AEW Valves Pvt. Ltd.

DATA FOR CALCULATION OF FLOW AND / OR PRESSURE DROP

Valve (Flow) coefficient Cv is a number, which represents a valve's ability to pass flow.
The bigger the Cv the more flow a valve can pass with a given pressure drop.
A Cv of 1 means a valve will pass 1 gallon per minute (GPM) of 60ºF water with a pressure drop (P) of 1 PSI across the valve.
A Cv of 350 means a valve will pass 350 GPM of 60ºF water with a P of 1 PSI.
It is affected by the pattern of the passage through the valve body and the condition of the opening around the valve seat and disc, and also surface finishes inside body.
It can be determined from calculations and actual flow tests.
There are several formulas to calculate flow rate and pressure drop using Cv each applicable to different types of flow such as liquid gas, saturated steam, superheated steam and others.
The following are typical formulae for liquid/gas:

For Liquid :

$$QL = Cv\sqrt{\frac{\Delta P}{\mathrm{SL}}} \qquad \Delta P = SL\left(\frac{QL}{Cv}\right)^2$$

For Gas :

When $\Delta P < .5P1$

$$Qg \quad 22.6\,Cv\sqrt{\frac{\Delta P \times P1}{T\,Sg}}$$

When $\Delta P > .5P1$

$$\Delta P = \frac{.00195\,T\,Sg}{P1}\left(\frac{Qg}{Cv}\right)^2$$

$$Qg = \frac{13.9\,P1\,Cv}{\sqrt{Sg\,T}}$$

Where,
Cv – Valve (Flow) coefficient for valves
QL – Liquid flow in gallons per minute (GPM)

Qg – Rate of gas flow in cubic feet per minute at standard conditions, 14.7 PSIA and 60ºF (SCFM)
P1 – Absolute inlet pressure (PSIA)
P1= Gage pressure (PSIG) + 14.7
P – Pressure drop in pounds per square inch (PSI)
SL – Specific gravity of flowing liquid relative water at 60ºF
Sg – Specific gravity of gas relative to air
T – Absolute temperature in degrees Rankine, (ºR)
T= ºF+460