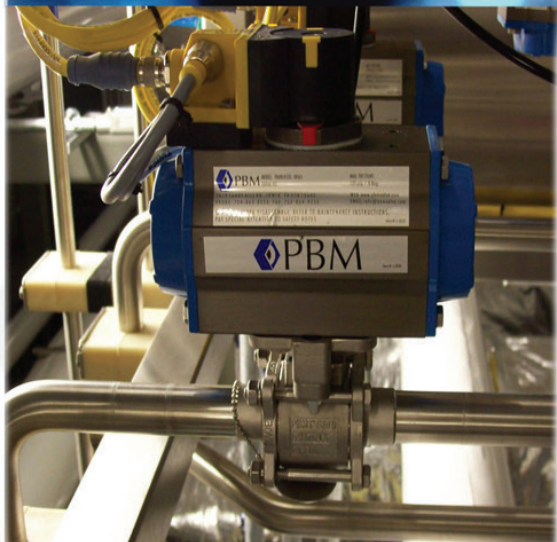


 PBM VALVE SOLUTIONS

# SANITARY VALVES





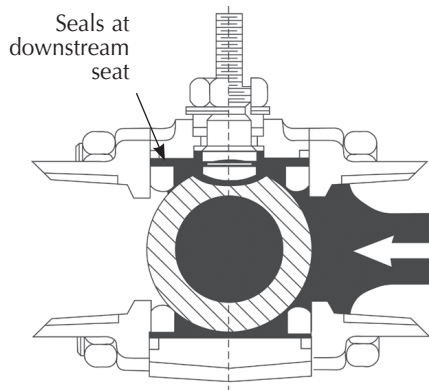
## Features

- ASME BPE Compliant
- Low controlled Ferrite, Cast and Forged
- 2, 3, 4, and 5-Way Configurations
- Inline Cleanability
- Optional Purge and Drain Ports
- Material Test Reports on Wetted Parts
- FDA and USP Class VI Compliant Elastomers
- US, DIN, & ISO True-Bore® Port Diameters
- In-house Polishing and Electropolishing
- Full Range of Automation and Controls
- Available in Stainless, Hastelloy, & Exotic Materials
- Optional Clean Steam and Trap Design

## Adjust-O-Seal®

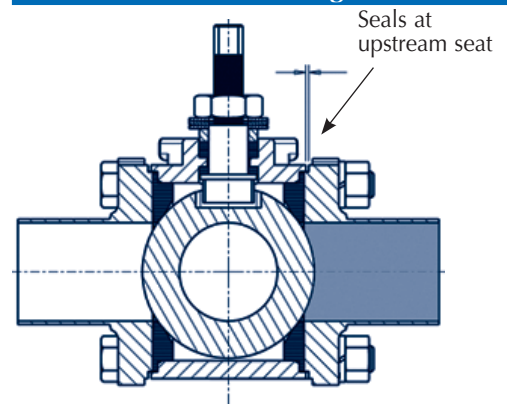
- PBM valves provide bidirectional upstream sealing. Seats are compressed tightly against the ball in the valve.
- Body bolts can be tightened to compensate for normal seat wear without having to remove the valve from service.

### Competitor's Design



Line pressure pushes ball downstream in the ball-closed position, providing sealing at the downstream seat. There is no adjustment to compensate for seat wear.

### PBM's Design



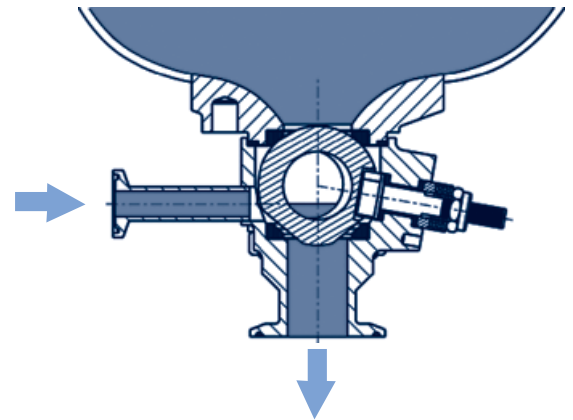
Valve body bolts compress valve seats against the ball, providing bidirectional sealing at the upstream seat. To compensate for seat wear, body bolts can be slightly tightened to re-compress seats against ball.

## PBM valves offer value over the life of the product with:

- Fewer process interruptions
- Longer Life
- Clean/drain without process interruption
- Improved product yields

## PBM also offers:

- On-time delivery
- Documentation
- Solutions to tough applications



This means on valves mounted vertically like PBM's angle stem flush tank valve, the valve seals on the upstream seat, thus allowing the body to be purged and drained without process interruption.



## Ordering Information

### VALVE CONFIGURATION ORDERING INFORMATION <sup>1</sup>

Number(s) in parentheses indicate valve configuration part number position  
PBM part numbers can have up to 20 alpha-numeric characters

Part Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Part Number Code example	S	I	H	F	E	9	F	-	G	-	-	-	3	4	A	-	S	X	X	X

SANITARY VALVES												
PRODUCT (1-2)		MATERIAL <sup>2</sup> (3-4)		SIZE (5)		SERIES (6)		END CONNECTION <sup>3</sup> (7-8)		SEAT & SEAL / FILLERS / O-RINGS (if used) <sup>4</sup> (9)		
										SEAT	FILLER	O-RING
AF	Angle Stem	C-	Hastelloy® C-276	A	¼	1	Series 1	A-	Acme Bevel	C	VT	VI
CS	Clean Steam	H-	316 / 316L Stainless	B	¾	3	Series 3	F-	Ext tube butt weld	D	VT	VI
CT	Clean Steam Trap	HC	Alloy 20	C	½	4	Series 4	G-	Female CBI <sup>7</sup>	G	TF	VI
DI	Diverter Port	HL	316L Stainless	D	¾	5	Series 5	H-	Male CBI <sup>7</sup>	H	HT	VI
DC	Diverter (Steam)	HF	F316L Forged	E	1	6	Series 6	I-	Swagelok TS	I	HT	VT
FI	Flush Tank	H2	317L Stainless	G	1½	8	Series 8	SM	Compression	J	TF	VT
FC	Flush Tank (Steam)	I-	Inconel® 600	H	2	9	Series 9	W-	clamp 1" BPE 09	K	UT	VI
MI	Multi-Port	P-	AL6XN	J	2½			X-	Hygienic clamp	L	UT	VT
SI	Sanitary 2-way	T-	Gr. 5 Titanium	K	3			Z-	No end fittings	M	UT	UT
		L	Gr. 2 Titanium	L	4					N	PK	KA
		T7	Gr. 7 Titanium	M	6					O	PK	VT
PV	see page 23	Y-	Hastelloy® C-22®							P	PK	PK
RD	see page 24	5-	Inconel® 625					3	Non Adjust-O-Seal®	R	PK	PK
S-	see page 25	25	254SMO® 6Mo					4	Reduced port	S	KY	VI
S2	see page 25	21	321 Stainless					5	Non Adjust-O-Seal® & Reduced port	T	VT	EP
S3	see page 25	22	Duplex 2205					7	Flat-faced flanges	U	VT	VT
		76	Super Duplex 32750 / 32760					9	Bar-stock	X	PC	VI
		55	Ferrallium 255							Z	TF	EP
										0	HT	EP
										1	HT	VT
										2	TF	VT
										3	UT	EP
										4	UT	VT
										5	UT	EP
										6	PK	VI
										7	VT	VV
										9	TF	VV

CURRENT PRODUCT SERIES	
1	AF, PV, RD Bronze DP & MP, Ductile Iron MP
3	AF (Fire-safe API-607)
4	Stainless & Carbon Steel MP, Stainless MI (300# class maximum)
5	AN, DD, DP, FD, FT, Stainless MI <sup>8</sup> , Stainless MP <sup>8</sup> , SP, SD
6	AN, FI, SI, SP, FT (Fire-safe API-607)
6	CN, CP (Fire-Safe API-607), CD (not fire-safe)
8 & 9	CS, CT, DC, DI, FC, FI, SI

STEAM vs. SEAT COMPATIBILITY	
VTFE	• ≤75psig at ≤320°F
TFM™ / RTFE	• ≤150psig at ≤366°F
S-TEF®	• ≤200psig at ≤388°F
PEEK	• ≤320psig at ≤425°F

SEAT / SEAL / MATERIAL CODES	
CG	Carbon-Graphite
HT	S-TEF®
KY	Kynar®
PC	PCTFE (Kel-F)
PK	PEEK®
RT	RTFE
TF	TFM™
UT	UHMWPE
VT	VTFE
CG	Carbon-Graphite

O-RING MATERIAL CODES	
EP	EPR
KA	Kalrez®
VI	Viton™
VV	PTFE Encapsulated Viton™

O-RINGS ARE NOT USED IN ALL VALVE PRODUCTS – SEE EACH RESPECTIVE PAGE

<sup>1</sup> - Not all options are available on all valve styles; consult PBM. <sup>2</sup> - For valves with 2 different materials, use the 1<sup>st</sup> position for body material and the 2<sup>nd</sup> position for end fitting material. <sup>3</sup> - For valves with 2 different end connections, use both end codes - e.g. - FX = extended butt weld for tube by clamp. <sup>4</sup> - For standard seat/seal material by series, please see appropriate pricing page. PBM may substitute TFM™ for RTFE at our discretion without notice. TFM™ is a registered trademark of Dyneon™ - a 3M Company. <sup>5</sup> - PBM reserves the right to use 922 Bronze in place of 836 Bronze without notification. <sup>6</sup> - All Carbon Steel and Ductile Iron valves may be coated internally and externally with Rust Veto 342, a rust inhibitor. Information on Rust Veto is available upon request. If Rust Veto is not acceptable, customer to advise specific coating required. Alternate coatings may impact price and delivery time. In addition, Carbon steel and Ductile Iron cast products are painted (black in color) externally prior to Rust Veto coating. <sup>7</sup> - only available 1" through 6". <sup>8</sup> - 150# class maximum. <sup>9</sup> Requires 17-4PH stem

# Ordering Information cont'd

Part Number Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Part Number Code example	S	I	H	F	E	9	F	-	G	-	-	-	3	4	A	-	S	X	X	X

## INDUSTRIAL & SANITARY VALVE OPTIONS

FLOW PATTERN / TANK PAD / PURGE OPTIONS (10 & 11)	BALL / STEM OPTIONS (12)	OPERATOR OPTIONS (13 & 14)	POLISH OPTIONS (15)
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<p><b>DIVERTER PORT AND MULTI-PORT VALVES</b> FOR DIVERTER AND MULTI-PORT VALVES, USE <b>POSITION 10 &amp; 11</b> TO INDICATE THE FLOW PATTERN - SEE PAGE 8 FOR COMMON FLOW PATTERNS</p> <p><b>FLUSH TANK OPTIONS (** POSITION 10 &amp; 11 **)</b></p> <p>-- Standard flush tank weld pad 02 Less tank weld pad but with plastic or wood shipping pad</p> <p>05 w/1" bolt-on tank pad 06 w/1.5" bolt-on tank pad 07 w/2" bolt-on tank pad 08 w/3" bolt-on tank pad 09 w/4" bolt-on tank pad 10 w/6" bolt-on tank pad 11 w/8" bolt-on tank pad</p>	<p>- Standard (316 / 316L ball &amp; stem) F Internal / external grounding G 17-4PH stem I Monel ball J 932 Bronze ball K Monel stem &amp; followers L Monel ball, stem &amp; followers M Aluminum ball N 922 Bronze ball O Hastelloy C-276 ball P C-276 ball, stem &amp; followers Q 922 Bronze ball w/Monel stem R Monel stem, followers &amp; bolting S Monel ball, stem, followers &amp; bolting T 922 Bronze ball, Monel stem &amp; followers, Silicon Bronze bolting &amp; CuSi fasteners U 922 Bronze ball w/Monel stem &amp; followers V 12" extended stem/body bonnet (cryo only) 1 Chrome carbide (ball &amp; seat coating) 2 Tungsten carbide (ball &amp; seat coating)</p>	<p>-- w/handle 00 Stainless locking oval handwheel<sup>1</sup> 02 w/o handle, w/stem actr prep 03 w/handle, w/stem actr prep 04 Locking lever handle 05 w/stainless oval handwheel<sup>1</sup> 07 w/45° handle 08 w/gear operator 09 w/T-handle 10 w/manual spring return handle<sup>2</sup> 11 w/fusible link SR handle (165°F)<sup>3</sup> 12 w/vane actr for 80psig 13 w/GP electric actuator 14 w/XP electric actuator 17 w/ext lockable oval handwheel - long<sup>1</sup> 18 w/ext lockable lever handle - long 71 w/ext lockable lever handle - short 72 w/ext lockable oval handwheel - short<sup>1</sup></p>	<p>- No polish A 20Ra ID B 32Ra OD C 20Ra ID / 32Ra OD D 15Ra ID E 10Ra ID F 20Ra ID after EP G 15Ra ID after EP H 10Ra ID after EP I 5Ra ID K 5Ra ID / 32Ra OD L 20Ra ID / 32Ra OD / EP M EP ID N 10Ra ID / 32Ra OD O 15Ra ID / 32Ra OD / EP Q 15Ra ID / 32Ra OD S 10Ra ID / 32Ra OD / EP</p>
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<p><b>PURGE PORT OPTIONS (** POSITION 10 ONLY **)</b></p> <p>- No purge option(s) selected<sup>1</sup> A (1) ½" clamp on center 90° from stem B (1) ½" clamp on center opposite stem C (1) ½" clamp upstream 90° from stem D (1) ½" clamp downstream opposite stem E (2) ½" clamp (1) on center 90° from stem &amp; (1) opposite stem F (2) ½" clamp (1) upstream 90° from stem &amp; (1) downstream opposite stem</p> <p>G (1) ½" BWTE on center 90° from stem H (1) ½" BWTE on center opposite stem I (1) ½" BWTE upstream 90° from stem J (1) ½" BWTE downstream opposite stem K (2) ½" BWTE on center (1) 90° from stem &amp; (1) opposite stem L (2) ½" BWTE (1) upstream 90° from stem &amp; (1) downstream opposite stem</p> <p>M (1) ¼" FNPT on center 90° from stem N (1) ¼" FNPT on center opposite stem O (1) ¼" FNPT upstream 90° from stem P (1) ¼" FNPT downstream opposite stem Q (2) ¼" FNPT (1) on center 90° from stem &amp; (1) opposite stem R (2) ¼" FNPT (1) upstream 90° from stem &amp; (1) downstream opposite stem</p>	<p><b>BALL HOLE &amp; FLAT OPTIONS (** POSITION 11 ONLY **)</b></p> <p>- No ball options selected position A Flats in closed downstream position B Flats in closed upstream position C Flats in open upstream position D Flats in open downstream position E Flats in open upstream &amp; downstream position F Holes in closed downstream position G Holes in closed upstream position H Holes in open upstream position I Holes in open downstream position J Holes in open upstream &amp; downstream position K Ball with vent hole (downstream) L Ball with (2) crown flats V Standard width slotted ball W 30° V-ball X 45° V-ball Y 60° V-ball 7 Self-flush ball with flats closed downstream 8 Self-flushing ball 9 Ball with vent hole (upstream)</p>	<p><b>24vdc 24vdc 24vdc 24vdc 24vdc 24vdc</b> <b>PBM, Asco &amp; Westlock combo</b></p> <p>55 DA80 psig actr &amp; GP Sol ↔ 56 DA80 psig actr &amp; GP LS &amp; Sol ↔</p> <p>57 DA80 psig actr &amp; XP Sol ↔ 58 DA80 psig actr &amp; XP LS &amp; Sol ↔</p> <p>59 DA60 psig actr &amp; GP Sol ↔ 60 DA60 psig actr &amp; GP LS &amp; Sol ↔</p> <p>61 DA60 psig actr &amp; XP Sol ↔ 62 DA60 psig actr &amp; XP LS &amp; Sol ↔</p> <p>63 SR80 psig actr &amp; GP Sol ↔ 64 SR80 psig actr &amp; GP LS &amp; Sol ↔</p> <p>65 SR80 psig actr &amp; XP Sol ↔ 66 SR80 psig actr &amp; XP LS &amp; Sol ↔</p> <p>67 SR60 psig actr &amp; GP Sol ↔ 68 SR60 psig actr &amp; GP LS &amp; Sol ↔</p> <p>69 SR60 psig actr &amp; XP Sol ↔ 70 SR60 psig actr &amp; XP LS &amp; Sol ↔</p>	<p><b>120vac 120vac 120vac 120vac 120vac</b> <b>PBM, Asco &amp; Westlock combo</b></p> <p>20 DA80 psig actr 21 DA80 psig actr &amp; GP LS 22 DA80 psig actr &amp; GP Sol 23 DA80 psig actr &amp; GP LS &amp; Sol 24 DA80 psig actr &amp; XP LS 25 DA80 psig actr &amp; XP Sol 26 DA80 psig actr &amp; XP LS &amp; Sol 27 DA60 psig actr 28 DA60 psig actr &amp; GP LS 29 DA60 psig actr &amp; GP Sol 30 DA60 psig actr &amp; GP LS &amp; Sol 31 DA60 psig actr &amp; XP LS 32 DA60 psig actr &amp; XP Sol 33 DA60 psig actr &amp; XP LS &amp; Sol 34 SR80 psig actr 35 SR80 psig actr &amp; GP LS 36 SR80 psig actr &amp; GP Sol 37 SR80 psig actr &amp; GP LS &amp; Sol 38 SR80 psig actr &amp; XP LS 39 SR80 psig actr &amp; XP Sol 40 SR80 psig actr &amp; XP LS &amp; Sol 41 SR60 psig actr 42 SR60 psig actr &amp; GP LS 43 SR60 psig actr &amp; GP Sol 44 SR60 psig actr &amp; GP LS &amp; Sol 45 SR60 psig actr &amp; XP LS 46 SR60 psig actr &amp; XP Sol 47 SR60 psig actr &amp; XP LS &amp; Sol 51<sup>4</sup> DA80 psig actr &amp; position indicator 52<sup>4</sup> DA60 psig actr &amp; position indicator 53<sup>4</sup> SR80 psig actr &amp; position indicator 54<sup>4</sup> SR60 psig actr &amp; position indicator</p> <p><b>PBM, Asco &amp; Topworx combo - 120vac</b></p> <p>73 DA80 psig actr &amp; GP Sol 74 DA80 psig actr, XP LS+GP Sol 75 DA80 psig actr, XP LS+XP Sol 76 DA60 psig actr &amp; XP LS 77 DA60 psig actr &amp; XP LS+GP Sol 78 DA60 psig actr &amp; XP LS+XP Sol 79 SR80 psig actr &amp; XP LS 80 SR80 psig actr, XP LS+GP Sol 81 SR80 psig actr, XP LS+XP Sol 82 SR60 psig actr &amp; XP LS 83 SR60 psig actr &amp; XP LS+GP Sol 84 SR60 psig actr &amp; XP LS+XP Sol 85 DA80 psig actr &amp; XP Prox 86 DA80 actr, XP Prox+XP Sol 87 DA60 psig actr &amp; XP Prox 88 DA60 actr, XP Prox+XP Sol 89 SR80 psig actr &amp; XP Prox 90 SR80 actr, XP Prox+XP Sol 91 SR60 psig actr &amp; XP Prox 92 SR60 actr, XP Prox+XP Sol</p>	<p><b>LOX &amp; BOLTING OPTIONS (16)</b></p> <p>- No option(s) required L LOX cleaning per PBM procedure</p> <p>M LOX &amp; CRN bolting Z CRN bolting</p>
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<p><b>SPECIAL ENGINEERING # (17-20)</b></p> <p>Special engineering number columns - consult PBM</p> <p>EXAMPLE: <b>SXXX</b> suffix at end of standard PBM part number</p>	<p>SXXX = 2016 TXXX = 2017 UXXX = 2018 VXXX = 2019 WXXX = 2020 YXXX = 2021 ZXXX = 2022 ZXXX = 2023</p>
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<p><b>Standard Asco solenoids (120vac &amp; 24vdc)</b> GP - WT8551A001MS XP - EF8551A001MS - solenoids are not wired to position monitors</p>	<p><b>Standard Westlock position monitors</b> GP - 2004NBY2A2M0200 XP - 2007NBY2B2M0200</p>	<p><b>Standard TopWorx position monitor</b> GP / XP - TXP-M21GNEM</p>	<p><b>Standard TopWorx proximity position monitor</b> GP / XP - TXP-P21GNEM</p>
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<p><b>Polish Notes</b></p> <ul style="list-style-type: none"> <li>On ID polished valves, the body, ball, seat retainer (if applicable) and end fittings are polished</li> <li>On ID/OD polished valves, the body, ball, seat retainer (if applicable), and end fittings are polished</li> <li>On ID+EP polished valves, the body, ball, seat retainer (if applicable), end fittings are polished. Stem is EP<sup>d</sup></li> </ul>	<p><b>Automation Notes</b></p> <ul style="list-style-type: none"> <li><sup>1</sup> for 2" and smaller valves</li> <li><sup>2</sup> for 1½" and smaller valves</li> <li><sup>3</sup> for 3" and smaller valve</li> <li><sup>4</sup> consult PBM for beacon indicators</li> </ul>
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<p><b>Abbreviation Index</b></p> <p>GP = General Purpose XP = Explosion Proof LS = Limit Switch Sol = Solenoid - N/C DA = Double Acting SR = Spring Return - FCW</p>
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## Materials

### 316L Stainless Steel

Castings comply with A351, Alloy CF3M.

Forgings (Series 8) comply with A182, Alloy F316L and 1.4404.

Bar product complies with A479, Alloy S31603.

Cast weld pads comply with SA 351, Alloy CF3M and wrought weld pads comply with SA 479, Alloy S31603.

- Has a low (<0.03%) carbon level to reduce carbide precipitation.
- Is extremely corrosion resistant to acidic and basic environments and does not pit easily.
- Can be mechanically polished to a near-mirror finish for easy clean ability (electro polishing also available).
- Is preferred for sanitary and biotechnological uses.
- Extended butt weld ends have a sulfur content of 0.005 to 0.017% to support orbital welding.
- Low controlled ferrite cast product is available for all product lines. Standard ferrite level of Series 8 forgings is less than 1% and standard ferrite level of Series 9 castings is also low controlled.

### Other

- Additional materials available include AL6XN<sup>®</sup>, duplex stainless, Hastelloy<sup>®</sup> alloys, Alloy 20, titanium alloys, and Inconel<sup>®</sup> alloys.

## Seat and Seal Materials

Designation	Description	Color	Purpose
TFM <sup>™</sup>	Chemically Modified PTFE  PBM Standard for Series 6, 7, 8, 9	White	Suitable for applications up to 400°F. This chemically modified PTFE material is PBM's standard seat and seal material. It combines the ruggedness of a filled PTFE with the low coefficient of friction of virgin PTFE. TFM <sup>™</sup> also has much improved porosity control and deformation under load when compared to PTFE grades. FDA and USP Class VI compliant. Meets bubble-tight seat leakage.
VTFE	Virgin PTFE	White	Suitable for applications up to 350°F. A low stem torque material ideal for sanitary use. FDA and USP Class VI compliant. Meets bubble-tight seat leakage.
S-TEF <sup>®</sup>	Stainless Steel Reinforced PTFE	Charcoal Gray	Suitable for applications up to 450°F. A suitable material for higher pressure/temperature applications. Higher stem torque than virgin grades and TFM <sup>™</sup> . USP Class VI compliant. Meets bubble-tight seat leakage.
UHMWPE	Ultra High Molecular Weight Polyethylene	Off White	Suitable for applications under 200°F. An extremely wear resistant material having a wear rate about 1/10th that of PTFE. FDA compliant and is used in high cycle applications where possible. Meets bubble-tight seat leakage.
PEEK <sup>®</sup>	Poly Ether Ether Ketone	Putty	For applications up to 500°F. PEEK <sup>®</sup> is a rugged, high strength material having fairly high stem torque. FDA compliant. PBM's PEEK <sup>®</sup> is 10 weight percent PTFE to reduce the hardness of virgin PEEK <sup>®</sup> . FDA compliant and meets Class V seat leakage.
KYNAR <sup>®</sup>	Polyvinylidene Fluoride	Slightly Transparent White	Suitable for applications under 250°F. Kynar <sup>®</sup> has been used successfully in abrasive service and is suitable for radiation environments where gamma levels accumulate to 1,000 megarads. FDA and USP Class VI compliant. Meets bubble-tight seat leakage.

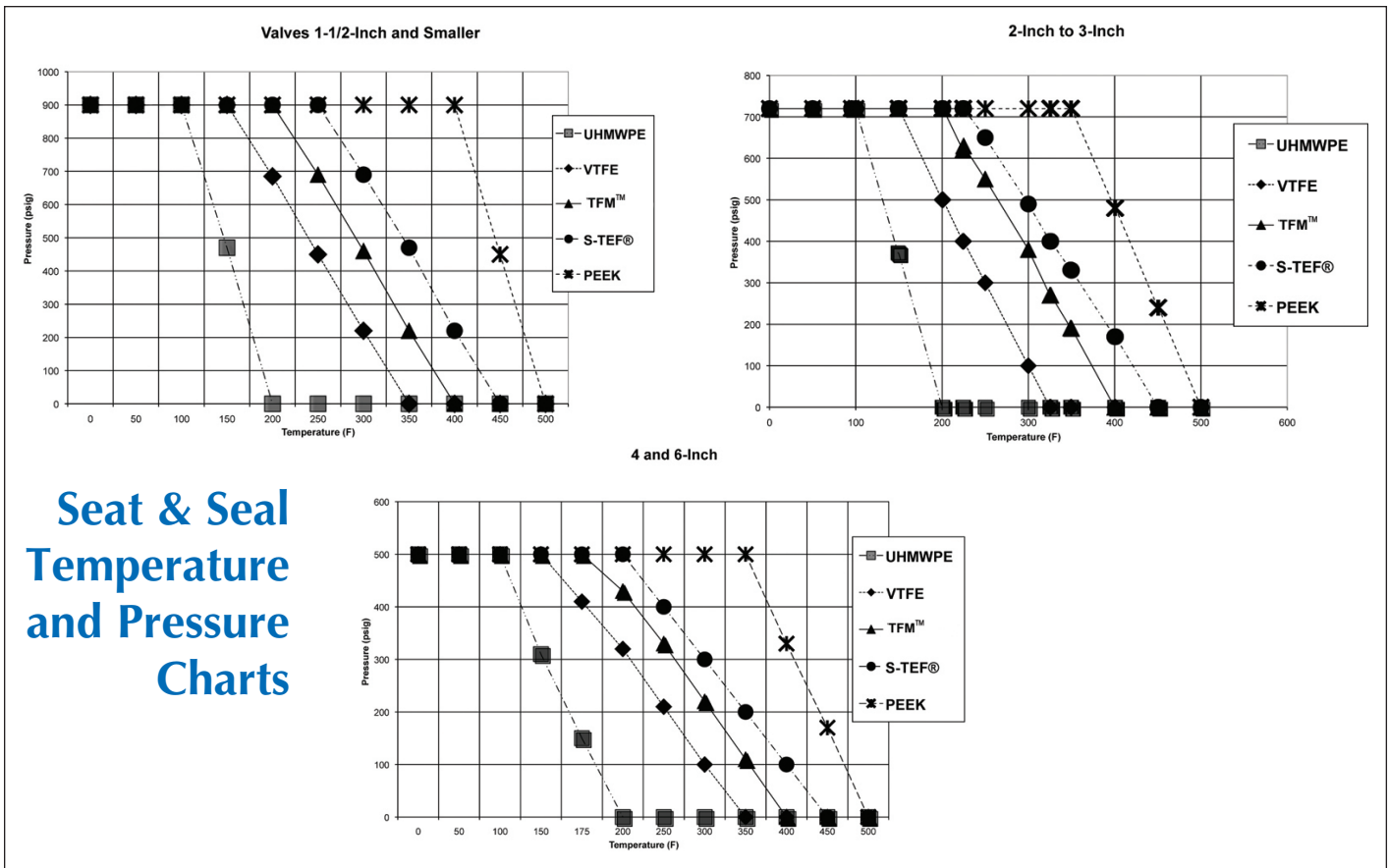
### NOTES:

1. PTFE is Polytetrafluorethylene.
2. Seat and seal materials may be mixed in a valve in order to provide media-compatibility and the appropriate torque, temperature and pressure ratings.
3. Temperature ratings based on 0 psi. See Pressure & Temperature Charts on page 8.

# Allowable Working Pressures (psig, barg)

Non-Flanged Valve Style/Series	Material	Size	-20°F to 100°F/ -28.9°C to 37.8°C		300°F/148.9°C		450°F/232.2°C	
			psig	barg	psig	barg	psig	barg
			Inches/DIN					
SI, FI Series 6	316 SS/316L	3" (DN80) and under	720	49.6	620	42.7	540	37.2
SI, CS, DI, DC Series 8	316 SS/316L	All	600	41.4	455	31.4	397	27.4
		C-276	740	51.0	655	45.2	620	42.7
SI, CS, DI, DC Series 9	316 SS/316L	1-1/2" (DN40) and smaller	900	62.1	770	53.1	680	46.9
		2" (DN50) thru 4" (DN100)	720	49.6	620	42.7	540	37.2
		6" (DN150)	375	25.9	320	22.1	280	19.3
	C-276	4" (DN100) and smaller	600	4.14	510	35.2	450	31.0
		6" (DN150)	375	25.9	320	22.1	280	19.3
MI Series 5	316 SS/316L	All	275	19.0	205	14.1	195	13.4
AF Series 1	316 SS/316L	1-1/2" (DN40) and smaller	900	62.1	770	53.1	680	46.9
	316 SS/316L	2" (DN50), 4" (DN100)	550	37.9	540	37.2	525	36.2
	316 SS/316L	3" (DN80)	625	43.1	610	42.1	600	41.4
	316 SS/316L	6" (DN150)	375	25.9	365	25.2	360	24.8
	C-276	1-1/2" (DN40) and smaller	600	41.4	520	35.9	475	32.8
	C-276	2" (DN50), 4" (DN100)	550	37.9	540	37.2	525	36.2
	C-276	3" (DN80)	600	41.4	520	35.9	475	32.8
	C-276	6" (DN150)	375	25.9	320	22.1	280	19.3
AF Series 3	316 SS/316L	1-1/2" (DN40) and smaller	720	49.6	620	42.7	540	37.2
	316 SS/316L	2" (DN50), 4" (DN100)	550	37.9	540	37.2	525	36.2
	316 SS/316L	3" (DN80)	625	43.1	610	42.1	600	41.4
	316 SS/316L	6" (DN150)	375	25.9	365	25.2	360	24.8
FI, FC Series 8 & 9	316 SS/316L	4" (DN100) and smaller	600	4.14	510	35.2	440	30.3
	316 SS/316L	6" (DN150)	375	25.9	320	22.1	280	19.3
	C-276	4" (DN100) and smaller	600	4.14	510	35.2	440	30.3
	C-276	6" (DN150)	375	25.9	320	22.1	280	19.3

- Notes:
1. 316 SS and C-276 retain their CWP below minus 20°F.
  2. All valves rated for full vacuum.
  3. Sanitary clamps and gaskets may limit pressure ratings to less than shown above.





## Cv Values (gpm)

Cv is defined as the number in U.S. gallons of water per minute, at ambient temperature, that will flow through a valve at 1 psi pressure drop.

VALVE SIZE	2-WAY SI, CS				FLUSH TANK FI SERIES 8 & 9 AF SERIES 1			DIVERTER PORT SERIES 8 & 9			MULTI-PORT SERIES 5		CT Valves	
	SERIES 8 & 9		FIRESAFE SI		AF	FI	FIRESAFE FI	DI SERIES, X-ENDS			MI SERIES 5, X-ENDS		Trap Position	
	End Connection				End Connection			L-PORT	T-PORT		T-PORT		L-PORT	Series
	F-	X-	F-	X-	X-	X-	X-		Straight	Branch	Straight	Branch		8 & 9
1/2"	6.5	8	7	8		8.9	8.9	4.0	4.7	3.0	3.8	2.5	3.8	0.41
3/4"	23	28	24	28		34	34	12	15	9.0	12	7	12	0.72
1"	55	65	55	60	63	62	62	25	29	18	25	15	25	0.96
1 1/2"	160	193	160	190	150	175	175	68	81	49	66	40	66	2.8
2"	365	420	370	420	280	480	480	133	160	92	129	78	129	2.7
2 1/2"	700	800	700	800										
3"	900	1,040	850	1000	505	870	870	324	390	233	310	185	310	5.4
4"	1,800	2,080	1600	1900	690	1,550	1,550	590	715	430	570	340	570	15
6"	4,200	5,000	4200	5000	1,430	3,750	3,750	1,450	1,750	1,040				

\* F- (extended butt weld) end  
 \* X- (Sanitary) end

## ID Surface Finish. Ra Readings for Valves per ASME BPE (Bioprocessing Equipment)

PBM's IGENIX® forged valves have a standard internal polish of 20 Ra Max/0.50 µm or better.

Surface Description	PBM Polish Code	Ra max.	
		µ-in.	µm
		Mechanical Polish	
SF 1	A	20	0.51
SF 2	A	25	0.64
SF 3	-	30	0.76
		Mechanical polish and electropolish	
SF 4	G	15	0.38
SF 5	F	20	0.51
SF 6	F	25	0.64

Default Polish:  
 Series 8 - 20 Ra (SF-1)  
 Series 9 - 30 Ra (SF-3)

**Polish Notes:**  
 - On ID polished valves, the body, ball, seat retainer (if applicable) and end fittings are polished.  
 - On ID/OD polished valves, the body, ball, seat retainer (if applicable) and end fittings are polished.  
 - On ID+EP polished valves, the body, ball, seat retainer (if applicable), end fittings are polished. Stem is EP'd.  
 - PBM achieves surface finishes without the use of ADIs (Animal Derived Ingredients).

## O-Ring and Seat Compliancy

Material		Compliancy	
		FDA	USP Class VI
EPR O-ring*	E3609-70	Yes	Yes
Seat	Virgin TFM™	Yes	Yes

\*O-rings used in "Clean Steam" Series CS, CT, FC, DC and SI, FI, AF Firesafe.

## Stem Torque

Valve Style/ Series	Valve Size (in.)	As built Torque		TFM™ and VTFE Seats - Differential Pressure across Seats																
				0 psig	0 barg	100 psig	6.9 barg	200 psig	13.8 barg	300 psig	20.7 barg	400 psig	27.6 barg	500 psig	34.5 barg	600 psig	41.4 barg	700 psig	48.3 barg	
		in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	in.-lb.	N-m	
Fire-safe Series 6	1/4, 1/2	32	3.6	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	64	7.2	
	3/4	40	4.5	80	9.0	80	9.0	80	9.0	80	9.0	80	9.0	96	10.8	112	10.8	128	12.7	
	1	58	6.6	116	13.1	116	13.1	116	13.1	150	16.9	185	20.9	220	24.9	trun.				
	1-1/2	154	17.4	308	34.8	308	34.8	440	49.7	580	65.5	715	80.8	trun.	trun.					
	2	182	20.6	364	41.1	364	41.1	635	71.7	910	102.8	1,180	133.3	trun.	trun.					
	2-1/2	288	32.5	576	65.1	576	65.1	1,200	135.6	1,600	180.8	trun.								
	3	430	48.6	860	97.2	860	97.2	1,560	176.3	trun.	trun.									
	4	787	88.9	1,570	177.4	1,570	177.4	2,650	299.4	trun.	trun.									
6	1,920	217.0	3,840	433.9	7,100	802.3	Use trunnion above 75 psig.													
All Series 8 & 9 2-Way and 3-Way	1/2	25	2.8	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	50	5.7	
	3/4	30	3.4	60	6.8	60	6.8	60	6.8	60	6.8	60	6.8	60	6.8	60	6.8	80	9.0	
	1	50	5.7	100	11.3	100	11.3	100	11.3	130	14.7	160	18.1	220	24.9	trun.	trun.			
	1-1/2	132	14.9	264	29.8	264	29.8	375	42.4	500	56.5	600	67.8	trun.	trun.					
	2	182	20.6	364	41.1	364	41.1	635	71.8	910	102.8	1,180	133.3	trun.	trun.					
	2-1/2	288	32.5	576	65.1	576	65.1	1,200	136	1,600	181	trun	trun.							
	3	430	49	860	97.2	860	97.2	1,560	176	trun.	trun.									
	4	672	76	1,340	151	1,340	151	2,250	254	trun.	trun.									
6	1,920	217	3,840	434	7,100	802	Use trunnion above 75 psig.													
AF Series 1 and Series 3	1	58	6.6	116	13.1	116	13.1	116	13.1	150	17.0	185	20.9	220	24.9	255	28.8	288	32.5	
	1-1/2	132	14.9	264	29.8	264	29.8	375	42.4	500	56.5	600	67.8	725	81.9	850	96.1	950	107	
	2	154	17.4	308	34.8	308	34.8	440	49.7	580	65.5	715	80.8	850	96.1					
	3	336	38.0	675	76.3	675	76.3	1,400	158	1,900	215	2,400	271	2,900	328	3,400	384			
	4	432	49	860	97.2	860	97.2	1,560	176	2,050	232	2,540	287	3,030	342					
	6	1,056	119	2,100	237	3,950	446													
Valve Series	Size	As built Torque		0 psig	0 barg	100 psig	6.9 barg	200 psig	13.8 barg	275 psig	19.0 barg									
MI Series 5	1/2	67	7.6	135	9.3	142	9.8	149	10.3	154	10.6									
	3/4	80	9.0	160	11.0	167	11.5	174	12.0	182	12.5									
	1	154	17.4	307	21.2	322	22.2	337	23.2	358	24.7									
	1-1/2	313	35.4	627	43.2	670	46.2	759	52.3	843	58.1									
	2	491	55.5	981	67.6	1,037	71.5	1,238	85.4	1,388	95.7									
	3	840	95.0	1,679	115.8	2,084	143.7	2,761	190.4	3,268	225.3									
4	1,539	173.9	3,077	212.2	4,114	283.7	5,580	384.7	6,679	460.5										

Notes:

1. For valves with UHMWPE seats, multiply the above values by 1.25
2. For valves which have S-TEF® or Kynar® seats, multiply the above values by 1.56.
3. For valves with PEEK® seats, multiply the above values by 1.7.
4. Where trunnion is indicated, PBM recommends trunnion mounting the ball to avoid excessive seat loads and stem torques.
5. To convert in.-lbs. torques to N-m, multiply by 0.113.





## Testing

- Vacuum Testing\*
- Cycle Testing
- Shock and Vibration
- Seismic
- Hydrostatic
- Material Test Reports
  - Physical testing
  - Chemical testing

## Options

- Cryogenic
- Manual Spring Return Handles
- LOX (Cleaned for Oxygen Service)
- Body Cavity Fillers
- Steam Seats (Encapsulated)
- Purge Ports (SIP/CIP)
- Fire Rated, API 607
- Dribble Control Units
- High Alloys
- Fabflex® Manifolds
- Self Cleaning Flushable Ball
- V-Balls for Flow Control
- Internal & External Grounding
- Mechanical & Electro-Polishing
- Direct Mount Actuation
- Positioners
- Fieldbus, AS-i, DeviceNet
- Ball Flats and Purge Holes
- Locking Handle
- Extended Locking Handle
- Cylindrical Radius Weld Pads

\*PBM valves are ideally suited for vacuum service. For valves intended for vacuum service, PBM offers optional helium leakage test of the seats and shell. Also, the seats of the valve are helium leakage tested. PBM valves will meet a leakage rate of  $1 \times 10^{-6}$  std. cc/sec. helium leakage for both tests.

## Steam Valves

