### Percent of Rated Wattage for Various Applied Voltages

<table>
<thead>
<tr>
<th>Applied Voltage</th>
<th>110</th>
<th>115</th>
<th>120</th>
<th>208</th>
<th>220</th>
<th>230</th>
<th>240</th>
<th>277</th>
<th>380</th>
<th>415</th>
<th>440</th>
<th>460</th>
<th>480</th>
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To determine the resultant wattage on a voltage not shown in the chart above, use the following formula:

\[
\text{Actual Wattage} = \frac{\text{Rated Wattage} \times (\text{Applied Voltage})^2}{(\text{Rated Voltage})^2}
\]

Applying higher than the actual rated voltage to heating elements will increase the watt density (watts/in.sq.), which can lead to premature heater failure and/or damage the material being heated.

### Watt Density Calculations

#### Band Heaters

\[
\text{Watts/In}^2 = \frac{\text{Wattage}}{(\text{Diameter} \times 3.1416 \times \text{Width}) - (\text{Cold Area})}
\]

#### Mica Strip Heaters

\[
\text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Heated Length} \times \text{Width}}
\]

#### Cartridge and Tubular Heaters

\[
\text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Diameter} \times 3.1416 \times \text{Heated Length}}
\]

#### Channel Strip Heaters

\[
\text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Heated Length} \times 3.625}
\]

### Ohm's Law

- Volts: \( V = \sqrt{W \times R} \)
- Volts: \( V = \frac{W}{R} \)
- Volts: \( V = I \times R \)
- Amp: \( I = \sqrt{W \times R} \)
- Amp: \( I = \frac{W}{R} \)
- Amp: \( I = \frac{V}{R} \)
- Watts: \( W = V \times I \)
- Watts: \( W = I \times R \)
- Watts: \( W = E \times I \)
- Ohms: \( R = \frac{W}{I^2} \)
- Ohms: \( R = \frac{V}{I} \)
- Ohms: \( R = \frac{E}{I} \)