

Cooling Formulas

CONVERSION

1 Ton = 12000 Btu/hr

COOLING LOAD REQUIREMENT

Total Cooling Load (Btu/hr) = $4.5 \times \text{CFM} \times (H1 - H2)$

Where:

CFM = Airflow in Cubic Feet Per Minute

H1 = Entering Air Enthalpy (Btu/lbm dry air)

H2 = Leaving Air Enthalpy (Btu/lbm dry air)

Or

Total Cooling Load (Btu/hr) = Sensible Cooling Load (Btu/hr) + Latent Cooling Load (Btu/hr)

Where:

Sensible Cooling Load (Btu/hr) = $\text{CFM} \times \text{Density Factor} \times (T1 - T2)$

Latent Cooling Load (Btu/hr) = $\text{CFM} \times 0.69143 \times (G1 - G2)$

Where:

CFM = Airflow in Cubic Feet Per Minute

Density Factor = $1.08 + \frac{(70 - \text{Blower Temp}) \times .024}{10}$

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T1 = Entering Air Drybulb Temperature (°F)

T2 = Leaving Air Drybulb Temperature (°F)

G1 = Grains of Moisture of Entering Air = $7000 \times \text{humidity ratio (lbm moisture/lbm of dry air)}$

G2 = Grains of Moisture of Leaving Air = $7000 \times \text{humidity ratio (lbm moisture/lbm of dry air)}$

EFFICIENCY CALCULATION

SEER = BTU / W-hr

COST OF COOLING:

Cost of cooling = $\text{BTU/hr} \times \text{hrs of operation} \times \text{electricity cost (\$/kw-hr)} / (\text{SEER} \times 1000)$