

AbsolutAire, Inc.

Engineering Information, Standards & Guidelines

100 cu ft natural gas = 1 therm = 100,000 BTUH = 100 MBH

Natural gas cost (Oct 2008 Kalamazoo) = \$1.15/therm

Electricity cost (Oct 2008 Kalamazoo) = \$0.105/KWH (10.5 cents/KWH)

Electric units - Coil sizing requirements: $Kwh = (CFM \times 1.08 \times \Delta T) / 3415$

BTUH = CFM x 1.14 x ΔT (Approximate – for sales use)

BTUH = (P x Cp x CFM x 60 x ΔT) / 0.92 (Actual). Where P = Air Density at fan, Cp = 0.241 (constant)

Natural Gas: 27.71" w.c. = 1 PSI = 16 ounces/in² Gas Pressure

LP Gas: 93,000 BTU per gallon. LPG cost: approx. \$2.50 per therm

DX Cooling: MBH/12 = Tons of Cooling

DB mixed air = (DB₁ x %₁) + (DB₂ x %₂) 1 = Air Stream 1

WB mixed air = (WB₁ x %₁) + (WB₂ x %₂) 2 = Air Stream 2

Evap Cooling (87% eff): LATdb = EATdb – 0.87(EATdb – EATwb)

ANSI Stds: 100% OA: ANSI Z83.4a, CSA 3.7 (2001) Recirc 80/20 & 85/15: ANSI Z83.18a (2001)
 Spray Bake: ANSI Z83.4 and UL795 Bake Only (Process) & APD90: UL795

Burners:

AA-Series and V-Series Model Units

		<u>Natural Gas</u>		<u>LP Gas</u>	
	<u>MBH/ft</u>	<u>ΔT°F 100% OA</u>	<u>ΔT°F 80/20</u>	<u>ΔT°F 100% OA</u>	<u>ΔT°F 80/20</u>
Maxon NP-LE	750	131	100	95	95
Midco HMA2	650	131	100	95	90
Eclipse	700	143	110	100	95

Burners:

R-Series Model Units

		<u>Natural Gas</u>		<u>LP Gas</u>	
	<u>MBH/ft</u>	<u>ΔT°F 100% OA</u>	<u>ΔT°F 80/20</u>	<u>ΔT°F 100% OA</u>	<u>ΔT°F 85/15</u>
Maxon NP-LE	750	125	100	95	90
Midco HMA2	650	125	100	95	90
Eclipse	700	125	110	95	90

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Motor Drive Losses*:	Up to 1-1/2 HP:	10%	*Fan manufacturers may provide specific values to use in place of these which will supersede these values.
	2 HP to 25 HP:	5%	
	30 HP + higher:	3.5%	

Power used by electric motors: Watts = Motor Efficiency % x Voltage x Amps

Motor HP = Watts/746 or Kw/0.746

Motor run cost per hour = [(HP x 0.746)/Motor Efficiency] x Electricity Cost per KWH

BHP (approximate) = (Volts x Amps x Power Factor x Efficiency x $\sqrt{3}$)/746

Above based on measured electrical data

Velocity Standards:

	<u>Max fpm</u>		<u>Max fpm</u>
Inlet Hoods	600	Steam/HW Coils	1000
Evap Media	500	HiE Filters	500
Inlet Plenums	900	30% Pleated Filters	500
Legs	600	DustLok Filters	450
Cooling Coils	500	Alum Filters (1" & 2")	600 (0.1"pd @ 500 fpm)

Fan Laws: $CFM_n = CFM_o (RPM_n/RPM_o)$

$SP_n = SP_o (RPM_n/RPM_o)^2$

$BHP_n = BHP_o (RPM_n/RPM_o)^3$

Friction Losses: Duct: $H_f = 0.0307 \times (V^{0.533}/Q^{0.612}) \times \text{Length of Duct in feet}$

Elbows: Mitered elbow w/o turning vanes = 1.2 Vp

Mitered elbow w/ turning vanes = 0.6 Vp

Velocity: $V(\text{fpm}) = 4005 \times \sqrt{V_p}$ (in. w.c.)

Metric Conversions: $m^3/S = CFM \times 0.000471947$ $mm = \text{inches} \times 25.4$

$W = \text{BTUH} \times 0.2931$ $kw = \text{HP}/0.7457$

$Pa = \text{in wc} \times 248.84$ $L/s = CFM \times 0.4719$

$KW = (\text{BTUH} \times 0.2931)/1000$ $^{\circ}C = (^{\circ}F - 32) \times 5/9$

$kPa = (\text{in wc} \times 248.84)/1000$ $^{\circ}F = (1.8 \times ^{\circ}C) + 32$

$kPa = 6.895 \times \text{PSI}$

Also see: www.engineeringtoolbox.com for other formulas and tools