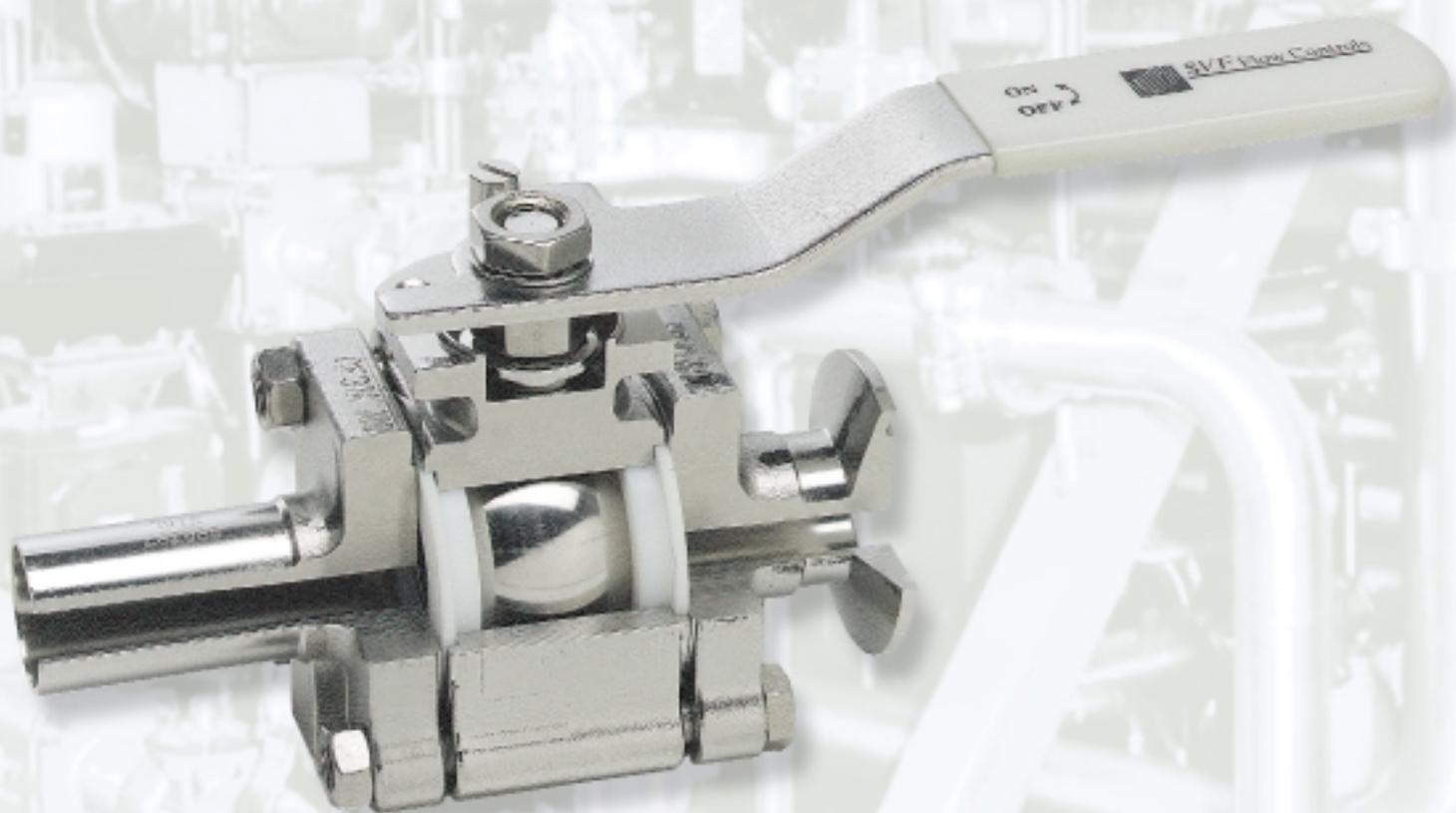


Clean**FLOW**™



SVF CleanFLOW™
HIGH PURITY BALL VALVES

The latest ASME/BPE guideline for valve and tubing designs used in biotech and pharmaceutical applications provides process engineers with a reliable and measurable valve selection criteria.

After years of successful installations throughout the pharmaceutical industry, **SVF Flow Controls, Inc.** now offers a fully compliant high purity ball valve that meets these stringent guidelines.

CleanFLOW™ ball valves are engineered to be a true process piping component to specifically meet the demanding processes found in the pharmaceutical, biotech, semiconductor, cosmetics, foods and other industries where particle generation and contamination can threaten the outcome of the product. The port opening of the valve's flow path is dimensionally identical to the adjacent tubing. This "Tube-ID" feature provides predictable flow rates and pressure drops and ensures thorough cleaning and full drainability as mandated by ASME/BPE.

As a BPE-compliant product, CleanFLOW™ valves may be specified and installed plant-wide making the process of design, construction, startup and maintenance easier to manage while helping to minimize overall project costs.

"We are pleased to recommend CleanFLOW™ valves to help you meet the critical demands of a BPE-compliant, high purity piping system."



CleanFLOW™ High Purity ball valves add a new level of quality and performance to High Purity and aseptic processes.

CleanFLOW™ valves are engineered and designed to specifically meet the demanding process found in the Pharmaceutical Biotech, Semiconductor, Cosmetic, Food and other industries where microbial, particle generation and contamination can threaten the outcome of the product. Our design team through years of experience, has developed a valve that is unparalleled for high purity, high vacuum, high cycle and may be used in a wide range of pressure and temperature applications.



Only the finest and highest quality materials, available from certified suppliers and manufacturers go into the producing the CleanFLOW™ ball valve. All materials used are inspected with the most stringent and advanced techniques possible to insure quality control and superior performance.

Clean**FLOW**™

CleanFlow™ High-Purity Ball Valves

Bottom entry 316L precision machined stem with live loaded high cycle stem packing, automatically adjusts with pressure and temperature fluctuations.

Vinyl covered stainless steel handle indicates direction of flow. Available in a variety of colors.

Solid 316L stainless steel ball with "Tube-ID" feature maintains full flow rate, reduces pressure drops and is fully drainable.

ISO 5211 Integral Mounting Pad Allows for precise actuator mounting or secondary containment unit.

Encapsulated heavy duty stainless steel body bolts are protected from outside environment and are ideal for washdowns.

PTFE-TFM® seats feature non-slotted hygienic design eliminating entrapment areas, smoother surface reduces torque and particle generation, FDA compliant and ideal for clean steam applications. (PTFE-TFM® cavity filler available)

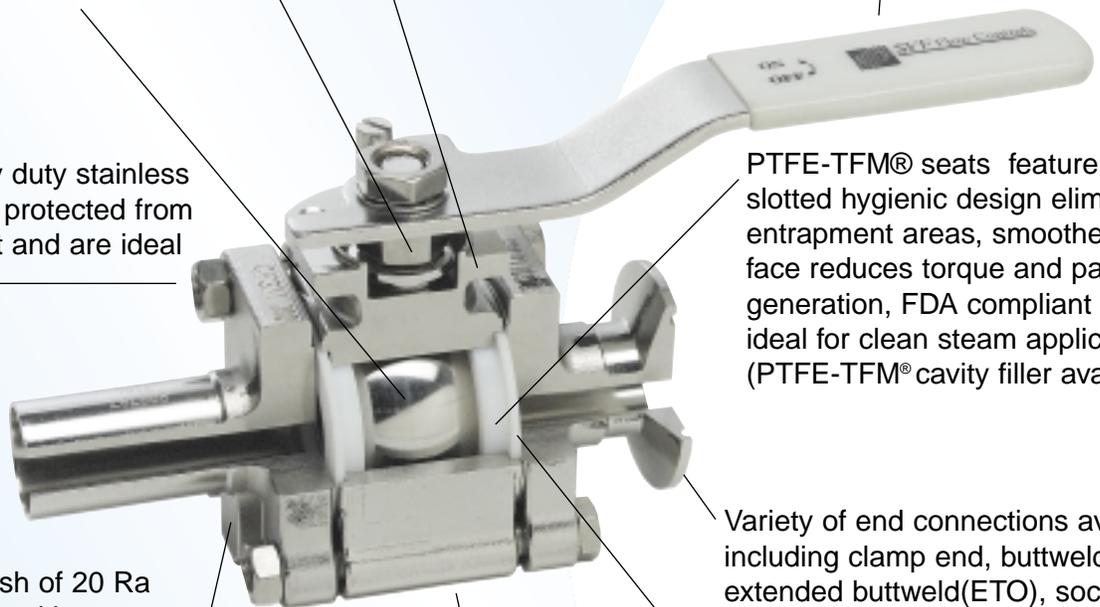
Interior standard finish of 20 Ra insures cleanliness and low friction. Electro-polishing and finishes as low as 5 Ra available.

Variety of end connections available including clamp end, butt weld, extended butt weld (ETO), socket weld, flush bottom tank pad, compression end.

Integral Bosses allows for purge ports be added for CIP or SIP applications.

316L Stainless Steel Center Section allows easy access to internal valve components without disturbing alignment of tubing. Functions as both valve and union.

Fully encapsulated body seals allows in line welding without disassembly, maintains sealing integrity from high vacuum to high pressure and temperature applications.



Typical CleanFLOW Applications

Pharmaceutical/Biotechnology

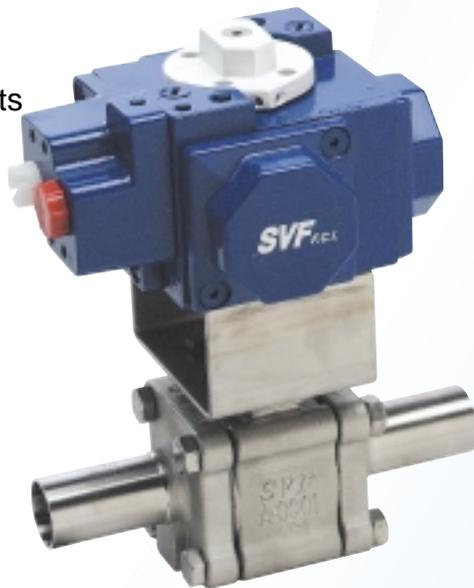
- High Purity Water
- Clean Steam
- WFI (water for injection)
- Gas and Air Delivery
- Cleaning Solutions
- Alcohol

Semiconductor/Microelectronics

- Vacuum
- High Purity Gases
- Toxic Gases
- Solvents (IPA, ketones)
- Tool Hookup

Cosmetics

- Creams
- Oils
- Alcohol
- Waxes
- Detergents



Our exclusive quad-piston pneumatic actuator is ideally suited for high density piping systems. The Compact4 is powerful and lightweight and is available with a full range of modular control accessories.



Performance Data

Seats

CleanFlow™ ball valves feature high-performance TFM seat materials; as standard. TFM is chemically modified PTFE that fills the gap between conventional PTFE and melt-processable PFA. Compared to conventional PTFE, TFM, has the following enhanced properties: Much lower deformation under pressure (cold flow) at room and elevated temperatures. Lower permeability. May be used at higher pressures. Our seat specification reads as follows:

Seats - Pure TFM, (FDA, USP23 Class VI), Non-slotted, designed to meet ASME/BPE SD 3.6.1, SG-4.1.1.8, SG4.1.1.6.

Body Seals

CleanFlow™ encapsulated PTFE seal design eliminates possible entrapment area between valve body and ends, also facilitates inline welding without disassembly. Optional body seal material is available when required.

C_v Factors For CleanFLOW Ball Valves

Size	Port	C _v	Size	Port	C _v
1/2	.37	8	2	1.87	434
3/4	.62	29	2-1/2	2.37	723
1	.87	66	3	2.87	1124
1-1/2	1.37	192	4	3.83	2100

C_v is defined as the number of U.S. gallons per minute that water will flow through a valve at 1 p.s.i drop.

**Pressure Rating

C.W.P (cold working pressure)

1/2 thru 2" 1500 PSI

2-1/2 thru 4" 720 PSI

W.S.P (working steam pressure)

1/2" thru 4" 150 P.S.I-366°F

CleanFLOW valves may be used at higher pressures and temperatures using either NRG or PEEK seats. Please consult factory for exact specifications.

Vacuum Rating.

CleanFLOW valves provide excellent performance under vacuum conditions and have been helium leak tested to 1 x 10⁻⁹. Data upon request.

TORQUE DATA (IN.LB.)

PTFE-TFM® SEATS

1/2"	25	2"	200
3/4"	35	2 1/2"	300
1"	60	3"	400
1 1/2"	150	4"	700

Torque values shown represent ideal conditions. For exact figures consult factory

** Note: CleanFlow™ valves with TR ends are rated to Tri Clover specifications

* Cavity filler are not recommended for steam service.

Available Options & Accessories

Cavity Filler*- seats of PTFE-TFM® eliminate the dead space between the ball and valve body.

Purge Ports- for C.I.P or S.I.P applications.

Polishing- Mechanical or electropolishing to 5Ra.

Actuation- Pneumatic or electric automation packages for ON/OFF or proportional control.

Flush Mounted Tank Pads- eliminate the dead leg between tank and valve.

Handles- variety of options including Locking, Oval, Extended, Spring return, Fusible link or Color coded.

Ends- variety of options including, Cherry Burrell I and Q-line, KF, socket weld tube, compression, 150lb and 300lb flanges.

Materials- Hastelloy, Alloy 20, Monel, AL6XN or Titanium.

Secondary Containment Unit-Designed to retrofit existing valve. Prevents possible leaks to outside environment.

Cryogenic-For applications to - 410°F.

Pro-Spec™- SVFs innovative design team can customize valves for unique applications.

PTFE-TFM® is a trademark of Dyneon

Surface Measurement

Measuring and specifying surface finish has, until recently, been left to a varying amount of speculation. The number of different standards being used by different equipment manufacturer has created a great deal of confusion and misunderstanding throughout the industry. With the advent of ASME/BPE the pharmaceutical and biotechnology industries finally have a standard that it can be universally applied.

***Table SF-5 Acceptance criteria for interior surface finishes of valve bodies**

Anomaly or Indication	Acceptance Criteria
Cluster of pits	None accepted.
Demarcation	If 5% of the total area when visually inspected and R_a is met
Grit lines	If R_a is met.
Nicks (per tube length)	f depth < 0.010 in.
Oxides	Not accepted.
Pits	If dia < 0.020 in. and bottom is shiny.
Porosity	If dia < 0.010 in. and bottom is shiny.
Scratches	f length < 0.25 in., depth < 0.003 in., and R_a is met.
Surface cracks	None accepted.
Surface inclusion	If R_a is met and there is no liquid penetrant indication.
Surface residuals	None accepted.
Surface roughness (R_a)	See Table SF-6.
Water stains	If not deposits.
Weld dross	None accepted.

Table SF-6 R_a Readings for Valves
Mechanically Polished

Surface Designation	R_a Average [Note (1)]		R_a Max	
	μ -in.	μ m	μ -in.	μ m
SFV1	15	0.375	20	0.5
SFV2	20	0.5	25	0.625
SFV3	25	0.625	30	0.75

Mechanically Polished and Electropolished

Surface Designation	R_a Average [Note (1)]		R_a Max	
	μ -in.	μ m	μ -in.	μ m
SFV4	10	0.25	15	0.375
SFV5	15	0.375	20	0.5
SFV6	20	0.5	25	0.625

Conversion Chart				
Standard Grit	R_a		RMS	
	μ -in.	μ m	μ -in.	μ m
150g	27-32	.68-.80	30-35	.76-.89
180g	18-23	.46-.58	20-25	.51-.64
240g	14-18	.34-.46	15-20	.38-.51
320g	8-10	.21-.25	9-11	.23-.28

General Note: All R_a readings are taken across the grain.

Note:

(1) The average R_a is derived from two readings taken at different locations.

Other R_a readings are available if agreed upon between vendor and owner/user.

*Table SF-5 from ASME/BPE-1997

Grit: Measures the number of scratches per linear inch of abrasive pad. Higher numbers indicate a smoother finish.

RMS: Defined as Root Mean Square roughness, this method measures a sample for peaks and valleys. Lower numbers indicate a smoother finish.

R_a : Known as the Arithmetic Mean, this measurement represents the average value of all peaks and valleys. Lower numbers indicate a smooth finish.

Surface Finish

The importance of surface finish in the pharmaceutical and biotechnology industries is due to concerns of possible microbial contamination. A smooth finish that is free of cracks, crevasses and inclusions is inherently easier to clean and maintain in an aseptic condition. The method of achieving a smooth surface varies from pharmaceutical equipment manufacture to manufacture using mechanical, chemical and electro polishing techniques.

Mechanical Polishing Procedures

CleanFLOW™ valves use a mechanical polishing technique that utilizes multiple passes with progressively finer grits to produce the required standard finish. The parts are either hand held during the process or fixtured for spinning on polishing lathes or die grinders. Aluminum Oxide and Silicone Carbide are used for the coated abrasive grit. Buffing compounds are not used in our polishing process. After inspection to insure proper finish requirements are achieved, valve parts are ready to be either cleaned or electro polished before final assembly.

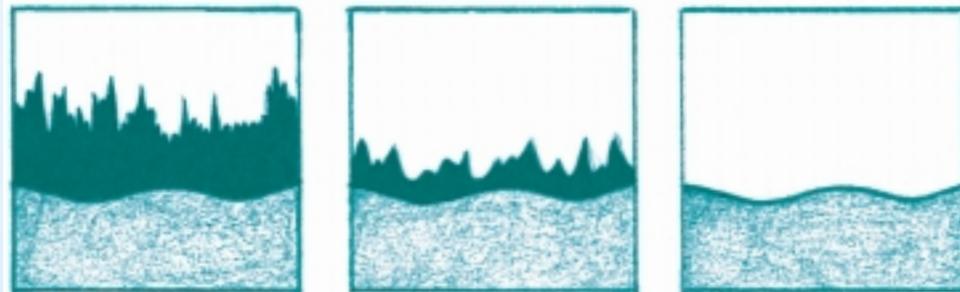
Electrol Polishing

Electro polishing is the opposite of the plating process it utilizes a combination of electric current and chemicals to remove surface material rather than add to it. It is the most effective method of removing burr, folds, inclusions and other abnormalities. Peaks are removed quicker than valleys because of the concentration of current on the peaks. This process leaves the surface extremely smooth and is far easier to clean by reducing the total area required to be sterilized. This electrolytic process is frequently specified because of the broad range of inherent benefits over mechanical polishing alone.

Electro Polishing Benefits

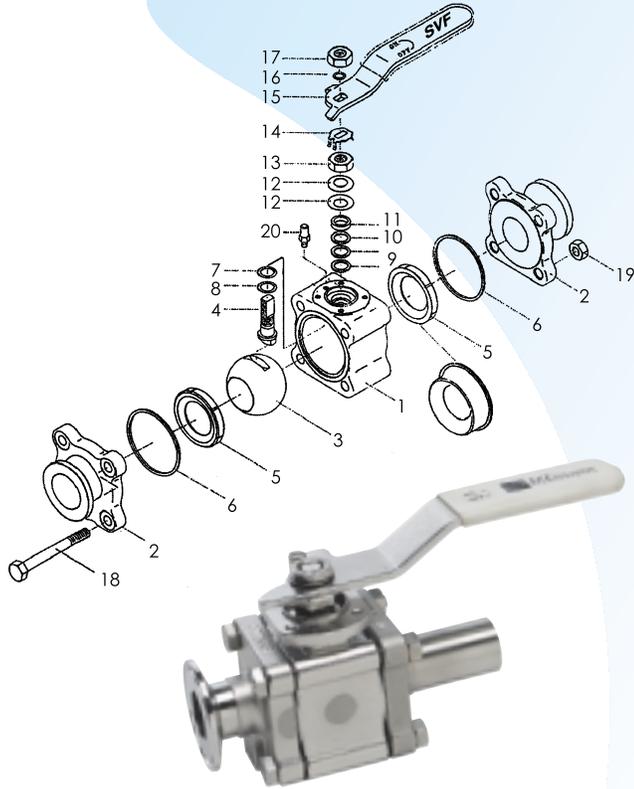
- * Enhances Cleanability.
- * Passivates surface for greater corrosion resistance.
- * Removes inclusions and entrapped contaminants such as lubricants and grit particles.
- * Leaves surface with highly reflective luster finish.
- * Eliminates smeared or torn surface caused by machining or abrasives.

Diagrams showing progressive removal of metal by electropolishing to provide an even surface profile.

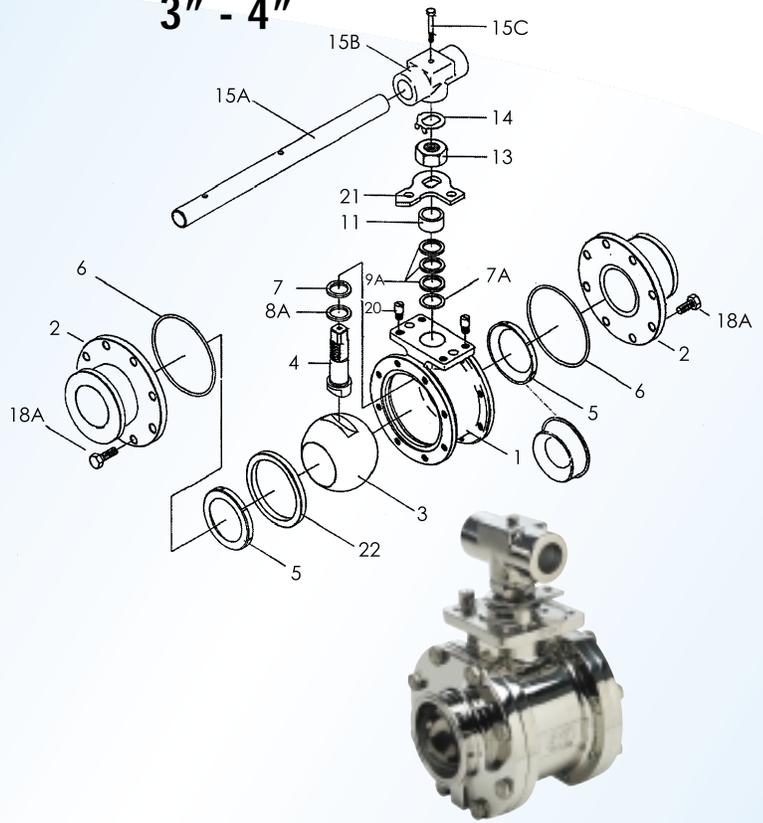


Valve Components

1/2" - 2 1/2"



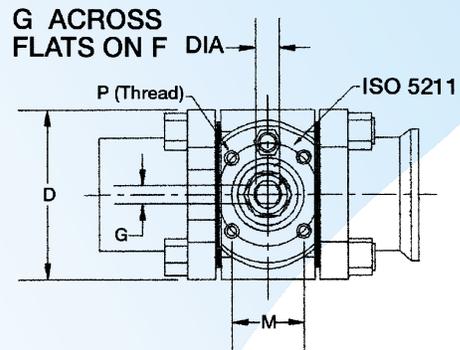
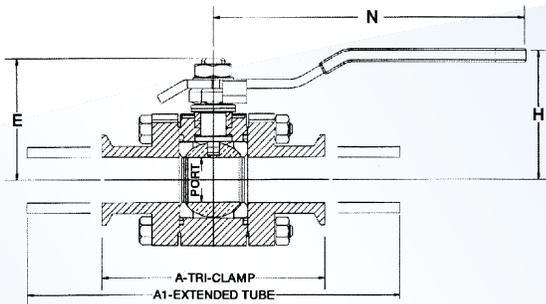
3" - 4"



Part No.	Part	Qty	Description
1	Body	1	316L, ASTM A351-CF3M
2	Pipe Ends	2	316L, ASTM A351-CF3M
3	Ball	1	316L
4	Stem	1	316L
5	Valve Seat	2	PTFE-TFM, NRG, PEEK, Cavity Filler PTFE-TFM
6	Valve Seal	2	PTFE
7	Thrust Bearing	1	PTFE
7A	Stem Location Ring (3" & 4")	1	Stainless Steel 316
8	Thrust Bearing	1	Peek
8A	Thrust Bearing	1	Peek
9	Stem Packing	2	RT-TFE
9A	Stem Packing (3" & 4")	3	PTFE
10	Seal Protector	1	Peek
11	Gland Packing	1	Stainless Steel 316L
12	Belleville Washer	2	Stainless Steel

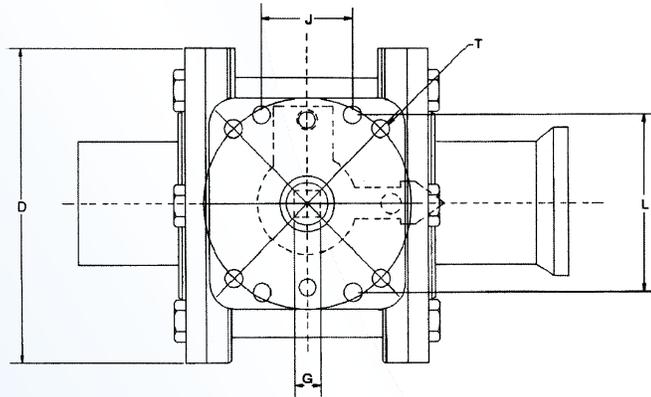
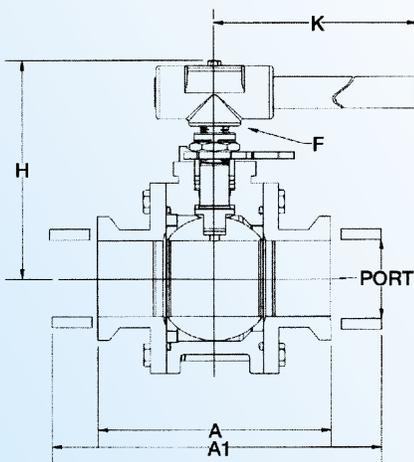
Part No.	Part	Qty	Description
13	Packing Nut	1	Stainless Steel 316
14	Lock Tab	2	Stainless Steel 309
15	Handle (1/2"-2")	1	Stainless Steel 304
15A	Wrench (3" & 4")	1	Stainless Steel 304
15B	Wrench Block	2	Stainless Steel 304
15C	Hex Head Bolt	2	Stainless Steel 304
16	Lock Washer	1	Stainless Steel 304
17	Handle Nut (1/2"-2")	1	Stainless Steel 316
18	Body Bolts	1	Stainless Steel 316
18A	Body Bolt	1	Stainless Steel 304
19	Nuts	2	Stainless Steel 304
20	Stop Pin	3	Stainless Steel 304
21	Stop Plate	1	Stainless Steel 304
22	Seat Retainer	1	Stainless Steel CF3M

Dimensions & Weight 1/2" - 2 1/2"



size	A TR	A1 ETO	D	E	F	G	H	M	N	P	I.D. & PORT	Tube O.D.	ISO	WEIGH (lbs)
1/2"	3.50	5.50	1.75	1.50	1/4 - 20	0.22	1.76	1.00	4.50	M5	0.37	0.50	F03	1.50
3/4"	4.00	6.00	2.05	1.59	1/4 - 20	0.22	1.87	1.00	4.50	M5	0.62	0.75	F03	1.75
1"	4.50	6.50	2.42	2.19	5/16 - 18	0.30	2.40	1.17	5.75	M5	0.87	1.00	F04	3.20
1"-1/2"	5.50	7.50	3.16	2.88	3/8 - 16	0.35	3.16	1.39	7.00	M6	1.37	1.50	F05	8.00
2"	6.25	8.00	3.56	3.06	3/8 - 16	0.35	3.35	1.39	7.00	M6	1.87	2.00	F05	13.00
2"-1/2"	6.75	9.50	4.90	4.80	M20	0.55	5.83	2.80	10.00	M8	2.37	2.50	F07	23.00

Dimensions & WEIGHT 3" - 4"



size	A TR	A1 ETO	D	F	G	H	J	L	K	T	I.D. & PORT	ISO	Tube O.D.	WEIGH (lbs)
3"	7.00	10.50	6.70	1"-14 UNS	.745	7.25	1.75	3.37	13.8	M10	2.87	F10	3.00	32
4"	8.50	12.50	8.00	1"-14 UNS	.745	8.00	1.75	3.37	22.0	M10	3.83	F10	4.00	47

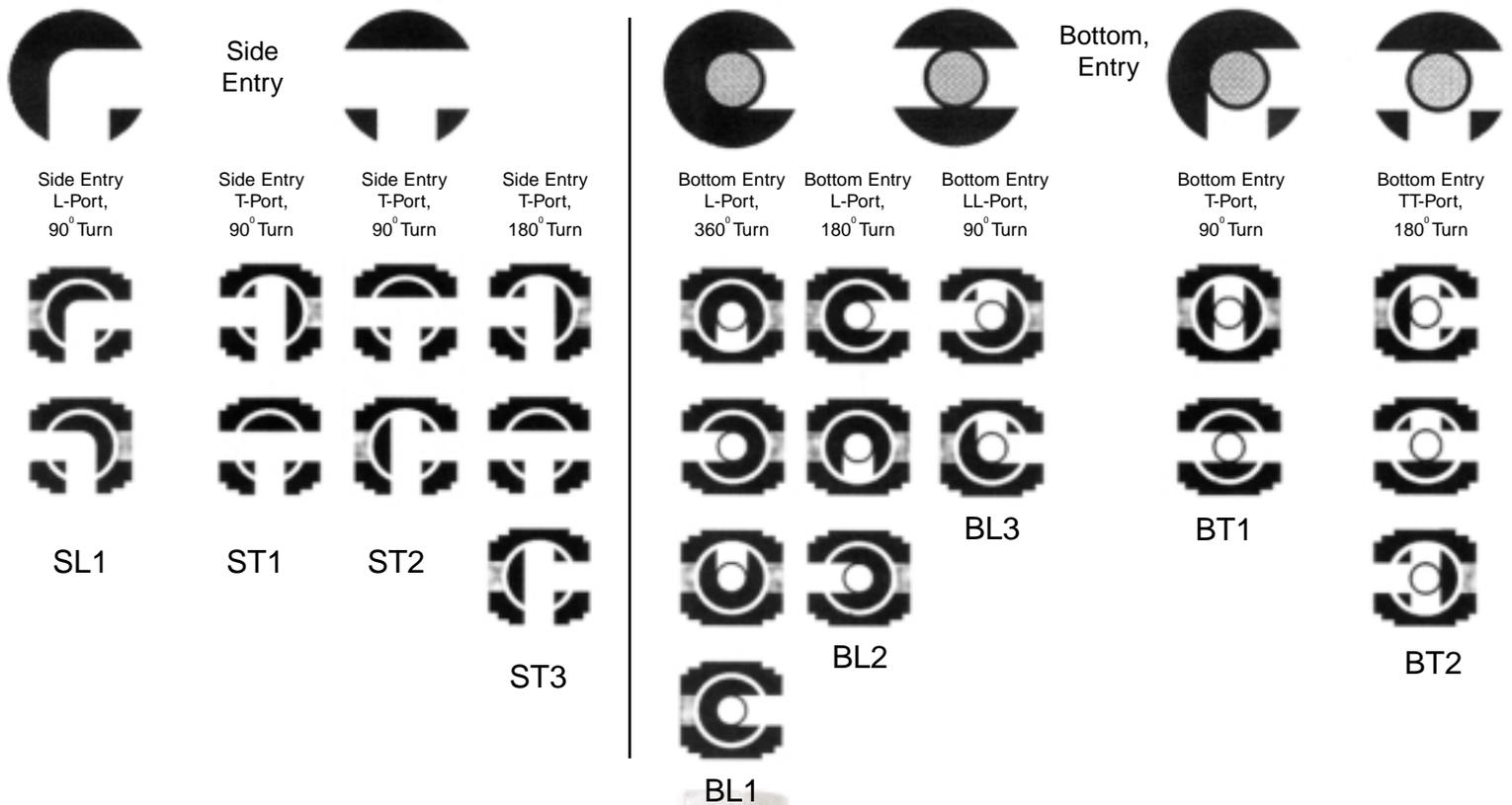
For 1/4", 3/8" and 6" contact factory

TSB7 Series Three Way Valve

The CleanFLOW™ TSB7 Series three-way valve is an ideal choice for high purity piping systems. Its inherent design features can replace two or three standard valves, saving space and reducing costs.

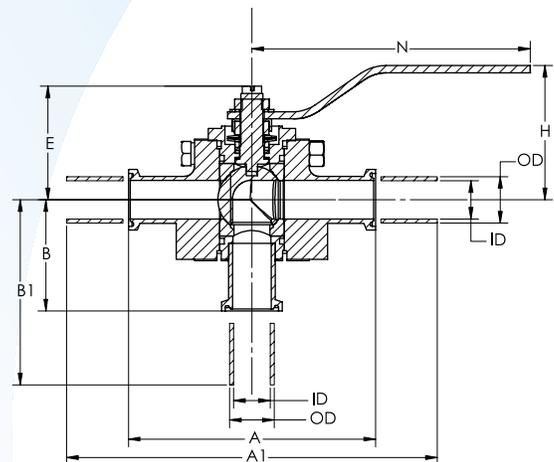
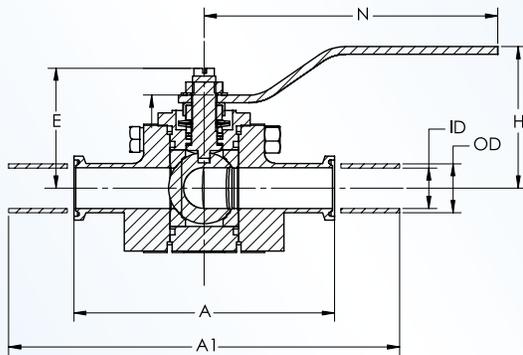
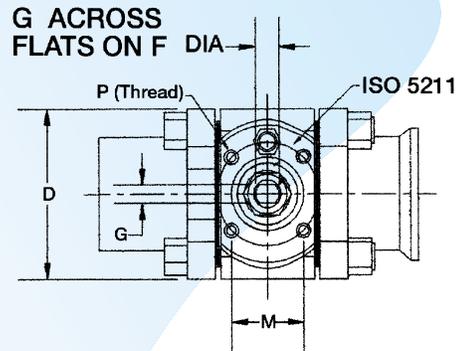
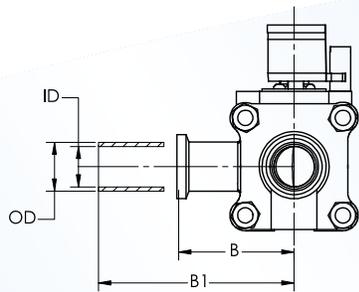
At the heart of the TSB7 design is the use of a common port that facilitates tri-directional flow requirements, eliminating deadlegs and in its optimal position is fully drainable. The common port can either be located at the bottom or side of the valve. The existing seats on the two remaining ports provide positive shutoff.

Three-way Ball Configurations



SIZE	STYLE	BODY & END MATERIAL	BALL & STEM MATERIAL	SEAT	SEAL	ENDS	FLOW PATTENY	OPTIONS
1/2" 3/4" 1" 1-1/2" 2" 2-1/2" 3" 4"	TSB7 (Non-Cavity Filled) TSBC7 (Cavity Filled)	6 - CF3M (316L)	6 - 316L	A - TFE - TFM N - NRG K - PEEK	A - TFE E - EPDM V - VITON	TR - T - Clamp ETO - Extended Tube OD Cherry Burrell I - I Line S - S Line Q - Q Line	ST1 ST2 SL1 BT1 BT2 BL1 BL2 BL3	<ul style="list-style-type: none"> • Purge Ports • Oval Handle • Spring Return Handle • Locking Device • Electro-Polish • Fusible Link • Stem Extentions

Dimensions & Weight 1/2" - 2 1/2"



size	A	A1	B	B1	C	D	E	F	G	H	M	N	P	I.D. & PORT	Tube O.D.	ISO	Weight (lbs)
	TR	ETO															
1/2"	3.50	5.50	1.67	2.96	1.25	1.75	1.50	1/4-20	0.22	1.76	1.00	4.50	M5	0.37	0.50	F03	1.50
3/4"	4.00	6.00	1.76	3.05	1.50	2.05	1.59	1/4-20	0.22	1.87	1.00	4.50	M5	0.62	0.75	F03	1.75
1"	4.50	6.50	1.95	3.23	1.75	2.42	2.19	5/16-18	0.30	2.40	1.17	5.75	M5	0.87	1.00	F04	3.20
1-1/2"	5.50	7.50	2.30	3.58	2.25	3.16	2.88	3/8-16	0.35	3.16	1.39	7.00	M6	1.37	1.50	F05	8.00
2"	6.25	8.00	2.46	3.74	2.62	3.56	3.06	3/8-16	0.35	3.35	1.39	7.00	M6	1.87	2.00	F05	13.00
2-1/2"	6.75	9.50	3.20	4.50	3.85	4.90	4.80	M20	0.55	5.83	2.80	10.00	M8	2.37	2.50	F07	23.00

3" & 4" consult factory for dimensions



Use this information to create your ASME/BPE compliant high purity ball valve specification.

High purity ball valve shall be a three piece design with ISO 5211 integral actuator mounting pad, removable swing-out center section, non-exposed body bolting and encapsulated body seals. The ID for the valve flow path (ball, seats, ends) shall be the same ID as the tubing it is attached to as per ASME/BPE 1997 SD.3.7.9.

- A. Body materials - 316L Stainless Steel ASTM A351 CF3M.
- B. Ball Materials - 316L Stainless Steel ASTM A479 or ASTM A351CF3M.
- C. End Connections.
 - I. Clamp style -316L Stainless Steel A351 CF3M (dimension per ASTM/BPE 1997 DT-10
 - II. Extended Butt weld (ETO) - 316L ASTM A-270 chemical composition and dimensions per ASTM/BPE 1997 table and DT-3 and DT-5
- D. Stem -316L Stainless Steel ASTM A479, live-loaded, blowout proof design.
Stem packing seals to be a combination of PEEK (Poly Ether Ether ketone) and TFE conforming to ASTM/BPE 1997 SG-4.1.1.1.
- E. Seats - PTFE-TFM, (FDA, USP 23 Class VI), non-slotted, designed to meet ASTM/BPE, 1997 SD 3.6.1, SG-4.1.1.8, SG-4.1.1.8, SG-4.1.1.6 and rated for steam pressure of 150 psi at 366 F°
- F. Interior Finish - Polished to meet ASTM/BPE 1997 specification DT-12 and Table SF-6.
 - I. Mechanical Polish to SFV 1
 - II. Electro-Polish to SFV 4
- G. Markings - Valves shall be marked to conform with ASTM-BPE 1997 DT-3.
- H. Packaging - Valves to be packaged to conform with ASTM/BPE 1997 DT-13.

Contact SVF for a copy of our "Engineering Manual on High Purity Ball Valves".

SIZE	STYLE	BODY & END MATERIAL	BALL & STEM MATERIAL	SEAT	SEAL	ENDS	OPTIONS
1/2" 3/4" 1" 1-1/2" 2" 2-1/2" 3" 4"	SB7 (Non-Cavity Filled) SBC7 (Cavity Filled)	6 - CF3M (316L)	6 - 316L	A - TFE - TFM® N - NRG P - PEEK	T - TFE	TR - T- Clamp® ETO - Extended Tube OD Cherry Burrell I - I Line S - S Line Q - Q Line T - Bottom	<ul style="list-style-type: none"> • Purge Ports • Oval Handle • Spring Return Handle • Locking Device • Electro-Polish • Fusible Link • Stem extension

Due to continuous development of our product range, we reserve the right to alter the dimensions and information contained in this leaflet as required.
TFM® is a trade mark of DYNEON