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>
<th>550</th>
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<tbody>
<tr>
<td>110</td>
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To determine the resultant wattage on a voltage not shown in the chart above, use the following formula:

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/in²), which can lead to premature heater failure and/or damage the material being heated.

Watt Density Calculations

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

- **Cartridge and Tubular Heaters**
  
  \[ \text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Diameter} \times 3.1416 \times \text{Heated Length}} \]

- **Mica Strip Heaters**
  
  \[ \text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Heated Length} \times \text{Width}} \]

- **Channel Strip Heaters**
  
  \[ \text{Watts/In}^2 = \frac{\text{Wattage}}{\text{Heated Length} \times 3.625} \]

**Ohm’s Law**

- **Volts**
  
  \[ \text{Volts} = \sqrt{\text{Watts} \times \text{Ohms}} \]
  
  \[ \text{Volts} = \frac{\text{Watts}}{\text{Amperes}} \]
  
  \[ \text{Volts} = \text{Amperes} \times \text{Ohms} \]

- **Ohms**
  
  \[ \text{Ohms} = \frac{\text{Volts}}{\text{Amperes}} \]
  
  \[ \text{Ohms} = \frac{\text{Watts}}{\text{Amperes}^2} \]
  
  \[ \text{Ohms} = \frac{\text{Volts}^2}{\text{Watts}} \]

- **Amperes**
  
  \[ \text{Amperes} = \frac{\text{Volts}}{\text{Ohms}} \]
  
  \[ \text{Amperes} = \sqrt{\frac{\text{Watts}}{\text{Ohms}}} \]
  
  \[ \text{Amperes} = \frac{\text{Watts}}{\text{Volts}} \]

- **Watts**
  
  \[ \text{Watts} = \text{Volts} \times \text{Amperes} \]
  
  \[ \text{Watts} = \text{Amps}^2 \times \text{Ohms} \]
  
  \[ \text{Watts} = \frac{\text{Volts}^2}{\text{Ohms}} \]