**Cast-In Heaters for the Semiconductor Processing Industry**

Tempco has been at the forefront of the industry, addressing the challenges of stringent operating parameters and high quality requirements faced by original equipment manufacturers specializing in the semiconductor, wave solder and reflow surface mount processes.

By employing state-of-the-art technologies and by utilizing our acquired knowledge as a company, we have met the challenges by offering and delivering excellence in the design, engineering and manufacturing of a complete selection of innovative, reliable and high quality cast-in aluminum thermal component products.

### Cast-In Thermal Platens for Wave Solder & Reflow Surface Mount Equipment

Tempco’s highly engineered platens are capable of maintaining a temperature gradient of 5°F (2.77°C) across the entire working surface of the heater platen at the process operating temperature. The innovative design of this cast-in thermal platen incorporates the dual functions of being both a radiant and a convection heat source.

### Cast-In Heaters for Wafer Processing

Our metallurgical knowledge and foundry expertise are the catalyst for producing cast-in heaters with the precise heat profiles and temperature gradient required for the process. Tempco’s state-of-the-art CNC machining capabilities will ensure that the working surface requirements of the part are precisely machined to customer requirements, including extremely flat surfaces, to within 0.0005 in (0.0127 mm) for optimizing the performance of the application.

### Design Features & Options

- **Casting Maximum Surface Temperature**
  - Aluminum Alloy 319: 700°F (371°C)
  - Aluminum Alloy 356: 750°F (399°C)

- **Interference Press Fit Construction – maximum surface temperature depends on base alloy used**

- **Surface Finish – Hard-Coat Anodized**

- **Built-in Temperature Sensors**

- **Selection of heating element and cooling tube terminations**

**Note:** Cast-In heaters for semiconductor processing are made to customer specifications. For technical assistance, engineering data and available options please refer to pages 3-4 and 3-5. When ordering, please provide detailed design drawings including dimensions, critical tolerances, watts, volts, and any other features or special requirements.

Please Consult Us With Your Requirements. We Welcome Your Inquiries.
**One Source Providing Extensive Engineering/Manufacturing Capabilities**

**Casting Process: No-Bake Sand Molds**
- Used for lower volume quantities, prototypes, very large irregular shapes and thermal platens.
- **Alloys:** Aluminum, Brass, Bronze and Iron
- **Tooling:** Requires a Wood or Plastic Pattern
- **Machining:** Extensive
- **Weight Capacity:** Up to 600 pounds

**Casting Process: Low Pressure**
- Used for large volume quantities. Specifically suited for intricate and challenging geometric shapes, producing quality castings with consistent dimensional accuracy and superior surface finish.
- **Alloy:** Aluminum (only)
- **Tooling:** Requires a Steel or Cast Iron Permanent Mold
- **Machining:** Minimum to no machining
- **Weight Capacity:** Up to 150 pounds depending on shape

**Casting Process: Tilt-Pour Gravity Feed**
- Used extensively for medium to high volume quantities. Will accommodate simple to some irregular shape castings, producing good dimensional accuracy and surface finish.
- **Alloy:** Aluminum (only)
- **Tooling:** Requires a Steel or Cast Iron Permanent Mold
- **Machining:** Moderate to Extensive
- **Weight Capacity:** Up to 150 pounds depending on shape

**Melting Capabilities**
- Electric Reverb and Induction furnaces are used to minimize gas inclusion into the molten metal, thereby producing a denser, higher quality casting.

**CNC Machining**
- There are certain dimensional and/or finish tolerances or geometry that cannot be produced as cast and must be machined. Tempco offers a full service state-of-the-art machine shop featuring various types of CNC machine tools to perform all of the precision machining required—from simple to complex contour geometrics, including turning and/or boring, with repeatable accuracy from one machined casting to the next. Machinists also build and maintain permanent mold tooling for the low pressure and tilt-pour gravity feed casting processes.

**CMM Inspection**
- Coordinate Measuring Machine provides precise measurement of complex parts in process or at final inspection.

**Pattern Shop**
- Tempco has an in-house Pattern Shop to build and maintain the wood or plastic patterns required to produce castings with no-bake sand molds.

**No one can do it better than Tempco – LET US PROVE IT!**
Experience Our Value-Added Services that are Second to None

### Casting Alloys

<table>
<thead>
<tr>
<th>Casting Alloy</th>
<th>Aluminum</th>
<th>Copper</th>
<th>Silicone</th>
<th>Zinc</th>
<th>Lead</th>
<th>Maximum Iron</th>
<th>Tin</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum 319</td>
<td>85.8 - 91.58%</td>
<td>3.0 - 4.0%</td>
<td>5.50 - 6.50%</td>
<td>≤ 1.0%</td>
<td>—</td>
<td>≤ 1.0%</td>
<td>—</td>
<td>±1.7%</td>
</tr>
<tr>
<td>Aluminum 356</td>
<td>90.1 - 93.3%</td>
<td>≤0.25%</td>
<td>6.50 - 7.50%</td>
<td>≤0.35%</td>
<td>—</td>
<td>≤0.60%</td>
<td>—</td>
<td>±1.125%</td>
</tr>
<tr>
<td>Bronze</td>
<td>9.0 - 11.0%</td>
<td>≥ 86.0%</td>
<td>≤0.05%</td>
<td>32.0 - 40.0%</td>
<td>0.80 - 1.50%</td>
<td>—</td>
<td>0.50 - 1.50%</td>
<td>—</td>
</tr>
<tr>
<td>Yellow Brass</td>
<td>≤0.55%</td>
<td>58.0 - 64.0%</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>±1%</td>
</tr>
</tbody>
</table>

### Heating Element Electrical Specifications

- **Tubular Heater Diameter**: 0.260" - 0.315" - 0.375" - 0.430" *Note: Tempo-Pak mineral insulated cable heaters can be used in place of tubular heating elements to fit physical constraints not possible with conventional heating elements. See catalog Section 5 for more details.*
- **Maximum Volts**: 110, 240, 277, 480, 600
- **Maximum Amps Per Element**: 15 – 30 – 40 – 40
- **Maximum Watt Density**: Aluminum Alloy—35 W/in² on the element
  - Bronze or Brass—45 W/in² on the element
- **Resistance Tolerance**: +10%, −5%
- **Wattage Tolerance**: +5%, −10%
- **Three Phase available depending on casting size.**
- **Ground Studs can be added to most cast-ins.**

### Cooling Tube Materials for Castings with Liquid Cooling

<table>
<thead>
<tr>
<th>Tube Material</th>
<th>Tube OD and Wall Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stainless Steel (Standard)</td>
<td>1/4&quot; O.D. × .028 wall</td>
</tr>
<tr>
<td>Stainless Steel (Standard)</td>
<td>3/8&quot; O.D. × .035 wall</td>
</tr>
<tr>
<td>Stainless Steel (Standard)</td>
<td>1/2&quot; O.D. × .049 wall</td>
</tr>
<tr>
<td>Stainless Steel (Optional)</td>
<td>5/8&quot; O.D. × .049 wall</td>
</tr>
<tr>
<td>Incoloy® 840 (Optional)</td>
<td>1/2&quot; O.D. × .049 wall</td>
</tr>
</tbody>
</table>

### Options for Cast-In Thermal Components

#### Casting Surface Treatments
- Electroless Nickel Plating
- Anodizing
- Teflon®
- Hard-Coat Anodizing
- Magnaplate

#### Lab Services
- Computerized Infrared Heating Profiles
- Life Cycle Testing
- X-Rays to confirm heating element location and casting density
- Heating Ramp Rate Testing

### Agency Approvals

Cast-In Heater Elements are UL recognized under UL File Number E90771.

*If you require UL agency approval, please specify when ordering.*
Cast-In Heaters

Cooling Tube Options

Cooling Tube Termination Options for Liquid-Cooled Cast-In Band Heaters

**Type FF Flared Seal Fittings**
Brass flared seal fittings are well adapted for low to medium pressure and resistant to mechanical pullout. Available for 3/8" and 1/2" diameter tubing with SAE 45° flare.

<table>
<thead>
<tr>
<th>Diameter Tubing</th>
<th>Thread</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>5/8&quot;-18</td>
<td>FTG-124-101</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>3/4&quot;-16</td>
<td>FTG-124-104</td>
</tr>
</tbody>
</table>

**Type HS Hi-Seal Fittings**
Hi-seal brass fittings are highly dependable under the most adverse conditions. For reliable and trouble-free service with ease of installation, we strongly recommend hi-seal fittings. Available for 3/8" and 1/2" diameter tubing. Male thread is 1/2" NPT for 1/2" tube and 3/8" tube.

<table>
<thead>
<tr>
<th>Diameter Tubing</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>FTG-118-124</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>FTG-118-116</td>
</tr>
</tbody>
</table>

**Type RA 90° Copper Elbow**
90° copper elbow is brazed to the Cast-In Heater cooling tube extension with additional tube extension for connecting cooling lines with compression and/or flared fittings. Available for 3/8" and 1/2" diameter tubing. If required, specify.

<table>
<thead>
<tr>
<th>Diameter Tubing</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>FTG-127-102</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>FTG-127-103</td>
</tr>
</tbody>
</table>

**Type RT Cast Brass 90° Threaded Elbow**
90° threaded elbow is brazed to the cooling tube extension, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" NPT internal threads. If required, specify.

<table>
<thead>
<tr>
<th>Diameter Tubing</th>
<th>NPT</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>3/8&quot;</td>
<td>FTG-125-101</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>FTG-125-102</td>
</tr>
</tbody>
</table>

**Type R3 Straight Threaded Copper Fitting**
Straight threaded fitting is brazed to the cooling tube extensions, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" diameter tubing with internal threads. If required, specify.

<table>
<thead>
<tr>
<th>Diameter Tubing</th>
<th>NPT</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>3/8&quot;</td>
<td>FTG-131-103</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>3/8&quot;</td>
<td>FTG-131-102</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>1/2&quot;</td>
<td>FTG-131-101</td>
</tr>
</tbody>
</table>
Stock Tubing for Cooling Lines

Cooling Line Tubing can be used to connect the Tempco Cast-In heat/cool bands to the plumbing system of your extruder. Tubing is available in 6’8” lengths for U.P.S. shipments and up to 20’ lengths for truck shipments. Barlow’s formula below was used to calculate Working Pressure in the table.

Maximum Working Pressure (PSIG) = \frac{2 \times \text{Material Strength (PSI at Room Temperature)} \times \text{Wall Thickness of Tube (in)}}{\text{OD of Tube (in)} \times \text{SF} (\text{Safety Factor of 1.5 to 10 depending on application})}

Flexible Teflon® Wire Braided Hose

Flexible Teflon® Wire Braided Hose provides an excellent means of connecting Cast-In Heaters to the extruder plumbing system. This style of hose meets the demands of medium to tight bending radius requirements. The stainless steel braid protects the Teflon® hose from any harsh mechanical conditions that may be present.

A variety of brass male and female threaded fittings can be incorporated onto the hose, making it a practical choice for use in conjunction with Tempco’s Style RC Non-Exposed Fittings and other available fittings.

Rigid brass adapter fittings as listed below are used to mate the base hose assembly to your existing installation. This allows for the installation of the rigid NPT coupling into the plumbing system and then attaching the swivel fitting on the hose, making assembly relatively easy. Remember to use Teflon® tape or equivalent.

Standard Hose: Size 8 (1/2”) .405” I.D., .549” O.D.

Operating Pressure: 2000 PSI

Burst Pressure: 8000 PSI

Adapter Fittings for Flexible Teflon® Wire Braid Hose

Rigid brass adapter fittings are used to mate the base hose assembly to your existing installation.

Ordering Information

The standard hose assemblies are supplied with 1/2” female 37° SAE flare swivel style crimped-on fittings. The hose assemblies can be ordered in 6” increments starting at 18” minimum. Fitting material is Brass.

Part Number*
WHT05 □□□

*Complete the Part Number with length of hose in 6” increments starting at 18” (018).

Standard lead time is 2 weeks or less.

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov.
Standard Tubular Heater Terminations for Cast-In Heaters

Select the termination style that meets your requirements for space, accessibility and reliability.

**Type S** Standard Unless Otherwise Specified

- Heavy Duty Ceramic Insulators.
- .315" diameter heater has 8-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.

**Type T7**

- Ceramic insulator is the same diameter as the heating element.
- .260" diameter heater has 6-32 screw terminals.
- .315" diameter heater has 8-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.

**Type T**

- Mica insulator is the same diameter as the heating element.
- .260" diameter heater has 6-32 screw terminals.
- .315" diameter heater has 8-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.

**Type C4**

- Heavy duty ceramic insulator with terminal cover.
- .315" diameter heater has 10-32 screw terminals.
- .430" diameter heater has 10-32 screw terminals.

**TYPE P—Plain Pin**

Plain terminal pin. Specify Length “L.” Standard 1/2” (12.7 mm) pin length.

<table>
<thead>
<tr>
<th>Element Diameter</th>
<th>Nominal Pin Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>mm</td>
</tr>
<tr>
<td>.260</td>
<td>6.6</td>
</tr>
<tr>
<td>.315</td>
<td>8.0</td>
</tr>
<tr>
<td>.430</td>
<td>10.9</td>
</tr>
</tbody>
</table>

**Type R**

- Mica washers with 90° blockhead screw terminal with 10-32 screw threads. Available for .315" and .430" diameter heaters.

**Type R2**

- Mica washers with blockhead and through hole for lead wire connection. Eliminates the use of ring terminals. Available for .315" and .430" diameter heaters. Accepts 6-14 gauge wire.

**Type E**

- Right-angle lug welded to pin with mica washer insulators and 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters.
Standard Tubular Heater Terminations for Cast-In Heaters

Select the termination style that meets your requirements for space, accessibility and reliability.

**Type L & L9**
Terminal lug spot welded to pin with 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters. Type L represents straight; Type L9 represents 90° to pin. Specify lug orientation.

**Type SF & SF9**
Quick-disconnect spade tabs spot welded to pin. Available for .260", .315" and .430" diameter heaters. Type SF represents straight. Type SF9 represents 90° to pin. Specify tab orientation.

**Type F**

**Type R1**
Flexible Armor Cable provides excellent protection to lead wires against abrasion and contaminants. Available for .260", .315" and .430" diameter heaters. Specify cable length and lead length. Style may vary from depiction depending on heater diameter and cable diameter used.

**Type R1A**
Stainless Steel Wire Overbraid provides flexibility and excellent protection to lead wires against abrasion. Available for .260", .315" and .430" diameter heaters. Specify stainless steel wire overbraid length and lead length. Style may vary from depiction depending on heater diameter and braid diameter used.

**Type MR**
Moisture resistant shrink strain relief and lead wire with or without stainless steel overbraid. Available for .260", .315" and .430" diameter heaters. Specify lead wire and overbraid length. Maximum operating temperature is 350°F (177°C).

**Type TS**
Contamination seal shrink-down Teflon® sleeving over the heater and lead wire splice. Provides a good moisture resistant seal. Maximum operating temperature 500°F (260°C). Available for .260", .315" and .430" diameter heaters. Specify lead length.

**Type P1**
Quick-disconnect plug, either mounted directly on casting or on elements ends offset a specified distance from casting. Rating: 16A-250VAC.
General Purpose Terminal Protection Boxes For Cast-In Heaters

Standard Box Type C2

Terminal Boxes provide a simple and economical means to eliminate exposed heater terminals and live electrical wiring, protecting employees from potential electrical shock. They also eliminate electrical shorts that can result from exposed wiring on Cast-In Heater installations.

Type C2 is an individual terminal box for protecting the terminals on each Cast-In Band Heater half. It is also used on many other Cast-In Heater designs with one set of heater terminals. The C2 box design requires a flat pad on half-round castings or a flat surface on other casting designs for mounting. It is made from heavy gauge, rust-resistant sheet metal. The cover is removable for easy access to terminals. The box has two 7/8" diameter knockouts opposite each other for standard 1/2" BX connectors.

To simplify installation, Cast-In Heaters fitted with boxes can be factory prewired with high temperature lead wire that can be protected with armor cable. If one of these options is required, specify terminal box type, lead wire and cable length. Satisfies NEMA 1 requirements.

Standard C2 box size: L = 4" W = 2-1/2" H = 2-1/8"

Terminal Protection for Both Heater Halves Type C7

Type C7 terminal boxes are made from rust-resistant sheet metal. The C7 base is fixed to the clamping straps. The box has two 7/8" diameter knockouts opposite each other for standard 1/2" BX connectors. The cover is removable, providing easy access to the screw terminals for electrical wiring.

To simplify installation, Cast-In Heaters fitted with boxes can be factory prewired with high temperature lead wire, protected with armor cable. If either one of these options is required, specify terminal box type, lead wire and cable length. Satisfies NEMA 1 requirements.

C7 Terminal Box Size varies with dimensions of casting.

Quick-Disconnect High Temperature Cup and Box Assembly Type P2

Quick-Disconnect Cup assemblies provide the simplest and safest means for applying power to any type of Cast-In Heater installation. The box extends over the screw terminals on both Cast-In Band Heater halves. The combination of prewired cup and box assembly, along with factory prewired high temperature lead wire protected with armor cable, eliminates live exposed heater terminals and electrical wiring, protecting employees from electrical shock and the possibility of electrical shorts due to exposed wiring.

If prewired plugs are required, specify length of lead wire and cable.

Rated 250V maximum, 15 Amp maximum
Terminal Box Size varies with dimensions of casting.
Terminal Protection Boxes for Cast-In Heaters

Type EP Explosion and Moisture Resistant Box
Cast iron explosion and moisture resistant boxes should be used in areas where the surrounding air may become contaminated with combustible gases or a high humidity level may exist. Installation requires one box per Cast-In Heater half and they are brazed to the tubular heater. The standard box has one 1/2” NPT hub.

Optional: Two hubs per box available. Cast-In Heater fitted with boxes can be factory prewired with high temperature lead wire, protected with special armor cable. If either of these options is required, please specify the following:
- Number of hubs
- Cable type
- Lead wire length
- Cable length

Type MPR Moisture Resistant Box
This design has a moisture resistant die cast aluminum box with a non-removable polyurethane gasket in the lid. Lid is secured with captive stainless steel screws. Body and lid are painted in basic industrial gray; interior contains copper ground screw. Box is mounted to a plate that is brazed to the element. Available in a wide variety of sizes.

Type MR1 Moisture Resistant Box with Perforated Shield
This design incorporates the MPR housing style along with a perforated tube shielding unheated extensions of the tubular heating elements. This feature provides mechanical strength to the element extension and prevents overheating of the terminals, reducing possible premature failure from corrosion and oxidation.

Type CB
A cast box mounted directly on the casting is used to protect the termination.

Exposed electrical wiring on cast-in heater installations is a violation of Electrical Safety Codes including O.S.H.A.
Installation Recommendations for Cast-In Thermal Components

Tempco Cast-In Heaters will provide long life and dependable, trouble-free service if properly installed, operated, and maintained as per the following recommendations:

Installation

1. Allow sufficient space for thermal expansion. The amount of space required depends upon the Cast-In Heater size, operating temperature and alloy.
2. Surface being heated must be free of any foreign materials and have a smooth finish.
3. Make sure that the casting is properly seated. The clamping devices used should be tightened down to the correct recommended torque. After initial heat-up, retighten fasteners to the correct recommended torque.

Recommended Torque:
- 10 ft-lb for 1/4–5/16 bolts, 20 ft-lb for 7/16–5/8 bolts

4. Thermal insulation can be used to reduce heat losses.
5. Avoid mounting heaters in an atmosphere containing combustible gases and vapors unless specifically manufactured for use in such conditions.
6. Liquid Cooled Cast-In Heater fittings must be securely tightened to prevent leaks.
8. To prevent overheating and heater failure, adequate temperature controls should be installed. For assistance in selecting temperature controls and thermocouples, see Tempco’s (in-stock) complete line of Plug-In type Proportional Temperature Controls for heating and cooling applications in Section 13. Also see the listings on standard and hot melt thermocouples in Section 14.

Operation

1. It is recommended to slow start the process during first use.
2. Do not operate above rated voltage. Excess voltage will result in heater failure.
3. Do not operate Cast-In Heaters above recommended temperatures. Heater temperature must be monitored and controlled. Use of over-temperature T/C is strongly recommended for higher temperature applications. Excess temperatures will result in heater failure and/or melting.
4. Electrical terminals must be kept free of contaminants, as spillage of plastic, water, oils, and their vapors can cause electric shorts, resulting in heater failure.
5. Liquid Cooled Cast-In Heaters must not be cycled to operate simultaneously. Thermal stresses may result in shorter heater life.
6. The water used on Liquid Cooled Cast-In Heaters must be properly treated. Hard water contains corrosive media that will contaminate the tubing, producing stress corrosion cracks and resulting in shorter heater life. Presence of minerals in water can cause clogged tubes that can result in poor heat transfer and eventually heater failure.

Maintenance

1. Never perform any type of service on heaters prior to disconnecting all electrical power.
2. To ensure good surface contact, periodically check clamping. Retighten clamping to the correct torque when required.
3. Repeat cycling of temperature controls can indicate poor response to temperature changes. Our recommendation is to change them periodically, as a bad thermocouple can be the cause of destroying an entire heating zone.
4. Heater terminal electrical connections must be kept free of plastics, oil, water, and any other foreign matter. As these materials carbonize, they create electrical shorts.
5. Heater terminal electrical connections must be kept tight. Loose connections can overheat and eventually destroy the connection or the heater terminal.
6. Water lines must be periodically checked for leaks. Water on heater terminals can be detrimental to the entire heating system.
7. Thermocouples must be kept free of contaminants and be checked for good response to temperature changes. Our recommendation is to change them periodically, as a bad thermocouple can be the cause of destroying an entire heating zone.

Wiring

1. For connections at the heater terminals, use high temperature nickel conductor or nickel clad copper lead wire or alloy bus bar. Keep all electrical connections properly protected to eliminate electric shock to machine operators.
2. Heaters of equal wattage and voltage can be connected in series for higher voltage.
3. Heater installations must be properly grounded to eliminate electric shock hazard, and wiring must comply with electrical codes.
4. Always have a qualified electrician perform all wiring and connections of heaters and control components. Terminals must be tightened to the correct torque (2.5 ft/lb for terminal connections).

CAUTION: Castings are not designed to be lifted or carried by the terminations or leads.

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

Note: See page 16-11 for Wiring Diagrams and page 15-2 for lead wire selection

Complete Your Installation With Accessories Available From Stock

- Stainless Steel Tubing and Fittings For Cooling Lines
- Pressure Transducers and Rupture Disks
- Temperature Controllers
- Temperature Sensors, Thermocouple Wire, Jacks & Plugs
- High Temperature Lead Wire & Fiberglass Tape, Ceramic Terminal Covers and Electric Plugs

View Product Inventory @ www.tempco.com