Formulas

Imperial

\[ \text{kW} = \frac{\text{CFM} \times (T^\circ_2 - T^\circ_1) \times 1.08}{3413} \]

- \( \text{kW} \): Power in kW
- \( \text{CFM} \): Air volume in cubic feet per minute
- \( T^\circ_2 \): Temperature of air leaving heater in °F
- \( T^\circ_1 \): Temperature of air entering heater in °F

Metric

\[ \text{P} = \frac{\text{Q} \times (T^\circ_2 - T^\circ_1) \times 1.21}{3600} \]

- \( \text{P} \): Power in kW
- \( \text{Q} \): Air volume in m³/hr
- \( T^\circ_2 \): Temperature of air leaving heater in °C
- \( T^\circ_1 \): Temperature of air entering heater in °C

KW per square foot

\[ \text{Imperial} \quad \frac{\text{kW}}{\text{pi}^2} = \frac{\text{kW}}{\text{S}} \]

\[ \text{Metric} \quad \frac{\text{P}}{\text{S}} \]

- \( \text{S} \): Surface area in square feet

Duct area

\[ \text{Imperial} \quad \text{S} = \frac{\text{W} \times \text{H}}{144} \]

\[ \text{Metric} \quad \text{S} = \text{W} \times \text{H} \]

- \( \text{W} \): Duct width in inches
- \( \text{H} \): Duct height in inches

Electric power

Single phase

\[ \text{P} = \frac{\text{V} \times \text{I}}{\text{R}} \]

3 phase

\[ \text{P} = \frac{\text{V}^2}{\text{R}} \times 1.732 \]

- \( \text{P} \): Power in Watts
- \( \text{V} \): Voltage in Volts
- \( \text{I} \): Current in Amps
- \( \text{R} \): Resistance in \( \Omega \) (Ohm)

Conversions

\( \text{\( ^\circ F \) to \( ^\circ C \)} \)

\[ ^\circ C = \frac{(^\circ F - 32)}{1.8} \]

\( \text{\( ^\circ C \) to \( ^\circ F \)} \)

\[ ^\circ F = (1.8 \times ^\circ C) + 32 \]

BTU to kW

\[ 1 \text{ kW} = 3413 \text{ BTU/hre} \]

kW to BTU

\[ 1 \text{ BTU/hre} = 0.29307 \times 10^{-3} \text{ kW} \]

mm to inches

\[ 1 \text{ in} = 25.4 \text{ mm} \]

Inches to mm

\[ 1 \text{ mm} = 0.03937 \text{ in} \]

CFM to FPM

\[ 1 \text{ FPM} = \frac{1 \text{ CFM}}{\text{S}} \]

FPM to CFM

\[ 1 \text{ CFM} = 1 \text{ FPM} \times \text{S} \]

- \( \text{S} \): Surface area in square feet
### Selection Guide

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

### Static Pressure Loss

![Static Pressure Loss Graph](image-url)
Minimum Air Velocity

Open Coil Elements

Kilowatts per square foot

Minimum air velocity in FPM

Tubular Elements

Kilowatts per square foot

Minimum air velocity in FPM

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