

V1C Series

Cage-Guided Control Valve

The V1C cage-guided balanced trim control valve offers high pressures and tight shutoff with the use of standard spring/diaphragm actuators. The balanced cage trim design enables this valve to handle differential pressures up to 1480 psi (102 bar) up through the 6" (DN150) size. The V1C contains a cage that is characterized in order to allow equal percentage and linear flow characteristics. Cavitation control trim, in-line maintainability, and fine proportioning control with high rangeability make the V1C both a precise and convenient valve to use for severe service control applications. The V1C Series is for use on a wide range of applications including throttling and on/off control of non-gritty liquids, gases and steam where the advantage of balanced trim, cage-guiding and wide rangeability are desired.



FEATURES

- **Balanced Trim Design**
 - Differential pressures up to 1480 psig/102 bar
 - Fine proportioning control and high rangeability
- **Cavitation Control Trim**
 - Less damage to the valve and attached equipment in cavitating liquid service
 - Less noise in gas service
- **In-line Maintainability**
 - Easy removal of yoke and actuator from valve body
 - Trim changes without removing body from the line

SPECIFICATIONS

Sizes: 1-1/2"/DN40, 2"/DN50, 3"/DN80, 4"/DN100, 6"/DN150

End Connections:

- Threaded — FNPT, BSPT, BSPP
- ANSI Flanges — 150#, 300#, 600#
- DIN Flanges — PN10/16, 25/40, 100

Body Rating: ANSI Class 150, 300, 600

Bonnet Style:

- Plain
- Extended
- Bellows seal (1-1/2" - 4")

Trim Style: Standard ported — cage-guided, balanced plug with metal or soft seat; optional — cavitation control trim. (See *Trim Selection Details*)

Flow Direction:

- Ported Cage: flow into cage, down through seat ring
- *Cavitation Control Trim, Liquid Service:* flow into cage and down through seat ring
- *Cavitation Control Trim, Gas/Steam Service:* flow up through seat ring and out of cage

Flow Characteristic: linear or equal percentage

Shutoff: Standard — ANSI Class IV; optional — ANSI Class III or VI. See Shutoff Classes Chart.

Actuators: ductile iron casings with Buna-N diaphragm; 1-1/2"/DN40 valves — 56in²; 2"/DN50 valves



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SPECIFICATIONS (CONT'D)

— 84in²; 3"/DN80, 4"/DN100 & 6"/DN150 valves — 140in²

Body Materials:

- Carbon Steel (ASTM A216, WCB)
- Stainless Steel (ASTM A351, CF8M)
- Please consult factory for alloy materials available

Trim Material (See Trim Selection Chart):

- Carbon Steel Valves: standard — 416SS plug with 416SS seat ring and 17-4 PH cage, 316/316L stem; optional — TFE insert ring for tight shutoff requirements
- Stainless Steel Valves: standard — 316/316L SS plug, cage, seat ring and stem; optional — hard faced seats for aggressive services or TFE insert ring for tight shutoff

Gaskets:

- For services from -340°F/-206°C to +450°F/+232°C: flat compressed man-made fiber and spiral wound 304SS/TFE
- For services from +450°F/+232°C to +1000°F/+538°C: flat laminated graphite and spiral wound 304SS/Grafoil

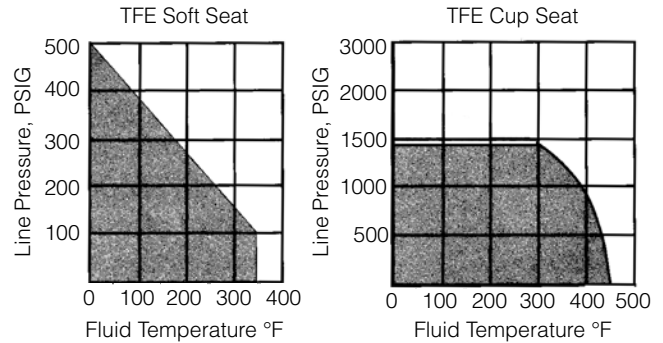
Packing Material:

- TFE V-ring: from -340°F/206°C to +450°F/+232°C
- Laminated graphite ring: from +450°F/+232°C to +1000°F/+538°C

Shutoff Classes

Seat Ring	Plug Seal	ANSI Shutoff	Service
Metal	Spring loaded TFE cup seal	Class IV	Standard plug seal for services below 450°F/232°C
Metal	Metal piston ring	Class III	Standard plug seal for services above 450°F/232°C

Soft Seat Ratings Chart



Cv (Kv) Capacity Chart

Size	Flow Characteristic	Cv (Kv)	Max ΔP* psi/bar
1-1/2" (DN40)	Linear	34 (29)	1480/102
	Equal Percentage	34 (29)	
	Cav Control = %	20 (17), 10 (9), 5 (4,3)	
2" (DN50)	Linear	60 (52)	1480/102
	Equal Percentage	60 (52)	
	Cav Control = %	35 (30), 17 (15)	
3" (DN80)	Linear	120 (103)	1480/102
	Equal Percentage	120 (103)	
	Cav Control = %	60 (52), 30 (26)	
4" (DN100)	Linear	200 (172)	1480/102
	Equal Percentage	200 (172)	
	Cav Control = %	120 (103), 60 (52)	
6" (DN150)	Linear	400 (344)	1480/102
	Equal Percentage	400 (344)	
	Cav Control = %	240 (224), 120 (103)	
	Cav Control Linear	330 (284)	

* Positioner with a 45 psig (3,1 bar) air supply is required.

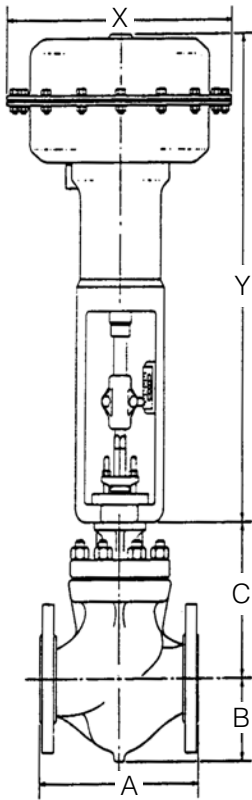
TRAVEL VS. Cv DATA

Valve Size	Cv (Kv)	Flow Characteristic	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1-1/2" (DN40)	34 (29)	Linear	3.4	6.8	10.2	13.6	17.0	20.4	23.8	27.2	30.6	34.0
2" (DN50)	60 (52)	Linear	6.0	12.0	18.0	24.0	30.0	36.0	42.0	48.0	54.0	60.0
3" (DN80)	120 (103)	Linear	12.0	24.0	36.0	48.0	60.0	72.0	84.0	96.0	108.0	120.0
4" (DN100)	200 (172)	Linear	20.0	40.0	60.0	80.0	100.0	120.0	140.0	160.0	180.0	200.0
6" (DN150)	400 (344)	Linear	40.0	80.0	120.0	160.0	200.0	240.0	280.0	320.0	360.0	400.0

Valve Size	Cv (Kv)	Flow Characteristic	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1-1/2" (DN40)	34 (29)	Equal Percentage	0.5	1.1	2.0	3.3	5.1	7.6	11.1	16.1	23.1	34.0
2" (DN50)	60 (52)	Equal Percentage	0.8	1.9	3.5	5.8	9.0	13.4	19.6	28.4	40.7	60.0
3" (DN80)	120 (103)	Equal Percentage	1.6	3.9	7.1	11.6	17.9	26.8	39.3	56.8	81.4	120.0
4" (DN100)	200 (172)	Equal Percentage	2.7	6.5	11.8	19.3	29.8	44.6	65.4	94.6	135.7	200.0
6" (DN150)	400 (344)	Equal Percentage	5.4	13.0	23.7	38.6	59.7	89.3	130.9	189.3	271.3	400.0

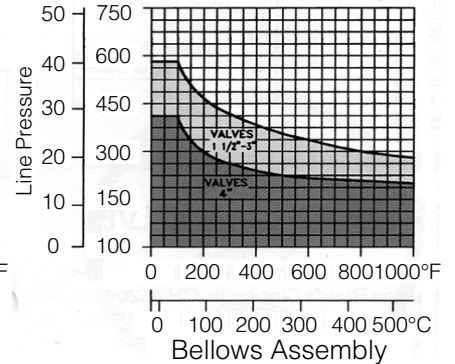
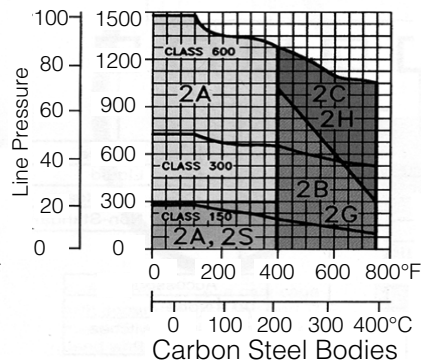
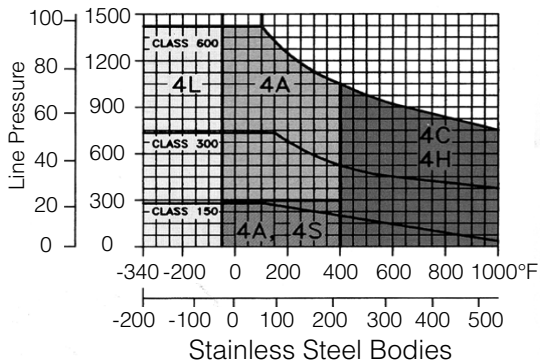
VIC CAGE-GUIDED CONTROL VALVE

DIMENSIONS



	Ends	1-1/2" (DN40)	2" (DN50)	3" (DN80)	4" (DN100)	6" (DN150)
A	NPT/SW	10-1/4" (260mm)	11-3/8" (289mm)	—	—	—
	150FE	8-3/4" (222mm)	10" (254mm)	11-3/4" (298mm)	13-7/8" (352mm)	17-3/4" (451mm)
	300FE	9-1/4" (235mm)	10-1/2" (267mm)	12-1/2" (318mm)	14-1/2" (368mm)	18-5/8" (473mm)
	600FE	9-7/8" (251mm)	11-1/4" (286mm)	13-1/4" (337mm)	15-1/2" (394mm)	20" (508mm)
	PN16	8-3/4" (222mm)	10" (254mm)	11-3/4" (298mm)	13-7/8" (352mm)	17-3/4" (451mm)
	PN40	9-1/4" (235mm)	10-1/2" (267mm)	12-1/2" (318mm)	14-1/2" (368mm)	18-5/8" (473mm)
	PN100	—	—	—	15-1/2" (394mm)	20" (508mm)
B	NPT, SW	3-5/16" (84mm)	3-3/8" (86mm)	—	—	—
	150FE	3-5/16" (84mm)	3-3/4" (95mm)	4-1/2" (114mm)	5-3/8" (137mm)	6-15/16" (176mm)
	300FE	3-5/16" (84mm)	3-13/16" (97mm)	4-1/2" (114mm)	5-3/8" (137mm)	6-15/16" (176mm)
	600FE	3-5/16" (84mm)	3-13/16" (97mm)	4-1/2" (114mm)	5-7/16" (138mm)	7-1/16" (179mm)
	PN16	2-47/50" (75mm)	3-19/50" (86mm)	4-1/2" (114mm)	5-7/20" (136mm)	6-47/50" (176mm)
	PN40	2-47/50" (75mm)	3-19/50" (86mm)	4-1/2" (114mm)	5-7/20" (136mm)	6-47/50" (176mm)
	PN100	—	—	—	5-7/20" (136mm)	6-47/50" (176mm)
C	Plain	6-5/16" (160mm)	7-1/8" (181mm)	7-5/8" (194mm)	8-13/16" (224mm)	10-3/16" (259mm)
	Extended	14-15/16" (379mm)	15-3/4" (400mm)	16-1/4" (413mm)	17-7/16" (443mm)	18-13/16" (478mm)
	Bellows	13-1/8" (333mm)	16-3/4" (425mm)	17-1/4" (438mm)	23" (584mm)	—
X	—	12" (305mm)	13-13/16" (335mm)	17" (432mm)	17" (432mm)	17" (432mm)
Y	—	21-5/8" (549mm)	22-7/8" (581mm)	27-1/4" (692mm)	27-1/4" (692mm)	32-1/2" (826mm)
Approx. Weight	—	107# (49kg)	142# (64kg)	218# (99kg)	297# (135kg)	473# (215kg)
Travel	—	1" (25mm)	1-1/4" (32mm)	1-1/2" (38mm)	2" (51mm)	2-1/4" (57mm)

PRESSURE & TEMPERATURE CHARTS



Use these charts to determine the material combination that meets your pressure and temperature requirements. The curves correspond to the appropriate ANSI B 16.34 pressure class and indicate the maximum pressure and temperature.

Metal & TFE Insert	Spring loaded	Class VI	See ratings chart
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- The set of curves sloping downward to the right are the pressure rating curves for each ANSI B16.34 pressure class. In each case, the curve designates the maximum pressure and temperature for the class listed directly below the curve.
- The bold boundaries mark the recommended pressure and temperature limits for trim material combinations listed under "Code" in the table below. The trim recommendations are generalized and may be subject to adjustment based upon hydraulic considerations determined during the valve sizing process.

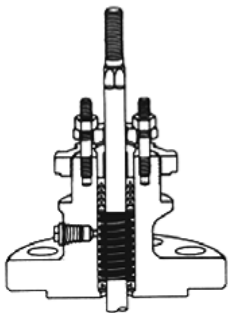
TRIM SELECTION GUIDELINES

Body	Code	Bonnet	Cage / Guide	Plug / Seat Ring	Plug Seal	Packing
CS	2A	Plain	17-4 PH SST	416 SST	Teflon	Teflon
	2G	Plain	17-4 PH SST	416 SST	420 SST	Graphite
	2B	Extension	17-4 PH SST	416 SST	420 SST	Teflon (Graphite Lantern Ring)
	2H	Plain	17-4 PH SST	416 SST	420 SST	Graphite
	2C	Extension	17-4 PH SST	416 SST	420 SST	Teflon
	2S	Bellows	17-4 PH SST	416 SST	Teflon	Teflon (316L Bellows)
SST	4A	Plain	316 SST*	316 SST	Teflon	Teflon
	4H	Plain	316 SST*	316 SST	420 SST	Graphite
	4C	Extension	316 SST*	316 SST**	420 SST	Teflon (Graphite Lantern Ring)
	4L	Extension	316 SST*	316 SST**	Teflon	Teflon
	4S	Bellows	316 SST*	316 SST	Teflon	Teflon (316L Bellows)

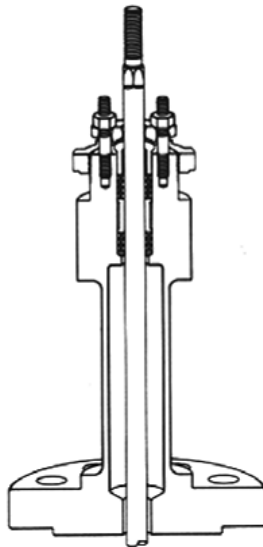
* 316SST Cage and Guide has hard chrome plating applied.

** Codes 4C and 4L have Alloy-6 hard facing.

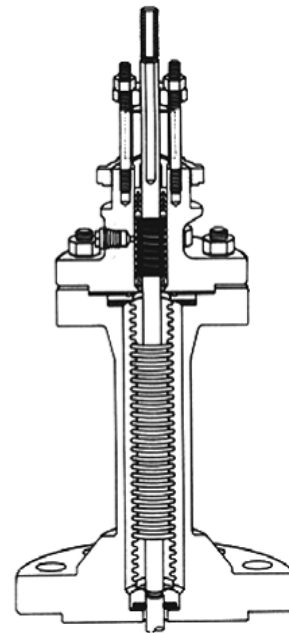
BONNET STYLES



Standard Flow Bonnet: used when the flow medium remains between -50°F and +450°F (-46°F and +232°C)



Extension Bonnet: isolates the stem packing and actuator from low (-340°F to -50°F/-207°C to -46°C) or high temperature (+450°F to +1000°F/+232°C to +538°C)

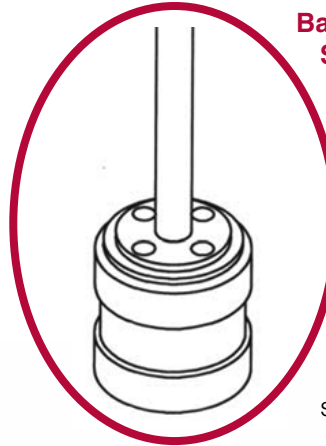


Bellows Bonnet: used when leakage containment is critical such as on toxic, flammable, explosive, or precious media

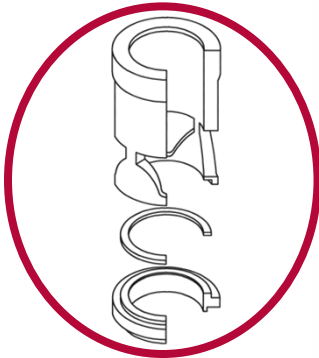
TRIM SELECTION DETAILS



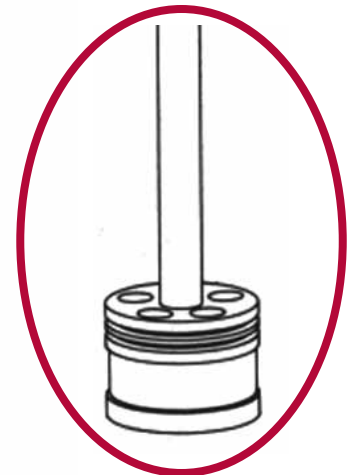
Metal Seated Cage: the standard cage construction is a cast cage with a separable seat ring. The dual function cage serves as a massive plug guide and has four contoured openings to determine flow characteristic.



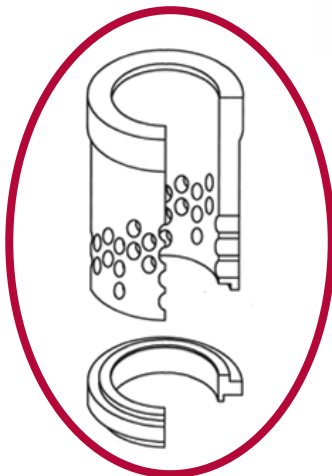
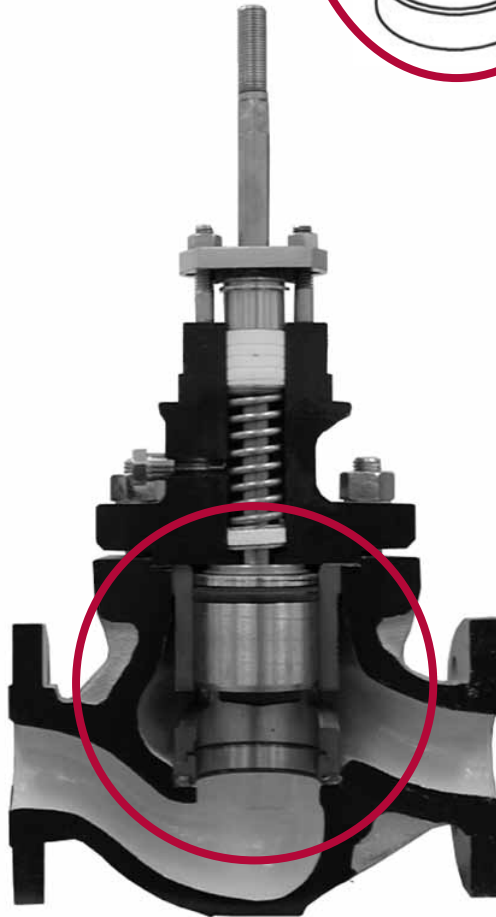
Balanced Plug with Metal Seat Rings: for applications where the temperature or pressure exceed the capabilities of the TFE Seal Cup (see TFE Cup Seal Ratings Curve), this plug is supplied with metal piston rings. These rings withstand the extreme temperatures and pressures encountered in these services.



Soft Seated Cage: a cast cage with separable seat ring and TFE insert. The soft seat design is used when ANSI Class VI bubble-tight shutoff is desired.



Balanced Plug with TFE Seal Rings: includes uni-directional spring-loaded, pressure-energized TFE cup seal. Upstream pressure enters the seal cavity deforming the seal outward to seal the gap between the plug and cage walls. Using this seal in conjunction with our TFE soft seat ring will provide ANSI Class VI bubble-tight shutoff.



Cavitation Control Cage: a series of diametrically opposing orifices divides the flow stream into multiple smaller streams with less energy. On liquid service, this trim is used as "flow into the cage" allowing the velocity streams to impinge upon each other to dissipate the energy between the cavitating liquid and the metal valve parts. For gas/steam services, the trim is used as "flow out of cage" with the velocity streams radiating out of the cage to redistribute the acoustical energy with resultant noise attenuation.

ORDERING SCHEMATIC

1		2		3		4		5	/	6	7	8	9	10	11	12	13	14
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1	Model	
	V1C	Standard

2	Size	
	150	1-1/2" (DN40)
	200	2" (DN50)
	300	3" (DN80)
	400	4" (DN100)
	600	6" (DN150)

3	Body Material	
	CS	Carbon Steel
	S6	Stainless Steel

4	Bonnet Style	
	P	Plain
	E	Extended
	B	Bellows

5	Trim Style	
	S	Standard
	C	Anti-Cavitation

6	End Connections	
	PT	NPT
	SW	Female Socket Weld
	BW	Butt Weld, Sch. 40
	I5	150# Integral Flange
	I3	300# Integral Flange
	I6	600# Integral Flange
	R6	600# Ring Type Joint
	D1	PN10 Integral Flange
	D6	PN16 Integral Flange
	D2	PN25 Integral Flange
	D4	PN40 Integral Flange
	ZZ	Non-Standard

7	Bonnet	
	SD	Standard
	ZZ	Non-Standard

8	Packing	
	TF	Teflon V-Ring
	GR	Graphite
	ZZ	Non-Standard
	EG	Enviro-Packing

9	Trim Material		
	Cage/Plug/Seat Ring, Char.		Seal
	A	Standard, Equal %	TFE Seal
	B	Standard, Linear	
	C	17-4/416/416, Equal %	
	D	17-4/416/416, Linear	
	E	17-4/Stellite/Stellite, Equal %	
	F	17-4/Stellite/Stellite, Linear	
	G	316/316/316, Equal %	Metal Seal, 150#, 300#, DIN Flanges
	H	316/316/316, Linear	
	J	Standard, Equal %	
	K	Standard, Linear	
	L	17-4/416/416, Equal %	
	M	17-4/416/416, Linear	
	N	17-4/Stellite/Stellite, Equal %	Metal Seal, 600# Flanges
	P	17-4/Stellite/Stellite, Linear	
	Q	Standard, Equal %	
	R	Standard, Linear	
	S	17-4/416/416, Equal %	
	T	17-4/416/416, Linear	
	U	17-4/Stellite/Stellite, Equal %	—
	W	17-4/Stellite/Stellite, Linear	
	Z	Non-Standard	

10	Cv (Kv)			
	B	10 (8,62)	J	60 (51,72)
	C	17 (14,66)	L	120 (103,45)
	D	20 (17,24)	M	200 (172,41)
	E	30 (25,86)	N	240 (206,90)
	F	34 (29,31)	P	330 (284,48)
	G	35 (30,17)	Q	400 (344,83)

11	Actuator / Positioner			
	RG	Reverse w/MK16IQ	1R	Reverse / None
	DG	Direct w/MK16IQ	1D	Direct / None
	RH	Reverse w/MK16IQ-B	RJ	Reverse w/MK16IQ-FF
	DH	Direct w/MK16IQ-B	DJ	Direct w/MK16IQ-FF

12	Soft Seat	
	SS	Soft Seat Insert
	00	None
	ZZ	Non-Standard

13	Accessories			
	00	None	HW	Limit Switches w/o HW
	LS	Limit Switches w/SMP	IP	I/P without SMP
	NS	Limit Switches w/o SMP	ZZ	Non-Standard
	HS	Limit Switches w/HW		

SMP = Side Mounted Positioner, I/P = Electro/Pneumatic Positioner

14	Service			
	0	Non Anti-Cav	G	Gas / Steam
	L	Liquid	Z	Non-Standard

