



Statement of down-rating electrical heating elements

Elements are manufactured to voltage and wattage specifications. When more than the design voltage is supplied to the heating element, the element will burn out. When less than design voltage is supplied to the heating element, the element will still heat, but at less than the design value.

For Example:

A 240 volt, 5500 watt heating element will deliver 5500 watts of heat energy into the water.

If 208 volts was supplied to the same heating element, the heating element will deliver only 4131 watts of heat energy into the water.

The formula for this computation is:

$$\frac{\text{new input voltage}^2 \text{ (squared)}}{\text{design input voltage}^2 \text{ (squared)}} = \text{percent devaluation of heating element}$$

$$\frac{208^2}{240^2} = \frac{43264}{57600} = 75.111\% \times 5500 \text{ watts} = 4131 \text{ watts.}$$

How does this affect the heaters performance? The heater takes longer to recover its' contents. Using the same example:

$$\frac{\text{element wattage}}{2.42 \times (\text{temp rise in degrees F}^\circ)} = \text{recovery rate in GPH}$$

$$\frac{5500}{2.42 \times (80^\circ \text{ rise})} = 28.4 \text{ GPH}$$

$$\frac{4131}{2.42 \times (80^\circ \text{ rise})} = 21.3 \text{ GPH}$$

These are performance characteristics of the electric heating element. Rheem Manufacturing does not recommend the down-rating of electrical heating elements.