# 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 x 1.08 x ΔT)/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/$in^2$ 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 = $(DB_1 \times \%_1) + (DB_2 \times \%_2)$ $_1$ = Air Stream 1
WB mixed air = $(WB_1 \times \%_1) + (WB_2 \times \%_2)$ $_2$ = 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

| | | Natural Gas | | LP Gas | |
|---|---|---|---|---|---|
| | MBH/ft | ΔT°F 100% OA | ΔT°F 80/20 | ΔT°F 100% OA | ΔT°F 80/20 |
| 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

| | | Natural Gas | | LP Gas | |
|---|---|---|---|---|---|
| | MBH/ft | ΔT°F 100% OA | ΔT°F 80/20 | ΔT°F 100% OA | ΔT°F 85/15 |
| 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 √3)/746
*Above based on measured electrical data*

**Velocity Standards:**

| | Max fpm | | Max fpm |
|---|---|---|---|
| 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: $H_f = 0.0307 \times (V^{0.533}/Q^{0.612}) \times$ Length of Duct in feet
Elbows: Mitered elbow w/o turning vanes = 1.2 $V_p$
Mitered elbow w/ turning vanes = 0.6 $V_p$

**Velocity:** V(fpm) = 4005 x √Vp (in. w.c.)

**Metric Conversions:**

| | |
|---|---|
| $m^3/S$ = CFM x 0.000471947 | mm = inches x 25.4 |
| W = BTUH x 0.2931 | kw = HP/0.7457 |
| Pa = in wc x 248.84 | L/s = CFM x 0.4719 |
| KW = (BTUH x 0.2931)/1000 | °C = (°F – 32) x 5/9 |
| kPa = (in wc x 248.84)/1000 | °F = (1.8 x °C) + 32 |
| kPa = 6.895 X PSI | |

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