

## Engineering Information For PDC Butterfly Valves

### Valve Sizing:

Cv sizing is the most widely used method for valve sizing, today. By using the Cv method, the proper valve size can be accurately determined for most applications when any three of the four following conditions are known or assumed: valve size, maximum flow, inlet pressure or maximum delta P.

By using the Cv formulas listed below in conjunction with the Cv factors for PDC butterfly valves and the maximum allowable pressure drops for PDC valves listed for each valve class, the proper PDC butterfly valve for each application can be determined. In addition to the standard Cv equations other forms of the equation are listed for determining flow or the delta P for PDC valves.

### Critical Flow:

When calculating the required valve Cv, the formula to be used is dependent on the flowing media and if the pressure drop is critical or subcritical.

Critical flow conditions exist when the line pressure reaches the vapor pressure of a flowing liquid, or approximately 1/2 of the absolute inlet pressure for gases or vapors. In the case of liquids, the result of critical flow is flashing or cavitation. Critical flow of gases produce sonic velocity. If pressure drop across valve, in open position, exceeds 0.1 times inlet pressure consult factory.

	<b>Subcritical Flow</b>	<b>Critical Flow</b>
For liquids:	$\Delta P < C_f^2(P_1 - P_v)$	$\Delta P \geq C_f^2(P_1 - P_v)$
For gases:	$\Delta P < 0.5 C_f^2 P_1$	$\Delta P \leq 0.5 C_f^2 P_1$

### Where:

$C_f$  = Critical flow factor, a dimensionless expression of the pressure recovery ratio in a control valve. While there are small variations in the  $C_f$  value for each valve size as determined by flow tests, for simplicity, the following values are assigned to PDC metal swing-thru butterfly valves.

At 60 deg. open  $C_f = 0.65$  and at 90 deg. open  $C_f = 0.55$ .

$P_1$  = Inlet pressure, psia

$P_v$  = Vapor pressure of fluid at flowing temperature, psia

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