PSYCHROMETRIC CHART FOR HVAC ANALYSIS

Air-Conditioning Formulas and Conversion Factors

Atmospheric pressure = 29.921" Hg. at sea level

1 BTU = Amount of heat required to raise (or lower) the temperature of one pound of water 1°F

1 ton of refrigeration = 12,000 Btu/hr = 200 Btu/min

1 watt = 3.414 Btu/hr

1 ft (head) = 0.433 psi (at 62°F)

1 boiler horsepower = 33,475 Btu/hr

Air changes per hour (N) in a space

N = (60 x CFM) / space ft³

CFM = airflow rate (ft³/min)

Water quantity (GPM) required for heating and cooling

GPM = q / (500 x Δt)

q = load in Btu/hr

Δt = temperature difference

Chiller capacity (Tons)

Tons = (GPM x Δh) / 24

GPM = gallons per minute of chilled water

Δh = enthalpy difference (Btu/lb)

Pump hp = GPM x ft head x specific gravity / 3960 x efficiency

Fan hp = CFM x static pressure (in. W.G.) x density of air / 6356 x efficiency x density of standard air

Total cooling (Btu/hr) = CFM x 4.5 x Δh

Sensible cooling (Btu/hr) = CFM x 1.085 x Δt

Latent cooling (Btu/hr) = CFM x 4840 x Δw

CFM = airflow rate (ft³/min)

h = enthalpy (Btu/lb)

t = dry bulb air temperature (°F)

w = humidity ratio (lb water / lb dry air)

Fan Laws

CFM2 = CFM1 x (RPM2 / RPM1)

SP2 = SP1 x (RPM2 / RPM1)²

HP2 = HP1 x (RPM2 / RPM1)³

1 = initial; 2 = desired