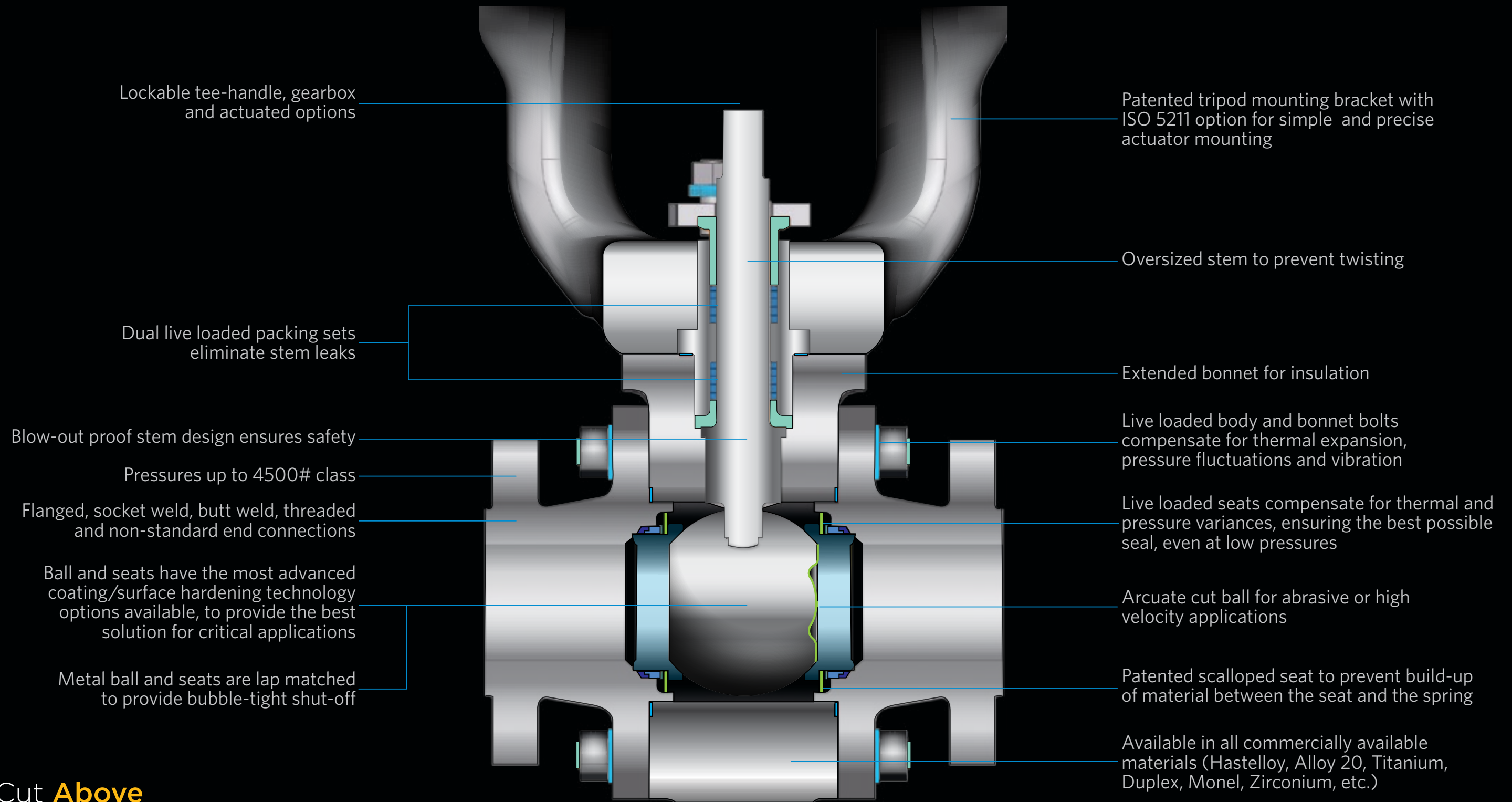


M-CLASS

METAL SEATED BALL VALVES





A Cut **Above**

- 1/2" TO 16" standard port
- 150# up to 4500#
- -270°C (-454°F) TO 788°C (1450°F)
- Bi-directional seating to handle back pressures to the full pressure rating of the valve

One year guarantee or extended guarantee options for special applications

ON/OFF VALVE

The **On/Off Ball Valve** is an elite, made-to-order, metal seated ball valve, unparalleled in quality and performance.

They are designed for any combination of abrasive, corrosive, high temperature, high pressure, and high-cycle applications. Options include Vari-V and arcuate cut balls, exotic alloys, and scalloped seats. Not only do M-Class Ball Valves provide superior performance for the toughest applications, they are truly bi-directional and provide bubble-tight shut-off.



CRYO VALVE

The **Cryogenic Valve** can handle temperatures as low as -270°C (-454°F). A bolt-on retrofit kit is also available.

Our Cryogenic Valves are designed to withstand temperatures of -270°C / -454°F and have a minimum 12" bonnet extension to protect the actuator and handle from ice build-up. The valve features the patented M-Class Stem Sealing System, a detachable bonnet, and metal seats. M-Class Cryogenic Valves feature a drilled ball, to relieve pressure, and a fully grounded stem. A bolt-on retrofit kit is also available.



BLOCK+BLEED

The **Block+Bleed Valves** provide bubble tight shut-off and are offered in single and double Block+Bleed configurations

Gosco's Block+Bleed Valves combine live loaded seat technology, the patented M-Class seating system, and completely bi-directional seating. This configuration makes our Block+Bleed Valves extremely versatile, enabling them to tackle the toughest severe service applications.





3-WAY VALVE

The **3-Way Diverter Valve** provides bottom entry with flow, to the left ports or right ports, “Single-L” for 180°, or “Double-L” for 90°.

The 3-Way Diverter offers superior reliability in a metal-seated package. Configurations include a “Single-L Port” ball for 180° applications, specifically for when there is no mix of the media between the two ports, and a “Double-L Port” ball for 90° applications in which mixing is expected to occur between the ports. Whatever the application, the 3-Way Diverter Valve is guaranteed to outperform its competitors and surpass all expectations.

VARI-V VALVE

The **Vari-V Ball Valve** offers precise flow control through a specific profile that is machined into the ball.

When precise control of flow or pressure is required in a metal seated ball valve, the M-Class Vari-V Control Valve is perfect for your tough applications. Standard 10°, 30°, 60°, 90° V's are cut in to the ball for a complete range of CV's and control requirements. Custom profile V's are used for unusual applications requiring special flow characteristics.



Linear-V



High Turndown-V



Filler-V



90° V-Ball



60° V-Ball



30° V-Ball



10° V-Ball



Control**Freak**

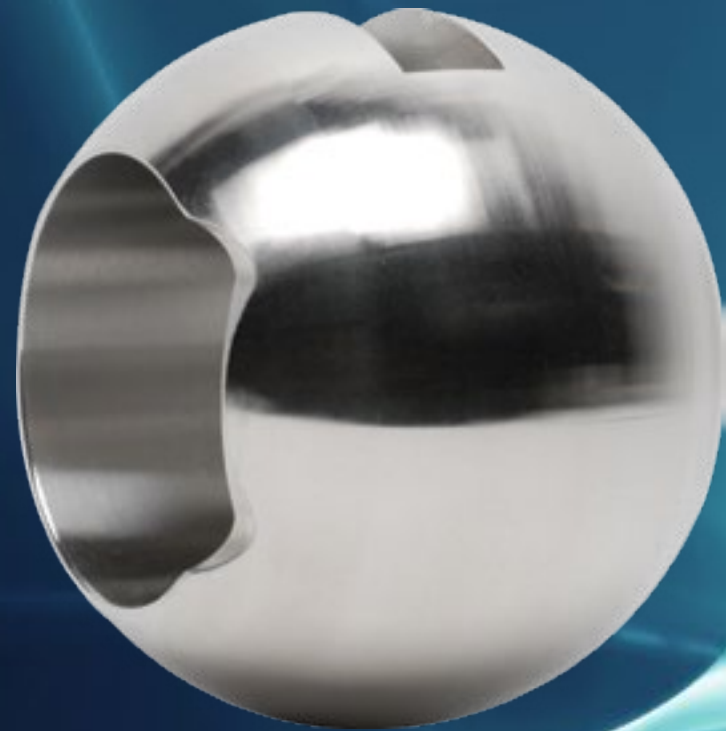
At the heart of every Gosco M-Class control valve is the Vari-V ball. The profile of the V-ball determines the flow characteristic of the valve and can be changed to suit the application. 10°, 30°, 60° and 90° V-balls are the most commonly used, but several other profiles are available. The transition between high flow and fine control with the Vari-V is extremely smooth.

- **Linear-V** is a slot in the ball that can be machined for precise flow requirements
- **Filler-V** is used when you need maximum flow for filling, followed by precise flow to accurately control the levels
- **High Turndown-V** maximizes flow in the open position, and provides fine flow control when the valve is partially closed

Free**Spirit**

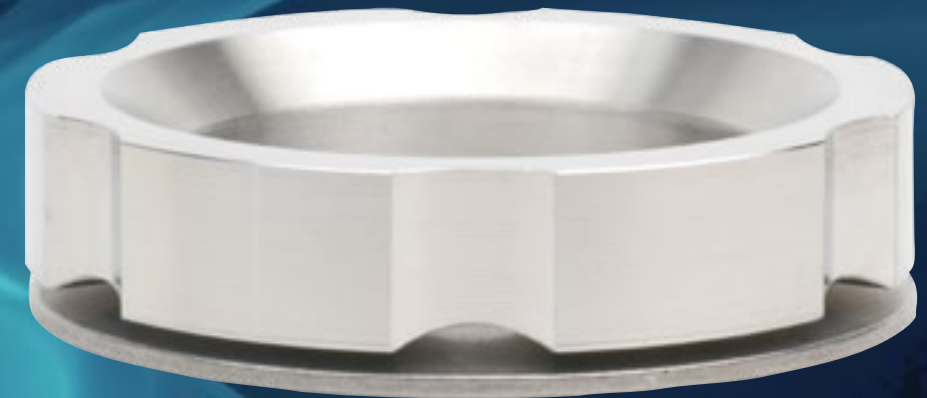


Custom V-balls are available for applications where specific flow requirements can not be met with the standard V-balls. Using Computational Fluid Dynamics (CFD), we can create a V-ball with a specific profile to fit any application. Anti-cavitation trim is also available. For examples of custom V-ball applications, including videos and specifications, visit www.goscovalves.com



Slow**Poke**

An arcuate cut is a profile in the ball that reduces velocity both when the valve opens, and as it closes. When a standard ball valve is in the first and last ten degrees of opening, the gap between the ball and seat is an elliptical shape. The velocities are very high (especially in the corners), and erosion occurs. With an arcuate cut, the opening on the ball is close to three times larger. This reduces the velocity by spreading out the flow through a larger opening, which ultimately reduces wear on the ball and seats. An arcuate cut ball is best utilized in abrasive and high cycle applications.



Smooth**Operator**

A common problem with metal seated valves is the build-up of material between the upstream seat and the body. Our approach to this problem is very different from traditional valve manufacturers. Their valve designs attempt to prevent media from getting behind the seat by sealing the outer edge and back of the seat. Our philosophy is the opposite: let the media flow behind the seat, as the seat's design allows material to escape just as easily. This is done with angled scallops at the back and outer edge of the seat. The size, steepness of the angle, and spacing of the scallops vary with the particle sizes and the pressure inside the valve.



TRIPOD MOUNT

The **M-CLASS Tripod Mount** is designed to eliminate the problems associated with traditional brackets.

Simple

No bracket - only a plate and coupling is needed.

Dead Centered

The mounting plate is secured between the C&C machined tripod prongs and cannot move in any direction. This guarantees perfect alignment of the actuator to the valve.

Easy to Assemble

The plate can be mounted on the actuator first, then the actuator will automatically be aligned by the three prongs.

Perfectly Flat

Three points define a plane, meaning the actuator will not rock.

Fully Visible

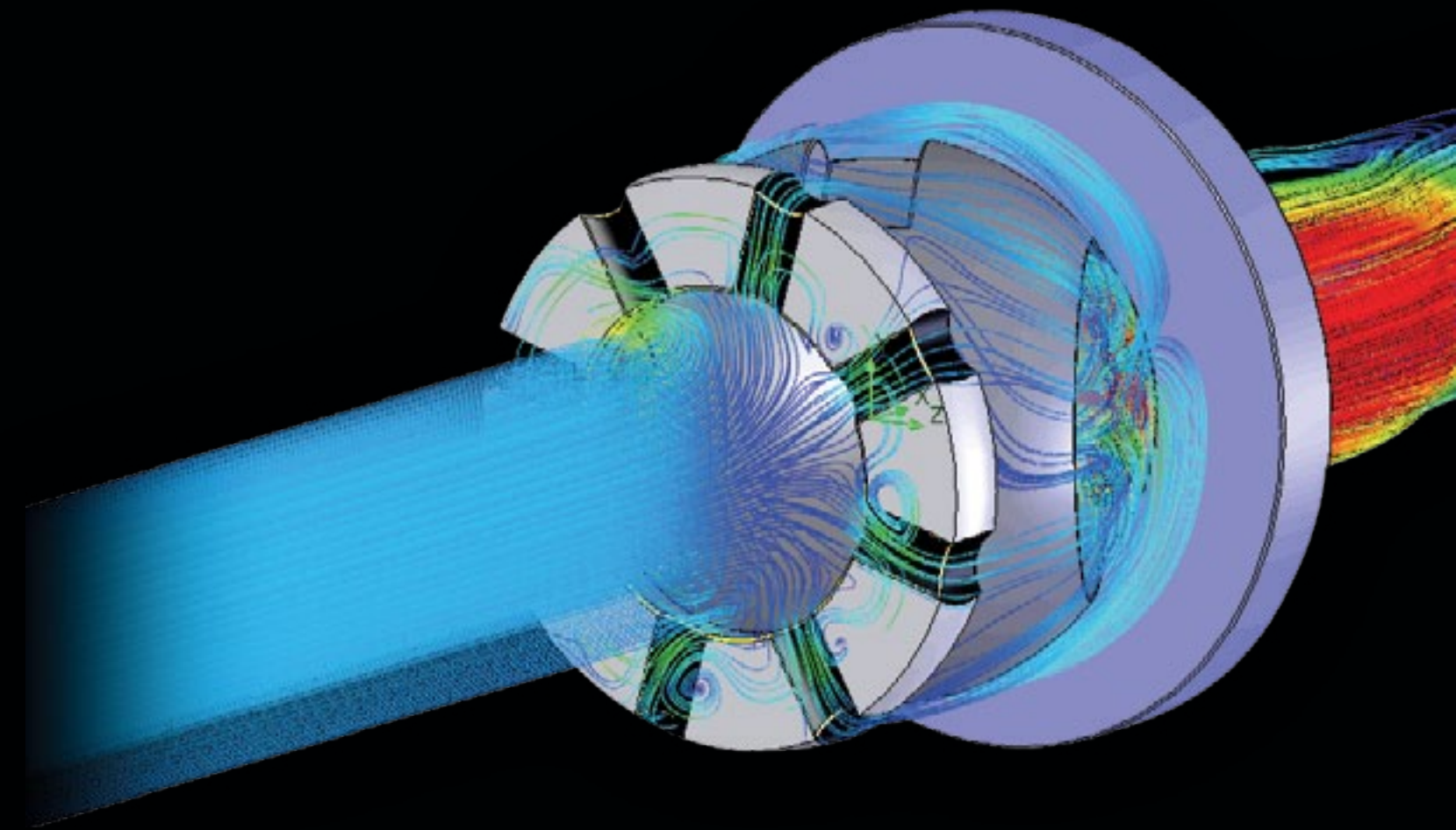
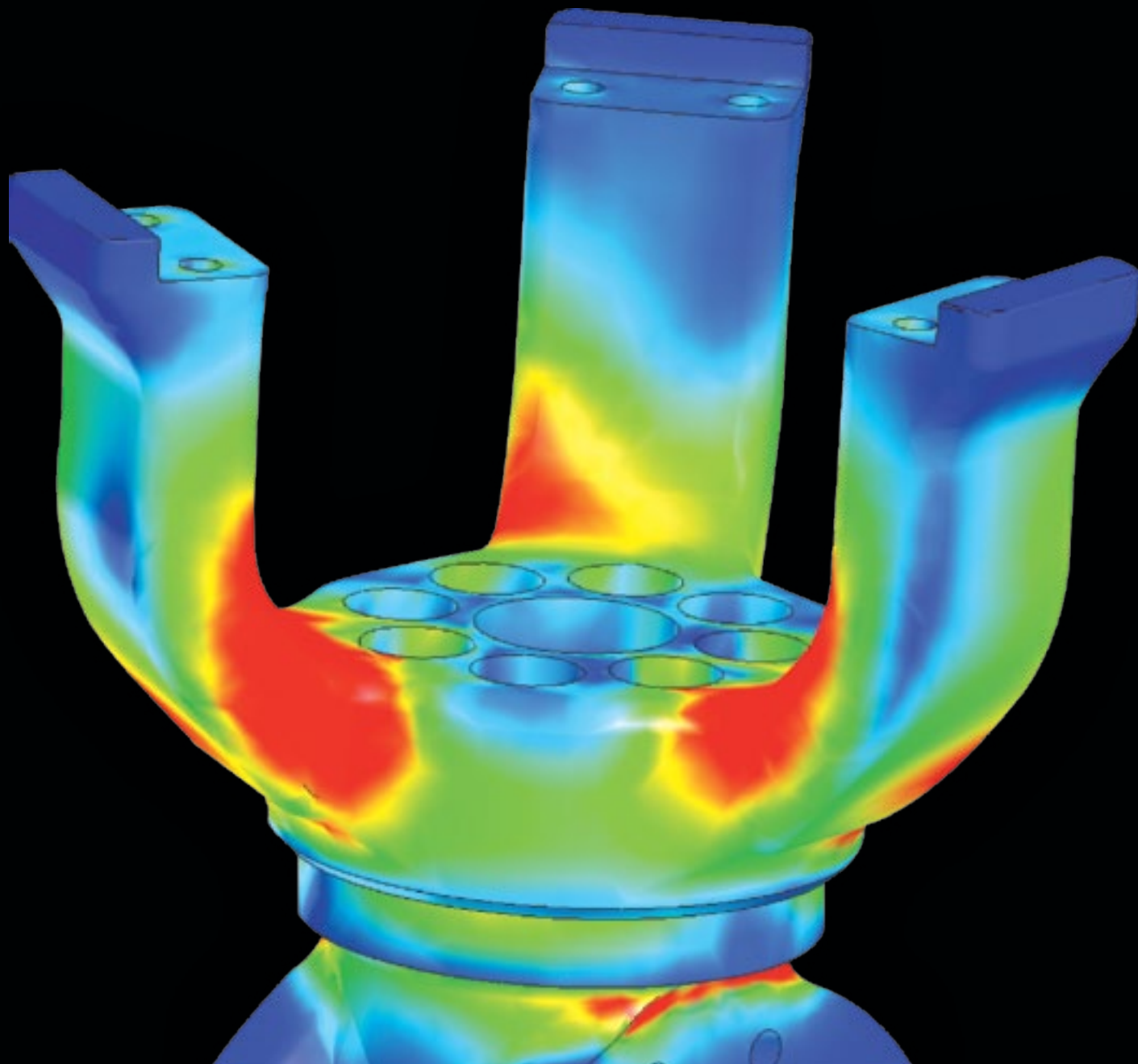
The double "D" on the stem is easily seen, giving a constant visual indication of the valve's position.

Open Between the Prongs

Allows full access to the packing adjustment without removal of the actuator.

Insulatable

A minimum of 2" between the top of the flange and the tripod allows insulation to be installed without covering the packing adjustments.



StressReliever

Finite Element Analysis (FEA) is used in Gosco Valves' design process to predict the behavior of a valve's components by subjecting them to varying loads. This ensures structural integrity. The analysis is based on variables such as maximum pressure and temperature inside the valve, and maximum actuator torque. The illustration shows the stress distribution in a body and bonnet assembly, based on FEA analysis.

FluidPerformer

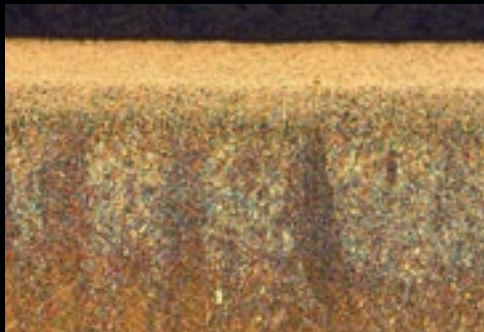
Computational Fluid Dynamics (CFD) is used to calculate the flow through the trim of a valve. It determines locations of high velocity and high flow, and assists in trim engineering for specific applications where velocities need to be controlled. CFD is also used to determine the flow coefficient (C_v) of Gosco Vari-V balls and aids in designing them to custom specifications. The illustration shows flow through a trim set at 45° open.

COATINGS



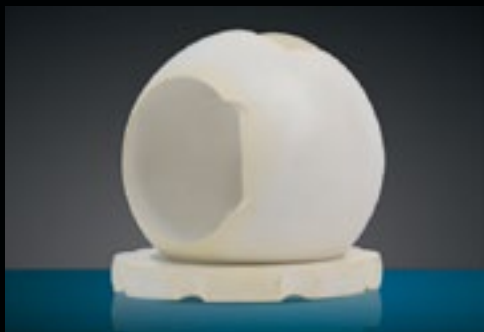
High Velocity Oxygen Flame (HVOF) is a thermal spray system that fuses a powdered metal feed (generally Chrome or Tungsten Carbide) onto a base material. In this process the oxygen flame, paired with a number of fuel gases, accelerates and propels the feed stock at supersonic speeds (1800ft/sec or 549 m/sec) directly on to the base material. Temperatures can reach upwards of 2300°C (4172°F). When particles strike the base material, they form a "splat", quickly cooling to create a high density coating.

BORONIZING



A thermochemical surface treatment in which Boron atoms are diffused into the surface of a base metal to form borides. It creates a new intermetallic layer with a hardness off the Rockwell C scale. The base metal is chosen to handle the temperature, abrasion and corrosion of the process, and has a superior wear resistance to that of coatings.

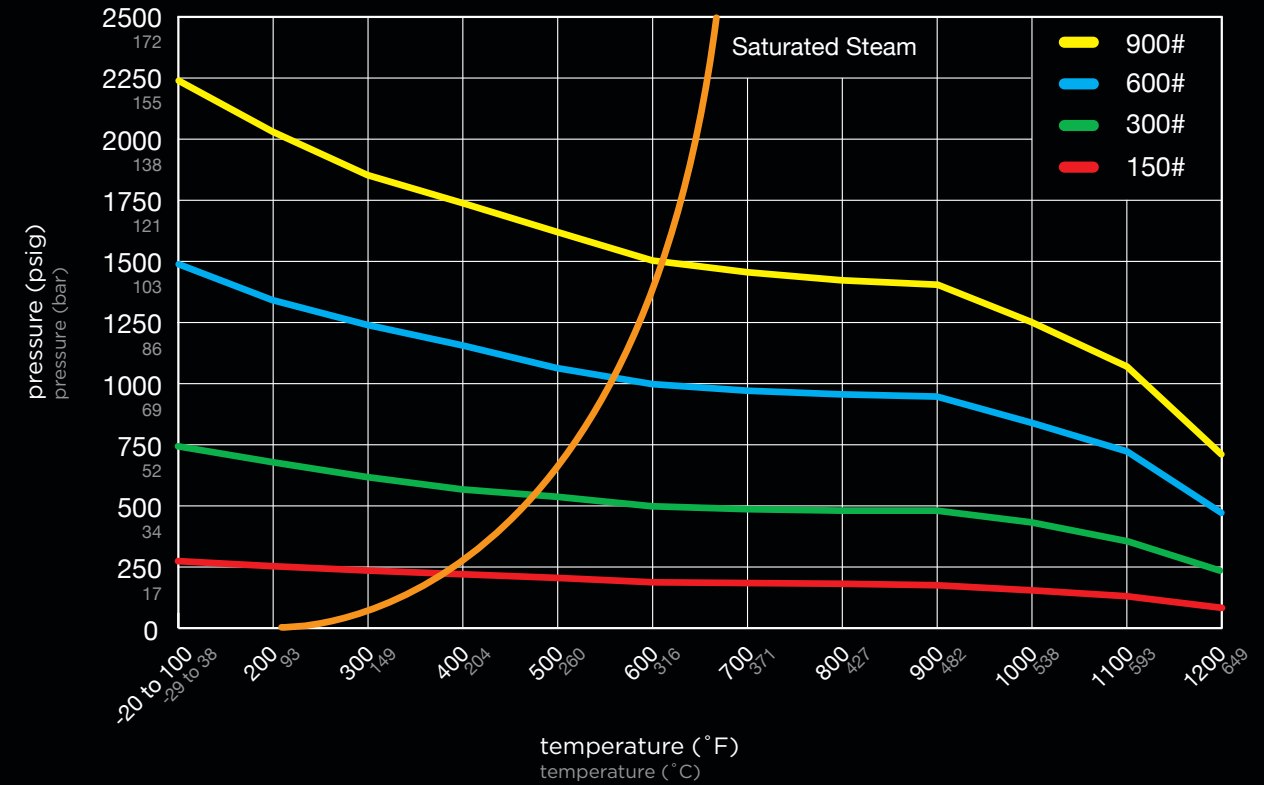
CERAMICS



Gosco also manufactures trim sets from a variety of different ceramics including a proprietary Alumina/ Zirconia based ceramic. This type of ceramic offers the chemical resistance and hardness of an alumina, combined with the toughness of zirconia. It does not shatter on impact and is abrasion and thermal shock resistant.

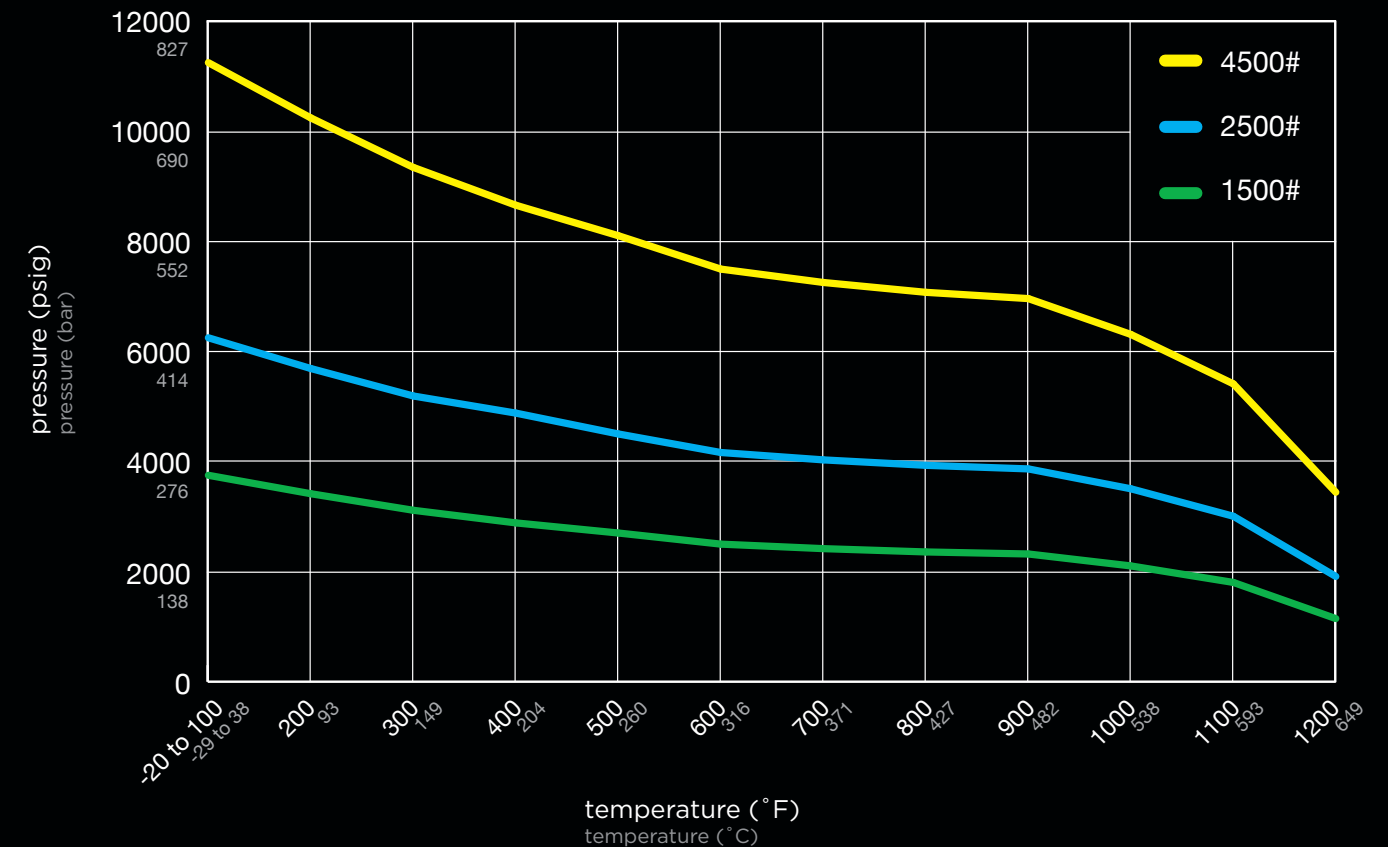
OPERATING INFORMATION

150#, 300#, 600#, 900# M-Class Valves



OPERATING INFORMATION

1500#, 2500#, 4500# M-Class Valves



M-CLASS PART NUMBERING SYSTEM

(e.g. part number: 09F1F1B17-I7B717B10-GGS1U*)

Size	Port	Bore	Connection	Pressure	Type	Body	Stem	Ball	Seat	Ball Profile	Packing	Handle	Special	Direction
01 = 1/2"	S = standard	1 = Schedule 40	F = flanged	1 = 150#	C = cast	SL = 316L	I7 = Inconel 718	B7 = Borided Inconel 718	I7B = Inconel 718, borided	10 = 10° V-Ball	C = PTFE chevron	A = actuated	DB = drilled ball (upstream side)	U = Unidirectional
02 = 3/4"	F = full	2 = Schedule 80	S = socket weld	2 = 300#	B = bar stock	SH = 316H	I6 = Inconel 625	B6 = Borided Inconel 625	I6B = Inconel 625, borided	30 = 30° V-Ball	G = standard graphoil	B = bare shaft	3W = 3-way diverter	B = Bidirectional
03 = 1"	T = true bore	3 = Schedule 160	B = butt weld	3 = 600#	F = forging	SS = 316 SS	S7 = 17-4 Ph	I7 = Inconel 718	HCB = Hastelloy C, borided	60 = 60° V-Ball	Y = cryogenic	T = tee handle	O2 = oxygen cleaning	.
04 = 1 1/4"	.	4 = Schedule 5S	X = extended BW	4 = 900#	O = other	CS = Carbon Steel	SS = 316 SS	I6 = Inconel 625	HBB = Hastelloy B, borided	90 = 90° V-Ball	.	G = gear box	SC = scalloped seat	.
05 = 1 1/2"	.	5 = Schedule 10S	R = RTJ	5 = 1500#	.	F1 = 1 1/4 Chrome	SH = 316H	SS = 316 SS	CER = ceramic	LN = linear V-Ball	.	L = lever	S1 = SC + O2	.
06 = 2"	.	6 = Schedule 120	N = NPT	6 = 2500#	.	F2 = 2 1/4 Chrome	SL = 316L	SH = 316H	EGR = encapsulated graphite	HT = high turndown V	.	K = lock-out	S2 = SC + 3W	.
07 = 2 1/2"	.	7 = Schedule XXS	G = Grayloc®	7 = 4500#	.	F9 = 9 Chrome	A2 = Alloy 20	SL = 316L	ZR2 = Zirconium 702	FL = filler V-Ball	.	1 = T + K	S4 = DB + O2	.
08 = 3"	.	O = other	O = other	O = other	.	HC = Hastelloy C276	HB = Hastelloy B	KS = Kolsterised Ball	ZR5 = Zirconium 705	AR = arcuate cut	.	2 = G + K	S6 = 3W + O2	.
09 = 4"	HB = Hastelloy B	HC = Hastelloy C276	A2 = Alloy 20	ST6 = Stellite 6	AC = anti-cavitation	.	3 = L + K	OT = other	.
10 = 6"	DP = Duplex	H2 = Hastelloy C22 HS	HB = Hastelloy B	CCC = chrome carbide coating	OT = other	.	4 = A + K	NS = no special	.
11 = 8"	SP = Super Duplex	DP = Duplex Stainless	HC = Hastelloy C	TCC = tungsten carbide coating	NO = none	.	O = other	.	.
12 = 10"	A1 = Alloy 20	SP = Super Duplex	DP = Duplex Stainless	OTH = other	.	.	.	.	.
13 = 12"	I6 = Inconel 625	T2 = Titanium, Gr. 2	SP = Super Duplex	.	.	.	.	.	.
14 = 14"	I7 = Inconel 718	T3 = Titanium, Gr. 3	S6 = Stellite 6	.	.	.	.	.	.
15 = 16"	T2 = Titanium, Gr. 2	T5 = Titanium, Gr. 5	T2 = Titanium, Gr. 2	.	.	.	.	.	.
.	T3 = Titanium, Gr. 3	M4 = Monel 400	T3 = Titanium, Gr. 3	.	.	.	.	.	.
.	T5 = Titanium, Gr. 5	M5 = Monel 500	T5 = Titanium, Gr. 5	.	.	.	.	.	.
.	M4 = Monel 400	Z2 = Zirconium 702	CC = chrome carbide coating	.	.	.	.	.	.
.	M5 = Monel 500	Z5 = Zirconium 705	TC = tungsten carbide coating	.	.	.	.	.	.
.	Z2 = Zirconium 702	OT = other	CR = Ceramic	.	.	.	.	.	.
.	Z5 = Zirconium 705	.	M4 = Monel 400	.	.	.	.	.	.
.	OT = other	.	M5 = Monel 500	.	.	.	.	.	.
.	Z2 = Zirconium 702	.	.	.	.	.	.
.	OT = other	.	.	.	.	.	.

*Example valve: 4", full port, schedule 40, 150# flanged, bar stock Inconel 718 body and stem, Borided Inconel 718 ball and seats, 10° V-Ball, graphoil packing, gear box, scalloped seat with oxygen cleaning, unidirectional

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

WARRANTY

WARRANTY - The Seller warrants its products against defects in material or workmanship, when used on those services approved by the Seller, for a period of one (1) year from date of original shipment. The Seller's liability under this warranty shall be limited to repair or replacement at Seller's option of such defective products, F.O.B. factory, upon proof of defect satisfactory to Seller. Seller shall have no further liability for damages of any kind, including but not limited to personal injuries and property damage, resulting from use of Seller's product. This warranty is expressly in lieu of all other warranties, either express or implied, including any implied warranty as to merchantability or fitness for any particular purpose. Special and consequential damages: In no event shall Seller be liable for any consequential or special damages arising from any breach of these terms and conditions from the use of its products.

DESIGN SPECIFICATIONS

- ASTM A 194/A193M-96b Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service
- ASTM A 194/A194M-96 Carbon and Alloy Steel Nuts for High Pressure and High Temperature Service
- 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
- MSS SP-25 Standard Marking System for Marking Valves, Fittings, Flanges and Unions
- CSA B51-95 Boiler, Pressure Vessel and Pressure Piping Code
- Mill certificates and additional non-destructive testing are available if required
- API 608 Metal Ball Valves - Flanged, Threaded and Welding ends
- API 598 Valve Inspection and Testing
- API 6D Pipeline Valves
- ISO 9001: 2000



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