SIZING & SELECTION OF INSTUMENTATION VALVES

Specifying instrumentation valves requires a complete understanding of process conditions. The basic selection of an instrumentation valve requires that process conditions be expressed in terms of a CV. ***The CV is a dimension-less sizing component that insures a given flow rate can be accommodated by a selected valve.*** CV is the valve flow coefficient expressing the flow rate in gallons per minute for a 1psi pressure drop across the valve at 60°F.

FOR LIQUID APPPLICATIONS:

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

Where:

GPM=Flow Rate in Gallons Per Minutes
ΔP=P1-P2
P1=Inlet Pressure in psia (Note 1)
P2=Outlett Pressure in psia (Note 1)
S.G.=Specific Gravity of Liquid
=1.0 for water at 60°F

FOR GAS APPLICATIONS:

$$SCFH = 1360\ Cv\sqrt{\frac{\Delta P \quad P1}{(460 + T)S.G.}}$$

Where:

ΔP=P1-P2
P1=Inlet Pressure in psia (Note 1)
P2=Outlett Pressure in psia (Note 1)
SCFH=Flow in Standard Cubic Feet Per House
S.G.=Specific Gravity of Liquid
=1.0 for air at 70°F and 14.7 psia
T=Temperature in F

The CV should be calculated for the expected variations in pressure, temperature, and flow to establish CV range. **The maximum CV from the analysis of the flow conditions gives the basic sizing parameter that insures that the valve can handle the maximum expected flow.** The maximum CV will in general occur at the highest flow and lowest differential pressure. **Taking the maximum Cv divided by the minimum Cv from the flow conditions will give the required "turn-down" range.** If the turn down range exceeds 4:1 a metering style valve is required. If the "turn-down" range exceeds 10:1 a micro-metering valve is required. For all other instrumentation applications a ball valve design is adequate.

Note: 1-P1 (psia) absolute pressure=Gauge Pressure (psiag) + 14.7