

## DETERMINE APPROPRIATE WATT DENSITY

**Watt density** is the rated wattage of an element per unit of surface heated area (usually square inches), and indicates the potential to transmit heat. The formula is as follows:

$$\text{Watt Density} = \frac{\text{Rated Wattage}}{\text{Heated Surface Area}}$$

For example, a **Mighty Watt**, ½" x 12" (MWEJ12A0191) is rated 1000 watts. The standard cold section each end is ¾" per the specifications in the catalog section. The total cold area is ¾" making the heated length 11¼". Then:

$$\text{Watt Density} = \frac{\text{Rated Wattage}}{\text{Dia. x Heated Length x 3.14}}$$

$$\text{Watt Density} = \frac{1000}{.496 \times 11.25 \times 3.14}$$

$$\text{Watt Density} = 57 \text{ Watts/sq.in.}$$

As the definition indicates, the higher the watt density, the greater the possibility for excessive sheath temperatures. When designing the system, spreading the wattage requirement over more or larger heaters will reduce the operating watt density. Sheath temperatures will be reduced, increasing the heater's length of service. Note that every **OGDEN** heater has watt density and sheath temperature limitations shown in each catalog section.

Recommended allowable ratings for various materials, temperature conditions, and application considerations are also shown in the catalog sections and in the following pages. See Chart 23T. Certain materials such as water, vegetable oils, and metals have high conductivity rates. The heat generated travels quickly from the element and through the medium, allowing these materials to be heated at relatively high watt densities. Fuel oils, lubricating oils, hydraulic fluid, and other materials with low conductivity rates such as sugar syrups and most gasses must be heated at low watt densities. A major concern is to dissipate the heat generated by the element. If attention is not paid to guidelines for both the heater and the material being heated, watt densities too high will result in failure of the elements and possible damage to the material and equipment.