FLOWSERVE

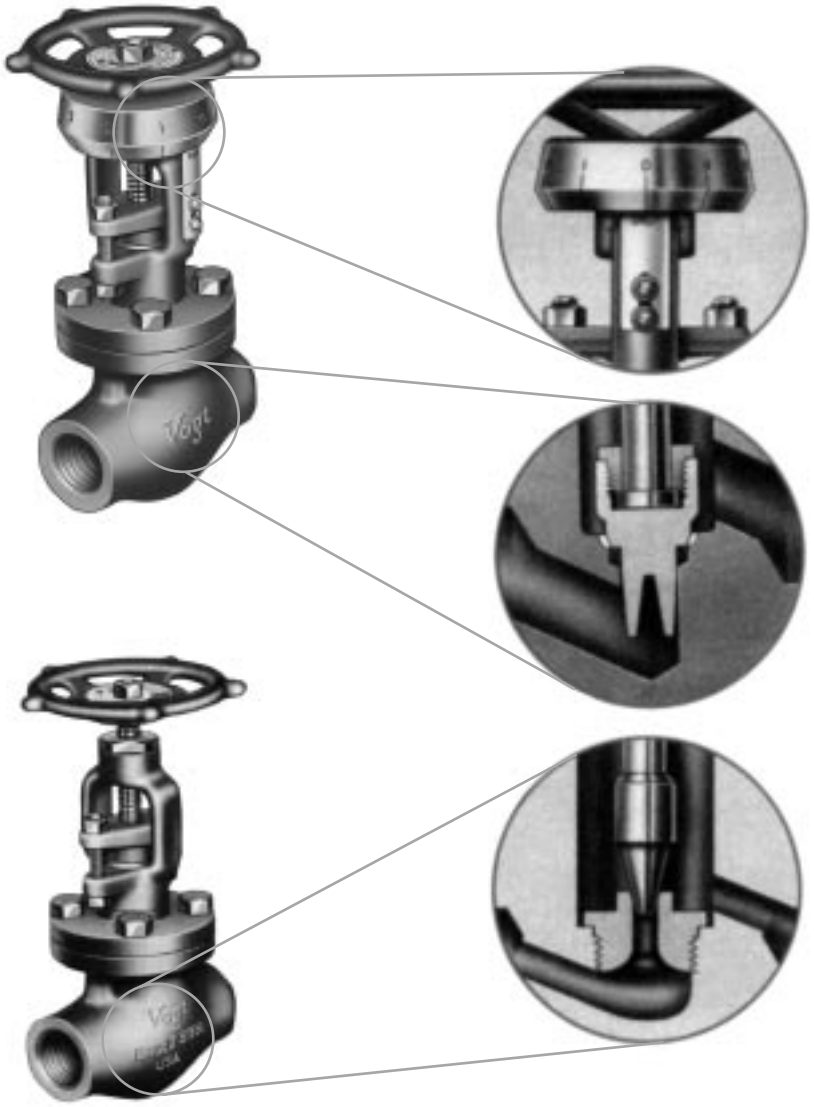
Vogt Valves

Vogt Valves

The Connection Bulletin for Forged Steel Flow Control Valves

CB 15

Forged Steel Flow Control Valves



GRADUATED DIAL AND INDICATOR

FULLY GUIDED V-PORT THROTTLING DISC AND INTEGRAL HARD FACED SEAT

NEEDLEPOINT STEM FOR PRECISE FLOW REGULATION

•ACCURATE FLOW REGULATION

•POSITIVE SHUT-OFF

THE CONNECTION for FORGED STEEL FLOW CONTROL VALVES

Vogt's V-Port valve is particularly suited for "Continuous Blowdown" applications in power plants and "Speed Control" applications in hydraulic systems. The design of the valve insures positive flow regulation without sacrificing the shutoff capability expected of a globe valve.

The V-Port flow control valves have specially designed discs for combination shutoff and throttling service. The shutoff and throttling surfaces are completely removed from each other in such a manner to insure that consistent flow rates are achieved during operation and that the shutoff seating surface is not subjected to the high velocities that occur at the throttling surface.

The discs are designed with an extended cylinder which has "V" shaped slots. As the disc is raised, the flow area at the "V" shaped slots is increased, achieving regulation. The extended V-Port disc legs are fully guided in the valve body during full lift, insuring minimum vibration of the disc.

Flow area generation at the disc throttling and seating surfaces are controlled to insure that a linear flow characteristic is achieved. Flow is directly proportional to the valve lift for a constant pressure drop. A stainless steel dial and indicator permits the operator to accurately regulate and duplicate the flow to a desired volume.

Forged Steel Flow Control Valves

The Cv factors (see definition, page 7) are listed for the valves in the full open position. Cv factors at intermediate valve openings can be determined by multiplying the full open Cv factor by the ratio of the desired turns opening to turns full open.

Pressure drop or flow rates can be obtained for the Vogt flow control valves by use of the Cv factor at full or intermediate valve openings in the formulas on Page 7.

Vogt's needle-point stem valve is specifically designed for those applications requiring flow regulation in the extreme low Cv range. A linear flow characteristic is not achieved with this valve design but repeatability and close regulation is assured. The solid stem design assures that the flow geometry is maintained at any valve setting and duplication can be achieved even at high pressure drops. This valve can be provided with a dial and indicator if required.

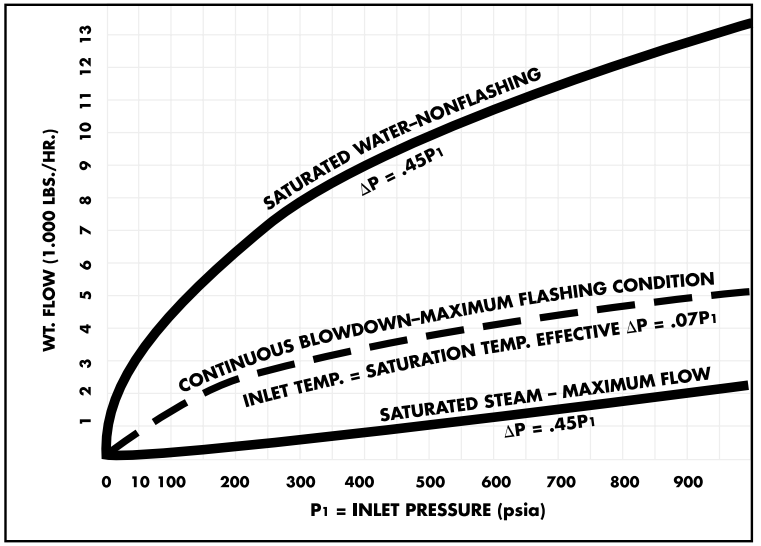
THE CONNECTION for FLOW CONTROL VALVES IN CONTINUOUS BLOWDOWN SERVICE

FLOW CAPACITIES

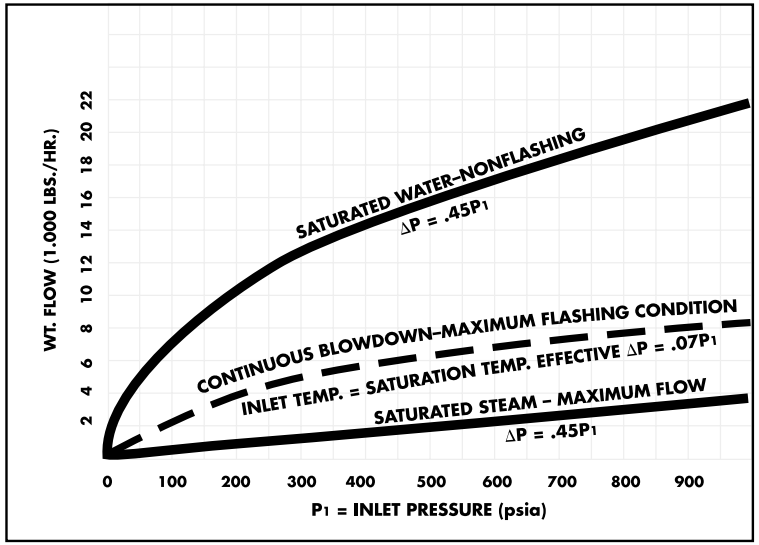
The following charts may be used to determine the flow anticipated for the Vogt V-Port valves when used in saturated water steam applications or continuous blowdown where a maximum "flashing condition" is expected.

Similar charts can be provided for other heat transfer fluids when desired.

Size ½
Series 12443
Series 15443



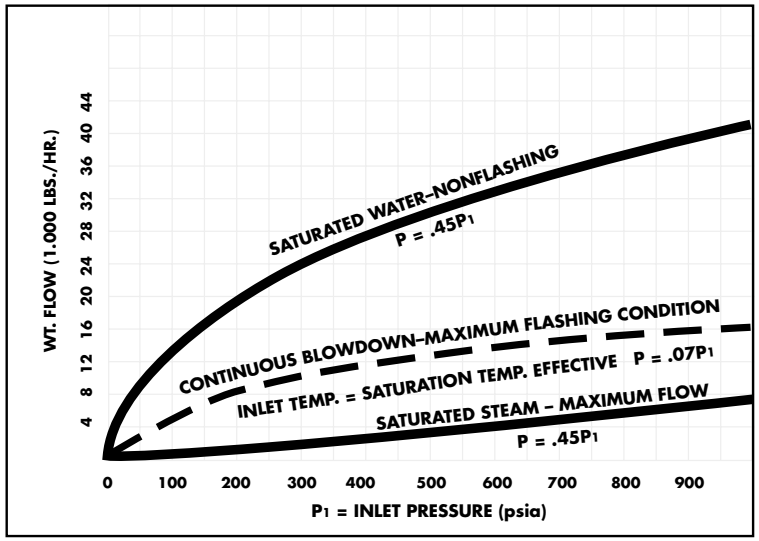
Size ¾
Series 12443
Series 15443



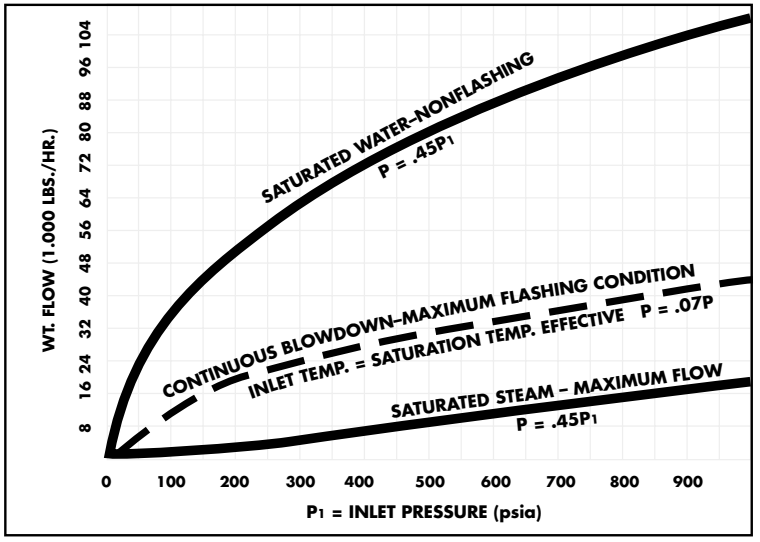
Forged Steel Flow Control Valves

FLOW CAPACITIES, Continued

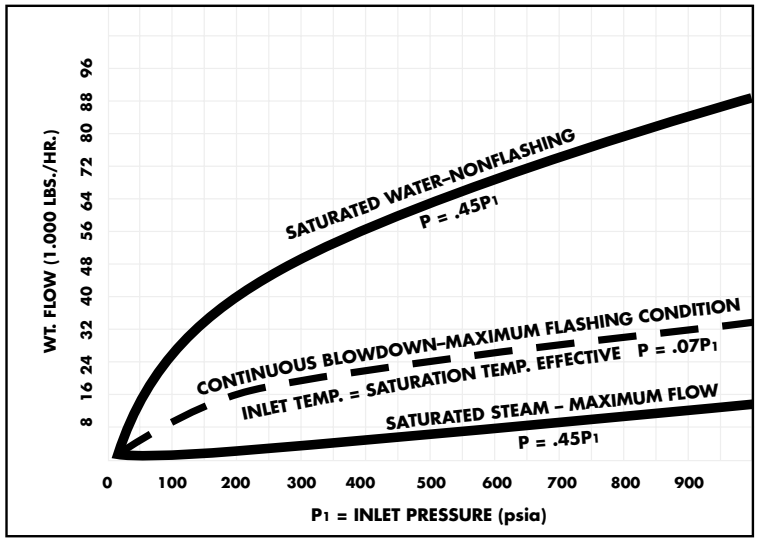
Size 1
Series 12443
Series 15443



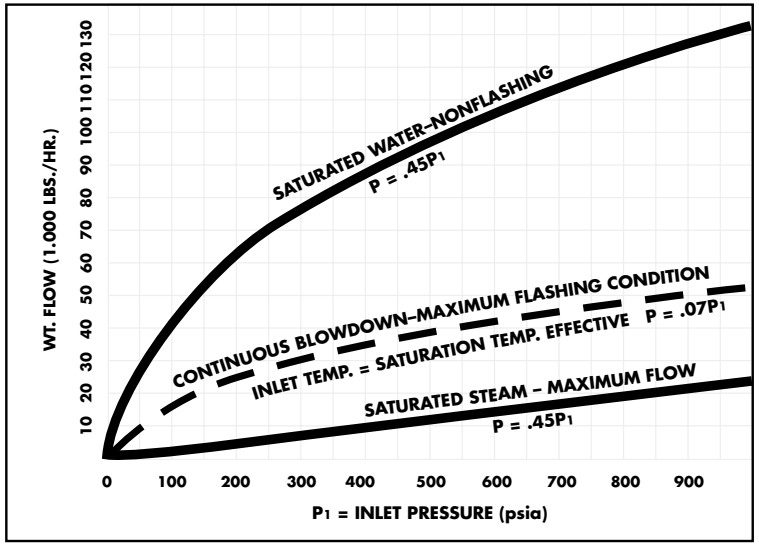
Size 1½
Series 15443



Size 1½
Series 12443



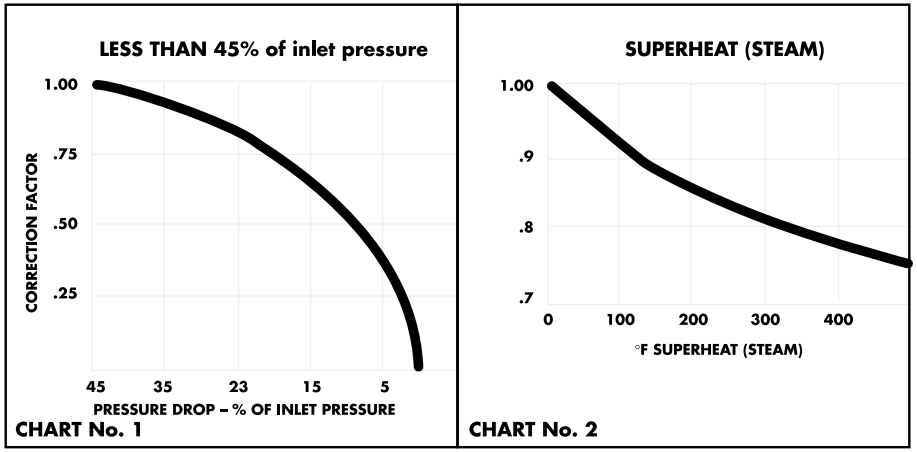
Size 2
Series 12443



Forged Steel Flow Control Valves

CORRECTION FACTORS

Saturated Steam capacities (Pounds per Hour) from the preceding graphs are valid when the pressure drop across the valve is greater than 45% of the inlet pressure. For pressure drops less than 45% of the inlet pressure, multiply capacities by correction factor from Chart 1. For superheated steam, multiply saturated steam flow capacities from graphs by correction factor from Chart 2.



PRESSURE - TEMPERATURE RATINGS

Service Tem. (F°)	–20 to 100	200	300	400	500	600	650	700	750	800	850	900	950	1000
CLASS 800														
Carbon Steel A105 (1) (3)	2000	2000	2000	2000	2000	1900	1865	1850	1680	1375	895	575	350	180
Carbon Steel A105 (2) (3)	1975	1800	1750	1690	1595	1460	1430	1420	1345	1100	715	460	275	140
CLASS 1500														
Carbon Steel A105 (1) (4)	3750	3750	3750	3750	3750	3565	3495	3470	3150	2570	1670	1070	660	340
Carbon Steel A105 (1) (3)	3705	3375	3280	3170	2995	2735	2685	2665	2520	2060	1340	860	515	260

(1) Ratings are in accordance with ASME B16.34-96, Limited Class
(2) Ratings are in accordance with procedures in ASME B16.34-96, Standard Class.
(3) Permissible but not recommended for prolonged use above 800°F.

Forged Steel Flow Control Valves

FLOW FORMULAS UTILIZING Cv FACTORS

FORMULAS		
TYPE FLOW	**FLOW RATE**	**PRESSURE DROP**
LIQUID	$Q = Cv\sqrt{\frac{\Delta P}{S}}$	$\Delta P = S\left(\frac{Q}{Cv}\right)^2$
GAS when DP < .5P_1	$q^1m = 22.6\ Cv\sqrt{\frac{\Delta P \times P_1}{T_1\ Sg}}$	$\Delta P = \frac{.00195\ T_1\ Sg}{P_1}\left(\frac{q^1m}{Cv}\right)^2$
when DP ≧ .5P_1	$q^1m = \frac{13.9\ P_1\ Cv}{\sqrt{Sg\ T_1}}$	
DRY SATURATED STEAM	$W = 2.97\ Cv\sqrt{\Delta P \times P_1}$	$\Delta P = \frac{.113}{P_1}\left(\frac{W}{Cv}\right)^2$
when DP < .5P_1		
when DP ≧ .5P_1	$W = 1.82\ Cv\ P_1$	
SUPERHEATED STEAM	$W = \frac{2\ 97\ Cv\ \sqrt{\Delta P \times P_1}}{(1 + .0007s)}$	$\Delta P = \frac{.113}{P_1}\left(\frac{W(1 + .0007s)}{Cv}\right)^2$
when DP < .5P_1		
when DP ≧ .5P_1	$W = \frac{1.82\ Cv\ P_1}{(1 + .0007s)}$	
FLASHING MIXTURES OF WATER AND STEAM **NOTE:** FOR DP, USE MIN. OF ACTUAL DP OR DP_{EFF}	$W = 500\ Cv\ \sqrt{S\Delta P}$	$\Delta P_{EFF} = [.07 + 0.022(t_s - t_1)^{.70}]\ P_1$ for $(t_s - t_1)$ less than 120°F.

FLUID FLOW NOMENCLATURE

Cv	Flow coefficient for valves and fittings.	**S**	Specific gravity of flowing liquid relative to water at 60°F.
P_1	Absolute inlet pressure. (PSIA)	**Sg**	Specific gravity of gas relative to air.
P_2	Absolute outlet pressure. (PSIA)	**s**	Number of degrees of superheat for steam in °F.
DP	Pressure drop in pounds per square inch. (PSI)	**t**	Temperature in °F.
DP_{EFF}	Effective pressure drop in pounds per square inch. (PSI)	**T_1**	Absolute inlet temperature in degrees Rankine. (°R)
Q	Liquid flow in gallons per minute (GPM)	**t_1**	Actual inlet water temperature in °F.
q^1m	Rate of gas flow in cubic feet per minute at standard conditions, 14.7 psia and 60°F. (SCFM)	**t_s**	Inlet water saturation temperature in °F.
		W	Steam or vapor flow rate in pounds per hour. (LBS./HR.)

Cv FACTOR Versus TURNS OPEN (Vogt V Port Values)

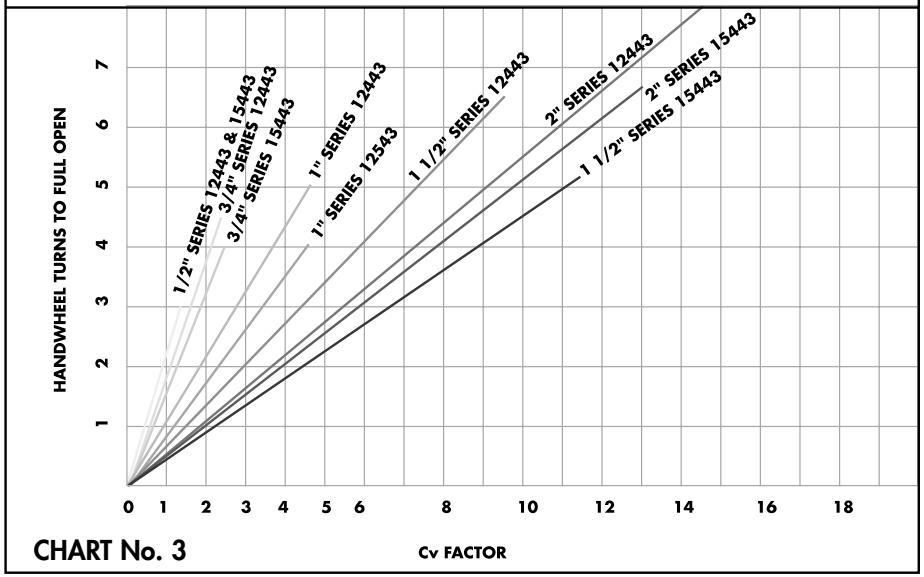


CHART No. 3

CHART NO. 3

Cv Factors at intermediate to full opening range, shown in the accompanying graph, are valid for all liquids having viscosity near that of water at 60°F and specific gravity of 1.

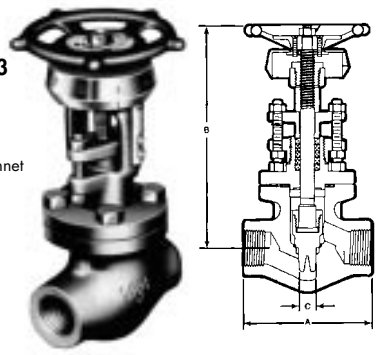
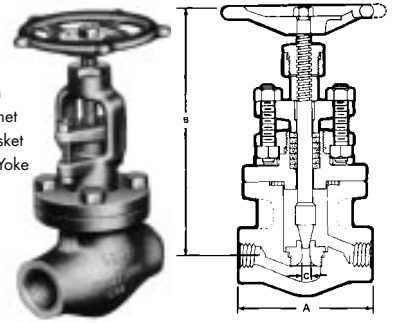
Cv FACTOR DEFINITION:

This is the most common of flow coefficients in use today for the determination of valve flow capacity. It is defined as "the number of U.S. gallons per minute of water at 70°F which will flow through a valve at a pressure drop of one PSI." It can be used for liquids other than water and gas flow calculations.

Forged Steel Flow Control Valves

Order by Size and these Series Numbers

Dimensions are in inches.

PRESSURE CLASS	SERIES NUMBER		MATERIAL		VALVE SIZE	WEIGHT (Lbs.)	A End to End	B Center to Top (open)	C Seat Diam.	Cv* Factor	Turns Full Open (Aprox.)
	Threaded	Socket Weld	Body/Bonnet	Trim							
SERIES 12443 & 15443 Loose V-Port Disc Dial & Indicator Round Bolted Bonnet Spiral Wound Gasket Outside Screw & Yoke Bolted Gland Integral Hard Faced Seat ASME B16.34											
CLASS 800 1975 PSI @ 100°F	**12443**	**SW 12443**	Carbon Steel A105	13% Cr.★	1/2	5.14	3.75	6.81	.38	1.46	3
					3/4	5.39	4.00	6.81	.44	2.38	4-1/2
					1	9.50	4.62	8.44	.62	4.54	5
					1-1/2	19.0	6.25	10.38	.94	9.65	6-1/2
					2	31.4	7.75	10.88	1.19	14.6	8
CLASS 1500 3705 PSI @ 100°F	**15443**	**SW 15443**	Carbon Steel A105	13% Cr.★	1/2	10.8	4.50	7.88	.44	1.46	3
					3/4	10.4	4.50	7.88	.44	2.38	4-1/2
					1	21.5	6.25	10.12	.62	4.54	5
					1-1/2	35.5	7.75	11.00	.94	11.50	5-1/4
					2	62.8	9.00	13.31	1.03	13.00	6-1/2
SERIES 22461 Needle Point Stem Round Bolted Bonnet Spiral Wound Gasket Outside Screw & Yoke Bolted Gland Renewable Seat ASME B16.34											
CLASS 800 1975 PSI @ 100°F	**22461**	**SW 22461**	Carbon Steel A105	13% Cr.	1/4	4.80	3.75	6.69	.19	.56	3-1/2
					3/8	4.59	3.75	6.69	.19	.55	3-1/2
					1/2	5.00	3.75	6.69	.19	.68	3-1/2
					3/4	4.85	4.00	6.69	.19	.99	3-1/2
					1	8.63	4.62	8.62	.25	1.50	5-1/2

★Integral hard faced seat.

*Cv factors are for Vogt standard 4 V port disc. 2 V port discs can be furnished in standard flow control valves. Their Cv factors can be determined approximately by dividing the listed Cv factors by 2 i.e., (1.414). Special flow control valves having Cv factors less than 1, are available upon request.

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 CB 15 3/03 Printed in USA