

**Engineering Information
For PDC Butterfly Valves**

Sizing for:

- Liquids
- Gases
- Saturated Steam Service
- Vapor Flow (other than steam)

Sizing For Liquids

SUBCRITICAL FLOW

$$C_v = Q \sqrt{\frac{G}{\Delta P}}$$

$$Q = C_v \sqrt{\frac{\Delta P}{G}}$$
$$\Delta P = G \left(\frac{Q}{C_v} \right)^2$$

Where:

C_v = Flow coefficient (number of U.S. gallons of water flowing through a valve with a pressure drop of 1 psig)

G = Specific gravity of flowing media at system temperature. (water = 1 @ 60 deg. F.)

ΔP = Pressure drop, $P_1 - P_2$, psig

C_f = Critical flow factor (0.65 @ 60 deg.; 0.55 @ 90 deg.)

P_1 = Inlet pressure, psia

P_2 = Outlet pressure, psia

Q = Flow, gallons per minute, GPM

Sizing for Gases:

SUBCRITICAL FLOW

$$C_v = \frac{q}{963} \sqrt{\frac{GT}{\Delta P (P_1 + P_2)}}$$
$$q = 963 C_v \sqrt{\frac{\Delta P (P_1 + P_2)}{GT}}$$
$$\Delta P = P_1 - \sqrt{P_1^2 - GT \left(\frac{q}{963 C_v} \right)^2}$$

Where:

T = Absolute temperature of flowing media,
deg. R (deg. F + 460)

q = Flow, standard cubic feet per hour, SCFH

Sizing for Saturated Steam Service:

$$C_v = \frac{W}{2.1 \sqrt{\Delta P (P_1 + P_2)}}$$
$$W = 2.1 C_v \sqrt{\Delta P (P_1 + P_2)}$$
$$\Delta P = P_1 - \sqrt{P_1^2 - \left(\frac{W}{2.1 C_v} \right)^2}$$

Where:

W = Flow, lbs./hr.

Add 7% to C_v for each 100° F of super heat.

Sizing for Vapor Flow (Other Than Steam):

$$C_v = \frac{W}{K \sqrt{\Delta P (P_1 + P_2)}}$$

$$W = K C_v \sqrt{\Delta P (P_1 + P_2)}$$

$$\Delta P = P_1 - \sqrt{P_1^2 - \left(\frac{W}{K C_v}\right)^2}$$

Where:

K = Constant for vapor

| Vapor | K |
|-----------------|----------|
| Freon 11..... | 7.4 |
| Freon 12..... | 7.1 |
| Freon 14..... | 8.4 |
| Freon 114..... | 8.3 |
| Ammonia..... | 2.7 |
| Dowtherm A..... | 5.6 |

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