

Supporting Tables and Conversions

Table 1: Vapor Pressure

Water Temperature (°F)	Vapor Pressure (psia)
35	0.09
40	0.121
45	0.147
50	0.177
55	0.213
60	0.256
65	0.316
70	0.362
75	0.429
80	0.506
85	0.595
90	0.698
95	0.815
100	0.949
110	1.275
120	1.692
130	2.223
140	2.889
150	3.718
160	4.741
170	5.992
180	7.511
190	9.340
200	11.526
210	14.123
212	14.696

Table 2: Average Absolute Atmospheric Head

Altitude Above Sea Level (feet)	Atmospheric Pressure	Inches of Hg
0	14.7	29.9
500	14.4	29.4
1,000	14.2	28.9
1,500	13.9	28.3
2,000	13.7	27.8
3,000	13.2	26.8
4,000	12.7	25.9
5,000	12.2	24.9
6,000	11.7	24.0
7,000	11.3	23.1

Table 3: Elbow Equivalent Length (feet)

Size	1 to 150 cps	150 to 1,500 cps	1,500 to 15,000 cps	15,000 to 100,000 cps
1 ½	2.5	2	1.4	0.7
2	3.5	2.3	1.8	0.8
2 ½	4	2.5	2	1
3	5	3.5	2.5	2
4	6	4.5	3	2
6	9	6.5	4	2.25

Table 4: Tee Equivalent Length (feet)

Size	1 to 150 cps	150 to 1,500 cps	1,500 to 15,000 cps	15,000 to 100,000 cps
1 ½	9	6.5	4	2.25
2	12	8.5	6	2.7
2 ½	15	11	7.5	3.75
3	18	13	8	4
4	20	15	10	5
6	35	25	18	10

Table 5: Valve Equivalent Length (feet)

Size	1 to 150 cps	150 to 1,500 cps	1,500 to 15,000 cps	15,000 to 100,000 cps
1 ½	11	8	5.5	2
2	18	13	8	4
2 ½	20	15	10	5
3	27	20	14	7
4	33	25	17	10

Source: Tables 3 - 5 were created from Crane Co. Technical Paper No. 409. Data based on the chart are satisfactory for most applications.

Table 6: Conversion Factors and Helpful Formulas

Length				Flow			
Meters	x	3.281	= Feet	Pounds of Water / Hour	x	0.002	= GPM
Centimeters	x	0.394	= Inches	Pounds of Fluid / Hour	x	0.002 / SG	= GPM
Millimeters	x	0.0394	= Inches	Cubic Meters / Hour	x	4.4	= GPM
Inches	x	25.4	= Millimeters	Liters / Minute	x	0.264	= GPM
Mass				Viscosity			
Kilograms	x	2.2	= Pounds	Centipoise	x	1 / SG	= Centistokes
Gallons of Water	x	8.34	= Pounds	SSU	x	0.216	= Centistokes
Cubic Feet of Water	x	62.4	= Pounds	Saybolt Furol	x	2.16	= Centistokes
Pounds	x	0.454	= Kilograms	Redwood Standard	x	0.237	= Centistokes
				Redwood Admiralty	x	2.34	= Centistokes
				Engler-Degrees	x	7.45	= Centistokes
				Ford Cup #4	x	3.76	= Centistokes
				MacMichael	x	0.415	= Centistokes
				Stormer	x	2.81	= Centistokes
Volume				Power			
Liter	x	0.264	= Gallon	T (in - lbs.) x RPM	/	63,025	= Horsepower
Cubic Feet	x	7.48	= Gallon	Kilowatts	x	1.341	= Horsepower
Pounds of Water	x	0.119	= Gallon	Metric Horsepower	x	0.9863	= Horsepower
Imperial Gallon	x	1.2	= Gallon	Horsepower	x	0.746	= Kilowatts
Gallon	x	3.785	= Liter	Horsepower	x	42.44	= BTU / Minute
						$\frac{\text{GMP} \times \text{Head (ft. of water)} \times \text{SG}}{3960}$	= Liquid Hp
Pressure				Efficiency			
Feet of Water	x	0.433	= PSI			$\frac{\text{Liquid HP}}{\text{Brake HP}}$	= Efficiency
Inches of Mercury	x	0.491	= PSI				
Atmospheres	x	14.7	= PSI				
Meters of Water	x	1.42	= PSI				
Bar	x	14.7	= PSI				
Kilo Pascals	x	0.145	= PSI				
Atmospheres	x	33.9	= Feet of Water				
PSI	x	2.31	= Feet of Water				
Inches of Mercury	x	1.13	= Feet of Water				
Meters of Water	x	3.28	= Feet of Water				
Temperature							
°C x 1.8	+	32	= °F				
°F - 32	x	0.555	= °C				

*Brake HP is read off the pump curve