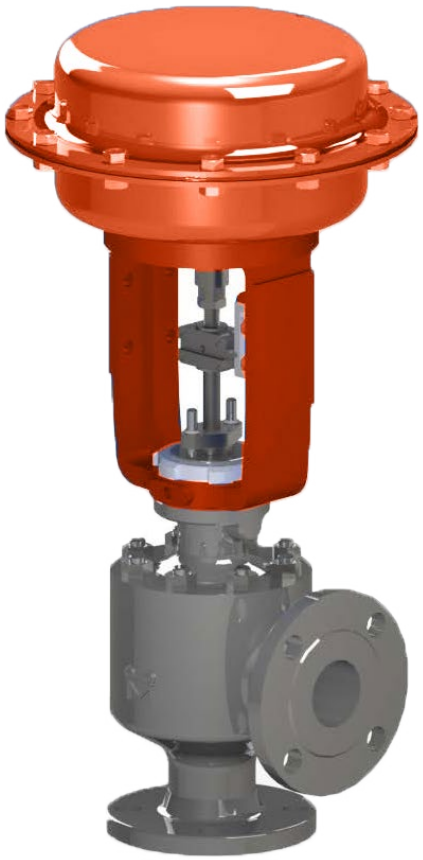
CELEROS™ FLOW TECHNOLOGY

CVK ANGLE GLOBE VALVE

COPES VULCAN®

RELIABLE, EFFICIENT FLOW CONTROL FOR GENERAL SERVICE APPLICATIONS



CELEROS FLOW TECHNOLOGY – AN INTRODUCTION

Celeros Flow Technology (Celeros FT) is a full lifecycle partner for sustainable flow technology solutions, from initial design and installation of equipment to after sales support. Celeros FT's products and technologies support many different industries including power generation, oil & gas, defense, water, chemical processing and energy transition. The company's innovative product portfolio, containing many energy efficient products, includes valves, pumps and closures.

CVK GLOBE CONTROL VALVE

PRODUCT INFORMATION

The Copes-Vulcan CVK Angle Globe Valve provides reliable and efficient flow control for high-pressure steam, condensate, and other demanding power service applications. Its streamlined flow path ensures a high capacity-to-body size ratio, while wear-resistant trim materials and top-entry maintenance access enhance durability and ease of service.

DESIGN HIGHLIGHTS:

- Modular design – A flexible valve platform that allows multiple body, bonnet, and trim combinations to match service requirements.
- Tailored performance – Available flow characteristics include equal percentage, linear, quick-opening, and modified parabolic profiles for precise control.
- Material flexibility – A broad selection of body and trim materials provides compatibility with high-temperature and high-pressure fluids.
- Noise and vibration control – Optional low-noise or anti-cavitation trims are available for severe service conditions.
- Thermal reliability – Proven bonnet and packing designs ensure consistent sealing across a wide temperature range.
- Ease of maintenance – All internal components are accessible from the top, minimizing downtime and simplifying overhaul.

PERFORMANCE BENEFITS:

- High efficiency: Optimized flow geometry minimizes energy losses and delivers exceptional capacity for its size.
- Compact strength: A high capacity-to-weight ratio simplifies installation and reduces footprint.
- Precision control: Excellent rangeability and actuator responsiveness support stable operation across wide load conditions.
- Operational reliability: Rugged construction ensures consistent performance under high temperature and pressure cycling.

SPECIFICATIONS:

Valve Type	Pneumatic Globe Control Valve										
Valve Model	CVK Angle Globe Valve										
Trim Type	Balanced, Unbalanced, Anti-Cavitation, Low-Noise, Optional Special Trim										
Valve Size (inch)	1/2	3/4	1	1.1/2	2	2.1/2	3	4	5	6	8
(mm)	15	20	25	40	50	65	80	100	125	150	200
Pressure Rating	ANSI 150 ~ 600 (PN ratings available)										
End Connection	RF, FF, SW, BW, RTJ										
Body Materials	WCB, WCC, WC6, WC9, CF8										
Bonnet Type	Standard (-17°C to 230°C), Extended (-45°C to -17°C, over 230°C)										
Packing	Graphite, Carbon Fiber, PTFE										
Gasket	Spiral Wound Metal Gasket										
Guiding	Top / Cage										
Seat Type	Metal / Soft										
Plug Characteristic	Equal Percentage / Linear / Modified-Parabolic / Quick Opening										
Trim Materials	316 SS, 410 Alloy Steel, Stellite Overlays										

Table 1. Angle Valve Specifications

FEATURES

Design Integrity:

- Heavy-duty top-guided construction eliminates lower guide obstructions and prevents debris accumulation.
- Oversized stem design enhances strength and alignment stability.
- Bonnet and seat ring gaskets are fully confined to ensure reliable sealing.

Quality Assurance:

- Each valve is factory tested to verify performance against customer specifications.
- Manufactured under a certified ISO 9001 quality management system.
- Optional compliance with NACE MR0175 for sour service applications.

Scope of Design:

End connection sizes: 1/2" to 8" (15mm to 200mm)

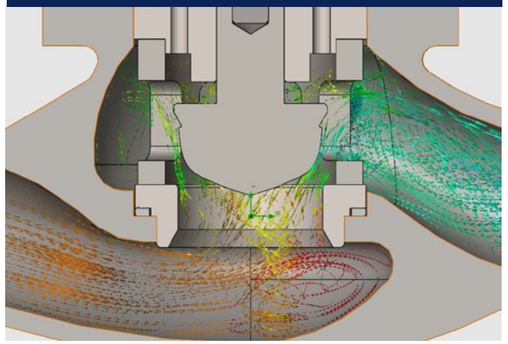
End Connection Styles:

- ANSI, RF, FF, RTJ (and other grooved designs)
- Welded profiles including butt weld, socket, etc.

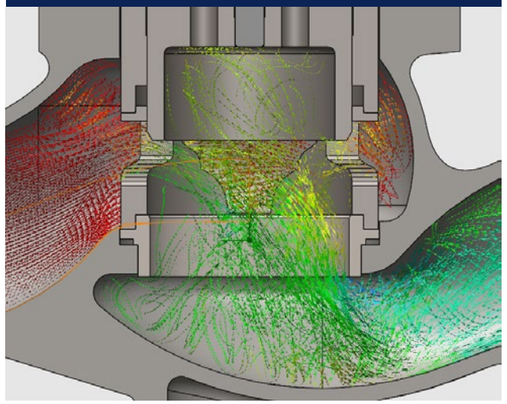
Other requirements available on request

TRIM CONFIGURATIONS

Unbalanced Contoured Single Port (CVK-U)



Balanced Cage Single Port (CVK-B)



MODULAR DESIGN

The CVK angle globe valve features a modular design that means the different valve components, materials, and trims can be combined to meet specific operating conditions. This approach enables customers to select the valve body that matches the necessary flow conditions and operating data, combined with the correct end connection size/rating. This not only allows the selection of full-size ends, but also offers the ability to select oversized end connections to suit a particular requirement.

TRIM OPTIONS

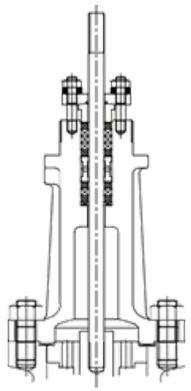
Multiple trim configurations are available, including balanced and unbalanced designs, full or reduced port options, and special noise or cavitation control trims. Body and bonnet materials can be specified to suit operating pressure, temperature, and media conditions. Available in ANSI Class 150 to 600 ratings. Other design standards and configurations can be supplied on request.

Balanced Trim

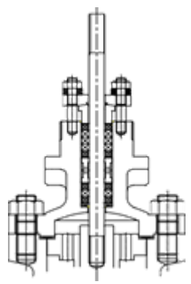
The balanced trim configuration is designed for applications involving high differential pressure or requiring precise flow control. It features a pressure-balanced cage assembly to minimize actuator thrust requirements and maintain stable operation. Standard sizes are 4 in (100 mm) and above, with smaller diameters available on request. For applications requiring ANSI Class VI "bubble-tight" shutoff and fire-safe performance, a soft-seat option is available. This design incorporates an elastomer element captured between two metallic components, providing secure sealing between the cage and seat.

Unbalanced Trim

The unbalanced trim configuration is suited to applications with moderate pressure drops and standard service conditions. It features a single contoured plug design with a heavy-duty top guide to ensure stable and accurate operation. Port diameters are available up to 4 in (100 mm). While this configuration may require a larger actuator, it provides a cost-effective and robust solution for general flow control applications.



Extended Bonnet



Standard Bonnet

Bonnet Type	Standard Bonnet	Extended Bonnet
Allowable Temperature	-25°C / -13°F ~ 230°C / 446°F	Over 230°C / 446 °F -25°C / -13 °F ~ -45°C / -49 °F

Nuts and Bolts

Low temperatures can cause weakness and brittleness in steel bolts. Our bolts are heat-treated to improve strength characteristics, in accordance with ASTM standards.

Packing options:

Packing materials such as carbon fiber and PTFE are used to insulate large columns to prevent them from shrinking due to outgassing.

DESIGN OPTIONS

Valve Body Ratings:

ANSI 150 to ANSI 600. Other requirements are available on request.

Design standards:

ANSI B16.34 and ASME section VIII (for body/bonnet bolting).

Trim Design Options:

Full and reduced trims, both unbalanced and balanced, are available as standard.

Inherent Characteristics:

Equal percentage, linear, modified parabolic or quick open.

Material Combinations:

A wide range of body/bonnet and trim materials are available.

Plug Design Options:

Unbalanced with metal/metal or resilient seating plus balanced with metal/metal seating and metallic or resilient piston rings.

Bonnet Options:

Standard and extended bonnet design options available.

Actuator:

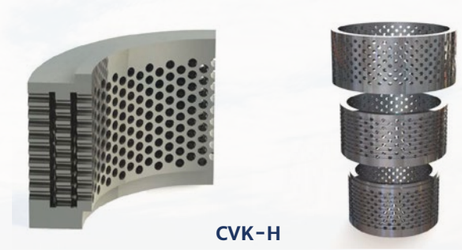
Various types of actuators are available including: pneumatic diaphragm, electric, electro-hydraulic and hydraulic operated.

Sizing/Noise Prediction:

Sizing and noise predictions are based on industry standards.

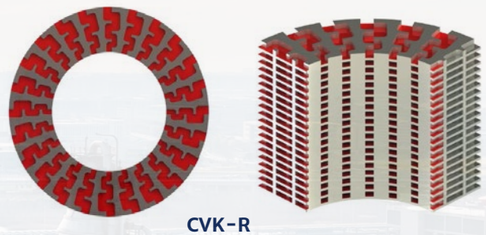
ADDITIONAL TRIM TYPES

ANTI-CAVITATION



CVK-H

NOISE ATTENUATION



CVK-R

SMALL FLOW CAVITATION

CVK-C

PARTICLES

CVK-S

Design CV Values

Table 2. Single Contoured plug Cv value up to 1" valve size

Valve Size		Trim Size	Lift		EQ%	Linear
in	mm		in	mm		
1/2"	15	3	1/2"	15	0.09	0.09
		4			0.15	0.15
		6 (1/8)			0.4	0.4
		7 (3/16)			0.8	0.8
		8 (1/4)			1.5	1.5
		10 (3/8)			3.0	3.0
		15 (1/2)			5.2	5.2
3/4"	20	3	1/2"	15	0.09	0.09
		4			0.15	0.15
		6 (1/8)			0.4	0.4
		7 (3/16)			0.8	0.8
		8 (1/4)			1.5	1.5
		10 (3/8)			3.0	3.0
		15 (1/2)			5.2	5.2
		20 (3/4)			9.0	9.0
1"	25	4	1/2"	15	0.15	0.15
		6 (1/8)			0.4	0.4
		7 (3/16)			0.8	0.8
		8 (1/4)			1.5	1.5
		10 (3/8)			3.0	3.0
		15 (1/2)			5.2	5.2
		20 (3/4)			9.0	9.0
		25 (1)			14	14

Note : The above Design Cv values apply to valves with body rating ANSI 150 to ANSI 600.

DESIGN CV TABLES

Table 3. Contoured Cv values (Balanced)

Connection Size (inch)	Full Ported				
	Trim Size	Lift		EQ%	Linear
		in	mm		
1"	1"	1/2"	15	18.5	19
1 1/2"	1 1/2"	3/4"	20	34	34.2
2"	2"	3/4"	25	56.2	60.5
2 1/2"	2 1/2"	1"	25	83	84
3"	3"	1 1/2"	38	125	135
4"	4"	1 1/2"	38	210	211
5"	5"	2"	50	276	294
6"	6"	2"	50	424	438
8"	8"	100		675	690

Table 4. Cage Cv values (Unbalanced)

Connection Size (inch)	Full Ported			
	Trim Size	Lift	EQ%	Linear
1"	1"	15	14	14
1 1/2"	1 1/2"	20	32	36
2"	2"	25	52	58
2 1/2"	2 1/2"	25	78	88
3"	3"	38	116	130
4"	4"	38	195	220

VELOCITY LIMITATIONS

Fluid velocity is a key consideration during valve selection. High velocity could lead to operational problems, including erosion, excessive vibration, and instability. The following tables indicate the maximum recommended velocity values for liquid and gas/steam services.

Table 5. Recommended Maximum Velocities for Liquid Service

Valve Size		Maximum Velocity					
		Carbon Steel		Alloy Steel		Ni Alloys	
in	mm	ft/s	m/s	ft/s	m/s	ft/s	m/s
0.5 - 2	15 – 50	41	12.5	41	14	25	7.6
3 - 6	80 – 150	34	10.4	34	10.4	20	6.2
8	200	29	8.9	29	8.9	17	5.2

Table 6. Recommended Maximum Velocities for Gas / Steam Services

Valve Size		Maximum inlet velocity		Maximum outlet velocity		Max. outlet mach number for required noise level		
in	mm	ft/s	m/s	ft/s	m/s	>95 dBA	<95 dBA	<85 dBA
0.5 - 2	15 – 50	340	104	830	253	0.65	0.5	0.3
3 - 6	80 – 150	294	90					
8	200	265	81					

INHERENT RANGEABILITY

The inherent rangeability of a control valve is the ratio between maximum and minimum flow within the working characteristic at constant pressure drop.

Table 7. Rangeability Values

Trim Size (in)	Rangeability	
1/2"	50:1	* Over
3/4"- 8"	50:1	* Over

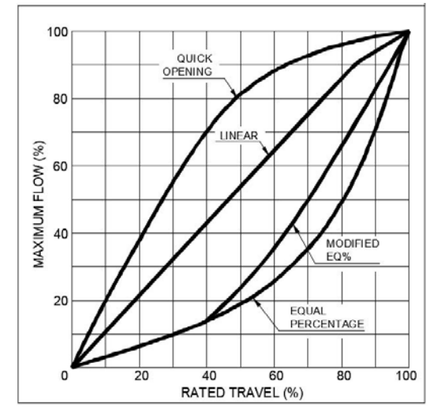
* Special option

CHARACTERISTIC CURVES

The inherent flow characteristic of a control valve is the relationship between the flow and the lift of the plug at constant pressure drop.

Definitions:

- **Linear –** Flow is directly proportional to valve lift.
- **Equal % –** Flow changes by a constant percentage of its instantaneous value for each unit of valve lift.
- **Quick Opening –** Flow increases rapidly with initial travel reaching near its maximum at a low lift.
- **Modified-Parabolic –** Provides fine throttling action at low valve lift and approximately a linear characteristic for upper portions of travel.



MAXIMUM LEAKAGE RATES

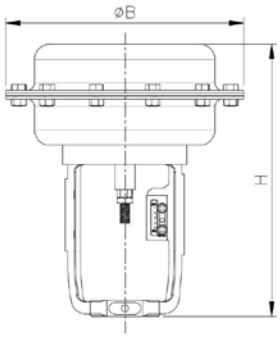
Leakage rates are normally measured in accordance with the ANSI / FCI 70-2 specification using the class designation. The following table defines the achievable leakage class for each available plug design.

Plug Design	Seating Style	Achievable Leakage Class
Unbalanced	Metal/Metal (standard)	IV
Unbalanced	Metal/Metal (special)	V
Unbalanced	Metal/PTFE (standard)	VI
Balanced	Metal/Metal (standard)	IV
Balanced	Metal/Metal (special)	V
Balanced	Metal/PTFE (standard)	VI

Table 8. Leakage Rates

Actuator Size	B mm / in	H
CVK T-1	257 / 10.12	332.4 / 13.09
CVK T-2	298 / 11.73	340.5 / 13.41
CVK T-3S	348 / 13.70	473 / 18.62
CVK T-3	348 / 13.70	493 / 19.41
CVK T-4	414 / 16.30	502.5 / 19.78
CVK T-5	526 / 20.71	691 / 27.20
CVK T-5L	526 / 20.71	738 / 29.06

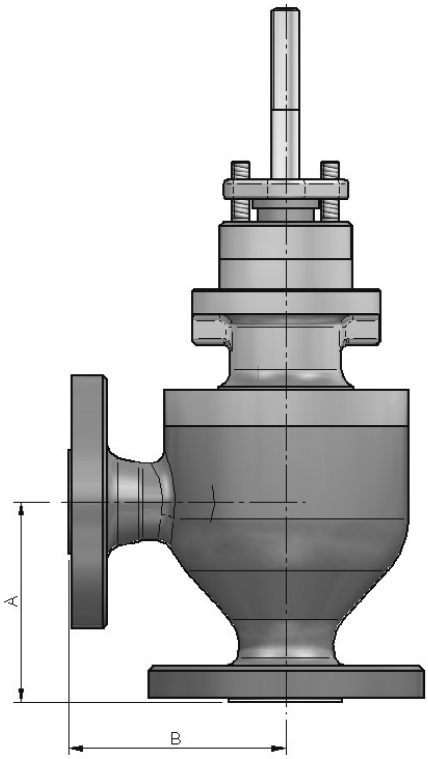
Table 9. Actuator Size



OUTLINE DIMENSIONS

Pressure Rating		A,B					
Body Size		ANSI 150RF		ANSI 300RF		ANSI 600RF	
mm	in	mm	in	mm	in	mm	in
20	¾"	92	3.62	97	3.82	103	4.06
25	1"	92	3.62	98.5	3.88	105	4.13
40	1 1/2"	111	4.37	117.5	4.63	125.5	4.94
50	2"	127	5.00	133.5	5.26	143	5.63
65	2 1/2"	138	5.43	146	5.75	155.5	6.12
80	3"	149	5.87	159	6.26	168.5	6.63
100	4"	176	6.93	184	7.24	197	7.76
150	6"	225.5	8.88	236.5	9.31	254	10.00
200	8"	271.5	10.69	284	11.18	305	12.01
250	10"	336.5	13.25	354	13.94	376	14.80
300	11"	368.5	14.51	387.5	15.26	409.5	16.12
350	13 ¾"	444.5	17.50	463.5	18.25	486	19.13

Table 10. Outline Dimensions



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