HOBBS & ASSOCIATES

PSYCHROMETRIC CHART FOR HVAC ANALYSIS (at sea level)

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 horsepower = 2545.6 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
t = water temperature

Chiller capacity (Tons)
Tons = (GPM x Δt) / 24
GPM = gallons per minute of chilled water
t = water temperature

$$\text{Pump hp} = \frac{\text{GPM x ft head}}{\text{3960 x efficiency}} \times \text{specific gravity}$$

$$\text{Fan hp} = \frac{\text{CFM x static pressure (in. W.G.)}}{\text{6356 x efficiency}} \times \frac{\text{density of air}}{\text{density of standard air}}$$

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

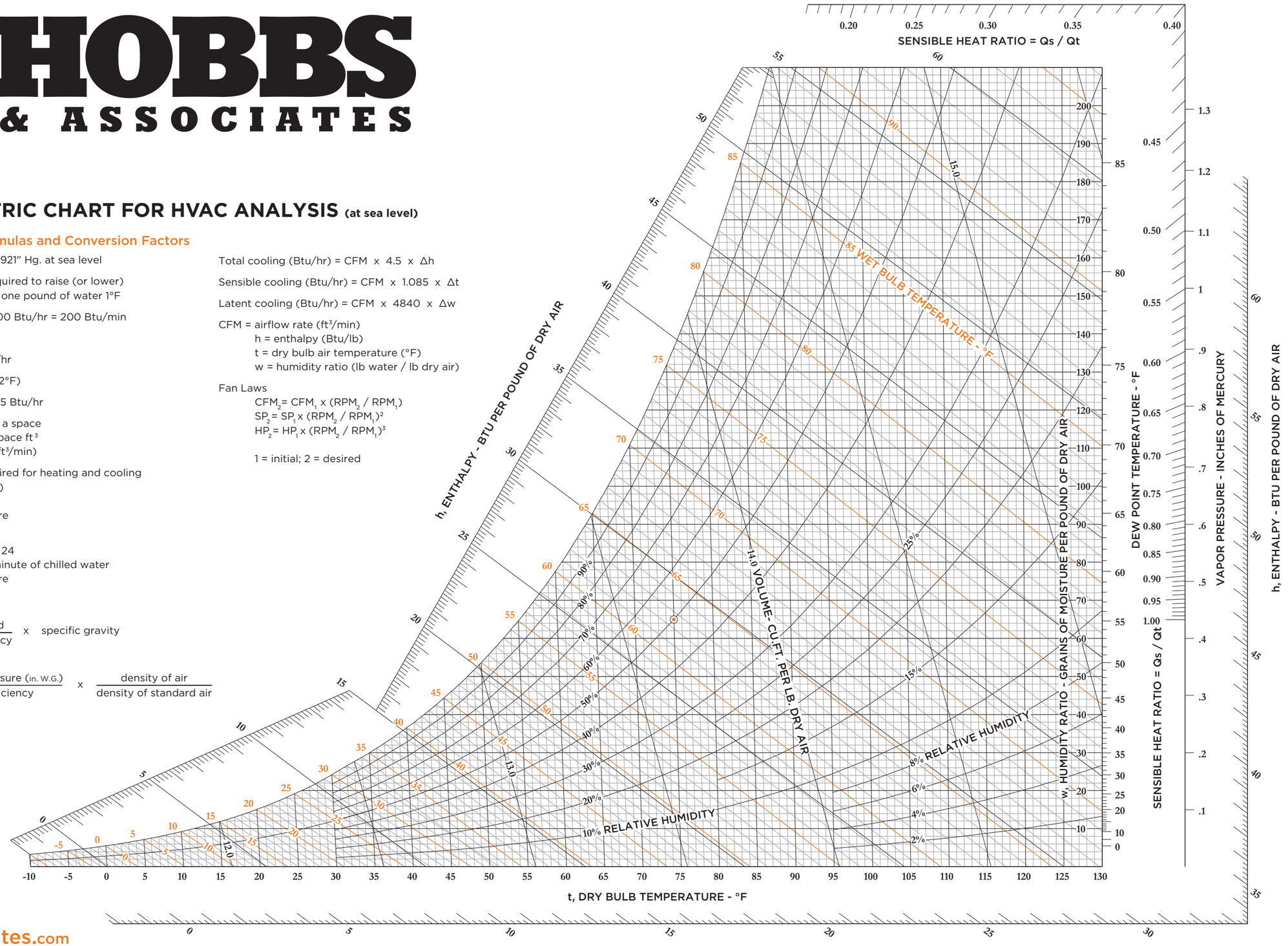
Sensible cooling (Btu/hr) = CFM x 1.085 x Δt

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
$CFM_2 = CFM_1 \times (RPM_2 / RPM_1)$
$SP_2 = SP_1 \times (RPM_2 / RPM_1)^2$
$HP_2 = HP_1 \times (RPM_2 / RPM_1)^3$

1 = initial; 2 = desired



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