

VALVE SIZING FORMULAS

The term Cv is generally used by industry for comparing and calculating relative flow capacity in valves. Consideration should be given that calculated results are comparative only.

Definitions: Cv equates to the number of gallons per minute of water, having a specific gravity of 1.0, that will pass through the valve with a pressure drop at the valve of 1 PSI.

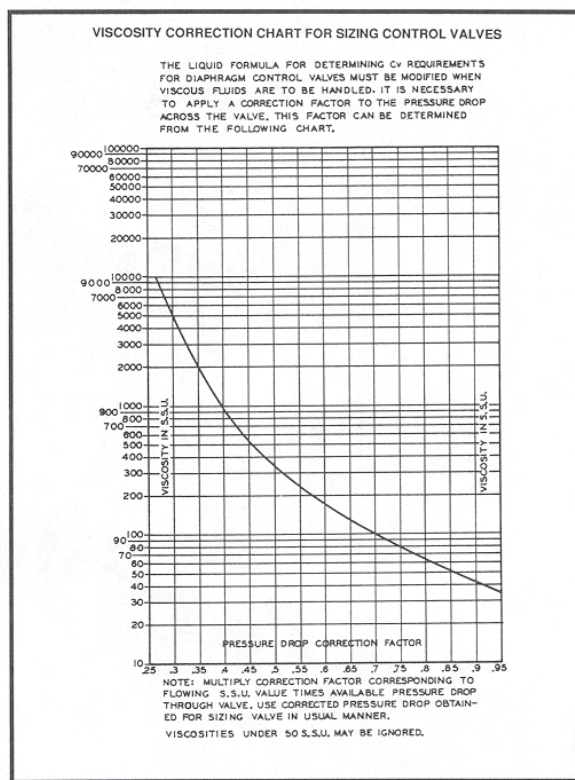
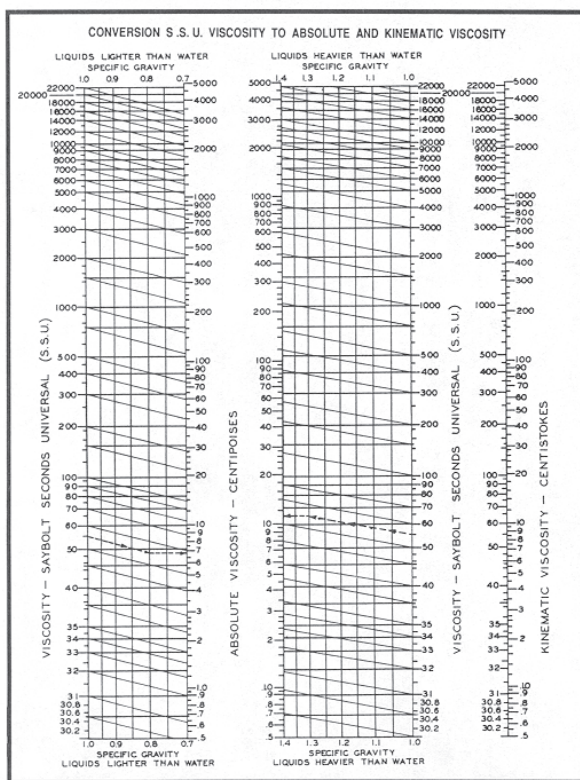
C_v = valve flow coefficient
P₁ = upstream pressure in PSIA
P₂ = downstream pressure in PSIA
*ΔP = pressure drop or differential (P₁ - P₂) in PSI
S.G. = specific gravity relative to air or water

SCFH = standard cubic feet per hour
PPH = pounds per hour of steam
V = specific volume of the upstream steam (cubic feet per pound of steam at a given pressure in PSIA and temperature in degrees F)

*When calculating gas or vapor flow and the calculated ΔP exceeds one-half the upstream pressure, use one-half the upstream PSIA as sizing ΔP.

$$C_v = \text{GPM} \sqrt{\frac{\text{S.G.}}{\Delta P}} \quad \text{Gas} \quad C_v = \frac{\text{SCFH} \sqrt{(460 + ^\circ\text{F}) \text{ S.G.}}}{1360 \sqrt{P_1 \times \Delta P}} \quad \text{Steam} \quad C_v = \frac{\text{PPH}}{63 \times \sqrt{\frac{\Delta P}{V}}}$$

**When sizing viscous liquids, use the charts below to correct the ΔP for sizing purposes.



SPECIFIC GRAVITY OF VARIOUS GASES — AIR = 1

Name	S.G.
Acetylene	0.9073
Ammonia	0.5963
Argon	1.3796
Boron Fluoride	2.31
Butane (n)	2.0854
Butane Iso-	2.067
Carbon Dioxide	1.5290
Carbon Monoxide	0.9671
Chloride	2.486
Ethane	1.0493

Name	S.G.
Ethylene	0.9749
Fluorine	1.312
Helium	0.13804
Hydrogen	0.06952
Hydrogen Bromide	2.8189
Hydrogen Chloride	1.2678
Hydrogen Sulfide	1.190
Krypton	2.868
Methane	0.5544
Methyl Chloride	1.7848
Sulfur Dioxide	2.2638

Name	S.G.
Methyl Ether	1.6318
Natural Gas	0.6 Ap.
Neon	0.69638
Nitric Oxide	1.0366
Nitrogen	0.96724
Nitrosyl Cl.	2.314
Nitrous Oxide	1.5297
Oxygen	1.105
Ozone	1.658
Propane	1.562

ALL SPECIFIC GRAVITIES ARE LISTED FOR COMPARISON ONLY



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