CELEROS™ FLOW TECHNOLOGY

GENERAL SERVICE (GS) CONTROL VALVES

COPES VULCAN®

Copes-Vulcan has been providing control valves and desuperheaters for the power, process and nuclear industries since 1903. Copes-Vulcan provides a wide range of valves for the control of pressure, temperature and flow-induced noise in all types of power plants. Products include severe service and general service control valves, variable orifice desuperheaters, Raven™, trim and steam-conditioning valves and nuclear control valves, as well as custom designed specialty valves. Copes-Vulcan is recognized worldwide as a leader in valves for severe and critical service applications. Our strength lies in our ability to provide innovative valve solutions for our customers' application needs.

GS-GENERAL SERVICE VALVES

The GS-General Service Valves continues Copes-Vulcan's tradition of designing and manufacturing control valves that provide both exceptional service and great value. Representing significant refinement in design and performance for general service globe style control valves, the GS-General Service Valves combine the most advanced levels of body configuration, trims and actuation to produce a valve assembly capable of premium performance at a competitive price.

Suitable for controlling water, steam, gas and most other fluids, GS-General Service Valves deliver a new standard of versatility, rugged dependability and cost effectiveness that will serve the power and process industries well into the 21st century.

Copes-Vulcan GS-General Service Valves are ideally suited for non-severe flow control of most liquids, steam and gases. They provide reliable, economical performance in heater drains, gas and fuel oil control, feedwater control, steam/gas pressure reduction and many other power and process flow control operations.

For applications involving extreme environments, especially hostile fluids, or pressure classes greater than ANSI 600, specify Copes-Vulcan SD-Severe Duty Control Valves.

DESCRIPTION AND PRINCIPLE OF OPERATION

GS-General Service Valve assemblies feature a straight-through globe style body design with streamlined precision cast bodies to provide smooth contours and transition areas. The result is minimized flow restriction and maximized capacity. Computer calculated cross sections and wall thicknesses assure high structural integrity while maintaining a very favorable strength-to-weight ratio. The GS-General Service Valves are available in .75–8" (20–200mm) sizes as standard, ANSI pressure classes of 125–600, and most standard castable material choices, with either flanged, welded or threaded end connections.

GS-General Service Valves can be equipped with an extensive array of standardized trims to meet virtually any general service requirement. A number of high performance trims, such as Raven, HUSH, Tandem, and GAD are also available and can be used to control occurrences of cavitation, flashing or noise. All trims are quick change to assure ease of maintenance. All trims are fully interchangeable between like sizes to ensure maximum flexibility and reduced inventory requirements.

A complete range of 700 series pneumatic diaphragm actuators that can handle supply air pressure as high as 80 psig (550 kPag) provides performance usually associated with much more expensive actuation systems. Copes-Vulcan pneumatic actuators are known worldwide for high performance and reliability.

The design is in accordance with ANSI B16.1, B16.5, B16.11, B16.25, B16.34. Copes-Vulcan also holds the following certifications that can be applied to the GS-Style Globe valve: ASME Section I, ASME Section III 'N' & 'NPT', 97/23/EC-PED-CE and is also ISO-9001 certified.

TYPICAL PRODUCT APPLICATIONS

Suitable for controlling liquid, steam, gas and most other fluids, General Service Valves deliver a new standard of versatility, rugged dependability and cost effectiveness.

Traditional Coal-Fired Power

- Heater Drain Valve
- Deaerator Level Control
- Aux Steam to Deaerator
- Condendate Water to Condenser
- Condensate Water Recycle
- Cold Reheat to Aux Steam
- Main Steam Letdown Spraywater
- LP Feedwater Recirculation
- Flash Tank Drain
- Reheater Spray Control

Nuclear Power

- Isolation Valves
- Level Control Valves
- Feedwater Valves
- LP Drain Pump Recirc
- Blowdown Cooling Water
- Steam Transformer Blowdown
- Drain Cooler to Condenser

Oil & Gas

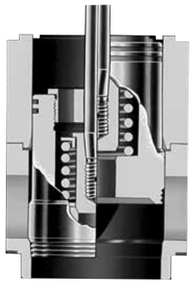
- Ethylene Control
- Propane Pressure Reducing
- Nitrogen to Mill Shut-Off
- Gas to Burner
- Oil Quick Shutoff
- Heavy Oil Control

TRIM TYPES

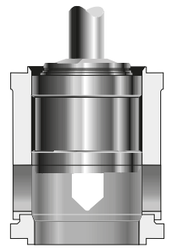
A broad variety of trims are available for the GS-General Service control valves. They are designed to match virtually any general service operational requirement. All GS trims feature a quick-change design to reduce downtime for inspection, maintenance or change out, and most are cage guided, further ensuring smooth, accurate operation. The entire trim line is interchangeable between like sizes, and many reduced trims are also available as standard offerings.

The trims shown in this bulletin are a partial representation of the standard trim selection. Additional standard, special and custom trims are available as required.

Standard stocked trim materials are 300 series and 400 series stainless steel. Other materials are available as required.

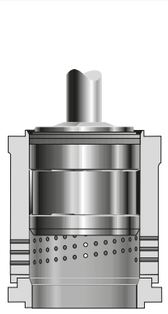
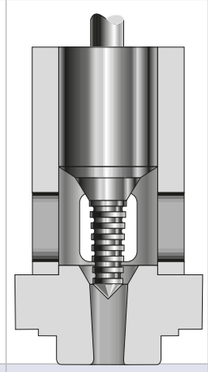
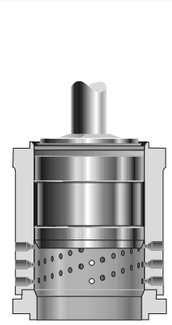
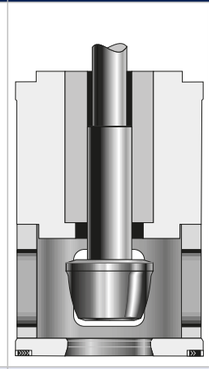
TRIM TYPES	RAVEN™ TRIM	HUSH™ TRIM	SOFT SEATED HUSH™ TRIM	TANDEM TRIM
				
DESCRIPTION/ APPLICATION	Raven is Copes-Vulcan's top-of-the-line high performance specialty trim that offers a proven solution for those severe service applications where a true velocity control trim is the best or possibly the only answer. By limiting the fluid velocities inside the valve, Raven's stacked disc design precludes problems typically associated with high velocity such as erosion, noise, vibration and poor control. Every Raven trim is custom designed to meet the needs of the toughest liquid, steam and gas services in the power and process industries.	HUSH Trim (multiple stage) is a high performance specialty trim that is cage guided and provides excellent control for both compressible and noncompressible fluid applications. By directing the flow through a series of staged pressure drops, this unique trim eliminates cavitation in liquid flow and provides multiple pressure breakdown for noise attenuation in critical pressure drop compressible fluid application. It is designed for all valve sizes.	Soft seated Hush Trim (double plug) is a high performance specialty trim that is cage guided and designed to provide and maintain extremely tight shutoff for high pressure differential liquid applications. Typically applied to operating conditions that exhibit pressure drops in excess of 1800 psig (12400 kPag) that are to remain closed more than 25% of the time. It is the ideal trim for applications such as boiler feed pump recirculation, spray block valves and spray control valves.	Tandem Trim is a high performance specialty trim that is a cage guided, uniquely balanced port throttling trim designed to solve difficult high temperature, high pressure differential applications that would require oversized, expensive actuators if more standard trims were utilized. Due to the relatively small pilot plug designed into the tandem trim, tight shutoff of up to Class V can easily be achieved with a moderately sized, economically priced actuator. It is available for valves 4" (100mm) and larger.
STANDARD FCI 70-2/ANSI RATED SEAT LEAKAGE	Class IV standard Class V optional *Class VI optional	Class IV standard Class V optional *Class VI optional	Class VI standard	Class IV standard Class V optional
STANDARD TRIIM CHARACTERISTIC	Linear standard, Specials optional	Linear standard, Specials optional	Linear standard, Specials optional	Special
TYPICAL FLOW DIRECTION	Under the seat Over the seat	Under the seat	Over the seat	Over the seat Under the seat
MAXIMUM RANGEABILITY	200:1 Or greater as required	35-50:1	Under the seat	25-50:1

* Class VI requires use of soft seat.

GAD TRIM	UNBALANCED SINGLE SEAT PLUG THROTTLING	UNBALANCED SINGLE SEAT PORT THROTTLING	BALANCED SINGLE SEAT PORT THROTTLING	BALANCED SINGLE SEAT PORT THROTTLING (HI-TEMP)
				
GAD Trim is a high performance specialty trim that is cage guided and engineered to meet the rigorous requirements of feedwater control and feedwater startup control. Designed to give optimum flexibility in automated control valves, this trim is available in double seat, balanced single seat, tandem plug and one-stage Hush versions. GAD Trim is equally suitable for use with steam and many other fluids. It has been successfully used on high pressure water applications involving pressure of 5075 psi (34970 kPa) and pressure differential of up to 3625 psi (24980 kPa). It is available for valves 2" (50mm) and larger.	This trim style is a general purpose cage guided trim for on/off or modulating control. It is designed for low to moderate pressure drop applications. The solid plug has a contour on its lower end that provides varying flow area with lift, thus regulating the flow. It can be used with a wide variety of non-abrasive/ non-adhesive compressible and noncompressible fluids. Standard trim for valve sizes 1.5" (40mm) and smaller.	This trim style is a general service cage guided trim for on/ off or modulating control where moderate flow rates exist along with low differential pressures. The unbalanced single seat plug modulates flow by uncovering ports in the cage. The cage porting produces the pressure drop or flow control. This trim can be used in most non-abrasive/non-adhesive compressible and noncompressible fluids.	This trim style is a general purpose cage guided trim for on/off or modulating control suitable for use in most non-abrasive/non-adhesive compressible and noncompressible fluid services. The balanced plug design reduces actuator force requirements thus permitting the use of smaller, less expensive actuators while maintaining tight shutoff capability. It is designed for valves 2" (50mm) and larger and is a standard offering when the service temperature does not exceed the 400°–500°F (204°– 260°C) range, relative to pressure.	This general purpose cage guided trim is virtually identical in all respects to the balanced single seat port throttling trim except that piston rings are used in lieu of the elastomeric seal on the trim's plug. While the piston rings do limit the leakage rate to ANSI Class III, this trim is a viable option when a balanced plug is desirable and when temperatures of the fluid exceed 500°F (260°C). It is for valve sizes 2" (50mm) and larger.
Class III–IV Depending upon design selected	Class IV standard Class V optional	Class IV standard Class V optional	Class IV standard Class V optional *Class VI optional	CClass IV standard
Modified parabolic, linear, equal percentage. All available as standard	Modified parabolic, linear, equal percent-age.	Modified parabolic, linear, equal percentage	Modified parabolic, linear, equal percentage	Modified parabolic, linear, equal percentage
Over the seat	Under the seat	Under the seat	Over the seat	Over the seat
50:1	50:1	35-50:1	35-50:1	35-50:1

* Class VI requires use of soft seat.

TRIM TYPES (CONT.)

TRIM TYPES	ONE STAGE HUSH	CASCADE	CAV B9*	TOP GUIDED
				
DESCRIPTION/ APPLICATION	One Stage Hush trim is a specialty trim designed to reduce noise associated with compressible fluids as well as to reduce the undesirable effects of flashing and cavitation that would occur with most single pressure drop trims. The Hush cage consists of a single cylinder with a large number of radially drilled orifices. The fluid exits the orifices as low energy jets resulting in significant reductions in noise or erosion. Although numerous standard designs are available, One Stage Hush is often custom engineered to provide various flow characteristics or optimal performance under specific operating conditions.	This trim style is a cage guided plug throttling trim designed primarily for high pressure drop water applications where cavitation, vibration and excessive wear occur with conventional trims. The tapered plug fits into a cage and seat with a matching taper, thus small changes in flow area occur with respect to plug travel resulting in extremely high rangeability. The labyrinth grooves machined into the plug's taper create a series of orifices which reduces the total pressure drop in a series of stages. It is especially suited to applications where small flow rates must be controlled accurately.	CAV B9 trim can be applied in liquid service where low level cavitation is evident. By utilizing flow over the seat, the radially step-drilled cage design reduces the effects of cavitation along with the associated noise and erosion problems by forcing the cavitation to occur in the center of the cage, away from all metal surfaces. In instances where flashing conditions are experienced, flow under the seat is employed with the multitude of small ports reduc-ing both noise and erosion. Although numerous standard designs are available, the trim can be custom designed to provide various flow characteristics or optimal performance under specific flow conditions. It is available for valves 2" (50mm) and larger.	This non-cage guided trim is designed for use with a wide variety of process applications involving corrosive, erosive and viscous line fluids and many steam and water applications. It is ideal for control applications where a maximum of free flow area is desired. The trim is unbalanced, single seat, plug throttling with the plug guided by a large diameter metal or teflon insert along the lower stem area. This guiding method ensures quiet, stable, vibration free operation with pressure drops limited to 600 psi (4130 kPa) under operating conditions. Pressure drop should also be limited to avoid cavitation or flashing. It is for valve sizes 4" (100mm) and smaller.
STANDARD FCI 70-2/ANSI RATED SEAT LEAKAGE	Class IV standard Class V optional *Class VI optional	Class IV standard Class V optional	Class IV standard Class V optional *Class VI optional	Class IV standard Class V optional *Class VI optional
STANDARD TRIM CHARACTERISTIC	Linear standard Specials optional	Special	Linear standard Specials optional	Equal percentage, linear
TYPICAL FLOW DIRECTION	Under the seat Over the seat	Under the seat	Under the seat (for flashing) Over the seat (for cavitation)	Under the seat
MAXIMUM RANGEability	35-100:1	200:1	35-100:1	25:1

* Class VI requires use of soft seat.

ACTUATORS

SERIES 700 ACTUATORS

Series 700 actuators are pneumatic diaphragm operators that have spring return in both direct and reverse acting styles, offering fail open and fail closed models respectively. The pressed steel diaphragm case construction along with the nylon reinforced Buna-N rubber diaphragm permits a maximum allowable air supply pressure of 80 psig (550 kPag).

This pre-formed diaphragm provides a constant effective area throughout the full extent of travel.

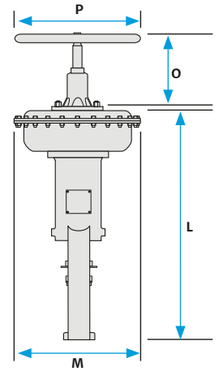
With effective diaphragm areas ranging from 60-160 in2 (385-1030 cm2). Series 700 actuators can provide the necessary stem force to meet virtually any operating requirement.

SERIES 700 ACTUATOR (SHOWN WITH OPTIONAL TOP-MOUNTED HANDWHEEL)

Reverse Acting (Spring-to-Close)

ACTUATOR SIZE	60	100	160	160L
L	**21.06** 536	**28.06** 713	**32.38** 822	**40.81** 1037
M	**11.50** 292	**15.12** 384	**18.00** 457	**18.00** 457
N	**6.50** 165	**6.50** 165	**6.25** 159	**6.38** 162
O	**6.72** 171	**11.38** 289	**11.56** 294	**17.19** 437
P	**10.00** 254	**18.00** 457	**18.00** 457	**18.00** 457

Inches
Millimeters



Direct Acting (Spring-to-Open)

ACTUATOR SIZE	60	100	160	160L
L	**20.50** 521	**28.12** 714	**32.31** 821	**39.75** 1010
M	**11.50** 292	**15.12** 384	**18.00** 457	**18.00** 457
N	**7.56** 192	**9.38** 238	**9.31** 236	**11.81** 300
O	**5.81** 148	**9.44** 240	**9.50** 241	**15.19** 386
P	**10.00** 254	**18.00** 457	**18.00** 457	**18.00** 457

Inches
Millimeters

An optional top mounted handwheel is available on both direct and reverse acting actuators, permitting manual operation of the valve should a loss in supply air pressure occur. Force is exerted directly on the actuator stem, making manual positioning smooth, easy and precise.

The top mounted handwheel will operate the valve in one direction. For direct acting units, the hand-wheel will extend the actuator stem; and for reverse acting units, the stem will be retracted. Side mounted handwheels are also available for Series 700 actuators. Contact Copes-Vulcan for details.

Copes-Vulcan offers handwheel operated actuators for applications where an automated valve is not required or where compressed air service is unavailable. Series 800 actuators are suitable for both on/off and modulating service. Since they are attached to the valve bonnet and stem using the same arrangement as the Series 700, future conversion to an automated actuator can be accomplished.

CELEROS™ FLOW TECHNOLOGY

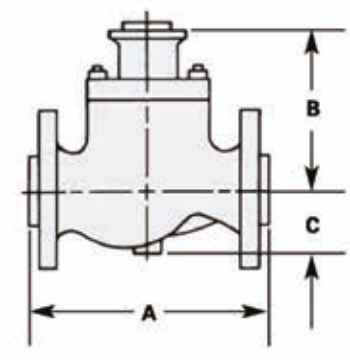
SPEED
EXCELLENCE
PARTNERSHIP

GENERAL SERVICE (GS) CONTROL VALVES

COPES VULCAN®

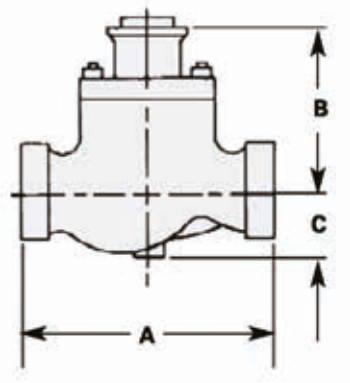
GS Valve Body/Bonnet Assembly

FLANGED ENDS



VALVE SIZE	CLASS 150			CLASS 300			CLASS 400			CLASS 600		
	A	B	C	A	B	C	A	B	C	A	B	C
.75" 20mm	7.25 184	7.00 178	1.69 43	7.62 194	7.00 178	1.69 43	8.12 206	7.00 178	1.69 43	8.12 206	7.00 178	1.69 43
1" 25mm	7.25 184	7.00 182	1.69 43	7.75 197	7.00 178	1.69 43	8.25 210	7.00 178	1.69 43	8.25 210	7.00 178	169 43
1.5" 40mm	8.75 222	7.15 182	1.94 49	9.25 235	7.15 182	1.94 49	9.88 251	7.15 182	1.94 49	9.88 251	7.15 182	1.94 49
2" 50mm	10.00 254	7.15 182	2.50 64	10.50 267	7.15 182	2.50 64	11.25 286	7.15 182	2.50 64	11.25 286	7.15 182	2.50 64
3" 75mm	11.75 298	9.47 241	3.31 84	12.50 318	9.47 241	3.31 84	13.25 337	9.47 241	3.31 84	13.25 337	9.47 241	3.31 84
4" 100mm	13.88 353	10.56 268	4.00 102	14.50 368	10.56 268	4.00 102	15.25 387	10.56 268	4.00 102	15.50 394	10.56 268	4.0 102
6" 150mm	17.75 451	11.81 300	5.50 140	18.62 473	11.81 300	5.50 140	19.50 495	11.81 300	5.59 142	20.00 508	11.81 300	5.50 140
8" 200mm	21.38 543	13.06 332	6.88 175	22.38 568	13.06 332	6.88 175	23.38 594	13.06 332	6.88 175	24.00 610	13.06 332	6.88 175

WELD ENDS AND THREADED ENDS (FOR 2" (50MM) AND SMALLER)



VALVE SIZE	CLASS 150			CLASS 300			CLASS 400			CLASS 600		
	A	B	C	A	B	C	A	B	C	A	B	C
.75" 20mm	7.75 197	7.00 178	1.69 43	7.75 197	7.00 178	1.69 43	7.75 197	7.00 178	1.69 43	7.75 197	7.00 178	1.69 43
1" 25mm	7.75 197	7.00 182	1.69 43	7.75 197	7.00 178	1.69 43	7.75 197	7.00 178	1.69 43	7.75 197	7.00 178	169 43
1.5" 40mm	9.25 235	7.15 182	1.94 49	9.25 235	7.15 182	1.94 49	9.25 235	7.15 182	1.94 49	9.25 235	7.15 182	1.94 49
2" 50mm	10.50 267	7.15 182	2.50 64	10.50 267	7.15 182	2.50 64	10.50 267	7.15 182	2.50 64	10.50 267	7.15 182	2.50 64
3" 75mm	12.50 318	9.47 241	3.31 84	12.50 318	9.47 241	3.31 84	12.50 318	9.47 241	3.31 84	12.50 318	9.47 241	3.31 84
4" 100mm	14.50 368	10.56 268	4.00 102	14.50 368	10.56 268	4.00 102	14.50 368	10.56 268	4.00 102	14.50 368	10.56 268	4.0 102
6" 150mm	20.00 508	11.81 300	5.50 140	20.00 508	11.81 300	5.50 140	20.00 508	11.81 300	5.59 142	20.00 508	11.81 300	5.50 140
8" 200mm	24.00 610	13.06 332	6.88 175	24.00 610	13.06 332	6.88 175	24.00 610	13.06 332	6.88 175	24.00 610	13.06 332	6.88 175

Inches
Millimeters

P: +44 1606 552041
F: +44 1606 558275
E: copeinquires@celerosft.com

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www.celerosft.com