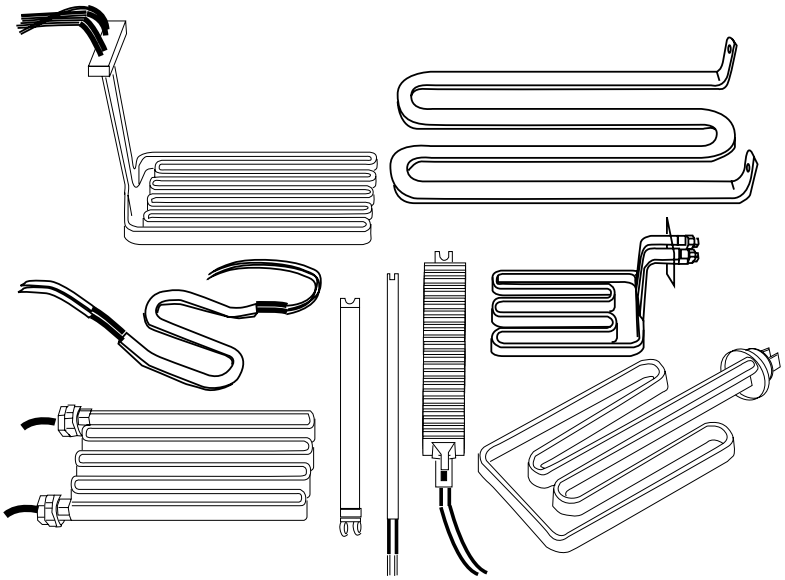
# F I R E B A R ®

# Provides Superior Heating Performance Over Standard Round Tubular Heating Elements



FIREBAR® heating elements provide added heating performance over standard round tubular heating elements—especially for immersion applications in petroleum based liquids that require high kilowatts. The FIREBAR's unique flat surface geometry packs more power in shorter elements and assemblies, along with a host of other performance improvements. These include:

- Minimizing coking and fluid degrading
- Enhancing the flow of fluid past the element's surface to carry heat from the sheath
- Improving heat transfer with a significantly larger boundary layer that allows much more liquid to flow up and across the sheath's surface

FIREBAR elements are available in single- and double-ended constructions with one inch or ⅝ inch heights. These two configuration variables make it possible to use FIREBAR elements instead of round tubular elements in many applications.

| Features | Benefits |
|---|---|
| ***One inch Features Double-Ended*** | |
| • Streamline, 0.235 x 1.010 inch (5.9 x 25.6 mm) normal to flow dimension | • Reduces drag and improves heat transfer |
| • 70 percent greater surface area per linear inch compared to 0.430 inch diameter tubular heater | • Reduces watt density or packs more kilowatts in smaller bundles |
| • Compacted MgO insulation | • Maximizes thermal conductivity and dielectric strength |
| • Precision wound nickel-chromium resistance wires | • Provide high temperature capability |
| • 0.040 inch (1 mm) thick MgO walls | • Transfer heat away from the resistance wire to the sheath and media more efficiently—conducts heat out of the element faster |
| • 360° fusion welded wire-to-pin connection | • Ensures reliable electrical connection |

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# F I R E B A R

## Features con't.

- Three resistance coil design
- Lavacone seals

***Single-Ended***

- Single-ended termination
- Streamline, 0.235 x 1.010 inch (5.9 x 25.6 mm) normal to flow dimension
- 70 percent greater surface area per linear inch
- Slotted end
- Lavacone seals

***⅝ inch Features***
***Double-Ended***

- Special sheath dimensions, 0.235 x 0.650 inch (5.9 x 16.5 mm)
- 10 percent greater surface area per linear inch
- 0.040 inch (1 mm) thick MgO walls
- Lavacone seals

***Single-Ended***

- Single-ended termination
- Special sheath dimensions, 0.235 x 0.650 inch (5.9 x 16.5 mm)
- Slotted end
- Lavacone seals

## Benefits con't.

- Configurable to either 1- or 3-phase power; readily adapts to a variety of electrical sources and wattage outputs
- Provide protection against humid storage conditions, moisture retardant to 390°F (200°C)
- Simplifies wiring and installation
- Reduces drag
- Reduces the watt density from that of the 0.430 inch (11 mm) diameter round tubular heater
- Provides ease of installation in clamp-on applications
- Provide protection against humid storage conditions; moisture retardant to 390°F (200°C).
- Result in a lower profile heater
- Reduces the watt density from that of the 0.430 inch (11 mm) diameter round tubular heater
- Efficiently transfer heat away from the resistance wire to the heated media—conducts heat out of the element faster
- Provide protection against humid storage conditions; moisture retardant to 390°F (200°C).
- Simplifies wiring and installation
- Result in a lower profile heater for more wattage in a smaller package
- Supplied for installation ease in clamp-on applications
- Provide protection against humid storage conditions, moisture retardant to 390°F (200°C).

## FIREBAR Performance Features

FIREBAR's flat tubular element geometry produces performance features and benefits not possible with traditional round tubular technology. The following describes how and why the FIREBAR is functionally superior for many applications - especially those requiring high wattage with low watt density.

***By using the FIREBAR element you can:***

- Lower the element's watt density
- Reduce element size and keep the same watt density
- Increase element life by reducing sheath temperature

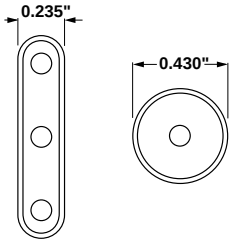
***Flat Shape Produces Lower Sheath Temperature***

The FIREBAR element operates at a lower sheath temperature than a round tubular element of equal watt density because of three factors:

1) Flat Surface Geometry
FIREBAR's flat, vertical geometry is streamlined. The liquid's flow past the heating element's surface is not impaired by back eddies inherent in the round tubular shape. The FIREBAR's streamlined shape results in fluids flowing more freely with more heat being carried away from the sheath.

2) Normal to the Flow
The element's width (thickness) of both one inch and ⅝ inch FIREBAR elements is just 0.235 inch (5.9 mm). Compared to a 0.430 inch (11 mm) round tubular element, this relative thinness further reduces drag on liquids or gases flowing past the heater.

**Comparative Widths**




3) Buoyancy Force
The FIREBAR element's boundary layer, or vertical side, is greater than virtually all round tubular elements. This is 1.010 and 0.650 inches (25.6 and 16.5 mm) for one inch and ⅝ inch FIREBARs respectively, compared to a 0.430 inch (11 mm) diameter on a round tubular element. The FIREBARs element's increased height, relative to flow, increases the buoyancy force in viscous liquids. This buoyancy force can be as much as 10 times greater depending on the FIREBAR element and liquid used.

***Watt Density and Surface Area Advantages***

The surface area per linear inch of a one inch FIREBAR is 70 percent greater than the 0.430 inch (11 mm) diameter round tubular element. And for the ⅝ inch FIREBAR it's nearly 10 percent greater.

## Flat vs. Round Geometry Comparisons

The unique flat surface geometry of the FIREBAR element offers more versatility in solving heater problems than the conventional round tubular element. The following comparisons show how the FIREBAR element consistently outperforms round tubular heaters. FIREBAR elements can:

- Reduce coking and fluid degrading
- Increase heater power within application space parameters
- Provide superior heat transfer in clamp-on applications resulting from greater surface area contact
- Lower watt density

Reducing watt density or sheath temperature extends life. The FIREBAR element allows you to do either, without sacrificing equipment performance.

## Options

**Mounting Brackets**
Steel brackets provide element mounting in non-pressurized applications. In air heating applications, an 18 gauge aluminized steel bracket is press fitted to the element. A ¼ inch (6 mm) thick steel bracket is brazed or welded liquid-tight to the element for liquid heating. Upon request, stainless steel brackets can be provided. Special sizes also available.

The bracket is located ½ inch (13 mm) from the sheath's end, unless otherwise specified. Available on ⅝ inch FIREBAR as Made-to-Order only.

**Water Tight Bulkheads**
A threaded ¾ inch-16 UNF-2A stainless steel bushing with flange on the heater sheath provides rigid, leak-proof mounting through tank walls. A gasket, plated steel washer and hex nut are included. Available on one inch FIREBAR only.

**Water-Tight Double Leg Threaded Fitting**
A threaded 1⅝ inch-10 UNC stainless steel fitting with flange on the heater sheath provides rigid, leak-proof mounting through tank walls. This fitting allows both legs of the heater to pass through the same opening. A gasket, plated steel washer and hex nut are included. The threaded end of the bulkhead is mounted flush with the sheath's end, unless otherwise specified. Available on one inch FIREBAR only.

**Surface Finish**
*Glass Beading*
Glass beading removes oxide from the sheath's surface to produce a mechanical bright finish.

*Passivation*
During manufacturing, particles of iron or tool steel may be embedded in the stainless steel or alloy sheath. If not removed, these particles may corrode and produce rust spots. For critical sheath applications, passivation will remove free iron from the sheath.

**Internal Thermocouples**
To provide protection against element over-temperature conditions, one inch single- and double-ended FIREBAR elements can be ordered with ANSI Type J or K thermocouples. This is accomplished by eliminating the center resistance coil and embedding the thermocouple junction inside the sheath. Thus thermocouples are available only on two resistance coil, 1-inch FIREBAR elements.

## Ordering Information

**How to Order**
To order a stock FIREBAR heating element, specify:
- Watlow code number (from Watlow Heater's Catalog)
- Size (1 or ⅝ inch)
- Type (single- or double-ended)
- Volts / watts
- Termination options
- Options
- Quantity

If our stock units do not meet your application needs, Watlow can provide a Made-to-Order unit, please specify:
- Type of application, including heated material, operating temperature, etc...
- Size (1 or ⅝ inch)
- Type (single- or double-ended)
- Volts / watts
- Sheath length and material
- Heated length
- No-heat length
- Terminal pin length or termination options
- Moisture seal
- Bend configuration - including dimensions, critical tolerances, major and minor axis bends (please send drawing if possible)
- Options, including external finish and mounting method
- Quantity

**Availability**
1 and ⅝ Inch Double-Ended
Straight Length Element
**Stock:** Same day shipment
**Modified Stock** (Stock units with catalog options): 3-5 working days
**Standard:** 3 weeks
**Made-to-Order:** 4-5 weeks

Formed Element
**Modified Stock** (Stock units with catalog options): 5-7 working days
**Standard:** 3 weeks
**Made-to-Order:** 4-5 weeks

1 and ⅝ inch Single Ended
Straight Length Element
**Stock:** Same day shipment
**Modified Stock** (Stock units with catalog options): 3 working days
**Made-to-Order:** 4-5 weeks

Formed Element
**Modified Stock** (Stock units with catalog options): 3 working days
**Made-to-Order:** 4-5 weeks

Options, complexity and quantity may affect availability and lead-times. Consult factory.