Cv VALUES

VALVE SIZE	10 °	20 °	30 °	40 °	50 °	60 °	70 °	80 °	90 °
2	2	5	10	18	28	55	77	127	153
2-1/2	3	7	14	24	41	87	115	186	242
3	4	12	23	37	66	129	166	274	337
4	6	24	44	76	125	241	312	521	601
5	8	32	87	158	257	298	632	983	1122
6	9	52	148	244	413	786	1028	1633	1949
8	12	101	24	418	693	1279	1732	2702	3232
10	21	165	393	667	1144	2140	2744	4276	4979
12	28	233	555	992	1588	3096	4044	6048	7481
									

Rated Cv — The Volume of water in United States gallons per minute that will pass through a given valve opening with a pressure drop of 1 lb. per sq. inch.

C_V values, given above, may be employed in the formula

$$Q = C_V \times \sqrt{\frac{\Delta P \times 62.4}{D}}$$

Where: Q = Gallons per minute of flow through the valve.
ΔP = Pounds per square inch of pressure drop across the valve.
D = Density of fluid in pounds per cubic foot.

Pressure drop is computed by rearranging the formula to:

$$\Delta P = \frac{Q^2 \times D}{C_V^2 \times 62.4}$$

Sample Computations:
What is the flow rate of water at ambient temperature through a 4" butterfly valve 70o open when pressure drop across the valve is 0.5 psi? (Denisty of water at 68o F is 62.4 pounds per cubic foot.)

$$Q = C_V \times \sqrt{\frac{\Delta P \times 62.4}{D}}$$
$$= 305 \times \sqrt{\frac{5 \times 62.4}{62.4}}$$
$$= 305 \times .707$$
$$Q = 215.6 \text{ gallons per minute}$$

What is the pressure drop across an 8" butterfly valve fully open, flowing 2000 gallons per minute of solvent with a density of 55 pounds per cubic foot?

$$\Delta P = \frac{Q^2 \times D}{C_V^2 \times 62.4}$$
$$= \frac{(2000)^2 \times 55}{(3250)^2 \times 62.4}$$
$$\Delta P = .33 \text{ pounds per square inch}$$

Basic Sizing Formulas

Liquid

$$Cv = Q\sqrt{\frac{S.G.}{\Delta P}}$$

Where:
Q = Flow
(U.S. gallons per minute)

S.G. = Specifcy Gravity
(water = 1)

ΔP = Pressure drop across valve
(lbs. per sq. inch)

Gas

$$Cv = Q\sqrt{\frac{S.G.}{P_2\ \Delta P}}$$

Where:
Q = Flow
(STD. CU. ft per minute)

S.G. = Specify Gravity
(Air + 1)

ΔP = Pressure drop across valve
(lbs. per sq. inch)

P_2 = outlet absolute pressure
(lbs. per sq. in absolute)

ΔP 1/2 inlet absolute pressure

Steam

$$Cv = \frac{W}{3\sqrt{P_2\ \Delta P}}$$

Where:
Q = Flow
(lbs. per hour)

Δ P = Pressure drop across valve
(lbs. per square inch)

P_2 = Outlet absolute pressure
(lbs. per sq. in. absolute)

ΔP 1/2 inlet absolute pressure

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