## Formulas

### Imperial

$$kW = \frac{CFM \times (T°2 - T°1) \times 1.08}{3413}$$

*kW : Power in kW*
*CFM : Air volume in cubic feet per minute*
*T°2 : Temperature of air leaving heater in °F*
*T°1 : Temperature of air entering heater in °F*

### Metric

$$P = \frac{Q \times (T°2 - T°1) \times 1,21}{3600}$$

*P : Power in kW*
*Q : Air volume in $m^3/hr$*
*T°2 : Temperature of air leaving heater in °C*
*T°1 : Temperature of air entering heater in °C*

### KW per square foot

*Imperial*

$$kW / pi^2 = \frac{kW}{S}$$

*kW : Power in kW*
*S : Surface area in square feet*

*Metric*

$$kW / m^2 = \frac{P}{S}$$

*P : Power in kW*
*S : Surface area in $m^2$*

### Duct area

*Imperial*

$$S = \frac{W \times H}{144}$$

*S : Surface area in square feet*
*W : Duct width in inches*
*H : Duct Height in inches*

*Metric*

$$S = W \times H$$

*S : Surface area in $m^2$*
*W :Duct width in meter*
*H : Duct height in meter*

### Electric power

*Single phase*

$$P = V \times I \quad \text{ou} \quad P = \frac{V^2}{R}$$

*3 phase*

$$P = V \times I \times 1.732 \qquad P = \frac{V^2}{R} \times 1.732$$

*P : Power in Watts*
*V : Voltage in Volts*
*R : Resistance in Ω (Ohm)*
*I : Current in Amps*

### Line current

*Single phase*

$$I = \frac{P}{V}$$

*3 phase*

$$I = \frac{P}{V \times 1.732}$$

## Conversions

### ∞F to ∞C

$$∞C = \frac{(∞F - 32)}{1.8}$$

### ∞C to ∞F

$$∞F = (1.8 \times ∞C) + 32$$

### BTU to kW

1 kW = 3413 BTU/hre

### kW to BTU

1 BTU/hre = $0.29307 \times 10^{-3}$ kW

### mm to inches

1 in = 25.4 mm

### Inches to mm

1 mm = 0.03937 in

### CFM to FPM

$$1 \text{ FPM} = \frac{1 \text{ CFM}}{S}$$

*S : Surface area in square feet*

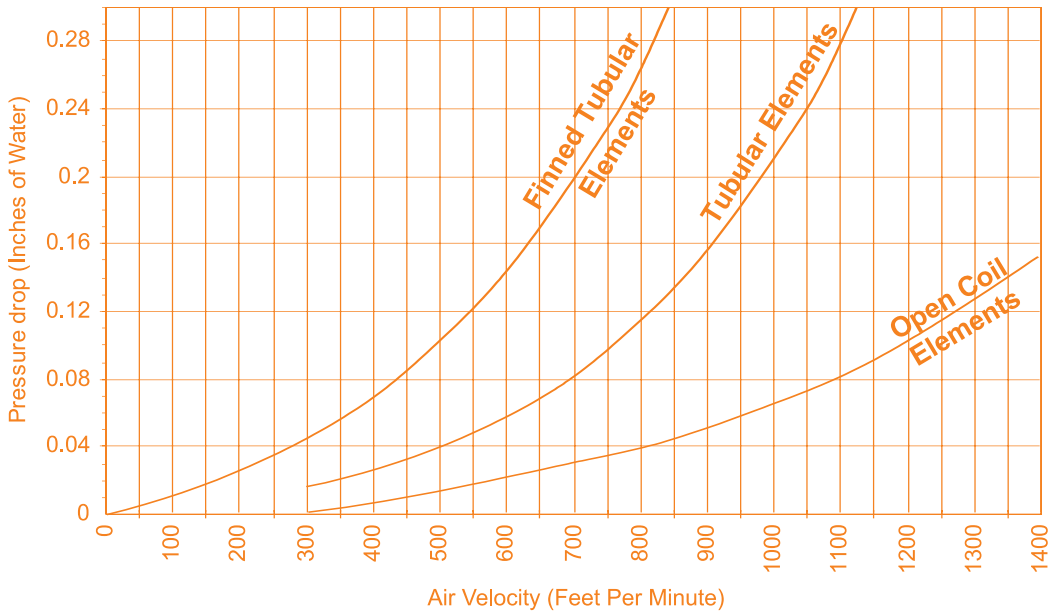
### FPM to CFM

1 CFM = 1 FPM x S

## Selection Guide

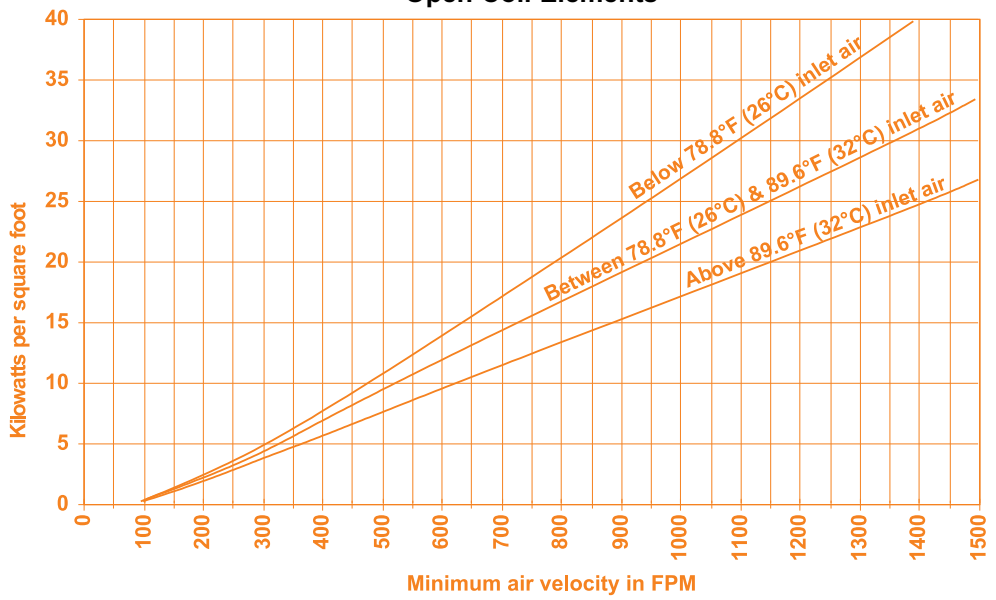
| Element Types | Advantages | Disadvantages |
|---|---|---|
| **Open Coil** | - Excellent heat dissipation<br>- Minimal pressure drop<br>- Fast response time<br>- More kilowatts per sq.ft.<br>- Quick delivery | - Elements in direct contact with air<br>- Cannot be installed in humid environments<br>- Cannot be installed in dusty environments |
| **Standard Tubular** | - Less sensitive to humidity and dust<br>- Suited for demanding environments<br>- Excellent mechanical resistance<br>- Heating element not in direct contact with air | - Increase in pressure drop<br>- Slower response time<br>- Less heat dissipation<br>- Less kilowatt per sq.ft.<br>- Longer delivery |
| **Finned Tubular** | - Good heat dissipation<br>- Less sensitive to humidity and dust<br>- Suited for demanding environments<br>- Excellent mechanical resistance<br>- Heating element not in direct contact with air | - Increase in pressure drop<br>- Slower response time<br>- Less kilowatt per sq.ft.<br>- Longer delivery |

## Static Pressure Loss



## Minimum Air Velocity

### Open Coil Elements




### Tubular Elements