Norman S Wright CO
Manufacturer's Representatives

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Norman S Wright

Common Conversions and Constants

Air
Cp = 0.2445 BTU / lb – °F
Density = 0.075 Lb / CF
Spec. Vol. = 13.3 CF / Lb

Water
Cp = 1.0 BTU / lb – °F

Fuel Heat Contents
1.03 MMBTU / MCF (Natural Gas)
0.135 MMBTU / Gallon (#2 Oil or "Diesel")
0.092 MMBTU / Gallon (Propane)
2.480 MMBTU / MCF (Propane)
3.20 MMBTU / MCF (Butane)

Steam
Heat Of Vaporization
Atmospheric Pressure Steam 970 BTU / lb
15 Psig Steam 945 BTU / lb
100 Psig Steam 880 BTU / lb
1 Boiler HP = 33,475 BTU / Hr = 10 kW = 34 lbs of steam / hr at 212°F

Sensible Heat
The sensible heat in a heating or cooling process of air (heating or cooling capacity) can be expressed as

$h_s = 1.08\ q\ dt$ (1)

where

h_s = *sensible heat (Btu/hr)*

q = *air volume flow (cfm, cubic feet per minute)*

dt = *temperature difference (°F)*

Total Heat - Latent and Sensible Heat
Total heat due to both temperature and moisture can be expressed as:

$h_t = 4.5\ q\ dh$ (4)

where

h_t= *total heat (Btu/hr)*
q = *air volume flow (cfm, cubic feet per minute)*
dh = *enthalpy difference (btu/lb dry air)*

Total heat can also be expressed as:
$h_t = h_s + h_l$
$= 1.08\ q\ dt + 0.68\ q\ dw_{gr}$ (5)

Volume and Weights
7.48 gal / CF
8.34 lb / gal H_2O
1.0 MCF = 1000 CF
1.0 lb = 7000 grains

Pressure
psig = 2.31 ft head (water) = 27.72 in. W.G.
in. HG = 13.61 in. W.G.

Time
8,760 hrs / year
52 weeks / year
730 hrs / month

Energy/ Power
12,000 BTU / ton-hr
0.746 KW / HP
3,413 BTU / KWH

Distance and Area
Acre = 43,560 ft²
mile = 5,280 feet

Latent Heat
The latent heat due to moisture in the air can be expressed as:

$h_l = 0.68\ q\ dw_{gr}$ (2)

or

$h_l = 4{,}840\ q\ dw_{lb}$ (3)

where

h_l= *latent heat (Btu/hr)*

q = *air volume flow (cfm, cubic feet per minute)*

dw_{gr} = *humidity ratio difference (grains water/lb dry air)*
dw_{lb} = *humidity ratio difference (lb water/lb dry air)*

- *1 grain = 0.000143 lb = 0.0648 g*

1 hp = .746 KW = KW ÷ 1.341

1 hp= 2,547 BTU per hour

1 BTU = Heat required to raise 1 lb water 1 °F

1 BTU = 777.6 / Foot-pounds work

1 Kilowatt Hour = 3,415 BTU

Heat Value of Carbon = 14,600 BTU per pound

Latent Heat of Fusion of Ice = 143.15 BTU per pound

Latent Heat of Evaporation of Water at 212 °F. = 970.4 BTU per pound

Total Heat of Saturated Steam at Atmospheric Pressure = 1,150.4 BTU per pound

1 Ton of Refrigeration = 288,000 BTU per 24 hours

g = Acceleration of Gravity (commonly taken as 32.16 feet per second per second)

1 Radian = 57.296°

1 Meter = 100 cm = 39.37 in

1 Kilometer = .62137 mi

1 Gallon = 231 cu in

1 Barrel = 31.5 gal

Atmospheric Pressure = 14.7 lbs per sq in = 29.92 in mercury at 32 °F

1 lb per sq in Pressure = 2.3095 ft fresh water at 62 °F
= 2.0355 in mercury at 32 °F
= 2.0416 in mercury at 62 °F

Water Pressure (lbss per sq in) = .433 X height of water in ft (Fresh water at 62 °F)

Weight of 1 cu ft Fresh Water = 62.355 lbs at 62 °F = 59.76 lbs at 212 °F

Weight of 1 cu ft Air at 14.7 lbs per sq in Pressure = .07608 lbs. at 62 °F = .08073 lbs at 32 °F