Band Heaters

Ceramic Insulated Band Heaters

**A** General purpose terminal box offers excellent protection to exposed terminals. To simplify electrical wiring, the box has a 1/2" trade size knockout (actual dia. 7/8") that will accept standard conduit or flexible armor cable connectors.

**B** Stainless steel screw terminals connected to stranded nickel wire designed to provide maximum amperage carrying capacity.

**C** Built-In ceramic fiber insulation 1/4" thick standard on all Ceramic Bands will reduce power consumption by 25 to 30 percent. Further reduction can be obtained with optional 1/2" thick insulation. Specially designed mounting brackets with 1/4"-20 socket cap screws are used to securely draw the heating element assembly against the cylinder evenly and tightly across its entire width. Brackets are located 180° from the screw terminals.

**D** Helically wound nickel-chrome resistance wire strung through specially designed ceramic insulating bricks.

**E** Stainless steel housing with serrated edges provides maximum flexibility for ease of installation.

**REDUCE HEAT LOSS**

**CONSERVE ENERGY**

**MAXIMIZE OPERATOR COMFORT**

**REDUCE OVERALL OPERATION COST**
**Design Features**

- Built-In Thermal Insulation
- Conserves Electrical Energy
- Minimum Heat Loss
- Fully Flexible For Easy Installation
- Good Temperature Uniformity
- Longer Heater Life
- Various Constructions & Terminations
- Heats Through Conduction and Radiation
- Designed to Your Specifications

**Tempco Ceramic Insulated Band Heaters** are specifically designed and engineered to meet the ever increasing demand for energy conservation and to improve operation efficiency. The Ceramic Band Heaters are capable of generating the higher temperatures essential to process today’s high temperature resins. Electrical energy savings are achieved by using a 1/4” thick ceramic fiber insulating blanket, reducing power consumption by 25 to 30 percent. Because of the low thermal conductivity of the ceramic fiber insulation, the external surface temperature of the Ceramic Band Heater is approximately 400°F while running the inside surface temperature at 1200°F.

Ceramic Band Heaters transmit heat through both conduction and radiation. The element winding is designed to run at maximum temperature and heat the ceramic blocks to the point at which they radiate energy into the barrel as well as conduct energy by being in contact with the barrel. Therefore, the fit is not as critical as in other types of bands.

Tempco Ceramic Band Heaters have become extremely popular among Original Equipment Manufacturers as the standard heaters for the barrels of Plastic Injection Molding Machines, Extruders, and Blow Molding Equipment.

**Variations and Advantages**

Ceramic Band Heaters are manufactured in a full range of standard construction variations, physical dimensions, electrical ratings, and a complete arrangement of screw terminals and lead terminations.

However, these standard Ceramic Band Heater variations and terminations do not represent the extent of our capabilities. Tempco’s engineering staff, with many years of experience in heat processing and temperature control applications, can assist you in designing the right Ceramic Band Heater for your specific application.

**Construction Characteristics**

**Standard**

The basic Tempco Ceramic Band Heater design consists of a helically wound resistance coil made from nickel-chrome wire, evenly stretched and precisely strung through specially designed ceramic insulating bricks, forming a flexible heating mat. The ceramic heating mat along with 1/4” thick ceramic fiber insulation is installed in a stainless steel housing made with serrated edges, providing maximum flexibility for ease of installation. This allows the use of wider band heaters, eliminating the need for numerous narrow width and two-piece band heaters.

**Double Insulated**

For situations requiring additional insulation for lower external temperatures and increased electrical energy savings, Tempco offers Double Insulated Ceramic Bands with a full 1/2” thick ceramic fiber insulation. This will decrease power consumption by 35 to 37 percent when compared to uninsulated band heaters.

**Rib Cage (Type R) Ceramic Band Heater**

When Ceramic Band Heaters are used on extruder barrels that require both heating and cooling, Tempco manufactures the Rib Cage (Type R) Air-Cooled Ceramic Band Heater in two watt density styles. See page 1-75 for details.
**Band Heaters**

**Ceramic Band Specifications**

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**Ceramic Band Standard Specifications and Tolerances**

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**PERFORMANCE RATINGS**

- **Maximum Temperature:** 1400°F (760°C)
- **Nominal Watt Density:** 20-45 W/in² (3-7 W/cm²)
- **Maximum Watt Density:** 45 W/in²

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**ELECTRICAL RATINGS**

- **Maximum Voltage:** 480 VAC per termination
- **Dual Voltage:** Available depending on heater configuration
- **Maximum Amperage per circuit:**
  - lead wire termination: 10 amp
  - screw terminations: 25 amp
- **Resistance Tolerance:** +10%, −5%
- **Wattage Tolerance:** +5%, −10%

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**PHYSICAL SIZE CONSTRUCTION LIMITATIONS**

- **Sheath Material:** Stainless Steel
- **Insulation Material:** Ceramic Fiber Blanket
  - Standard Thickness: 1/4" Double Thickness: 1/2"
  - Overall Thickness: Standard Insulation: 5/8" Double Insulation: 3/4"
- **Minimum Width:** 1"
- **Standard Width Increments:** 1/2" Consult Tempco for non-standard widths.
- **Maximum Width:** Dependent upon the ratio of diameter to width
  - Width Tolerance: 1" to 3-1/2": ±1/16" 4" to 6-1/2": ±1/8" Over 6-1/2": ±1/4"
- **Minimum Diameter:** 2"
- **Maximum Diameter—One-Piece:** 21"
  - **Two-Piece:** 44"
- **Nominal Gap:** 3/8" — If a larger gap is required for probes or thermocouples, specify when ordering.

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*If tighter tolerances are required consult Tempco.*

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*Note:* Refer to individual construction and termination descriptions on pages 1-66 through 1-74 for further information. Actual heater minimums and maximums will depend upon the combination of construction/clamp, termination styles and electrical ratings.

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**Ordering Information**

Select a Ceramic Insulated Band Heater from pages 1-63 through 1-65. Each heater’s Termination Type is indicated.

Type L1 has 10'' long leads.
Type W1 has 12'' long leads with 10'' wire braid.
Type R2A has 12'' long leads with 10'' galvanized steel armor cable.

**Custom Engineered/Manufactured Heaters**

Understanding that an electric heater can be very application specific, for sizes and ratings not listed TEMPCO will design and manufacture a Ceramic Insulated Band Heater to meet your requirements. **Standard lead time is 3 weeks.**

**Please Specify** the following:
- Inside Diameter
- Termination (see pages 1-68 through 1-74)
- Width
- Lead Cable/Braid Length
- Wattage
- Construction style (see page 1-66)
- Voltage
- Clamping variation (see page 1-67)

**WARNING:** Cancer and Reproductive Harm - www.P65Warnings.ca.gov.

(800) 323-6859 • Email: sales@tempco.com

1-65 Rev 2 (8-18)
How To Specify A Ceramic Band Heater

Ceramic band heaters offer several variations in construction, clamping and electrical terminations. For ease of ordering, make a selection from options listed in each of the boxes below.

Construction Styles

(See below)
One-piece
Two-piece
Multiple Sections
(Specify number of sections required.)

Clamping

(See page 1-67)
Type B – Built-in bracket (Standard)
Type S – Built-in bracket with spring loaded screw
Type L – Latch and trunnion
Type F – Bent-up flange (Ears)

Termination

Select termination type from pages 1-68 through 1-74

Insulation

(See below)
Standard 1/4” insulation (S)
Double 1/2” insulation (D)

Shell Overlap

(See page 1-67)
Provides T/C hole. (Specify if required.)

Ceramic Band Construction Styles

One-Piece Band
The One-Piece Ceramic Band Heater is the basic design most often specified by OEMs and processors. It is available with all types of insulation, construction styles, clamping or termination variations.

Min. ID: 2” (50.8 mm)
Min. Width: 1” (25.4 mm)
Max. ID: 21” (533.4 mm)

Two-Piece Band
The Two-Piece Ceramic Band Heater is commonly used on sizes larger than 21” diameter or when it would be inconvenient to use a one-piece heater. It is available with all types of insulation, construction styles, clamping or termination variations.

Min. ID: 4” (101.6 mm)
Min. Width: 1” (25.4 mm)
Max. ID: 44” (1118 mm)

Larger sizes are manufactured in multiple sections. Watts and volts are specified per each section when ordering.

Ceramic Band Insulation Options

Standard Insulation (S): 1/4”
Built-In ceramic fiber insulation ¼” thick standard on all Ceramic Bands will reduce power consumption by 25 to 30 percent, and lower external temperatures.

Optional Double Insulation (D): 1/2”
For situations requiring additional insulation for lower external temperatures and increased electrical energy savings, Tempco offers Double Insulated Ceramic Bands with a full 1/2” thick ceramic fiber insulation. This will decrease power consumption by 35 to 37 percent when compared to uninsulated band heaters.

View Product Inventory @ www.tempco.com
Ceramic Band Clamping Variations

Type B – Built-In Bracket (Standard)
The Built-In Bracket is the basic design most often specified by OEMs and processors. The standard screw used is 1/4-20. It is available with all types of insulation, construction styles, and termination variations.

Type S – Built-In Bracket with Spring-Loaded Screw
The Built-In Bracket can also be supplied with a spring-loaded screw. The spring-loaded clamp aids in absorbing thermal expansion.

Type L – Latch and Trunnion
The spring-loaded Latch and Trunnion clamping system is ideal for bands over 12" in diameter to absorb thermal expansion and facilitate installation on large bands. The Latch and Trunnion clamping system is available with all types of insulation, construction styles, and termination variations.

Type F – Bent-Up Flange (Ears)
The Bent-Up Flange (Ears) design is available with all types of insulation, construction styles, and termination variations.

Shell Overlap
The Shell Overlap design is the preferred method of providing a thermocouple mounting hole in a ceramic band heater. It is available with all types of insulation, construction styles, clamping and termination variations.
Ceramic Band Type T2 – Screw Terminals

Type T2 Screw Terminals are available with all types of insulation, construction styles, and clamping variations. They are considered to be standard on most band heaters under 2” in width unless otherwise specified. 10-32 post terminals are standard.

One-Piece Band

**Standard** Termination Location:
opposite the gap; center of width

- **Minimum Inside Diameter:** 2” (50.8 mm)
- **Minimum Width:** 1” (25.4 mm)
- **Maximum Volts/Amps:** 480VAC/25A

Two-Piece Band

**Standard** Termination Location:
center of each half; center of width

- **Minimum Inside Diameter:** 4” (101.6 mm)
- **Minimum Width:** 1” (25.4 mm)
- **Maximum Volts/Amps:** 480VAC/25A each half

Ceramic Band Type T3 – Screw Terminals

Type T3 Screw Terminals are available with all types of insulation, construction styles, and clamping variations. They are considered to be standard on most band heaters unless otherwise specified. For use with leads, crimp terminals, or bus bars.

One-Piece Band

**Standard** Termination Location:
opposite the gap; across center of width

- **Minimum Inside Diameter:** 2” (50.8 mm)
- **Minimum Width:** 2” (50.8 mm)
- **Maximum Volts/Amps:** 480VAC/25A

Two-Piece Band

**Standard** Termination Location:
center of each half; across center of width

- **Minimum Inside Diameter:** 4” (101.6 mm)
- **Minimum Width:** 2” (50.8 mm)
- **Maximum Volts/Amps:** 480VAC/25A each half
Igloo™ Ceramic Covers consist of two individual ceramic parts. They are available with all types of insulation, construction styles, and clamping variations. Unlike conventional ceramic caps, Igloo fully insulates any standard #10 terminal lugs used for electrical hook-ups.

**Limitations**

- **Min. ID:** 2" (50.8 mm)
- **Min. Width:** 1" (25.4 mm)

Three types of Igloo™ bases are available:

- **Type C6** — Double Port In-Line P/N CER-101-104
- **Type C7** — Double Port 90° P/N CER-101-106
- **Type C8** — Single Port P/N CER-101-107

Igloo™ caps are available in the following screw terminal size:

- **10-32** — P/N CER-102-101

**Exposed electrical wiring on band heater installations is a violation of Electrical Safety Codes including O.S.H.A.**

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**Ceramic Band Type L1 – Straight Lead Wires**

Type L1 Straight Lead Wires are available with all types of insulation, construction styles, and clamping variations. They are used primarily on small diameter bands where clearance is limited. If applicable, screw terminals should always be specified due to the high heat generated by ceramic bands. The standard flexible leads are 10" long.

*If longer leads are required, specify when ordering.*

---

**One-Piece Band**

- **Standard Termination Location:** opposite the gap; center of width
- **Minimum Inside Diameter:** 2" (50.8 mm)
- **Minimum Width:** 1" (25.4 mm)
- **Maximum Volts/Amps:** 480VAC/10A

---

**Two-Piece Band**

- **Standard Termination Location:** center of each half; center of width
- **Minimum Inside Diameter:** 4" (101.6 mm)
- **Minimum Width:** 1" (25.4 mm)
- **Maximum Volts/Amps:** 480VAC/10A each half
Ceramic Band Type W1 – Abrasion Resistant Straight Wire Braid Leads

Straight Wire Braid Leads are available with all types of insulation, construction styles, and clamping variations. Wire braid leads offer sharp bending not possible with armor cable. If applicable, screw terminals should always be specified due to the high heat generated by ceramic bands. The standard leads are 10" of wire braid over 12" of flexible leads. **If longer leads are required, specify when ordering.**

<table>
<thead>
<tr>
<th>One-Piece Band</th>
<th>Two-Piece Band</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Termination Location:</strong></td>
<td><strong>Standard Termination Location:</strong></td>
</tr>
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<td>center of each half; center of width</td>
</tr>
<tr>
<td>✺ Minimum Inside Diameter: 2&quot; (50.8 mm)</td>
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</tr>
<tr>
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</tr>
<tr>
<td>✺ Maximum Volts/Amps: 480VAC/10A</td>
<td>✺ Maximum Volts/Amps: 480VAC/10A each half</td>
</tr>
</tbody>
</table>

Ceramic Band Type R1 – Abrasion Resistant Straight Armor Cable

Straight Armor Cable is available with all types of insulation, construction styles, and clamping variations. Armor cable provides far superior protection to lead wires where abrasion is a constant problem. If applicable, screw terminals should always be specified due to the high heat generated by ceramic bands. The standard leads are 10" of armor cable over 12" of flexible leads. **If longer leads or electrical connectors are required, specify when ordering.**

<table>
<thead>
<tr>
<th>Type R1A</th>
<th>Type R1B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanized Steel Armor Cable</td>
<td>Stainless Steel Armor Cable</td>
</tr>
</tbody>
</table>

<table>
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<td>✺ Maximum Volts/Amps: 480VAC/10A each half</td>
</tr>
</tbody>
</table>

View Product Inventory @ www.tempco.com
**Ceramic Band Type R2 – Abrasion Resistant Right-Angle Armor Cable**

Right-Angle Armor Cable is available with all types of insulation, construction styles, and clamping variations. It is used where space is limited and abrasion is a constant problem. If applicable, screw terminals should always be specified due to the high heat generated by ceramic bands. The standard leads are 10" of armor cable over 12" of flexible leads. *If longer leads or electrical connectors are required, specify when ordering.*

- **Type R2A** — Galvanized Steel Armor Cable
- **Type R2B** — Stainless Steel Armor Cable

**One-Piece Band**

*Standard Termination Location:*

- Opposite the gap; center of width
- Minimum Inside Diameter: 2" (50.8 mm)
- Minimum Width: 1" (25.4 mm)
- Maximum Volts/Amps: 480VAC/10A

**Two-Piece Band**

*Standard Termination Location:*

- Center of each half; center of width
- Minimum Inside Diameter: 4" (101.6 mm)
- Minimum Width: 1" (25.4 mm)
- Maximum Volts/Amps: 480VAC/10A each half

**Ceramic Band Type S1 – Lead Wire Spring Strain Relief**

A strain relief spring is attached to the heater at the termination exit to reduce strain on leads subjected to excessive flexing. The spring is 2-5/8" long. The flexible standard leads are 10" long with 2-1/2" of fiberglass sleeving.

*If longer leads are required, specify when ordering.*

- **Type S1A** — Plain Leads and Strain Relief Spring
- **Type S1B** — Stainless Steel Wire Braided Leads and Strain Relief Spring

**One-Piece Band**

*Standard Termination Location:*

- Opposite the gap; center of width
- Minimum Inside Diameter: 2" (50.8 mm)
- Minimum Width: 1" (25.4 mm)
- Maximum Volts/Amps: 480VAC/10A

**Two-Piece Band**

*Standard Termination Location:*

- Center of each half; center of width
- Minimum Inside Diameter: 4" (101.6 mm)
- Minimum Width: 1" (25.4 mm)
- Maximum Volts/Amps: 480VAC/10A each half

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**General Purpose Terminal Boxes: Type C2 & Type C5**

Terminal Boxes are available with all types of insulation, construction styles, or clamping variations. It is a simple and economical way to protect employees from electric shock or prevent electric shorts that can result from exposed wiring on band heater electrical installations.

The Heavy Duty Terminal Boxes have a 1/2" trade size knockout (actual diameter 7/8") that will accept standard armor cable connectors. The boxes can be field assembled on band heaters that have a center distance between screws of 7/8". To simplify installation the boxes can be pre-wired with galvanized armor, stainless steel armor, or wire braid.

**Ceramic Band Type C2 – Standard Terminal Box**

**Type C2 □ Standard Box**

- **C2A** — Box only
- **C2B** — with galvanized armor
- **C2C** — with stainless steel armor
- **C2D** — with wire braid

**Box Size:**
- 1-1/2"H x 1-1/2"W x 2-1/2"L
  - for bands 1-1/2" to 2" wide
- 1-1/2"H x 2-1/4"W x 2-1/2"L
  - for bands greater than 2" wide

**NOTE:** Heater dimensions will determine terminal configuration.

**Ceramic Band Type C5 – Low-Profile Terminal Box**

**Type C5 □ Low Profile Box**

- **C5A** — Box only
- **C5B** — with galvanized armor
- **C5C** — with stainless steel armor
- **C5D** — with wire braid
- **C5J** — Box with lead wire

**Box Size:**
- 1"H x 1-1/4"W x 3"L
  - for bands 1-1/2" to 2" wide
- 1"H x 2-1/4"W x 2"L
  - for bands greater than 2" wide

**NOTE:** Heater dimensions will determine terminal configuration.

**Exposed electrical wiring on band heater installations is a violation of Electrical Safety Codes including O.S.H.A.**
**Quick Disconnect Plugs** are available on any construction or clamping variation. These quick disconnect plug assemblies are highly recommended and should be used whenever possible. The combination of plug and cup assembly along with armor cable covered leads eliminates all live exposed terminals or wiring that can be a potential hazard to employees or machinery.

Type P1 and P3 assemblies are available with a straight or right-angle plug. Type P2 and P4 plug assemblies have a lower profile and are available with a straight plug only.

To simplify installation, band heaters with these assemblies can be supplied pre-wired using high temperature lead wire protected with armor cable. *If longer leads are required, specify when ordering.*

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### Ceramic Band Type P1 – High Temperature Quick Disconnect Plugs

**Type P1□—Standard Cup Assembly**

- P1K—Cup Assembly only
- P1L—w/straight plug only
- P1M—w/90° plug only
- P1N—w/straight plug & galvanized armor cable
- P1O—w/straight plug & stainless steel armor cable
- P1P—w/straight plug & wire braid
- P1Q—w/90° plug & galvanized armor cable
- P1R—w/90° plug & stainless steel armor cable
- P1S—w/90° plug & wire braid

**One-Piece Band**

- **Standard Termination Location:** opposite the gap; center of width

- *Minimum Inside Diameter:* 2” (50.8 mm)
- *Minimum Width:* 2” (50.8 mm)
  depending on termination orientation

**Two-Piece Band**

- **Standard Termination Location:** center of each half; center of width

- *Minimum Inside Diameter:* 4” (101.6 mm)
- *Minimum Width:* 2” (50.8 mm)
  depending on termination orientation

**Plug Electrical Ratings**

- 2-Pole 3-Wire Grounding
- *Maximum Volts:* 250 VAC
- *Maximum Amps:* 16A
- *Maximum Temperature:* 572°F (300°C)

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### Ceramic Band Type P2 – High Temperature Quick Disconnect Plugs

**Type P2□—Low Profile Assembly**

- P2F—Low profile assembly only
- P2G—w/straight plug only
- P2H—w/straight plug and galvanized armor cable
- P2J—w/straight plug and stainless steel armor cable
- P2K—w/straight plug and wire braid

**One-Piece Band**

- **Standard Termination Location:** opposite the gap; center of width

- *Minimum Inside Diameter:* 2” (50.8 mm)
- *Minimum Width:* 2” (50.8 mm)

**Two-Piece Band**

- **Standard Termination Location:** center of each half; center of width

- *Minimum Inside Diameter:* 4” (101.6 mm)
- *Minimum Width:* 2” (50.8 mm)

**Plug Electrical Ratings**

- 2-Pole 3-Wire Grounding
- *Maximum Volts:* 250 VAC
- *Maximum Amps:* 16A
- *Maximum Temperature:* 572°F (300°C)
Ceramic Band Type P3 – DIN 49458 A/B Quick Disconnect Plugs

Continued from previous page...

Type P3 – Vertical Box Assembly
P3A — Box assembly only
P3B — Box assembly w/straight plug
P3C — Box assembly w/right-angle plug

Plug Electrical Ratings
※ 2-Pole 3-Wire Grounding
※ Maximum Volts: 250 VAC
※ Maximum Amps: 16A
※ Maximum Temperature: 392°F (200°C)

One-Piece Band

Standard Termination Location:
opposite the gap; center of width

※ Minimum Inside Diameter: 3” (76.2 mm)
※ Minimum Width: 2” (50.8 mm)

Two-Piece Band

Standard Termination Location:
center of each half; center of width

※ Minimum Inside Diameter: 4” (101.6 mm)
※ Minimum Width: 2” (50.8 mm)

Ceramic Band Type P4 – DIN 49458 A/B Quick Disconnect Plugs

Type P4 – Horizontal Box Assembly
P4A — Box assembly only
P4B — Box assembly w/straight plug

Plug Electrical Ratings
※ 2-Pole 3-Wire Grounding
※ Maximum Volts: 250 VAC
※ Maximum Amps: 16A
※ Maximum Temperature: 392°F (200°C)

One-Piece Band

Standard Termination Location:
opposite the gap; center of width

※ Minimum Inside Diameter: 2-1/2” (63.5 mm)
※ Minimum Width: 2-1/2” (63.5 mm)

Two-Piece Band

Standard Termination Location:
center of each half; center of width

※ Minimum Inside Diameter: 4” (101.6 mm)
※ Minimum Width: 2-1/2” (63.5 mm)
Ceramic Band Heaters — Cool TO-THE Touch Shroud Systems

**Type R Uninsulated Ceramic Band Heaters**

This system was developed to provide another means of heating and cooling high temperature extrusion processes. Typically cast-in bronze or brass units are used in applications in which heater temperatures can be in excess of 700°F (371°C). Cast-in bronze or brass heaters are expensive and since they weigh approximately three times their aluminum counterparts they are difficult to install.

In response to this challenge, Tempco’s engineers have developed a low mass, non-thermally insulated ceramic band heater to work in tandem with a highly efficient stainless steel sheet metal shroud for high temperature heating and cooling extrusion processes.

Forced air blowers are used for cooling. The ambient airflow enters the shroud, circulates around the ceramic heater and barrel, removes the heat from the heater and the process and exits the shroud opposite the entrance port.

**Construction Characteristics**

Type R construction is an uninsulated ceramic band heater with a perforated Stainless Steel outer shell for more efficient cooling. It is typically used in multiple quantities with forced air cooling systems.

*Consult Tempco with your requirements.*

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**Type RCC (Ribcage) Heating Mounting Configuration**

Tempco’s Type RCC (Rib Cage) Air Cooled System uses multiple Type R Ceramic Band Heaters under one air cooled shroud. Type R heaters are typically arranged with spaces between the heaters to enhance the cooling of the barrel when external heat is no longer required.

The Cool TO-THE Touch dual layer shroud uses an inner stainless steel solid layer thermally isolated from the heater, providing a path for the forced cooling air. An outer Stainless Steel perforated layer provides optimal venting and heat dissipation while providing personnel safety.

*See catalog page 3-29 for shroud assembly details.*

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**Complete Information on Shrouds Systems can be found in Section 3, pages 3-26 through 3-47**

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**PERFORMANCE RATINGS FOR HEATER BAND**

- **Maximum Watt Density:** 50 W/in²
- **Maximum Temperature:** 900°F (482°C)

**MECHANICAL**

- **Standard Width Increments:** 1/2"
- **Maximum Width:** depends on ratio of diameter to width
- **Minimum Width:** 1-1/2" (38.1 mm)
- **Standard Gap:** 1/2" ±1/8" (12.7 ±3.2 mm)

**ELECTRICAL RATINGS**

- **Resistance tolerance:** +10%, –5%
- **Wattage tolerance:** +5%, –10%
- **Maximum Voltage:** 480 single or 3-phase (when applicable)
- **Maximum Amperage:** 25 Amps per circuit

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Band Heaters

Additional Features

**Electrical VARIATIONS**

**Three-Phase** — On very high wattage band heaters it would be advantageous to set up the wiring three-phase to reduce the current load across a single conductor. Three-phase wiring is available with all types of insulation, construction styles, and clamping variations.

*Limitations*

**Minimum width:** 3" (76.2 mm)

**Dual Voltage** — Band heaters can be designed using 3-wire series/parallel circuits for dual voltage applications. Whether the heater is run on the high or low voltage, the wattage will be the same. Dual Voltage wiring is available with all types of insulation, construction styles, or clamping variations.

*Limitations*

**Minimum width:** 2" (50.8 mm)

**Single-Phase/Three-Phase** — Ceramic Band Heaters can be designed with multiple circuits to operate single or three-phase.

**Lead VARIATIONS**

**Electrical Plugs** — Industry standard NEMA twist lock electrical connectors are available. The plugs can be attached to fiberglass leads, armor cable or wire braid. Electrical Plugs can be added to any termination variation. See Section 15 page 15-15.

**Terminal Lugs** — Various types of crimp terminals can be attached to the heater leads to make wiring into applications quick and easy. High temperature [1200°F (649°C)] ring terminals and nylon or PVC insulated terminals are available. Spade, ring, and right-angle or straight quick disconnect type terminals can be attached to the leads. See Section 15 page 15-18.

**High Temperature Lead Wire** — When required, high temperature lead wire can be used. The wire is insulated with mica tapes over the stranded nickel conductors and then treated fiberglass overbraid. See Section 15 page 15-2.

Maximum temperature: 450°C (842°F)

**Ground Terminal or Lead** — For those applications requiring a separate ground terminal or lead attached to the heater sheath. A Ground Terminal or Lead is available on any construction or termination variation.

**Other VARIATIONS**

**Oversize Gap** — The nominal gap is 3/8". If a larger gap is required for probes or thermocouples, specify when ordering.

### Installation Accessories Available for Immediate Delivery

- High Temperature Terminal Lugs
- Igloo™ Ceramic Insulating Covers
- UL Listed Plugs
- High Temperature Lead Wire 842°F (450°C)
- Armor Cable
- Stainless Steel Braid
- High Temperature Sleeving
- High Temperature Mica Insulated Wiring Harnesses 842°F (450°C)
- Thermocouples
- Temperature Controllers
- High Temperature Fiberglass Tape

*All Items Available from Stock*
1. Disconnect electric power to the machine and/or heaters prior to installing or replacing heaters.

2. Do not install heaters in areas where combustible gases, vapor or dust is present.

3. Reduce the number of narrow or two-piece bands used on the barrel. Ceramic bands are very flexible and can be made in large widths and one-piece construction for easy installation. This eliminates heat losses between narrow bands and sharply reduces costly installation labor.

4. Using a heater that closely matches the wattage requirements will decrease the frequency of cycling and temperature over-shoot, thereby increasing the life of the heater.

5. When replacing any other type of non-insulated band heater with Tempco ceramic band heaters, you can decrease your total operating wattage by approximately 15 to 20 percent.

6. To prevent overheating and heater failure, adequate temperature controls should be installed. The thermocouples must be kept free of contaminants and checked for good response to temperature changes. A faulty thermocouple can cause the destruction of an entire heating zone due to overheating. Tempco offers a wide variety of temperature controls and thermocouples from stock for immediate delivery. Consult the index of this catalog for appropriate pages.

7. Make certain that all barrel surfaces are clean and free of contaminants. During operation, the band heaters and cylinder surface must be kept free of all contaminants that might liquefy under heat and find their way into the heater windings, carbonizing and becoming conductive. The smallest amount of contamination can cause electrical shorts, resulting in heater failure.

8. Position heater bands on the barrel.

9. Take up all the slack by tightening the low thermal expansion outer housing until the serrated edges come firmly in direct contact with the cylinder. A rawhide mallet can be used to lightly tap the outer edges—only to get uniform contact as you tighten the clamping screws. Do not overtighten to the point where the serrated edges begin to collapse and thrust outward. At this point you are compressing the ceramic insulation and decreasing its insulating value. Unlike all other types of band heaters, ceramic bands heat by radiation as well as conduction and they do not require the same clamping force that is essential with all other types of band heaters.

10. For heaters with screw terminals, remove the top nut and flat washers from the power screw terminals. Do not remove or loosen the bottom nut on the power screw terminals.

11. All electrical wiring of heater bands should be done by a qualified electrician.

12. Use only lead wire with high temperature insulation and proper gauge size. See page 15-2 in the accessories section.

13. When connecting power leads to screw terminals make certain that barrels of terminal lugs are not facing down toward the heater case, which will create a short circuit.

14. Make sure the voltage input to the heater bands does not exceed the voltage rating that is stamped on the heater band.

15. It is recommended that an amperage reading is taken for each heater to verify proper wiring.

\[
\text{Amps} = \frac{\text{Watts}}{\text{Volts}}
\]

16. Insulate all live electrical connections per applicable safety standards.

17. Install shrouds around the machine to meet applicable safety requirements.

18. Once installed, check surroundings to make sure that contaminants won’t get on the heater while the unit is in operation. Accumulation of contaminants on heaters can cause premature heater failure.

It is imperative that upon start-up of new machines at customer facilities, all of the aforementioned parameters are double checked by qualified field service personnel.

Exposed electrical wiring on band heater installations is a violation of Electrical Safety Codes including O.S.H.A.