

Tubular and Process Assemblies

WATROD Heating Elements

Single- and Double-Ended Elements

Available in single- or double-ended termination styles, the versatile and economical WATROD tubular heating element lends itself to virtually the entire range of immersion and air heating applications.

The single-ended WATROD tubular design has both terminals at one end. The opposite end is sealed. Standard 12-inch (305 mm) flexible lead wires are crimp connected to the terminal pin and have silicone-impregnated fiberglass oversleeves.

The double-ended WATROD, with its round cross-sectional geometry, is highly adaptable for bending—especially when bending is performed in the field.

Watlow's new double-sided multicoil tubular elements offer various combinations of resistor coils and thermocouples inside one sheath. They have the ability to sense the heater's internal temperature accurately every time, or offer three-phase capability in one element. Both single- and double-ended WATRODs share many construction features that deliver long life—the resistance wire is centered in the heater sheath and electrically insulated with compacted, high-grade magnesium oxide for superior heating performance.

WATROD heating elements have a variety of mounting and termination options that make them highly popular among industrial customers.

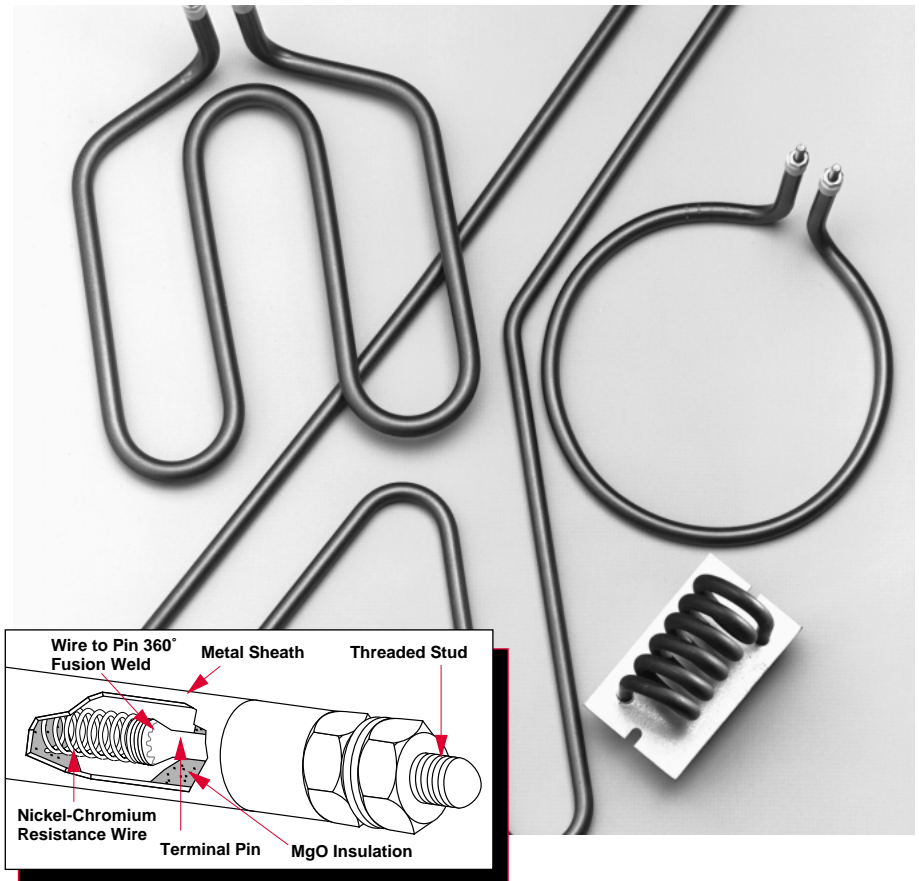
Single-Ended WATROD Performance Capabilities

- Watt densities to 45 W/in² (6.9 W/cm²)
- UL® and CSA component recognition to 240V~(ac)
- Incoloy® and stainless steel sheath temperatures to 1200°F (650°C)

Double-Ended WATROD Performance Capabilities

- Watt densities up to 120 W/in² (18.6 W/cm²)

UL® is a registered trademark of Underwriter's Laboratories, Inc.



- UL® and CSA component recognition to 480 and 600V~(ac) respectively
- Inconel® sheath temperatures to 1800°F (982°C)
- Incoloy® sheath temperatures to 1600°F (870°C)
- Stainless steel sheath temperatures to 1200°F (650°C)
- Steel sheath temperatures to 750°F (400°C)
- Copper sheath temperatures to 350°F (175°C)
- Inconel® 600 sheath temperatures to 1800°F (982°C)

Features and Benefits

- **Precision wound nickel-chromium resistance wire** distributes heat evenly to the sheath for optimum heater performance.
- **Silicone resin seals** protect against moisture contamination and are rated to 390°F (200°C).

- **MgO insulation filled sheath** maximizes dielectric strength, heat transfer and life.
- **Standard sheath materials include:** copper, steel, 316 stainless steel and Incoloy®. Optional materials, available on made-to-order, include 304 stainless steel, Inconel® Monel® and titanium.
- **36 standard bend formations** allow forming the heating element to the application. Spirals, compound bends and multi-axis and multi-plane configurations.
- **Resistance wire fusion welded to the terminal pin** for a stronger, positive electrical connection.
- **Stainless steel studs** are fusion welded to terminal pins for mechanical strength with ceramic insulators.
- **Popular termination, mounting and moisture seal options available.**

Incoloy®, Inconel® and Monel® are registered trademarks of Special Metals Corporation.

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High Temperature Tubular Double-Ended Elements



Watlow manufactures high temperature tubular heaters to bridge the gap between standard tubular heaters and Watlow multicell heaters. This new tubular is well suited for process air heating applications in excess of 1300°F (704°C), resulting in a maximum sheath temperature of 1800°F (983°C). Controlled lab testing between the new design and

current tubular designs show an increase in life of approximately 50 percent.

The high temperature tubular consists of an engineered tubing with an outer sheath of Inconel® 600 and a special internal construction. The outer sheath offers high temperature capabilities, reduced oxidation, as well as corrosion resistance.

The new tubular offering is available in 0.430 and 0.375 inch diameters that are configurable either as formed tubulars or process heaters. The heaters can also be welded to flanges and plates for mounting purposes. Maximum sheath length available is 275 inches for the 0.430 inch and 0.375 inch diameters. The factory should be contacted for longer sheath lengths.

Features and Benefits

- **Inconel® 600 sheath material and a special internal construction** assures high temperature performance and corrosion protection in tough applications.

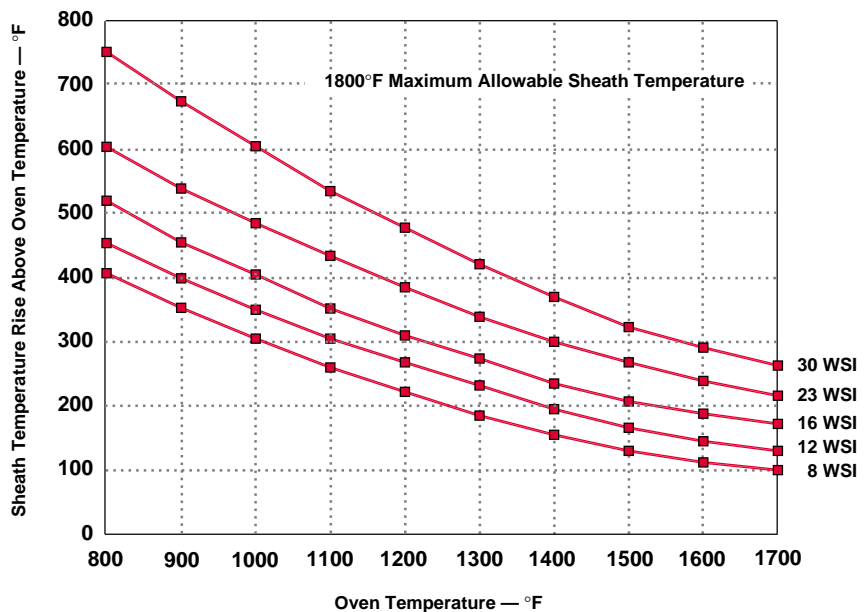
- **0.375 in and 0.430 in diameters** allow heater to be configured to existing tubular designs that may be experiencing short life.
- **Dual-ended termination** can be installed into flanges and screw plugs similarly to standard product configurations.
- **Bendable in standard formations** makes the heater easy to apply in a wide variety of applications.

Applications

- High temperature ovens and furnaces
- Radiant heating
- Drying
- Environmental—VOC abatement
- Process air heating: duct heaters, circulation heaters
- Vacuum applications
- Flue gas cleaning (desulphurization)
- Fluidized beds

Sheath Temperature Versus Oven Temperature at Various Watt Density

This chart is used to verify the correct watt density for an oven application assuming no air flow. To use the chart, first select the oven process temperature on the X axis, using the chosen watt density read the sheath temperature rise above oven temperature from the Y axis. This number should then be added to oven temperature. If this number is greater than 1800°F (982°C), a lower watt density should be chosen.



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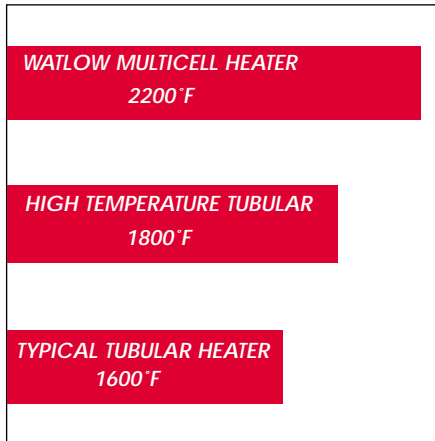
WATROD Heating Elements

High Temperature Tubular Double-Ended Elements

Continued

Heater Life Estimate Service

High Temperature Heater Comparisons



*Assuming normal design practices.

Watlow now provides an industry first service with the offering of the high temperature tubular. By providing operating parameters Watlow can provide customers with the estimated life of the heater. To get this information the following information should be provided:

- Heater voltage
- Heater wattage
- Heater diameter (0.430 in or 0.375 in)
- Heated length
- Bend configuration and dimensions (# of bends and radius)
- Application including process temperature
- Power switching device and cycle time (SCR, etc.)

WATROD

F.O.B.: Hannibal, Missouri

How to Order

To order please specify:

- Volts
- Watts
- Heater diameter (0.430 in or 0.375 in)
- Termination type or style (studs, lead wire)
- Heated length
- Cold end length
- Overall sheath length
- Formation
- Mounting option (bulkheads, brackets, etc.)