

## Revolutionizing the Heater Industry

The FIREROD® revolutionized the heating element industry in 1954 when it was patented as the first swaged cartridge heater. With premium materials and tight manufacturing controls, the FIREROD heater continues to provide superior heat transfer, uniform temperatures and resistance to oxidation and corrosion even at high temperatures.

Thermal Solutions of Texas' FIREROD offers many delivery programs to meet your needs: same day shipment, ship-to-stock or just-in-time. Our experience in customized engineering is reflected in over 250,000 FIREROD cartridge heater designs. Stock or made-to-order, Thermal Solutions delivers heat in a hurry.



## Applications

- Molds, Dies and Platens
- Hot plates and Sealings
- Fluid heating
- Life sciences
- Aerospace and Semiconductor
- Foodservice equipment

## Features and Benefits

- Nickel-chromium resistance wire assures even, efficient distribution of heat to the sheath
- Conductor pins ensure trouble-free, electrical continuity
- Magnesium oxide insulation of specific grain and purity results in high dielectric strength and faster heat-up
- Incoloy® sheath resists oxidation and corrosion
- Minimal spacing between element wire and sheath results in lower internal temperature, providing the ability to design with fewer or smaller heaters that operate at higher watt densities
- UL® and CSA approved flexible stranded wires available, insulating temperatures of 250°C (480°F)
- Patented Lead Adapter (LA) method allows same day shipment on more than 150,000 stock FIRERODs

### Applications and Technical Data

#### Dimensional Data

The Dimensional Data table gives minimum/maximum lengths for available FIREROD diameters.

FIREROD DIAMETER			LENGTH			
Nominal Inches	Actual Inches	(mm)	Minimum Inches	(mm)	Maximum *~ Inches	(mm)
1/8	0.122	(3.10)	1	(25)	12	(305)
1/4	0.246	(6.25)	1	(25)	36	(915)
3/8	0.371	(9.42)	1	(25)	48	(1,220)
1/2	0.496	(12.60)	1	(25)	60	(1,520)
5/8	0.621	(15.77)	1	(25)	72	(1,830)
3/4	0.746	(18.95)	1	(25)	72	(1,830)
1	0.996	(25.30)	1 1/4	(32)	72	(1,830)

#### Tolerances

##### Diameter:

- 1 inch units: ±0.003 inches (±0.076 mm)
- All other units: ±0.002 inches (±0.0508 mm)

##### Length:

- All units to 4 1/2" (115 mm) long: ±3/32" (±2.4 mm)
- 1/8" diameter units over 4 1/2" (75 mm) long: ±3%
- All other units over 4 1/2" (115 mm) long: ±2%

##### Wattage:

- 1/8" units: +10 percent, -15 percent
- All other units: +5%, -10%

##### Resistance:

- 1/8" units: +15%, -10%
- All other units: +10%, -5%
- Resistance changes with temperature. There are three circumstances under which resistance can be measured:
  - Room temperature (before use): nominal ohms are 90% of ohm's law calculation
  - Room temperature (after use): nominal ohms are 95% of ohm's law calculation
  - At temperature (during use): depending on application nominal ohms are approximately 100% of ohm's law

#### Camber:

Units to 12 inches long: 0.005 inch per six inch length.

Standard camber tolerance varies as the square of the length, in feet, is multiplied by 0.020 inches. For example, a 36 inch FIREROD has a camber tolerance of 0.020 inches X (3)² = 0.180 inches. Normally, slight camber does not present a problem since the heater will flex enough to fit into a straight, close fit hole.

#### Component Recognition File Numbers

UL component rated to 240V~(ac) (File number E52951)

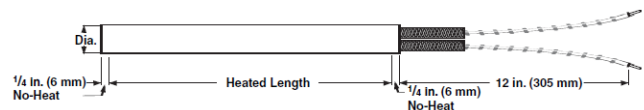
CSA component rated to 240V~(ac) (File number LR7392)

VDE component rated to 240V~(ac) (File number 10062-4911-0006)

Note: These are options, not all designs are covered.

#### Electrical Data

The electrical data table will assist you in selecting the correct FIREROD heater for your application, according to available voltage, amperage and wattage. Please note: some combinations of minimum and maximum wattages are not available on the same heater diameter. Also, if you need to exceed limitations shown, contact your Thermal Solutions of Texas sales engineer.



Diameter inches	NUMBER OF CIRCUITS	
	1-phase	3-phase
3/4	3	1
1	5	2

FIREROD Diameter inches	Volts Max.	Amp Max <sup>1</sup>	Minimum Watts @ 120V <sup>2</sup> Heater Length			Maximum Watts				
			1 in (25 mm)	1½ in (38 mm)	2 in (50 mm)	120V 2-phase	240V 3-phase	480V 3-phase	240V 3-phase	480V 3-phase
¼	240	3.1	—	8	5	360	720	—	—	—
¼	240	4.4 <sup>6</sup>	100	55	40	525	1050	—	—	—
⅜	240	6.7	65	35	25	800	1600	—	—	—
½	240	9.7	40	25	20	1,160	2,320	—	—	—
⅝	480	23.0	35	20	15	2,760	5,520	11,000	④	④
¾	480	23.0	30	15	10	2,760 <sup>3</sup>	5,520	11,000	9,550	19,100
1	480	23.0	—	15	10	2,760 <sup>3</sup>	5,520	11,000	9,550 <sup>3</sup>	9,100 <sup>3</sup>

- ① Determined by the current carrying capacity of internal parts and standard lead wire.
- ② Determined by the limitation of space for resistance winding. For minimum wattage of 240V~(ac) multiply value by four.
- ③ Higher wattages are available using more than one set of power leads. Multiply the wattage from the table by the applicable factor.
- ④ Consult Thermal Solutions for availability.
- ⑤ On ¾ inch diameter units, either three single-phase circuits or one three-phase Delta or Wye circuit is available. On one inch diameter units, either five single-phase or two three-phase Delta circuits are available.
- ⑥ For ¼ inch units with thermocouple maximum amperage is 3.1.

## Ordering Information

### To order Stock FIREROD cartridge heaters, specify:

- Code number (from Watlow Heaters Catalog)
- Quantity
- Options
- Lead length: If not specified, 12 inch (305 mm) crimped on leads will be shipped.

### For made-to-order FIRERODs, please specify:

- Diameter
- Overall length
- Volts
- Watts
- Lead option and length or terminal configuration
- Lead end no-heat if different from standard
- Optional accessories, finishing, internal construction, sensors/controls and mounting

## Availability

**Stock:** Same day shipment

**Made-to-Order:** Consult Thermal Solutions of Texas