	4.84	15.76	674

*See note 1

NOTES:

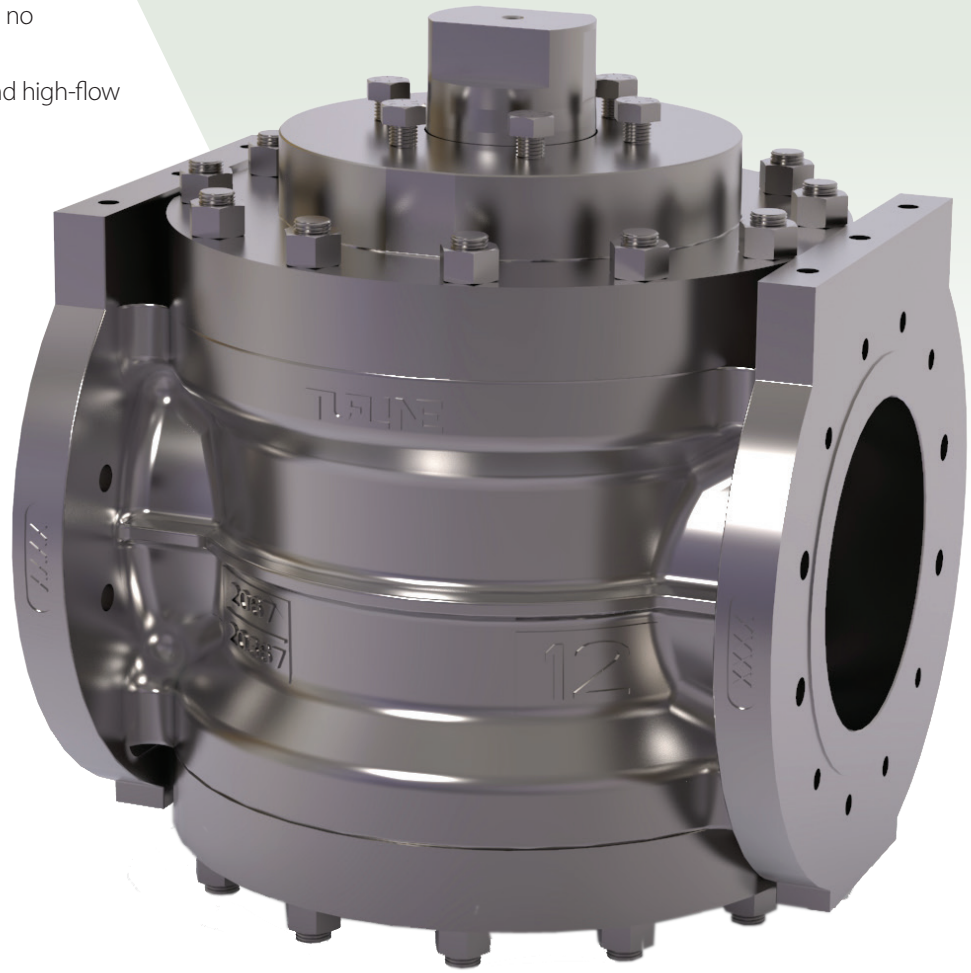
1. 2 top holes in the flanges of 8" Fig. 067XP3 are tapped 3/4-10unc-2B threads
   Top holes in the flanges of 10", 12" Fig. 067XP3 are tapped for 7/8-9unc-2B threads
2. All dimensions in inches. Weight of valve in pounds. All weights are estimated
3. All operator related dimensions are assuming gears and handwheels are sized for valves with PTFE sleeves

XOMOX® XP3 Full Port Low Emission SPV

XOMOX® FULL PORT DESIGN

With the full-area round port there is no diminished or constricted flow.

Ideal wherever low pressure-drop and high-flow efficiency are important.



Reference of Available Configurations and Figure numbers

Size (inch)	ASME Class	Figure Number	Flanged Ends
2" - 12"	150	2067XP3	X
2" - 12"	300	20367XP3	X

XOMOX® XP3 Full Port Low Emission SPV Dimensional Data

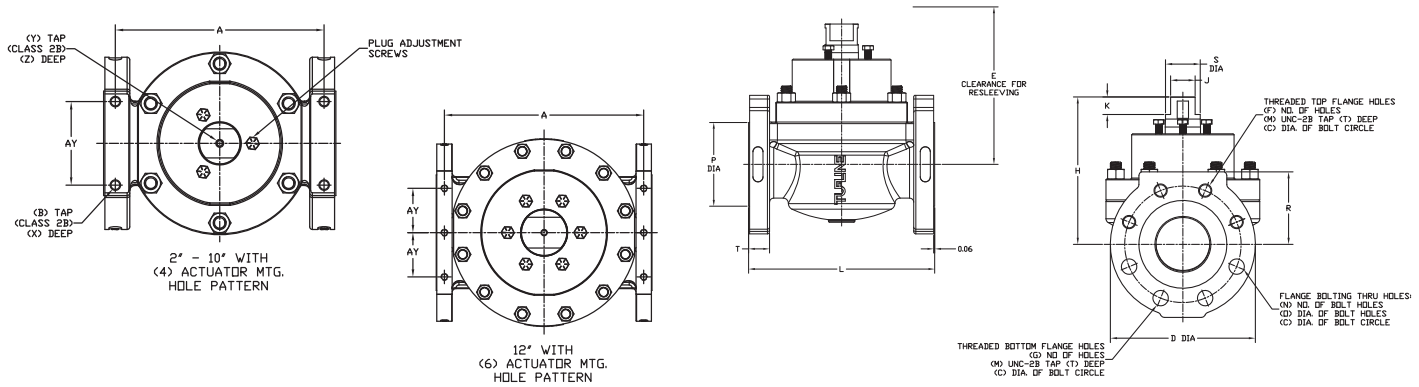


Figure 2067XP3

SIZE	L	D	T	R	N	O	C	F	G	M	W
2"	8.50	6.50	.94	3.16	4	.75	4.75	—	—	—	54
3"	11.13	8.25	1.25	4.13	2	.75	6.00	2	0	5/8—11	124
4"	12.00	10.00	1.43	5.00	6	.75	7.50	2	0	5/8—11	189
6"	15.88	12.50	1.50	6.44	0	—	9.50	4	4	3/4—10	404
8"	19.75	15.00	1.73	7.56	4	.88	11.75	2	2	3/4—10	823
10"	22.38	17.50	2.03	8.84	6	1.00	14.25	4	2	7/8—9	1344
12"	28.00	23.00	2.06	11.56	4	1.00	17.00	4	4	7/8—9	2612

Figure 20367XP3

SIZE	L	D	T	R	N	O	C	F	G	M	W
2"	8.50	6.50	.94	3.16	8	.75	5.00	—	—	—	53
3"	11.13	8.25	1.25	4.13	4	.88	6.63	4	0	3/4—10	122
4"	12.00	10.00	1.43	5.00	6	.88	7.88	2	0	3/4—10	188
6"	15.88	12.50	1.50	6.44	4	.88	10.63	4	4	3/4—10	402
8"	19.75	15.00	1.73	7.56	6	1.00	13.00	4	2	7/8—9	819
10"	22.38	17.50	2.03	8.84	8	1.13	15.25	6	2	1—8	1338
12"	28.00	23.00	2.06	11.56	8	1.25	17.75	4	4	1—1/4—8*	2600

* UN-8 THREAD

Figure 2067XP3 and 20367XP3

SIZE	H	S	J	K	P	E	Y	Z	A	AY	B	X
2"	7.414	1.258	.874	.984	3.63	11.38	5/16—18	.88	7.50	4.00	7/16—14	.69
3"	8.388	2.008	1.398	1.000	5.00	13.50	5/16—18	.88	10.00	4.00	1/2—13	.63
4"	8.956	2.500	1.673	1.000	6.19	15.38	1/2—13	.75	10.69	4.00	1/2—13	.63
6"	10.575	2.992	1.969	1.000	8.50	19.25	1/2—13	.75	14.38	5.50	5/8—11	1.00
8"	14.789	3.937	2.000	1.575	10.63	26.00	1/2—13	.75	18.06	8.00	3/4—10	1.13
10"	16.897	6.000	4.000	2.000	12.75	30.38	3/4—10	1.00	20.44	8.00	3/4—10	1.13
12"	18.221	6.000	4.000	2.000	15.00	24.25	3/4—10	1.00	25.88	5.75	7/8—9	1.31

NOTES:

1. Weight of valves in pounds. All weights are estimate.
2. 12" 2067XP3 / 20367XP3 uses bottom cover design.

XOMOX® XP3 Low Emission SPV Applications

APPLICATIONS

Chlor-Akali

- Chlorine & Derivatives
- Caustic Soda & Derivatives

Olefins

- Ethylene & Derivatives
- Ethylene Oxide & Derivatives
- Butadiene & Derivatives
- Propylene & Derivatives

Aromatics

- Styrene & Derivatives
- Benzene & Derivatives
- Toluene & Derivatives
- Xylene & Derivatives

XOMOX® XP3 - PERFORMANCE CHART

● Well Suited ● Appropriate Application ● Limited Application

FUNCTION	ON / Off	●
	Throttling	●
	Diversion	●
MEDIA TYPES	Clean Liquids & Gases	●
	Dirty Liquids & Gases	●
	Corrosive Liquids & Gases	●
	Hazardous Liquids & Gases	●
	Viscous Liquids	●
	Scaling Liquids & Slurries	●
	Abrasive Slurries	●
	Fibrous Slurries	●
	High Pressure Steam (>150 lbs.)	●
	Low Pressure Steam (<150 lbs.)	●
	Dry Materials	●
	Food / Pharmaceutical	●
	Vacuum Service	●
APPLICATION REQUIREMENTS	High Flow Capacity	●
	Low Torque	●
	Fire Tested	●
	Fugitive Emission Control	●
	Reduced Maintenance	●
	Extended Service Life	●
	Size Range (inches)	½" to 24"
	Pressure Rating (ANSI Classes)	150, 300
	High Temperature	600°F (316°C)
	Low Temperature	-40°F (-40°C)
	Unique Features and Benefits	Exceptional fugitive emissions control: ISO15848-1 BH CO3 392°F (200°C) SSA 0 and API 641 Class B & E.

How to Order

1"	067	XP3	6	6	P1	W	C

Figure No.

Class 150	067
Class 300	0367
Class 150	2067
Class 300	20367

Options

XP3	XP3
XP4D	XP4D

Body

CN7M - Alloy 20	0
WCB	2
M35-1 - Monel	3
CF8 - 304SS	4
Nickel	5
CF8M - 316SS	6
Hastelloy B	8
Hastelloy C	9
CD4MCuN	27
Inconel	40
Other (Specify)	X

Service

Chlorine	C
Oxygen	O
Vacuum	V
General Service	Blank
Other**	X

Operator

Wrench	W
Gear	G
Actuator*	A
Less Operator	N

Sleeve

PTFE	P1
15% RPTFE	P2
25% RPTFE	P3
PFA	P6
Xomox-7	P7
UHMWPE	P8
Tufline-475	P16
Tufline-600	P20
Other (Specify)	PX

Plug

CN7M - Alloy 20	0
M35-1 - Monel	3
CF8 - 304SS	4
Nickel	5
CF8M - 316SS	6
Hastelloy B	8
Hastelloy C	9
CD4MCuN	27
Inconel	40
Other (Specify)	X

Tufline® automated valve packages assure single-source responsibility for flow control equipment.

With the XOMOX® family of valves, actuators, and control accessories, combined with our problem solving expertise, you are assured of valve packages that will provide optimum performance in your application.

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Our Automation & Service Centers are strategically located to provide comprehensive:

- Automated valve packing
- Valve modification
- Valve repair
- Application counseling

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* Specify actuator type and available air supply.

** Consult your Tufline Sales Engineer for a wide variety of other available service options.

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NOZ-CHEK® PACIFIC VALVES® RESISTOFLEX® revo® Saunders® the science inside
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