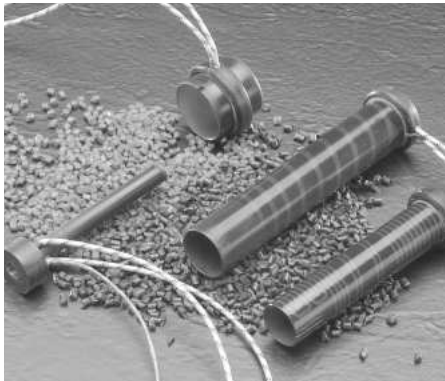


## Thick Film Heaters

### Thick Film Heating Technology

#### Nozzle Heater



Because the hot runner nozzle is the final melt path between the manifold and the gate area, temperature uniformity is critical to avoid differences in melt viscosity. Whether it's hot spots causing thermal degradation of the plastic, or cold spots causing flow restrictions, both affect the final part quality and consistency from shot to shot.

Watlow's innovative thick film heating technology provides the injection molding industry with a patented (U.S. patent number 5,973,296) high-performance, low profile hot runner nozzle heater. The direct surface contact of the thick film material to the cylindrical stainless steel sleeve creates optimal heat transfer while the non-porous glass film prevents moisture absorption resulting in dielectric failure in other heaters.

#### Features and Benefits

- **Uniform thermal profile and ability to pattern heater layout** results in uniform melt temperature for equal cavity filling and improved part quality; eliminates hot and cold spots.
- **Low thermal mass** allows quicker heat up and less thermal lag between the heater and the nozzle.
- **Extremely low radial profile** allows closer pitch – center-to-center distance – between nozzles for higher nozzle density and more parts per mold.
- **Moisture-resistant non-porous glass film construction** eliminates need for soft starting, minimizes current leakage and ultimately reduces cost by eliminating special need of GFI protection.
- **UL®, CSA and CE pending.** Contact factory for current status of agency approval.

#### Installation

The thick film nozzle heaters are designed with the optimum diametric clearance of 0.0015 inch (0.038 mm) above the actual nozzle. This clearance allows for easy insertion and removal of the heater and excellent heat transfer without the need for clamping, anti-seize or heat sink compound with the thick film nozzle heater.

Nozzle surface preparation may be necessary if the nozzle has any surface contamination or other

irregularities. Cleaning of the used nozzle body surface is easily accomplished with light sand blasting of the surface and then a light buffing of the surface with a piece of emery cloth. After the cleaning operation the nozzle heater should slip on and off very easily. Forcing a heater on to a nozzle may result in heater damage and possible failure after it has been in operation.

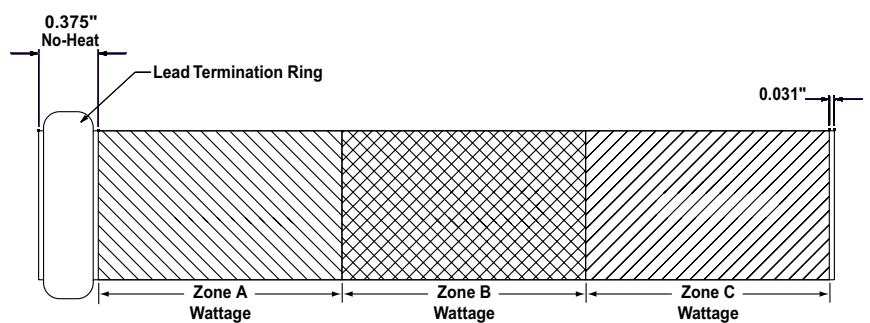
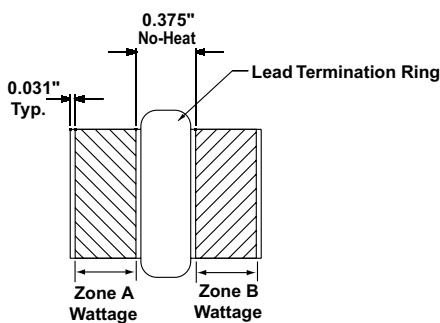
#### Substrate I.D.

- 0.25 inch (6.35 mm) to 1.5 inch (38.1 mm)

#### Substrate Length

- 1 inch (25.4 mm) to 8 inches (203.2 mm)
- Consult factory for other diameters and lengths.

#### Distributed Wattage



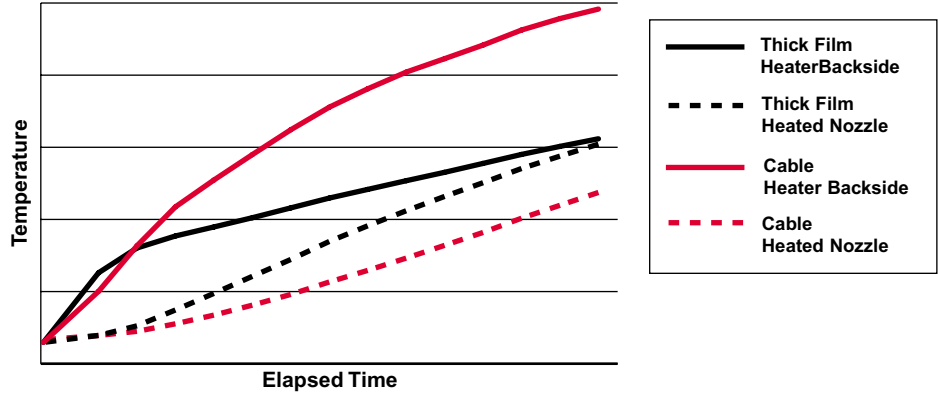
# Thick Film Heaters

## Thick Film Heating Technology

### Nozzle Heater

Continued

### Thick Film Nozzle Heater Response Test Thick Film vs. Axial Clamped Cable



Watlow thick film technology heaters offer five distinct competitive advantages over cable heater technology:

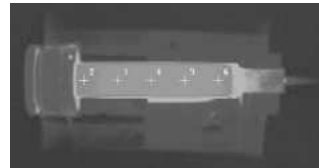
- 1. Uniform temperature profile
- 2. No requirement for clamping of the heater
- 3. High dielectric barrier with agency recognition pending UL®, CSA and CE – eliminates need for softstart
- 4. Lower heater operating temperatures
- 5. Precise and repeatable wattage distribution

### Precise Wattage Distribution

Thick film nozzle heaters rated to 1025°F (550°C) provide superior temperature uniformity by putting the energy exactly where it is needed.



Temperature distribution using standard coiled cable heater.



Temperature distribution using thick film heating technology.