

EAGLE AMERICA, INC.

DATA FOR CALCULATION OF FLOW AND/OR PRESSURE DROP

Valve (Flow) coefficient C_v is a number which represents a valve's ability to pass flow.

The bigger the C_v the more flow a valve can pass with a given pressure drop.

A C_v of 1 means a valve will pass 1 gallon per minute (GPM) of 60°F water with a pressure drop (P) of 1 PSI across the valve.

A C_v of 350 means a valve will pass 350 GPM of 60°F 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 C_v each applicable to different type of flow such as liquid gas, saturated steam, superheated steam and others.

The following are typical formulas for liquid / gas:

For Liquid :

$$QL = C_v \sqrt{\frac{\Delta P}{SL}}$$

$$\Delta P = SL \left(\frac{QL}{C_v} \right)^2$$

For Gas :

When $\Delta P < .5P_1$

$$Q_g = 22.6 C_v \sqrt{\frac{\Delta P \times P_1}{T S_g}}$$

When $\Delta P > .5P_1$

$$\Delta P = \frac{.00195 T S_g}{P_1} \left(\frac{Q_g}{C_v} \right)^2$$

$$Q_g = \frac{13.9 P_1 C_v}{\sqrt{S_g T}}$$

Where:

C_v – Valve (Flow) coefficient for valves

QL – Liquid flow in gallons per minute (GPM)

Q_g – Rate of gas flow in cubic feet per minute at standard conditions, 14.7 PSIA and 60°F (SCFM)

P_1 – Absolute inlet pressure (PSIA)

$P_1 =$ Gage pressure (PSIG) + 14.7

P – Pressure drop in pounds per square inch (PSI)

SL – Specific gravity of flowing liquid relative water at 60°F

S_g – Specific gravity of gas relative to air.

T – Absolute temperature in degrees Rankine, (°R)

$T =$ °F+460