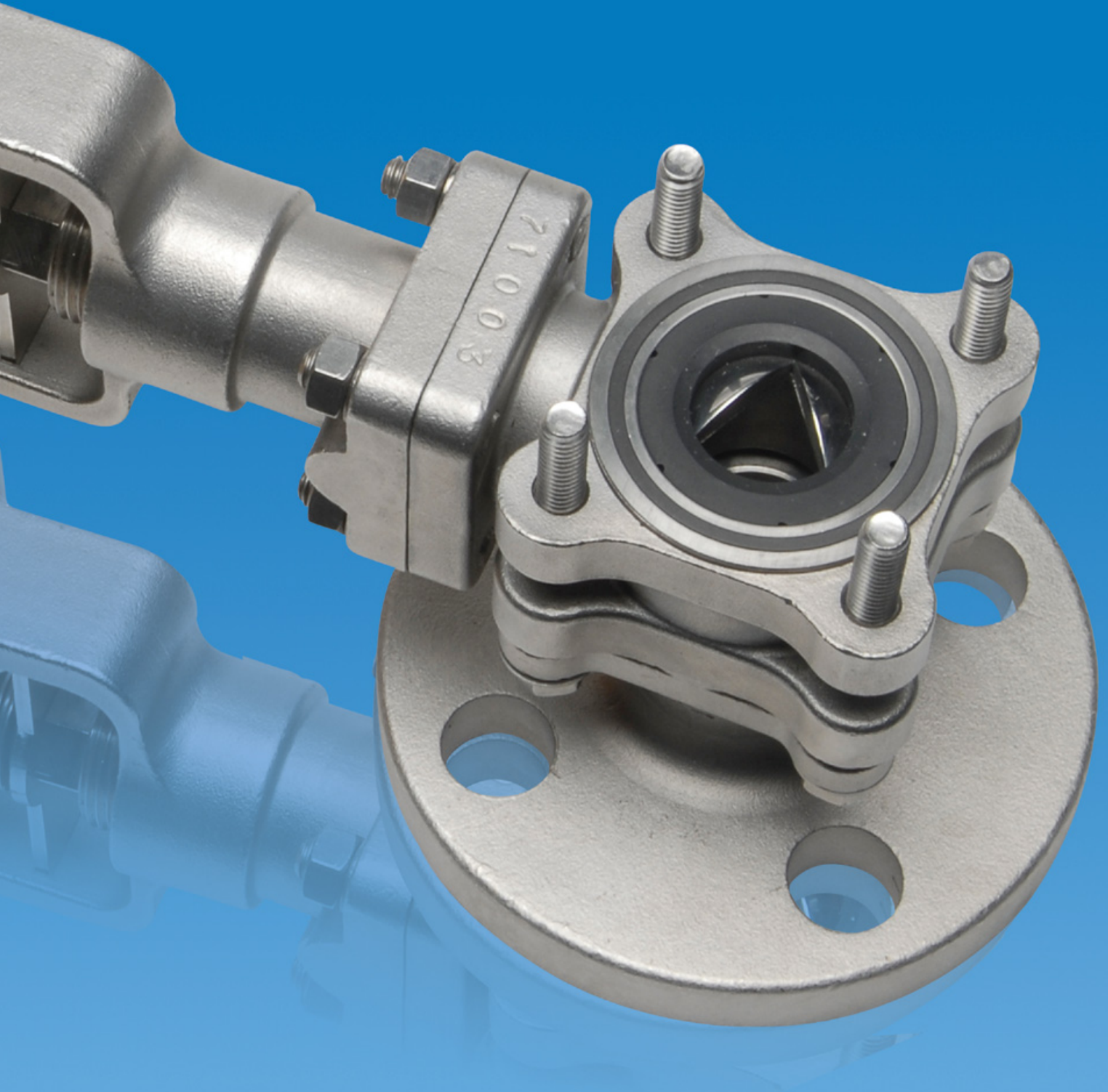


GOSCO VARI-V CONTROL VALVE





VARI-V

The Vari-V control valve is designed to precisely control flow, pressure, pH, temperature and any other critical process. The simple design of the Vari-V ball allows Gosco Valves to modify the opening of the ball to suit any application, making the Gosco Vari-V one of the most versatile control valves on the market.

FAST TRACK*



*Available on a case-by-case basis.

What good is an elite control ball valve, if it can't be delivered when you need it? Fast Track, our premium expedited ball valve service was designed to help you meet near-impossible deadlines. The Fast Track service fee is based on accelerated engineering and design, supplier expedite charges, air freight, extra manpower and other associated costs. What does this buy you? The best in control ball valves and a solid guarantee: if we do not deliver in time, we will waive all Fast Track fees.



OUTPERFORM

Multiple Vari-V ball options, designed to outperform in any control application

Metal seats for demanding applications

Full range of seat, trim and body materials (Hastelloy, Alloy 20, Titanium, Duplex, Monel, Tantalum, etc.)

Extended bonnet to allow a minimum of 2" of insulation without interfering with the packing adjustments

Clearview ISO 5211 mounting pad which leaves the stem flats visible, allowing packing adjustments without removing the actuator

Dual live loaded packing sets eliminate stem leaks

Anti-cavitation trim available

Upper and lower stem guides to prevent side load on the packing

Multiple end connections, including 150# & 300# flanges, threaded, butt weld, socket weld, or customer specified connections

Blow-out proof stem design assures safety

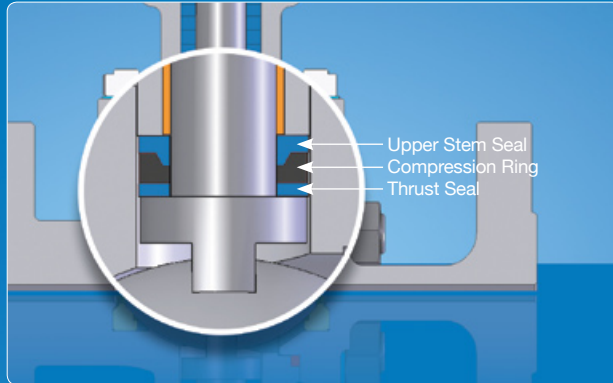
Lockable lever handle, gear box, pneumatic/hydraulic/electric actuator options

ISO 9001:2000 certified

Patented Technology 5,967,685

Best warranty in the control valve industry: 1,000,000 cycles

VARI-V FEATURES



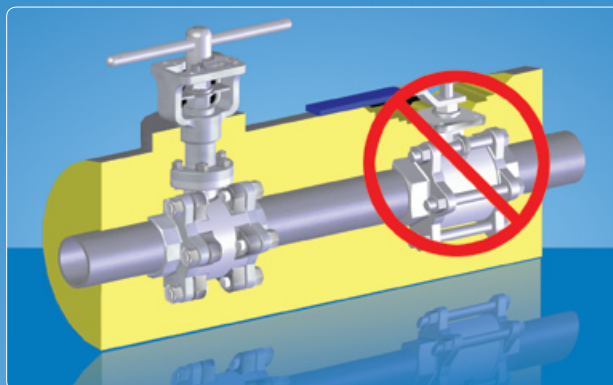
Sealmaster Stem Seal

Gosco's patented Sealmaster has been tested by TÜV, meets all current and projected fugitive emission standards, and is considered equal or better than a bellows sealed valve. (Please contact Gosco Valves for a copy of the TÜV certificate).



Clearview Mounting Pad

The Clearview Mounting Pad is ISO 5211 compliant and allows packing adjustments to be made without removing the actuator. The stem flats are always visible even when the valve is insulated and an actuator is installed.



Extended Bonnet

The extended bonnet is designed to allow a minimum of 2" of insulation around the pipe without interfering with the packing adjustments. It also keeps the actuator away from elevated process temperatures, which prevents damage to the actuator from excessive heat.

VARI-V OPTIONS



Metal Seats

Metal seats have been added as a special option for abrasive and high temperature applications. Trim hardening alternatives including HVOF coatings and a proprietary diffusion process are available to protect the trim from damage in extreme services. Contact Gosco Valves for more information.



Ceramics

Ceramics are one of the most abrasion resistant materials on the market today. They are exceptional in abrasive and highly corrosive applications and are perfect for certain applications. The specific grade of ceramic components we use are extremely durable, and will not shatter on impact.

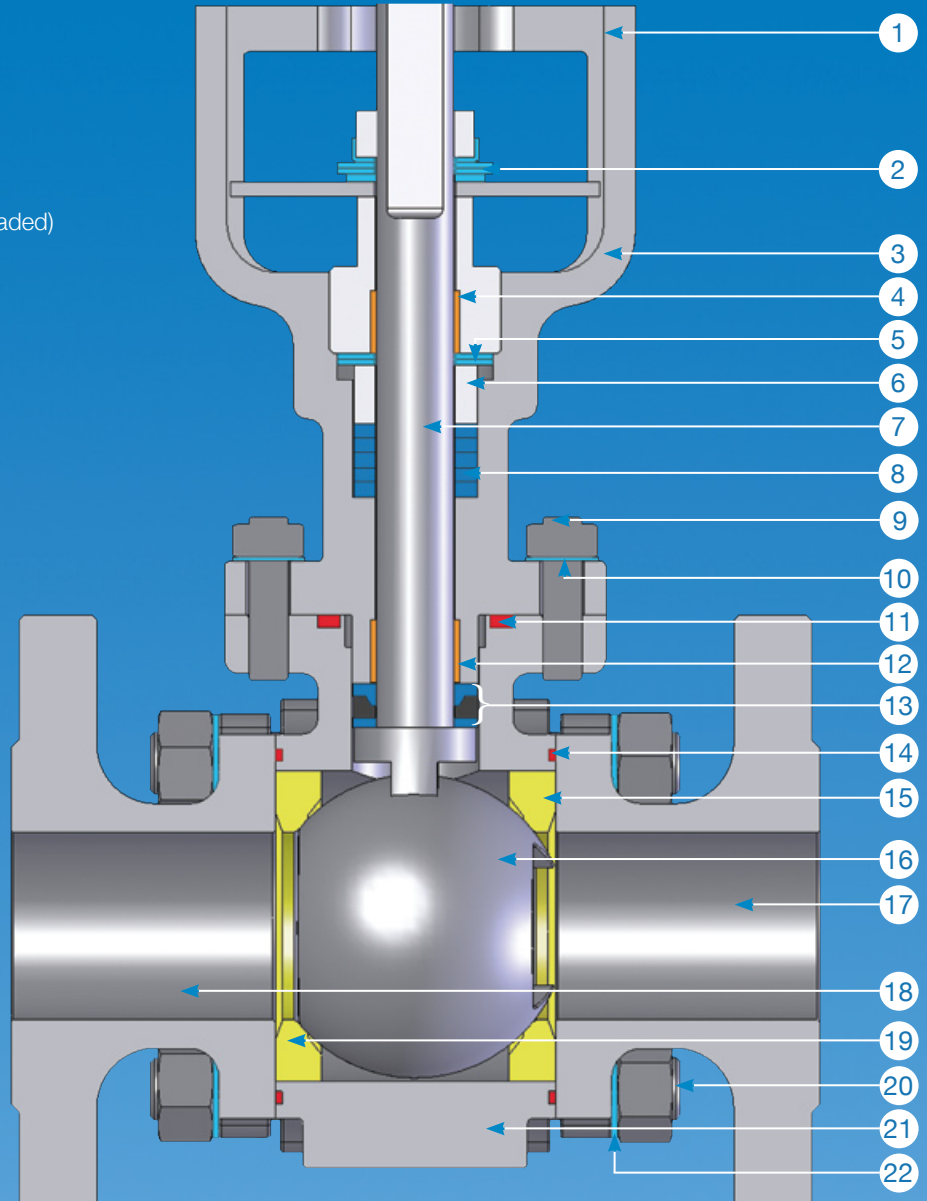


Scalloped Seats

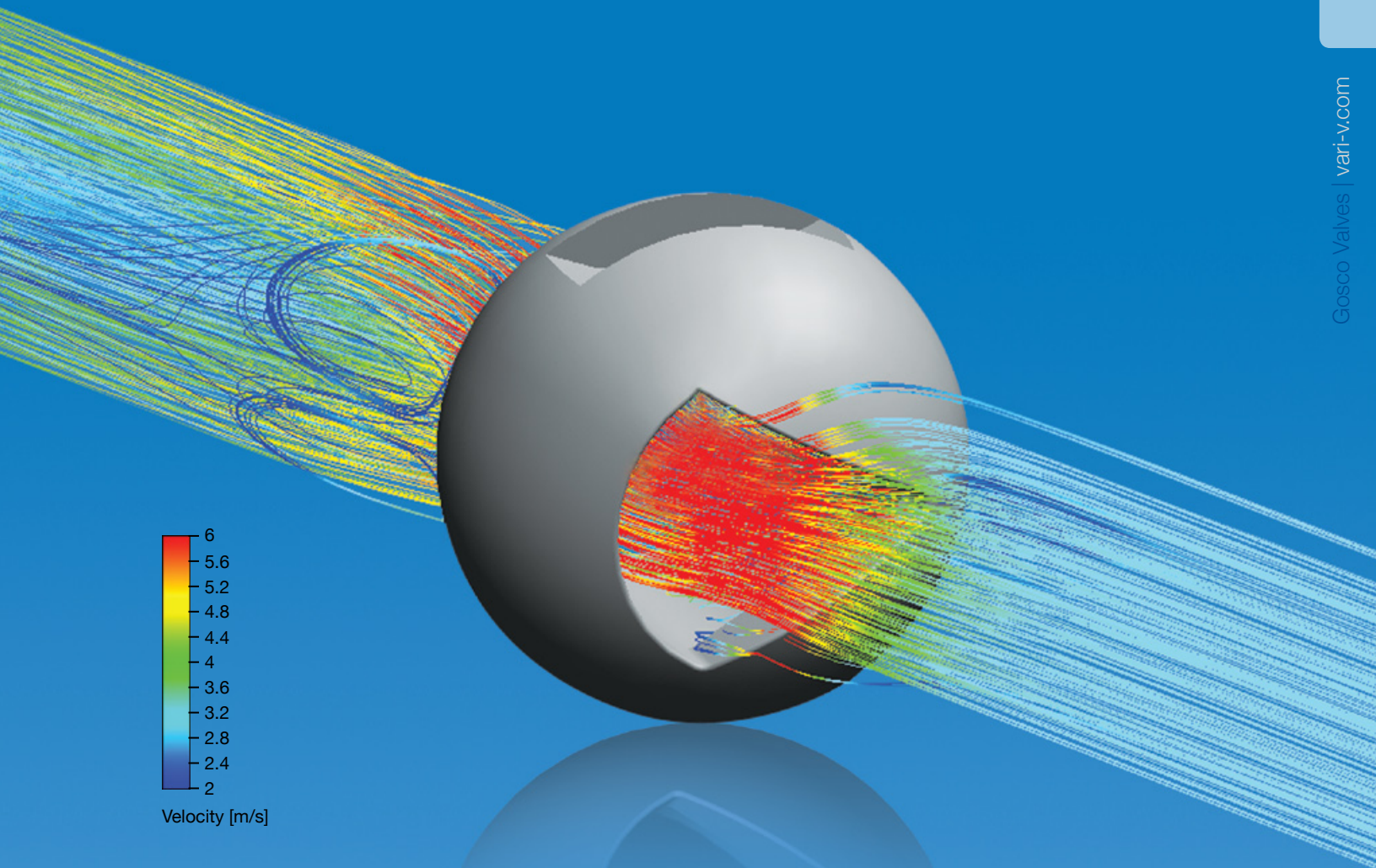
A common problem with metal seated valves is the build up of solids between the upstream seat and the body. Instead of trying to prevent media from getting behind the seat, we allow it to flow behind, but it can also flow back just as easily. This is done with angled scallops at the back and outer edge of the seats. The size, pitch, angle, depth and spacing of the scallops all vary with the particle size and pressure of the media.

A CUT ABOVE: VARI-V CONTROL VALVE

- 1 Clearview Mounting Pad
- 2 Belleville Washer (live loaded)
- 3 Extended Bonnet
- 4 Upper Stem Guide
- 5 Packing Belleville Washer (live loaded)
- 6 Packing Follower
- 7 Stem
- 8 Gland Packing
- 9 Bonnet Studs
- 10 Bonnet Belleville Washer
- 11 Bonnet Gasket
- 12 Lower Stem Guide
- 13 Sealmaster Stem Seal
- 14 End Cap Seal
- 15 Downstream Seat
- 16 Ball
- 17 End Cap - Downstream
- 18 End Cap - Upstream
- 19 Upstream Seat
- 20 End Cap Studs
- 21 Body
- 22 End Cap Belleville Washer



COMPUTATIONAL FLUID DYNAMICS (CFD)



Fluid dynamics, fluid performance.

Computational Fluid Dynamics (CFD) is used to illustrate the flow path through a valve. It pinpoints areas where there are high velocities and where cavitation is likely to occur. CFD is also used as a tool to help design trim sets that prevent cavitation, or where custom flow requirements are needed. It is also used to determine the flow coefficient (C_v) of our standard Vari-V balls.

BRILLIANCE THROUGH SIMPLICITY AND PRECISION.

High Turndown-V



90° V-Ball



10° V-Ball



60° V



The Characterized Ball

“V” profiles are machined into the ball for optimum performance

The angle of the “V” determines the maximum C_v versus the ability to control the process

10° V-Ball	30° V-Ball	60° V-Ball	90° V-Ball
Low C_v	Medium C_v	Equal Percentage	High C_v
High Control	Medium Control	Characteristic	Low Control

High Turndown-V



30° V-Ball



Linear-V



Filler-V

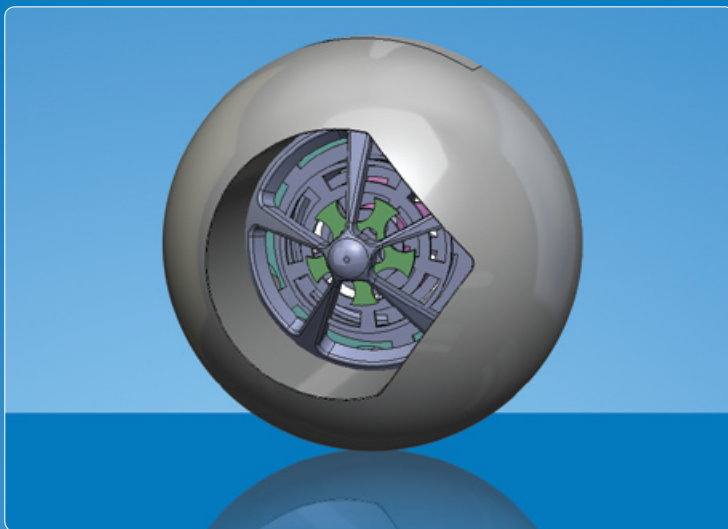


High Turndown-V	Linear-V	Filler-V
<p>Maximize flow in the open position with extremely fine control when the valve is partially closed. The transition between high flow and fine control is as smooth as possible.</p>	<p>Accurate flow control is only a matter of adjusting the slot profile. If you need a specific output we will machine it to suit your specifications. The slot can be as thin as a human hair!</p>	<p>Perfect for two stage output. Use it when the application requires initial maximum flow to fill the majority of the vessel, and precision flow to accurately control the level.</p>

CUSTOM VARI-V BALLS



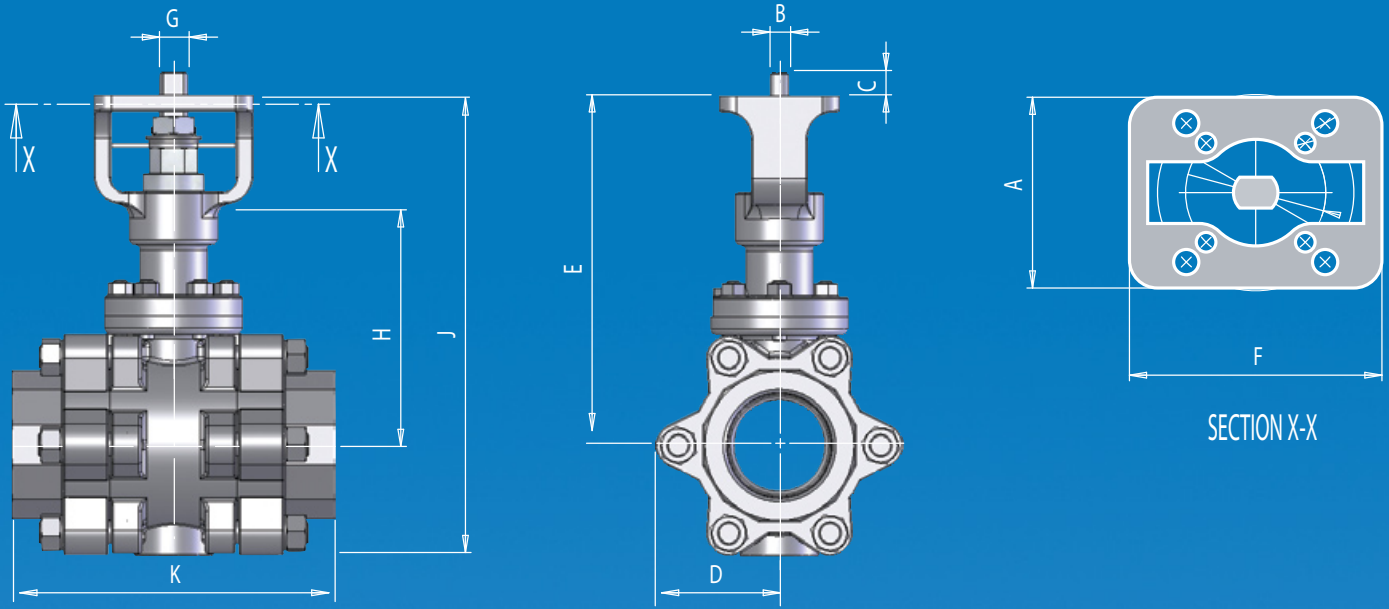
Not all control applications were created equal, which is why Gosco Valves can design and manufacture custom Vari-V balls that adhere to your strict flow requirements. A complete CFD (Computational Fluid Dynamics) analysis is performed on the design before it is constructed, eliminating trial and error in the field. The custom V-ball pictured above was created to eliminate cavitation and provide a very specific flow characteristic. The possibilities are endless, as we can create V-balls that have a slot width slightly larger than the diameter of a human hair.



Anti-cavitation Trim

Cavitation conditions can be controlled by dividing the full pressure drop across the valve into smaller drops using plates with miniature orifices. The series of parallel plates consist of barriers to direct flow, which causes the media to pass from a laminar to a turbulent nature, promoting energy loss. Gosco Valves can create custom anti-cavitation trim that adheres to your control valve's strict process requirements. Please contact Gosco Valves for more information on anti-cavitation trim.

VARI-V DIMENSIONS & OPERATING INFORMATION



Vari-V Control Valve Overall Dimensions¹

inches, lbs / cm, kgs

Valve Size	A	B ²	C	D	E	F	G	H	J	K			ISO 5211 MTG Pattern	Weight ³
										NPT	150#	300#		
1/2"	1.88/4.78	0.256/0.650	0.39/0.99	1.75/4.45	5.77/14.66	2.36/5.99	0.38/0.97	3.88/9.86	7.52/19.10	3.27/8.31	4.25/10.80	5.50/13.97	F04	3.7/1.68
3/4" SP	1.88/4.78	0.256/0.650	0.39/0.99	1.94/4.93	5.77/14.66	2.36/5.99	0.38/0.97	3.88/9.86	7.71/19.58	3.79/9.63	4.61/11.71	6.00/15.24	F04	4.3/1.95
3/4"	1.88/4.78	0.256/0.650	0.39/0.99	1.94/4.93	5.90/14.99	2.36/5.99	0.38/0.97	4.00/10.16	7.84/19.91	3.79/9.63	4.61/11.71	6.00/15.24	F04	5.6/2.54
1" SP	1.88/4.78	0.256/0.650	0.39/0.99	2.13/5.41	5.90/14.99	2.36/5.99	0.38/0.97	4.00/10.16	8.03/20.40	4.31/10.95	5.00/12.70	6.50/16.51	F04	5.8/2.63
1"	2.20/5.59	0.335/0.851	0.45/1.14	2.13/5.41	6.26/15.90	3.22/8.18	0.50/1.27	4.17/10.59	8.39/21.31	4.31/10.95	5.00/12.70	6.50/16.51	F05	10.7/4.85
1 1/4" SP	2.20/5.59	0.335/0.851	0.45/1.14	2.31/5.87	6.26/15.90	3.22/8.18	0.50/1.27	4.17/10.59	8.57/21.77	4.60/11.68	5.50/13.97	7.00/17.78	F05	11.6/5.26
1 1/4"	2.20/5.59	0.335/0.851	0.45/1.14	2.31/5.87	6.44/16.36	3.22/8.18	0.50/1.27	4.35/11.05	8.75/22.23	4.60/11.68	5.50/13.97	7.00/17.78	F05	12.3/5.58
1 1/2" SP	2.20/5.59	0.335/0.851	0.45/1.14	2.50/6.35	6.44/16.36	3.22/8.18	0.50/1.27	4.35/11.05	8.94/22.71	5.07/12.88	6.50/16.51	7.50/19.05	F05	14.1/6.40
1 1/2"	2.68/6.81	0.433/1.100	0.51/1.30	2.50/6.35	7.40/18.80	3.54/8.99	0.62/1.57	5.00/12.70	9.90/25.15	5.07/12.88	6.50/16.51	7.50/19.05	F05/F07	19.7/8.94
2" SP	2.68/6.81	0.433/1.100	0.51/1.30	3.00/7.62	7.40/18.80	3.54/8.99	0.62/1.57	5.00/12.70	10.40/26.42	5.59/14.20	7.00/17.78	8.50/21.59	F05/F07	23.0/10.4
2"	2.68/6.81	0.433/1.100	0.51/1.30	3.00/7.62	7.76/19.71	3.54/8.99	0.62/1.57	5.34/13.56	10.76/27.33	5.59/14.20	7.00/17.78	8.50/21.59	F05/F07	26.3/11.9
2 1/2" SP	2.68/6.81	0.433/1.100	0.51/1.30	3.50/8.89	7.76/19.71	3.54/8.99	0.62/1.57	5.34/13.56	11.26/28.60	6.84/17.37	7.50/19.05	9.50/24.13	F05/F07	32.0/14.5
2 1/2"	3.86/9.80	0.591/1.501	0.63/1.60	3.50/8.89	8.56/21.74	4.92/12.50	0.88/2.24	5.93/15.06	12.06/30.63	6.84/17.37	7.50/19.05	9.50/24.13	F07/F10	46.4/21.05
3" SP	3.86/9.80	0.591/1.501	0.63/1.60	3.75/9.53	8.56/21.74	4.92/12.50	0.88/2.24	5.93/15.06	12.31/31.27	7.59/19.28	8.00/20.32	11.13/28.27	F07/F10	47.0/21.32
3"	3.86/9.80	0.591/1.501	0.63/1.60	3.75/9.53	9.07/23.04	4.92/12.50	0.88/2.24	6.44/16.36	12.82/32.56	7.59/19.28	8.00/20.32	11.13/28.27	F07/F10	64.0/17.98
4" SP	3.86/9.80	0.591/1.501	0.63/1.60	4.50/11.43	9.07/23.04	4.92/12.50	0.88/2.24	6.44/16.36	13.57/34.47	N/A	9.00/22.86	12.00/30.48	F07/F10	78.0/35.38
4"	4.72/11.99	0.709/1.800	0.61/1.55	4.50/11.43	10.67/27.10	5.63/14.30	1.00/2.54	7.29/18.52	15.17/38.53	N/A	9.00/22.86	12.00/30.48	F10/F12	93.0/42.18
6" SP	4.72/11.99	0.709/1.800	0.61/1.55	5.50/13.97	10.67/27.10	5.63/14.30	1.00/2.54	7.29/18.52	16.17/41.07	N/A	10.50/26.67	15.88/40.34	F10/F12	103/46.72
6"	7.00/17.78	1.125/2.858	1.08/2.74	7.85/19.94	15.25/38.74	8.25/20.96	1.50/3.81	11.00/27.94	23.10/58.67	N/A	15.50/39.37	15.88/40.34	F12/F16	357/161.8
8" SP	7.00/17.78	1.125/2.858	1.08/2.74	7.85/19.94	15.25/38.74	8.25/20.96	1.50/3.81	11.00/27.94	23.10/58.67	N/A	18.00/45.72	19.75/50.17	F12/F16	396/179.6

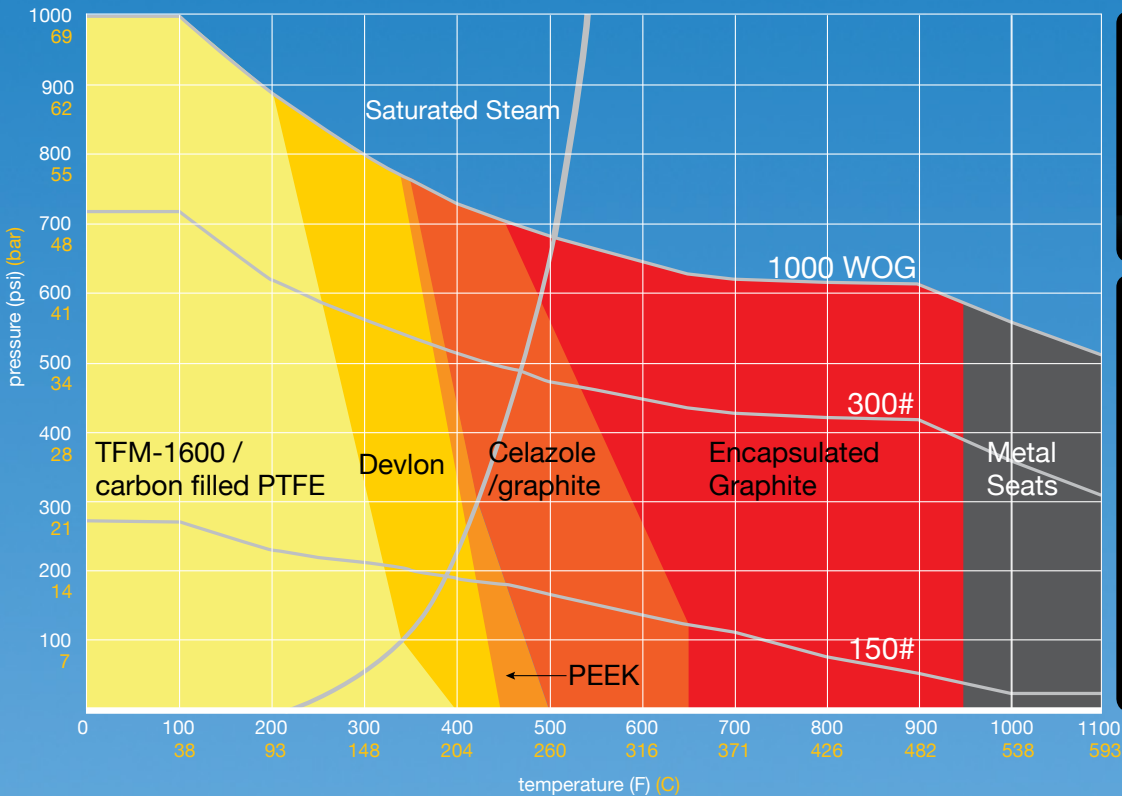
1) Please visit goscovalves.com to download up-to-date dimensional information.
 2) For coupling manufacture, all dimension "B's are ±0.003
 3) Valve weights and dimension "D" are based on a 150# class assembly

Vari-V Ball Valve Torques* (in/lbs)

Valve Size	TFM-1600 / carbon-filled PTFE		Devlon		PEEK / Graphite		Metal Seats	
	Standard Port	Full Port	Standard Port	Full Port	Standard Port	Full Port	Standard Port	Full Port
1/2"	n/a	120	n/a	140	n/a	150	n/a	200
3/4"	120	150	140	170	150	200	200	300
1"	150	200	170	250	200	300	300	450
1 1/4"	200	260	250	320	300	400	450	600
1 1/2"	260	330	320	380	400	520	600	750
2"	330	450	380	550	520	650	750	900
2 1/2"	450	900	550	1050	650	1450	900	1950
3"	900	1800	1050	2100	1450	2750	1950	3200
4"	1800	3300	2100	3750	2750	4500	3200	6250
6"	3300	4200	3750	5600	4500	5700	6250	13500
8"	4200	n/a	5600	n/a	5700	n/a	13500	n/a

*Torque values are based on a shut-off pressure of 300 psi, calculations are based on clean water @ 70 °F
 Values will increase linearly by 50% between 300 psi and 1000 psi shut-off

Pressure/Temperature Chart



M-CLASS VALVES

For temperatures over 1100 °F (538 °C) and/or pressures over 1000 psi (69 bar), please refer to Gosco M-Class Valves
www.mclassvalve.com

Part Number Ordering System¹ (e.g. part number 02F-150A2-K7TUFCHV10V-BFE²)

Size	Port	Connection	Body	Trim	Seat	Packing	Vari-V	Handle	Special
01 = 1/2" valve	S = standard port	NPT = national pipe thread	SS = 316/316L stainless steel (CF8M/CF3M)	SS = 316 SS stem and ball	COR = Core Seat (see trim option booklet)	CHV = PTFE chevron	10V = 10° Vari-V	T = tee handle	FE = drilled fugitive emission port
02 = 3/4" valve	F = full port	SWE = socket weld ends	A2 = Alloy 20 (CN7M)	S7 = 17-4PH stem, 316 SS ball	HOT = Hot Seat (see trim option booklet)	GRA = standard graphoil	30V = 30° Vari-V	B = bare shaft (for actuation)	DB = drilled ball (upstream side)
03 = 1" valve	•	BWE = butt weld ends	HC = Hastelloy C	K7 = 17-4PH stem, hardened arcuate cut ball	TUF = Tough Seat (see trim option booklet)	CRY = Cryogenic Valve ⁴	60V = 60° Vari-V	G = gear box	3W = 3-way diverter
04 = 1 1/4" valve	•	150 = 150# flanged	DP = Duplex 2205	I7 = Inconel stem, borided Inconel ball	ARM = Armor Seat (see trim option booklet)	•	90V = 90° Vari-V	L = lever	O2 = oxygen cleaned
05 = 1 1/2" valve	•	300 = 300# flanged	OT = other	KS = stainless stem, hardened ball	TFE = TFM-1600, 2nd generation PTFE	•	LVN = linear Vari-V	K = lock-out	SC = scalloped seat
06 = 2" valve	•	S15 = split body, 150# flanged ⁵	•	I4 = 17-4PH stem, borided Inconel ball	TCF = 25% carbon-filled PTFE	•	HTV = high turndown Vari-V	1 = T + K	S1 = SC + O2
07 = 2 1/2" valve	•	XBW = extended butt weld ends	•	HC = Hastelloy C276	B17 = borided Inconel 718	•	FLV = filler Vari-V	2 = G + K	S2 = SC + 3W
08 = 3" valve	•	FNP = firesafe national pipe thread	•	A2 = Alloy 20	UMP = UHMWPE	•	ARC = arcuate cut ball	3 = L + K	S3 = SC + FE
09 = 4" valve	•	FSW = firesafe socket weld ends	•	KM = K Monel	PEK = carbon filled PEEK	•	OTH = other	O = other	S4 = DB + O2
10 = 6" valve	•	FBW = firesafe butt weld ends	•	SD = Super Duplex	VPK = FDA approved virgin PEEK	•	NON = regular ball	•	S5 = DB + FE
11 = 8" valve	•	F15 = firesafe 150# flanged	•	HB = Hastelloy B	Cavity Filler ³	•	•	•	S6 = 3W + O2
OT = other	•	F30 = firesafe 300# flanged	•	I6 = Inconel 625	PTF = PTFE	•	•	•	S7 = 3W + FE
•	•	OTH = other	•	OT = other	OTH = other	•	•	•	S8 = FE + O2
•	•	•	•	•	•	•	•	•	NS = no special
•	•	•	•	•	•	•	•	•	OT = other

1) Please visit goscovales.com to download up-to-date part ordering information.

2) Example valve: 3/4" valve, full port, 150# flanged, CN7M body, 17-4PH stem, hardened arcuate cut ball, Tough Seat, PTFE chevron packing, 10° Vari-V ball, bare shaft, drilled fugitive emission port

3) CVT = cavity filler TFM-1600, CVU = cavity filler UHMWPE, CVD = cavity filler Devlon, CVC = cavity filler 25% carbon-filled PTFE

4) Specific to the Gosco Cryogenic Valve part number. Includes standard cryogenic extension, PTFE chevron packing, and a drilled ball for pressure relief.

5) Only available on full port valves

Design Specifications

ANSI/ASME B1.3M screw thread gauging system for dimensional acceptability

ANSI/ASME B16.10 face-to-face and end-to-end dimensions of valves

ANSI/ASME B16.34 valves-flanged, threaded and welding ends

ANSI/ASME B16.5 pipe flanges and pipe fittings

ASTM A193/A 194M-96b standard specifications for alloy steel and stainless steel bolting materials for high temperature service

ASTM A194/A 194M-96 standard specifications for carbon and alloy steel nuts and bolts for high pressure and high temperature service

MSS SP-25 standard marking system for marking valves, fittings, flanges and unions

CSA B51-95 boiler, pressure vessel and pressure piping code

API 598 valve inspection and testing

CRN Canadian Registration Number (0911851.5)

ISO 9001:2000

API 607 5th edition

TÜV section 3.1.8.4



Dual Pak

Dual Pak Ball Valve

dualpak.com

- 1/2" to 8" standard port
- Million cycle packing guarantee
- Temperatures to 650 °F (343 °C)
- Exotic alloys
- Extended bonnet for insulation

The Dual Pak ball valve is a soft seated, high performance valve designed to operate in high cycle, high temperature and corrosive applications. Short lead times, competitive prices and a unique design, makes this the valve of choice for problem applications.



M-Class

M-Class Custom Ball Valve

mclassvalve.com

- 1/2" to 10" standard port
- Metal seats with Class VI shut-off
- Anti-abrasion trim
- Temperatures to 1200 °F (649 °C)
- Exotic alloys
- Pressures to 4500# class

Gosco made-to-order M-Class ball valves are designed to tackle the most extreme applications in the industry, at a very competitive price. We outperform in abrasive, high temperature, high cycle, corrosive and high pressure services.



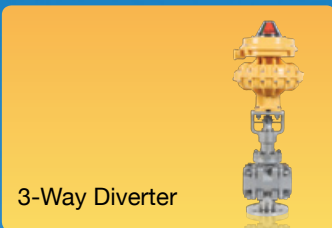
Cryogenic

Gosco Cryogenic Valve

goscocryogenic.com

- 1/2" to 8" standard port
- Multiple end connections
- Temp. to -454 °F (-270 °C)
- Several seat options

The Gosco Cryogenic valve is available with an extended bonnet for temperatures to -454 °F (-270 °C). Live-loaded body and bonnet bolting prevents leakage due to temperature fluctuations. A bolt on retrofit kit allows you to change the bonnet in-line.



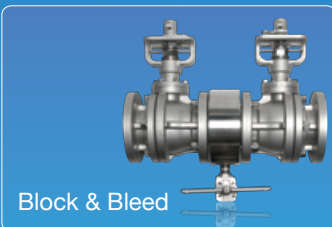
3-Way Diverter

3-Way Diverter Valve

3waydiverter.com

- 1/2" to 8" standard port
- Million cycle packing guarantee
- Temperatures to 650 °F (343 °C)
- Exotic alloys
- Extended bonnet for insulation

Our quarter-turn 3-Way Diverter valves are bottom entry with flow to the left or right ports. We offer a "Single L Port" ball for 180° applications, and a "Double-L Port" ball for 90° applications. The seats are live loaded so that they seal in both directions.



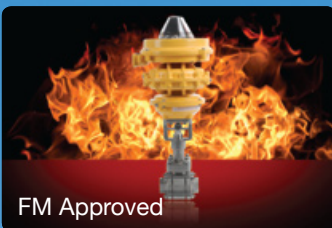
Block & Bleed

Block and Bleed Valves

blockandbleed.com

- 1/2" to 8" standard port
- Temperatures to 650 °F (343 °C)
- Metal seats available
- Single / double block & bleed
- Compact, fire-safe

We offer three styles of block and bleed valve: single block and bleed with live loaded seats (one valve, two seats, and a bleed valve), double block and bleed (two valves with a spacer between them and a bleed valve) and double block and bleed: single body.



FM Approved

FM Approved Safety Shut-Off Valve

fm-valve.com

- FM approved
- 1/2" to 8" standard port
- Bubble tight shut-off
- Soft and metal seat options

Gosco FM Valves have been put through the most rigorous FM approval testing, and have come out on top. A large selection of FM approved sizes and options are available.



Kinetrol

Kinetrol Actuators

goscovallves.com

- Vane type actuators
- One moving part
- Direct mount controls
- 2 million cycle guarantee

Kinetrol offers long-lasting actuators and direct-mount control modules (fail-safe spring returns, limit switches, and positioners), a perfect complement for Gosco valves.



US patent No 5,967,685



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