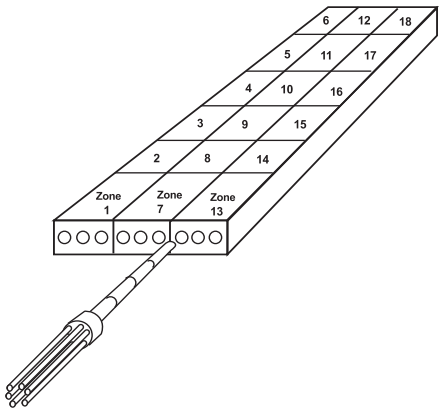
# Multicell Heaters

## Multicell Heaters

The advanced design of the multicell insertion heater from Watlow offers three major advantages: extreme process temperature capability, independent zone control for precise temperature uniformity, and loose fit design for easy insertion and removal.

***Performance Capabilities***

- Has been engineered to achieve process temperatures above 2200°F (1204°C)
- Up to eight independently controllable zones




***Features and Benefits***

- **Multiple, independently controllable zones** allow process temperature uniformity not possible with any other single sheathed heater.
- **The heater's radiant design allows for loose insertion** in boiling holes, and piping holes. Since it will not bind or seize in the hole, the heater is easily removed and replaced with minimal down time.
- **The oxidized sheath** provides high emissivity and improves the heater's performance as oxidation increases.
- **Individually metal-sheathed coils** are swaged into a larger, high temperature alloy outer sheath for maximum protection against element burnout through the outer sheath.


- **Satisfies long heater needs** (40 foot plus) providing reduced wiring.
- **Quick disconnect plug and jack** permit fast replacement of individual elements while the press stays at operating temperature.
- **Special bending capabilities** solve unusual machinery needs and keep leads away from heated zones.
- **Flexible leads up to 986°F (530°C).**

# Multicell Heaters

## *Applications*

- Hot gas generators
- Hot isothermal forming
- Radiant heating processes
- Glass tempering
- Soil remediation
- Hot forging dies
- Long heater needs (40 foot plus)
- Heated platens
- Aluminum processing
- Fluidized bed processes
- Glass bending, forming, treating
- Hazardous waste treatment systems
- Super plastic forming
- Heated platens (single and multiple zones)
- Heat treating processes
- Super plastic forming with diffusion bonding

## Applications and Technical Data

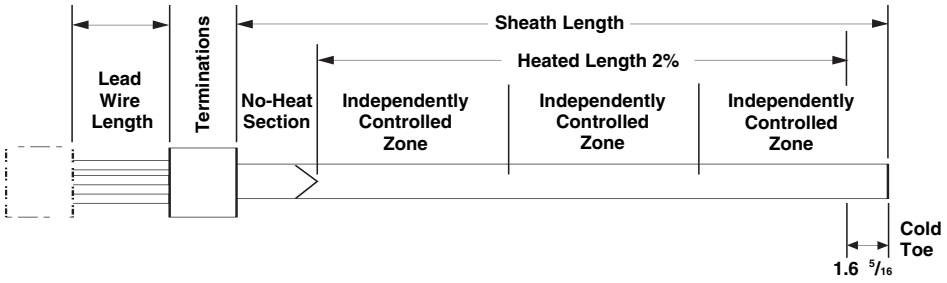
### *Definition of Terms*

**Cold Toe:** A physical minimum requirement of 1.6 ± 5/16

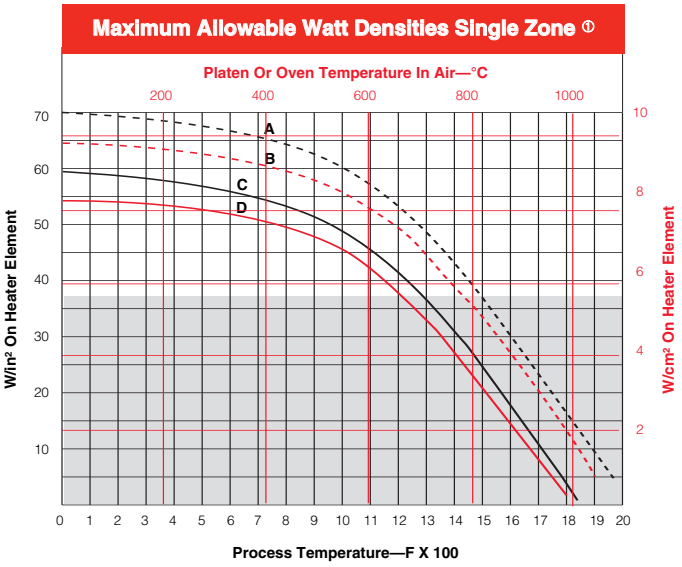
**Independent Zone:** Up to three, separately controlled zones which can be of varying lengths and wattages

**Heated Length:** The combined sum of all independent zones

**Wattage:** Ratings are the combined sum of all independent zones

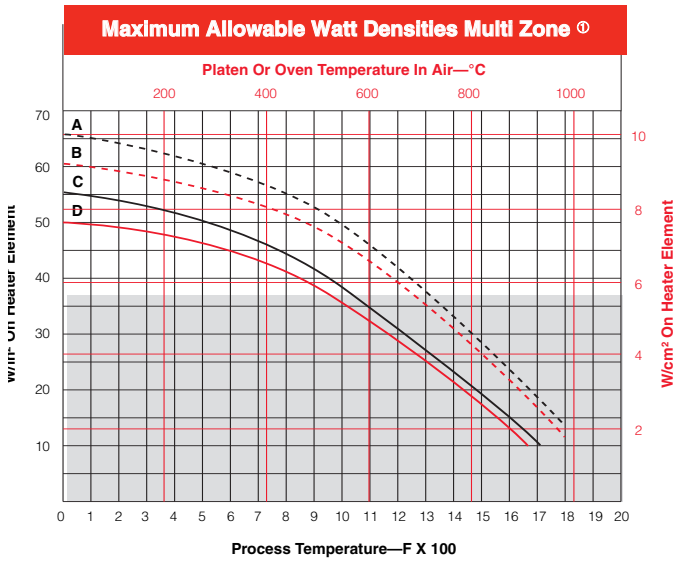



**Note:** For heated toe see page 201.




**Note:** Shaded area is standard, Non-shaded area consult factory.

A = 0.935 inch diameter, 240V~(ac), 3-phase
B = 0.685 inch diameter, 240V~(ac), 3-phase
C = 0.935 inch diameter, 480V~(ac), 3-phase
D = 0.685 inch diameter, 480V~(ac), 3-phase




**Note:** Shaded area is standard, Non-shaded area consult factory.

A = 0.935 inch diameter, 240V~(ac), 3-phase
B = 0.685 inch diameter, 240V~(ac), 3-phase
C = 0.935 inch diameter, 480V~(ac), 3-phase
D = 0.685 inch diameter, 480V~(ac), 3-phase

# Multicell Heaters

## Multicell Heaters

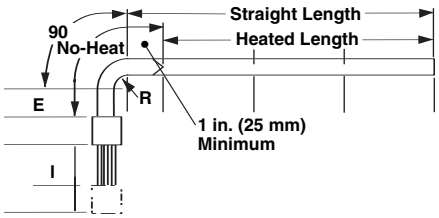
### Applications and Technical Data

Continued

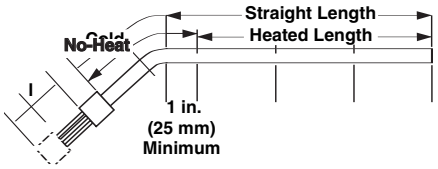
***Physical Design Parameters***

All bending of a multicell heater is restricted to the cold area of the heater. All bend radii points must be one inch (25 mm) from the hot/cold junction.

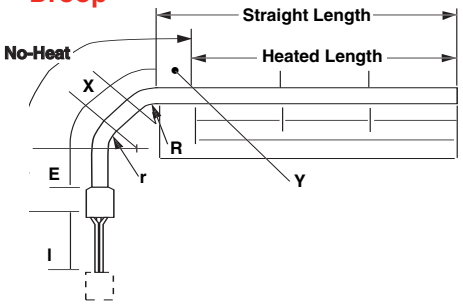
**"L"**



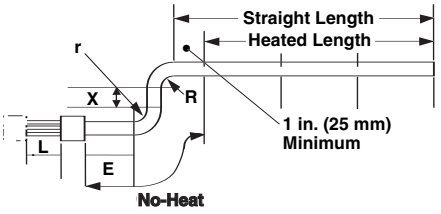

**Angle**



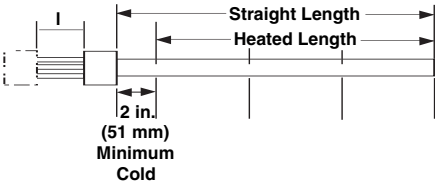

**Droop**

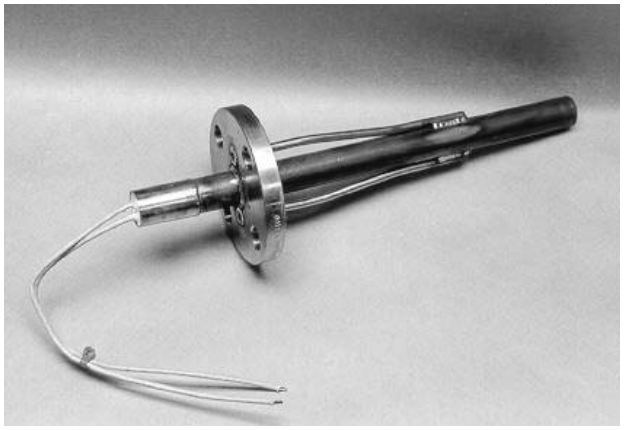



**Crank**




**Straight**



Special high-temperature R&D project with replaceable external thermocouple capability.

# Multicell Heaters

## Applications and Technical Data

***Physical Design Parameters***

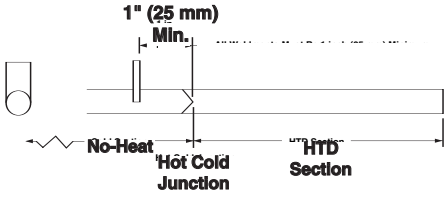
Continued

| Diameter in. | Bending Style | Sheath Length Min./Max. in. (mm) | Minimum No-Heat Length in. (mm) | Total Heated Length Min./Max. in. (mm) |
|---|---|---|---|---|
| 0.935 | Straight | 8 (203)<br>180 (4572) | 2 (51) | 6 (152)<br>160 (4064) |
| 0.935 | Angle | 13 ½ (343)<br>180 (4572) | 7 ½ (191) | 6 (152)<br>172 ½ (4382) |
| 0.935 | L | 15 ¾ (400)<br>180 (4572) | 9 ¾ (248) | 6 (152)<br>170 ¼ (4324) |
| 0.935 | Crank | 23 (584)<br>180 (4572) | 17 (432) | 6 (152)<br>163 (4140) |
| 0.935 | Droop | 18 (457)<br>180 (4572) | 12 (305) | 6 (152)<br>168 (4267) |
| 0.935 HOT-TOE | Straight | 12 (305)<br>66 (1676) | 2 (51) | 10 (254)<br>64 (1626) |

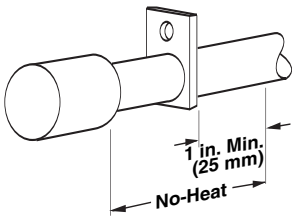
| Symbol | E | r | X | R | Y | l |
|---|---|---|---|---|---|---|
| Min. Length in. (mm) | 4 (102) | 2 ½ (38) | 1 ½ (38) | 2 ½ (38) | 1 (25) | 12 (305) |

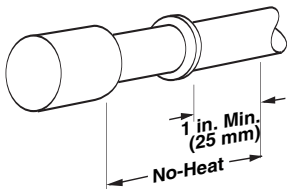
| Zones | 1 | 2 | 3 |
|---|---|---|---|
| Min. Heated in. (mm) | 6 (152) | 6 (152) | 6 (152) |

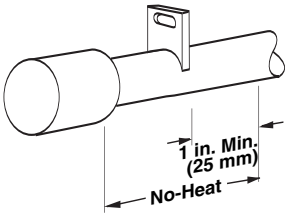
### Weldments to the Multicell Heater Element




### Tabs, rings and brackets are used to hold the heater in place and keep it from creeping.




| Diameter in. | Bending Style | Sheath Length Min./Max. in. (mm) | Minimum No-Heat Length in. (mm) | Total Heated Length Min./Max. in. (mm) |
|---|---|---|---|---|
| 0.685 | Straight | 8 (203)<br>180 (4572) | 2 (51) | 6 (152)<br>178 (4521) |
| 0.685 | Angle | 12 ½ (318)<br>180 (4572) | 6 ½ (165) | 6 (152)<br>173 ½ (4407) |
| 0.685 | L | 14 (356)<br>180 (4572) | 8 (203) | 6 (152)<br>172 (4369) |
| 0.685 | Crank | 18 (457)<br>180 (4572) | 12 (305) | 6 (152)<br>168 (4267) |
| 0.685 | Droop | 15 ½ (394)<br>180 (4572) | 9 ½ (241) | 6 (152)<br>170 ½ (4331) |

| Symbol | E | r | X | R | Y | l |
|---|---|---|---|---|---|---|
| Min. Length in. (mm) | 4 (102) | 2 ½ (38) | 1 ½ (38) | 2 ½ (38) | 1 (25) | 12 (305) |

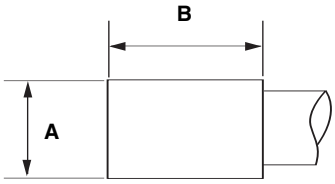
| Zones | 1 | 2 | 3 |
|---|---|---|---|
| Min. Heated in. (mm) | 6 (152) | 6 (152) | 6 (152) |

# Multicell Heaters

## Multicell Heaters

### Termination Standards

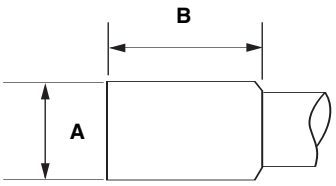
#### Potting Sleeves




| Heater O.D. in. | Dimension A in. (mm) | Dimension B in. (mm) | Zone | Phase | Type No. |
|---|---|---|---|---|---|
| 0.685 | ¾ (19) | 1 ½ (38) | 1 | 1 | 61L |
| 0.935 | 1 (25) | 1 ½ (38) | 1 | 1 | 91L |
| 0.935 | 1 (25) | 1 ½ (38) | 1 | 3 ① | 91L |

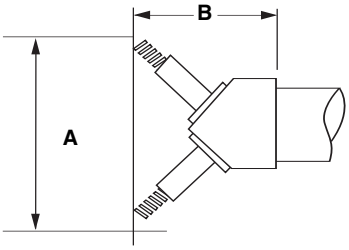
① 3 wire only

#### Potting Cups



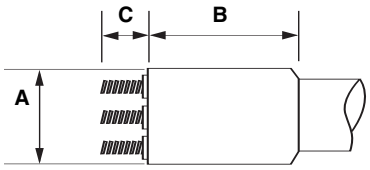

| Heater O.D. in. | Dimension A in. (mm) | Dimension B in. (mm) | Zone | Phase | Type No. |
|---|---|---|---|---|---|
| 0.685 | 1 ⅜ (35) | 1 ⅜ (35) | 2 | 1 | 62L |
| 0.685 | 1 ⅜ (35) | 1 ⅜ (35) | 3 | 1 | 62L |
| 0.685 | 1 ⅜ (35) | 1 ⅜ (35) | 1 | 3 | 62L |
| 0.685 | 1 ⅜ (35) | 1 ⅜ (35) | 2 | 3 | 62L |
| 0.935 | 1 ⅜ (35) | 1 ⅜ (35) | 2 | 1 | 92L |
| 0.935 | 1 ⅜ (35) | 1 ⅜ (35) | 3 | 1 | 92L |
| 0.935 | 1 ⅜ (35) | 1 ⅜ (35) | 1 | 3 | 92L |
| 0.935 | 1 ⅜ (35) | 1 ⅜ (35) | 2 | 3 | 92L |

#### Ceramic Wedge with 10-32 Threaded Terminals




| Heater O.D. in. | Dimension A in. (mm) | Dimension B in. (mm) | Zone | Phase | Type No. |
|---|---|---|---|---|---|
| 0.685 | 1 ¼ (32) | 1 ¼ (32) | 1 | 1 | 61T |
| 0.935 | 1 ⅝ (41) | 1 ⅝ (41) | 1 | 1 | 91T |

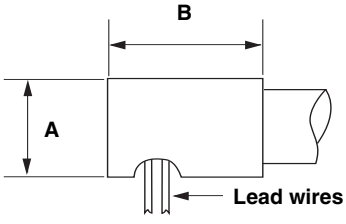
#### Potting Cup with 10-32 Threaded Terminals




| Heater O.D. in. | Dimension A in. (mm) | Dimension B in. (mm) | Dimension C in. (mm) | Zone | Phase | Type No. |
|---|---|---|---|---|---|---|
| 0.685 | 1 ⅜ (35) | 1 ⅜ (35) | ⅝ (16) | 1 | 3 | 62T |
| 0.935 | 1 ⅜ (35) | 1 ⅜ (35) | ⅝ (16) | 1 | 3 | 92T |

**Note:** All threaded terminals are supplied with mating nuts and washers.

#### Potting Cup for Right Angle Exit

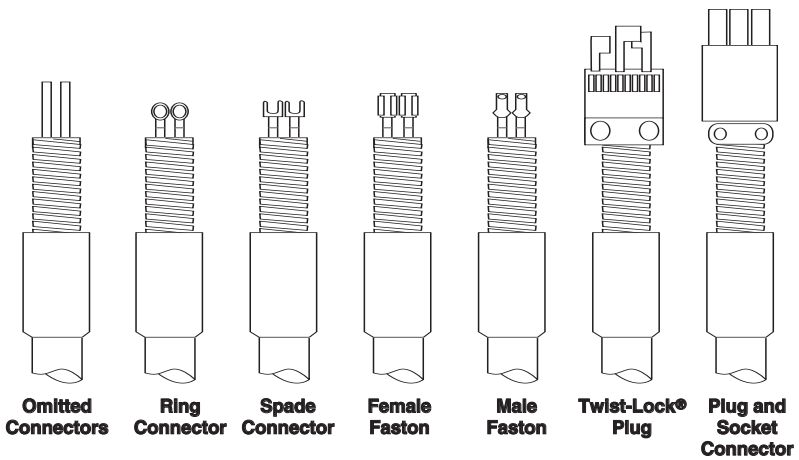



| Heater O.D. inches | Dimension A inches (mm) | Dimension B inches (mm) | Zone | Phase | Type No. |
|---|---|---|---|---|---|
| 0.685 | ¾ (19) | 1 ½ (38) | 1 | 1 or 3 | RAE1 |
| 0.935 | 1 (25) | 1 ½ (38) | 1 | 1 or 3 | RAE2 |

# Multicell Heaters

## Termination Assemblies

All termination assemblies are available with potting sleeves or cups, with or without armorflex lead wire protection. Please specify **potting vessel** and **lead cover option** when ordering.




**Termination illustrations shown with armorflex covering.**

## Options

### *Plug and Socket and Twist-Lock® Plug Variations*

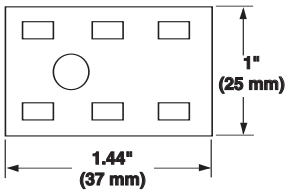
Two zone heaters requiring a quick disconnect plug will typically be supplied with a four contact plug and socket while three zone heaters will be supplied with a six contact plug and socket. Twist-Lock® plug variations are typically supplied with single zone multicell heaters. When ordering a Twist-Lock® plug, please specify the **NEMA type** as shown below.

For any other plug variations, please contact the factory.

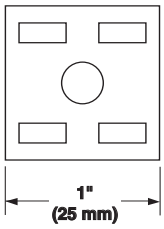
**Note:** Mating connectors are also available for plug terminations listed. Contact factory.

| Male Plug | Zones | Type | Voltage | Amperage | Blade Type |
|---|---|---|---|---|---|
| P404-CCT | 2 | 4 Wire | 600 | 30 | Straight |
| P406-CCT | 3 | 6 Wire | 600 | 30 | Straight |
| 4570C | 1 | 3 Wire | 250 | 15 | Twist-Lock® |
| 4720C | 1 | 3 Wire | 125 | 15 | Twist-Lock® |
| 5266C | 1 | 3 Wire | 125 | 15 | Straight |
| 5666C | 1 | 3 Wire | 250 | 15 | Straight |
| 7102C | 1 | 2 Wire | 250 | 20 | Twist-Lock® |
| 7545C | 1 | 2 Wire | 250 | 15 | Twist-Lock® |
| 7567C | 1 | 3 Wire | 125 | 10 | Twist-Lock® |

### Plug and Socket




**6 Contacts**

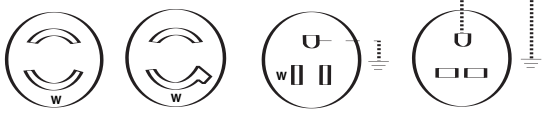



**4 Contacts**

### Twist-Lock®


**4720C** **4570C** **7567C**

### Straight




**7102C** **7545C** **5266C** **5666C**

**F.O.B.: Hannibal, Missouri**

Twist-Lock® is a registered trademark of Hubbell Incorporated.

### *How to Order*

To order multicell insertion heaters, please specify:

- Sheath diameter
- Heater length
- Configuration
- Potting vessel
- Connector
- Lead cover
- Flexleads
- Watts
- Volts
- Lead wire length (12-inch standard)
- NEMA type for Twist-Lock®/straight plugs, if required
- Process temperature
- Control system
- Ground voltage

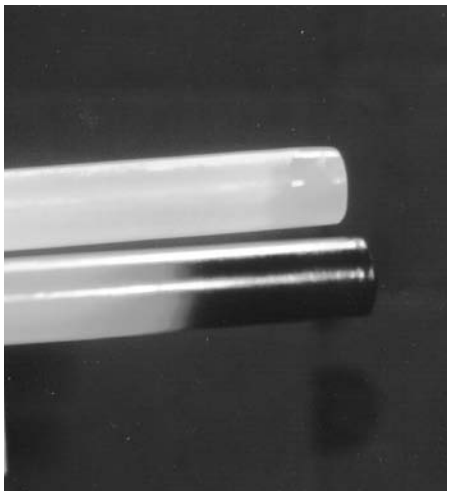
**Availability**

**Made-to-Order**: Consult Watlow

# Multicell Heaters

## Multicell Heaters

### Hot-Toe Multicell Heaters



Watlow's new HOT-TOE multicell heater eliminates the unheated section typically found at the end of standard multicell constructions. Benefits of the HOT-TOE multicell are threefold:

- heat to the full length of the assembly
- optimum heat distribution for extended heater life
- double wall ground fault isolation

Multicell heaters have always offered many advantages including extreme process temperature capabilities, independent zone control and a loose fit design for easy insertion and removal. Now Watlow's multicell heater line includes another valuable heater characteristic with the addition of the HOT-TOE multicell.

This HOT-TOE feature allows for optimum heat distribution with a lowered watt density for shorter length designs. By heating the full section of the unit, temperatures for internal wires are lower, therefore improving heater life. Due to the design of the HOT-TOE multicell, ground fault isolation over the heated portion can also provide improved heater safety.

Watlow's HOT-TOE multicell heaters can be engineered to achieve process temperatures to 1900°F (1037°C) and can satisfy 240 volt, single-phase power requirements for the process industry.

Designed to handle applications that demand high voltages and wattages, these multicell heaters have a rugged construction that permits the heaters to survive in conditions that would normally be lethal to many other heater types.

**U.S. Patent Pending**

***Performance Capabilities***

- Sheath temperatures to 1900°F (1038°C)
- Heated toe section

**Features and Benefits**

- **Inconel® 600, Incoloy® 800 or equivalent sheath material and a special internal construction** assures high temperature performance and corrosion protection in static air applications.
- **Available in 0.935 inch (23.7 mm) diameter** it is configurable to existing tubular designs that may be experiencing short life.
- **Single-phase, single zone, 240 volts** individual metal-sheathed coils swaged into high-temperature outer sheath and solves unusual machinery requirements.
- **Single-ended termination lead wires** can be installed into flanges and screw plugs similar to standard product configurations.
- **Bendable in standard multicell configurations** makes it easy to apply in a wide variety of applications.

***Applications***

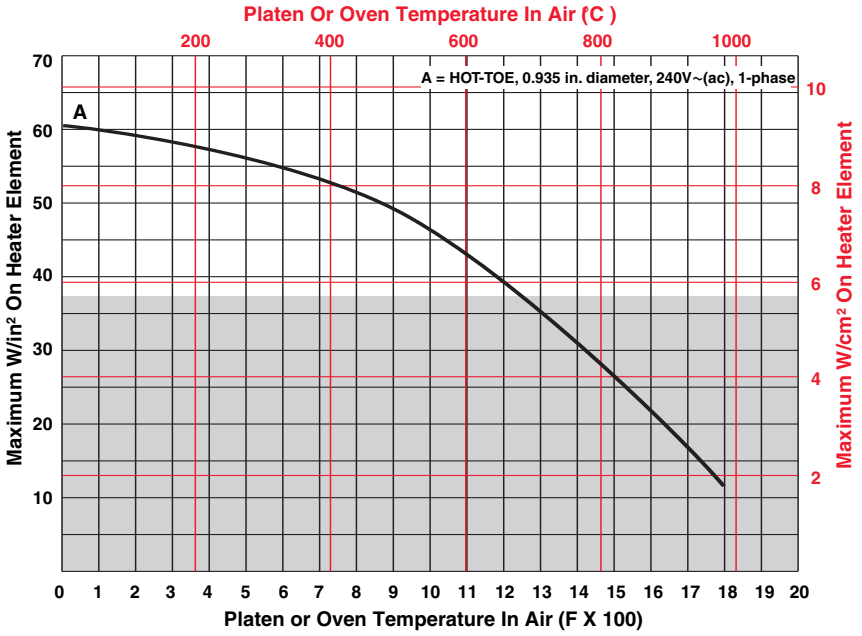
- SPF single zone platens
- Radiant heating
- Drying
- Environmental—VOC abatement
- Process air heating: duct heaters, circulation heaters
- Vacuum
- Flue gas cleaning (desulfurization)
- Fluidized beds
- Light metals extrusion

# Multicell Heaters

## Hot-Toe Multicell Heaters

### Single Zone HOT-TOE Heater*

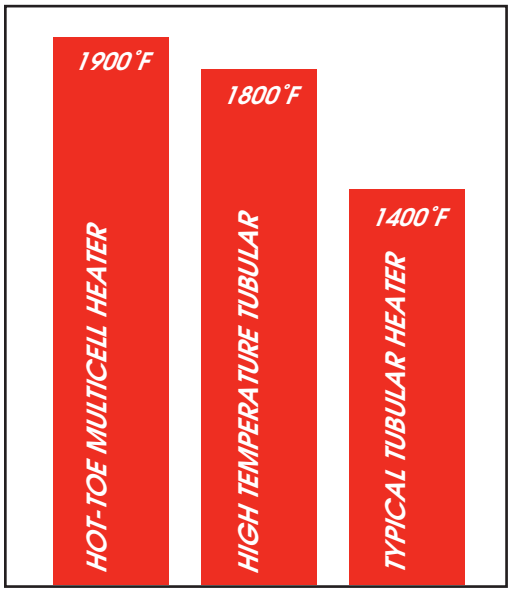
This chart should be used to verify the correct watt density for a platen or oven application assuming no air flow. To use this chart, select platen or oven temperature from X axis. Find the intersection with curve A. Determine maximum watt density by reading left or right to the intersection with Y axis.




**Note:** Shaded area is standard. Non-shaded area, consult factory.

* Other designs and voltages with higher temperature capabilities are available. Consult factory.

### Sheath Temperature Comparisons




*Assuming normal design practices.

**F.O.B.: Hannibal, Missouri**

### *How to Order*

To order, please specify:

- Volts
- Watts
- Heater sheath material
- Lead wire temperature rating
- Heated length
- No-heat length—lead end only
- Overall sheath length
- Formation—if desired
- Mounting option, stop bracket, etc.
- Process temperature

### Availability

**Made-to-Order:** Five to six weeks

***For Multicell Radiant Heater Specification Data Sheet see FAX REPLY sheet 1470.***