

## Tubular Heaters Heat Up the Foodservice Industry

When there's a need for heat in your foodservice equipment application—from fryers to griddles to ovens—turn to Watlow, the leader with more than 25 years experience providing heating solutions to the foodservice equipment market. Using Watlow's WATROD round tubular and FIREBAR® flat tubular heating elements in the cooking process promotes faster cooking, consistent food preparation, ease of operation and low maintenance.

These reliable, versatile heating elements can be configured with a variety of wattage and voltage ratings, terminations, sheath materials and mounting options to satisfy the most demanding foodservice applications.

### Advantages

- Watlow's heaters for the foodservice industry are constructed with epoxy or silicone seals to combat moisture contamination from environmental kitchen conditions.
- Compacted MgO insulation transfers heat away from resistance wire to sheath material and media more efficiently resulting in faster heat up.
- Over 36 standard and a virtually limitless array of custom bend formation options enable the heating element to be designed around available space to maximize heating efficiency.



### Applications

- Griddles
- Rotisserie ovens
- Convection ovens
- Combi ovens
- Conveyor ovens
- Fryers
- Steamers
- Smokers
- Warewashers
- Warming cabinets
- Toasters
- Other clamp-on applications



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## Fast Heat-up with Flat Surface Technology

Watlow's FIREBAR heaters with flat surface technology provide faster heat-up and recovery times than standard round tubular heaters. Their unique shape minimizes coking and oil degradation, and enhances the flow of the oil past the element's surface, helping to pull heat away from the heater sheath. The heater lasts longer because it runs at a significantly lower sheath temperature than an equal watt density standard round tubular. This also prolongs the life of the oil or shortening and reduces costs from frequent changing.

Because of its design and geometry, a FIREBAR heater will heat viscous fluids from ambient temperature faster than tubular elements with the same wattage and at a lower sheath temperature. Other advantages of the FIREBAR heater's flat surface technology include:

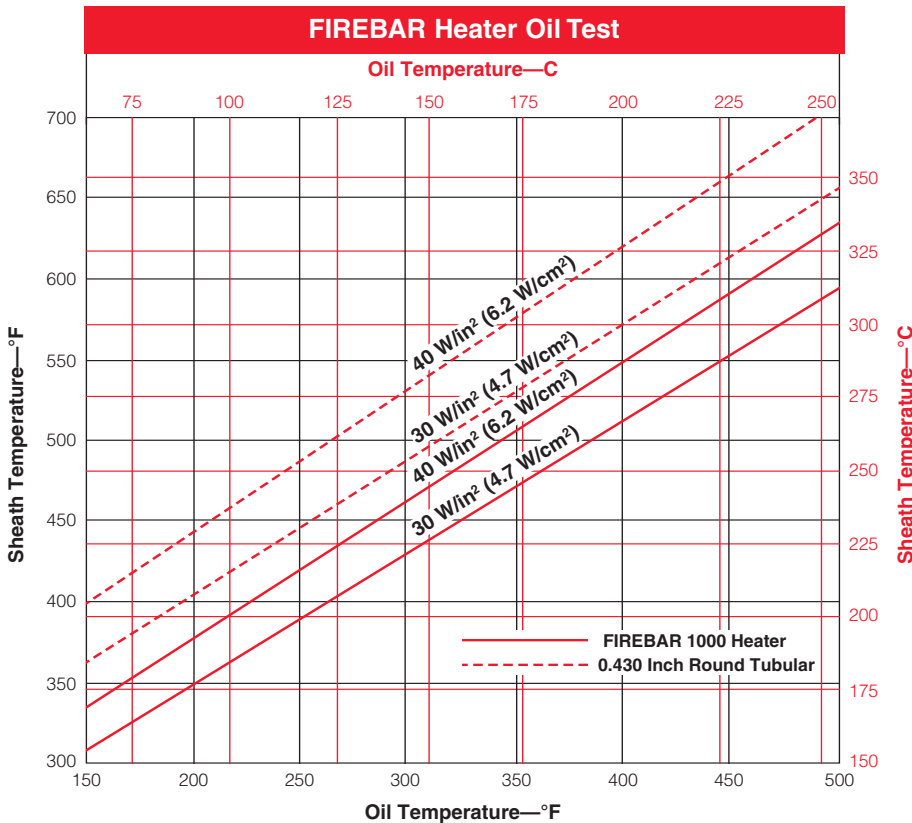
- **Buoyancy force** – The flat geometry of the FIREBAR heater creates the physical principle of buoyancy force that lifts the oil into the work zone and makes this product superior to round tubular heaters.
- **Smaller dimension normal to the flow** – The element's width or thickness is 0.235 in. (5.9 mm). Compared to a 0.430 in. (11 mm) round tubular element, this relative thinness further reduces drag on liquids or gases flowing past the heater, resulting in better heat transfer, quicker heat up and lower sheath temperature.



- **Reduced watt density** - The surface area per linear inch of a FIREBAR is 70 percent greater than the 0.430 inch (11 mm) diameter round tubular element. The FIREBAR, is nearly 13 percent greater. This translates into longer heater life with optimum performance.

The lower profile design of the 5/8-inch FIREBAR heater packages 13 percent greater wattage than an equal length, commonly used tubular heater. This heater is available in two-coil construction, while the one-inch FIREBAR heater offers three-coil, three-phase construction.

Perfect for oil immersion applications, such as open and pressure fryers or smaller countertop fryers.



Watlow's FIREBAR flat tubular heaters are ideal for fryer applications because its shape lifts the oil into the work zone superior to traditional round heaters.

### FIREBAR Heater Oil Test 40 W/in² (6.7 W/cm²)

Tested at different temperatures in light oil, the sheath temperature of a FIREBAR heater is constantly lower than that of a tubular element. In fact, the sheath temperature of the FIREBAR heater at 40 W/in² (6.7 W/cm²) is lower than a 30 W/in² (4.6 W/cm²) tubular.

## FIREBAR Features

- **Nichrome resistance wire.** High grade resistance wire is precisely wound to provide the heat required for your application.
- **Magnesium oxide (MgO) insulation.** High purity material is compacted around the coils for optimum thermal conductance and dielectric strengths.
- **Sheath material.** Incoloy® and 304 stainless steel are available. 304 stainless steel is limited to 650°C (1200°F) maximum sheath temperature. Incoloy® is limited to 760°C (1400°F) maximum.
- **Lead wire termination** ranging from 90 to 250°C (194 to 482°F) construction. Fiberglass sleeving combined with epoxy, Lavacone or RTV seal provide protection against moisture entry and excellent dielectric strength for operation up to and including 480V~(ac).

## FIREBAR Specifications

- Dimensions: one-inch FIREBAR: 1.010 inch (25.7 mm) height, 0.235 inch (5.9 mm) thickness; 5/8-inch (16mm) FIREBAR: 0.650 inch (16.5 mm) height, 0.235 inch (5.9 mm) thickness
- Watt densities:  
One-inch (25 mm) FIREBAR, double-ended, up to 120 W/in<sup>2</sup> (18.6 W/cm<sup>2</sup>), single-ended, up to 60 W/in<sup>2</sup> (9.3 W/cm<sup>2</sup>); 5/8-inch (16mm) FIREBAR, double-ended, up to 90 W/in<sup>2</sup> (13.9 W/cm<sup>2</sup>), single-ended, up to 80 W/in<sup>2</sup> (12.4 W/cm<sup>2</sup>)
- Incoloy® sheath temperatures to 760°C (1400°F)
- 304 stainless steel sheath temperatures to 650°C (1200°F)
- Three resistance coil design, available in 1- or 3-phase on FIREBAR only
- Amperages on FIREBAR to 48 amps per heater or 16 amps per coil; amperages on FIREBAR to 25 amps per heater on single-ended and 32 amps per heater or 16 amps per coil on double-ended
- Mounting options: mounting brackets, water-tight bulkheads, water-tight double leg threaded fitting
- UL® and CSA component recognition, CE (Declaration of Conformity) available on request

## Reliable and Versatile Heating with Round Tubular Heaters

Watlow's WATROD tubular heating elements are versatile, economical and used for virtually the entire range of foodservice heating applications, from radiant and convection ovens, immersion heating in steam tables, to fryers or warewashing equipment. These versatile, reliable heaters provide uniform heat distribution and can be bent to almost any shape to fit your foodservice application needs.

## WATROD Features

- **Precision-wound nickel chromium resistance wire** distributes heat evenly to the sheath for optimum heater performance and consistent cooking processes.
- **Epoxy or silicone resin seals** protect against moisture contamination and are rated up to 390°F (200°C).
- **Sheath materials** Incoloy® 800 or 840, 316 stainless steel, 304 stainless steel, steel or copper.
- **MgO insulation** filled sheath maximizes dielectric strength, heat transfer and life.
- **Resistance wire** fusion welded to the terminal pin provides a stronger, positive electrical connection for longer heater life.
- **Stainless steel studs** are fusion welded to terminal pins for mechanical strength with ceramic insulators.
- **Ceramic insulators** isolate terminations from grounded metal sheaths.



## WATROD Specifications

- Watt densities: double-ended up to 120 W/in<sup>2</sup> (18.6 W/cm<sup>2</sup>) single-ended up to 45 W/in<sup>2</sup> (6.9 W/cm<sup>2</sup>)
- Incoloy® sheath temperatures to 870°C (1600°F)
- Stainless steel sheath temperatures to 650°C (1200°F)
- Steel sheath temperatures to 400°C (750°F)
- Copper sheath temperatures to 175°C (350°F)
- Mounting options: mounting brackets, locator washers, mounting collars, water-tight bulkheads
- UL® and CSA component recognition for double-ended to 480 and 600V~(ac) respectively and single-ended to 240V~(ac), CE (Declaration of Conformity) available on request

Incoloy® is a registered trademark of Special Metals Corporation.  
UL® is a registered trademark of Underwriter's Laboratories, Inc.

## Smart Heating Elements Provide System Data Relevant to Equipment Maintenance, Safety and Automation

Watlow's smart heating elements, such as FIREBAR and tubular heaters, are equipped with a sensor inside the heater. When used with automated cooking components, such as the Diagnostic Module (DM), WATLINK™ software, or MINICHEF® cooking computers, they provide important system data relevant to equipment maintenance, safety and automation. These smart components provide data for liquid level sensing, high temperature conditions, dry fire limits, service functions for cleaning and component failure prediction and detection and provide the following benefits:

- **Burnout failure detection** – detects when a heater has failed and prevents the chance of under cooked food.
- **Failure prediction** – estimates when a heater needs to be replaced, so components can be serviced during slow periods or after business hours, reducing equipment downtime. Because the heater is replaced before failure, it also prevents the possibility of unsafe, under cooked food.
- **High/low temperature safety alarm** – alerts when sufficient heat levels are not being generated to assure the quality of the cooking process; determines if the element is operating above safe temperature limits by sensing an abnormally high heater sheath temperature, indicating the potential for burning the cooking media. The components also help meet HACCP standards and requirements for diagnostic and heating elements by logging data including cooking history.
- **Low liquid level safety alarm** – indicates that the product being cooked could be above the liquid level and being cooked improperly.
- **Service alarm** – indicates that an element immersed in oil is coked and not properly heating to set temperature, risking the integrity of the cooking process; measures delta temperature between a clean element and one that needs cleaning and provides a service element alarm.
- **Closed-loop element soft start** – maximum sheath temperatures can be maintained on initial startup to prevent fires or over-temperature media conditions when hard shortening is used.
- **Closed-loop element burnoff** – allows the fryer operator to carbonize a contaminated element at high temperatures for ease in cleaning.

Watlow can provide any combination of resistance coil and thermocouple in a FIREBAR or multicoil tubular heater. Watlow's patent-pending method of packaging a thermocouple inside of a heater with one or more resistance coils gives you the ability to accurately sense a heater's internal temperature, and reduces separate parts needed and assembly costs.

As the first tubular heater in the industry with three-phase capability, the multicoil heater offers a lower amperage solution while delivering the full power needed in a compact heater package. Previously, three separate heaters would have been required to do the same job. Because only one element is required, installation time and overall costs are reduced.

### Smart Tubular Heater Specifications

Watlow can supply up to two coils in a 0.375- or 0.430-inch diameter heater and up to three coils in a 0.475- or 0.490-inch diameter heater in any combination of resistance wire and/or thermocouple.

- 3-phase tubular, 0.475 and 0.490 inch diameter
- 1-phase tubular with two resistance wires and one thermocouple, 0.475 and 0.490 inch diameter
- 1-phase tubular with one resistance wire and two thermocouples, 0.475 and 0.490 inch diameter
- 1-phase tubular with three different 1-phase circuits, 0.475 and 0.490 inch diameter
- 1-phase tubular with two resistance coils, 0.375, 0.430, 0.475 and 0.490 inch diameter
- 1-phase tubular with one resistance coil and one thermocouple, 0.375, 0.430, 0.475 and 0.490 inch diameter
- Termination style – lead wires 200°C (392°F) Sil-A-Blend™ wire or 250°C (482°F) TGGT
- Moisture seals: standard epoxy with temperature rating to 130°C (266°F) or 176°C (350°F) for water/oil applications. Consult factory for other options.
- Maximum sheath trim length, 120 inches (3048 mm). For longer lengths, consult factory
- For internal thermocouple, Type K is used

### Smart FIREBAR Specifications

Watlow can supply up to three coils in single- or three-phase with one or two thermocouples in the FIREBAR 1000 and two coils with one thermocouple or one coil with one thermocouple, single-phase only in the FIREBAR 625.

- Termination style – lead wires 200°C (392°F) Sil-A-Blend™ wire or 250°C (482°F) TGGT
- Moisture seals: standard epoxy with temperature rating to 130°C (266°F) or 176°C (350°F) for water/oil applications. Consult factory for other options
- Maximum sheath trim length, 120 inches (3048 mm). For longer lengths, consult factory
- For internal thermocouple, Type K is used