TUTCO HEATING SOLUTIONS GROUP

TUTCONNECT

FARNAM | SUREHEAT | CONDUCTIVE | WATTCO | MARCH 2025

Think About the Heater Sooner Rather than Later

At TUTCO, we work with customers every day to develop process heating solutions that integrate seamlessly into their systems. All to often, one of the most common things we find ourselves saying is, "Wow, I really wish you had brought us in sooner."

Why? Because early collaboration leads to smarter, more efficient, and more cost-effective heating solutions. When we're involved from the beginning, we can tailor the heater to your system's exact needs—maximizing performance, reducing costs, and ensuring a perfect fit.

Why Timing Matters

Many times, by the time a client reaches out to us, they've already designed most of their system, leaving little room for flexibility. At that point, we often find ourselves working within tight constraints—sometimes quite literally backed into a corner—where design choices are limited. This can lead to compromises in heater placement, airflow efficiency, or overall system performance.

Had we been involved earlier, we could have provided a solution that not only fits better but performs more effectively. Perhaps the heater could have been designed to take up a bit more width but less length, or vice versa. Maybe a slight change in system layout could have allowed for better heat distribution. These small adjustments can make a big difference in efficiency, cost, and ease of integration.

The Importance of Airflow

When designing a heating solution, airflow is a crucial consideration—often more critical than many customers realize. Air, much like water in a stream, follows the path of least resistance and prefers to move in a straight line. When forced to navigate sharp corners or bottlenecks, it can build up or become unevenly distributed, reducing efficiency.

Our goal is to maximize heat transfer by ensuring that the air comes into direct contact with as much of the heater's coil as possible. The more efficiently air flows through the system, the better the heating performance. By involving us early in the design process, we can help you avoid common airflow pitfalls and create a more effective heating solution from the start.

Smarter, Simpler Solutions

Beyond airflow, early involvement also allows us to explore other choices that help enhance efficiency, such as:

- **Optimized Heater Shape & Placement** – We can adjust dimensions to fit your system without sacrificing efficiency.
- **Complete Thermal Solutions** – We may be able to design plug-and-play units that simply drop into place, saving time and effort.
- **Cost Savings** – A custom-tailored solution early in development is often more cost-effective than making last-minute adjustments or retrofits.

Let's Talk Early

If you're developing a new system that requires process heating, let's start the conversation sooner rather than later. By working together from the beginning, we can design a heating solution that is more efficient, more cost-effective, and better suited to your needs.

Different Types of Leadwire Insulating Material

by Ian Renwick

There are many different types of leadwire insulating materials that we can provide with our heaters. There really isn't any type of material we can't use as an insulating material on the leadwire of a heater, unless it can't fit. That's really the only physically limiting factor.

Why select from different insulating materials? The two main factors are temperature rating and water resistance. Other factors are cost and form-factor.

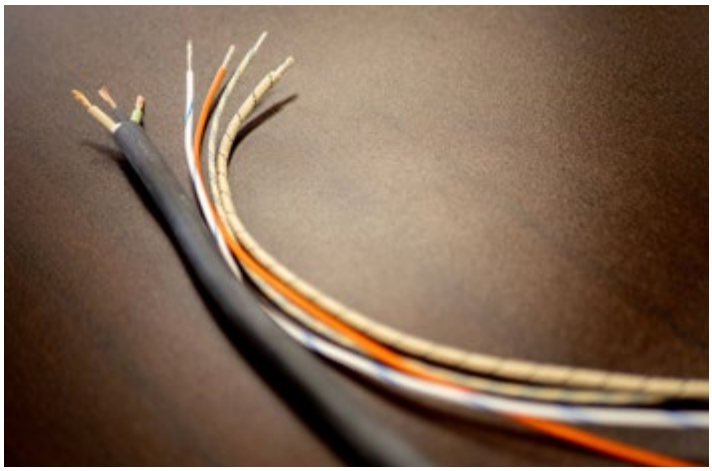
At TUTCO, we used mica insulated leads as our default leadwire. It has a very good temperature rating of 450°C (842°F) and is comprised of stranded nickel conductors so it's flexible and has a good ampacity. We also carry Teflon insulated leads as a moisture resistant alternative, which is great for applications where water is present, but it doesn't have such a high temperature rating of only 250°C (482° F). Unfortunately, plastic and rubber insulations (or anything made from an organic compound) that can resist water have a temperature rating that can't exceed about 500°F. For things hotter than that you'll have to go to non-organic insulations which are typically not water resistant. You can have one or the other, but not both.

That's where leadwire protection comes in. We can provide mica insulated leads with heat-shrink sleeving over them, or convoluted armor, both which will keep water away.

If you're looking for an inexpensive insulation you might want to try PVC. It has a rating of only 105°C (220°F) but it can keep water away. You need to be careful in how these leads are connected to heaters. They can't be too close to a hot part of a heater, such as if they're internally connected inside a cartridge heater, because the insulation will get damaged from excessive heat.

SJO Cord is a popular option when you want all the conductors (power leads and groudwire [if called for]) to be held in the same outer jacket that provides good protection from water. It's also handy if you want to attach a plug to the end of the leads. The insulating material is neoprene rubber (polychloroprene) and has a temperature rating a little lower than PVC of 90°C / 194°F so similar precautions must be taken. If used on a cartridge heater you'll want an unheated length of at least an inch or two to keep the heat away from the rubber insulation. SJO Cord can't be used on all our heaters because the conductors are held together in a single outer jacket, so the connecting points can't be too far apart, like with an Ultima Strip Heater, for example.

At the other end of the temperature scale there are some conductors that are insulated with a high temperature material able to withstand 550°C (1020°F) for those applications where the leads need to run through very hot spaces. The insulation is a proprietary mica/glass composite, is not the least bit water resistant and the leadwires are quite thick in diameter, sometimes 50% thicker than our default mica insulated wires. That makes them unsuitable for some heater where they simply won't fit. These leads with a very high temperature rating are also quite expensive. We do have a few sizes of the wire in stock, but not all of them. In the case of this exotic leadwire, don't assume we can build you something without a conversation first.



Blue/White & Orange - PTFE or Teflon, Black with 3 conductors - SJO Cord, With Fiber Glass Braid - Mica / Mica Glass

In some of these cases where we don't normally carry a specific leadwire in-house, customers have provided the leadwire to us to use in their heaters. We have one particular customer that doesn't like the texture of one of our leadwires, so they provide their own when they place an order. Another customer wants the most flexible leadwires imaginable, so they provide us a17 ga rubber insulated wire with 210 strands(!) when placing an order.

Another point to consider is the seal called for on the heater. If you're going to want a moisture resistant heater built with Teflon leads (for example) don't forget that you'll probably need to go with an epoxy or RTV seal in the heater. Our default seal is cement, which is porous, so using it in a moist environment isn't a great idea, especially when you've gone to the effort of specifying moisture resistant leadwires.

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Different Types of Leadwire Insulating Material (Continued)

Here's a table that summarizes the details above:

Insulation Type	Temperature Rating (C°)	Temperature Rating (F°)	Moisture Resistance	Ease of Use (for manufacturing)	Cost	Availability
Mica	450	842	Poor	Easy	Medium	Common
Teflon	250	482	Good	Easy	Medium	Common
PVC	105	221	Good	Easy	Low	Common
SJO Cord	90	194	Good	Medium	Medium/High	Common
Mica/Glass	550	1022	Poor	Difficult	High	Special

At TUTCO, we can offer you a variety of leadwire insulating materials, many of which we have in stock and can build into heater right away. If you have special requirements, please contact us to discuss and we'll see how we can accommodate your needs.

MORE ASK IANS

The Ultimate Heat!

The Ultima Series of band and strip heaters produced by TUTCO Conductive deliver a robust selection of band and strip heater options to meet the need of a variety of applications. These heaters will operate up to 1200°F (648°C) and will withstand most corrosive environments and harsh installations. Ultima heaters start with a stainless-steel tubular heating element that is inserted into a 3/8" thick x 1 1/2" wide stainless-steel sheath which is then filled with MgO to allow for quick high heat transfer. They are available with a watt density of 40 to 45 Watts/In² of heating surface. These heaters are used in many process heating applications from aerospace, custom plastic molding dies and molds to custom made solutions, like a heater used to keep a cast iron pot of soup at specified serving temperature.

This heater style is available in a wide variety of electrical terminations. We can do basic screw stud terminals with or without a stainless-steel terminal box, high temp leads with lengths to match your system requirements with stainless steel braid, stainless steel armor and fiberglass sleeving protection available. We can also offer a stainless-steel terminal box with a German Plug installed into the terminal box. We can also offer a variety of other plugs, just let us know what plug you require, and we will evaluate and should be able to offer it to you.

The TUTCO Ultima Band heaters can be built with Inside diameters from 5" to 30" and larger diameters can be evaluated and sometimes built. These heaters come standard with 2-piece construction but some designs can be built is 3, 4, or possibly more segments. The clamping hardware is heavy duty 1/4-20 SHCS w/ clamp bars with spring bolt and Belleville washer clamping optional.

The TUTCO Strip heaters are available from 5 to 50" in length but longer lengths may be possible but need to be evaluated by the factory. These heaters will look very similar to a standard ceramic strip heater but they are much more robust with optional mounting tabs, brackets and even fins for rugged air heating applications.

If you need a non- standard Ultima heater, please consult the factory and we will be happy to evaluate and see if we can offer you something to meet your needs as we are happy to do custom configurations. Please contact us; we would love to help you with all your conductive heater needs whether it be the Ultima product line or another one of our other conductive products.

Feature Video

Thermal Process Controllers

TUTCO Farnam's Thermal Process Controllers are convenient plug-and-play products that offer a complete thermal solution for application where you need to heat up shop or compressed air from 200 to 500° F. In this month's video, learn how these fully integrated systems take the guesswork out of heating applications by combining all essential components into one convenient, wall-mountable steel enclosure. Each system includes a high-performance heater, a state-of-the-art digital controller, a flow switch, and a solid-state relay—delivering precise temperature control and reliability. Designed for applications requiring moderate wattage with 120V or 240V power, these heaters can handle airflows up to 25 SCFM and pressures up to 120 PSIG, achieving temperatures up to 260°C (500°F) depending on airflow.

WATCH THE VIDEO

MRO Americas

Visit SureHeat in Booth 5128

Meet with the TUTCO SureHeat team at booth 5128 during the largest gathering of the aviation maintenance community in the world. MRO Americas brings together maintenance, repair and overhaul professionals to explore new technology and innovative aerospace solutions. TUTCO SureHeat specialty flanged inline heaters play a key role in the maintenance, repair, and overhaul (MRO) operations conducted at FAA repair stations. SFI heaters provide the high-temperature and high-pressure essential for testing pneumatic aerospace components—a critical and precise application in the aerospace industry.

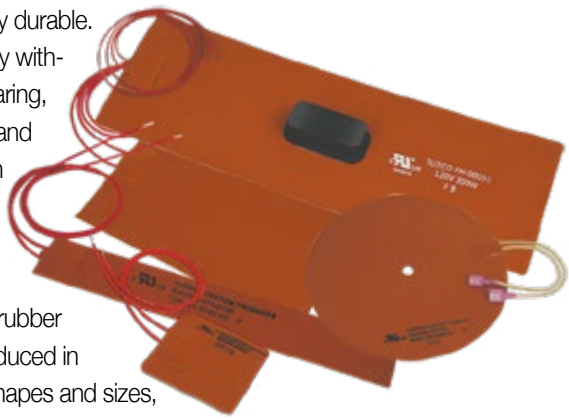
Make plans to visit SureHeat at this year's MRO Amricas. To connect with the SureHeat team, email support@tutcosureheat.com

Feature Product

Silicone Rubber Heaters

TUTCO Farnam silicone rubber heaters are highly customizable industrial heaters that are very durable and offer amazing heat transfer properties, making an excellent choice for applications like process heating, condensation control, freeze protection, and composite bonding or curing. The etched foil heating elements used in TUTCO Farnam's Silicone heaters are designed to maintain uniform temperatures across the heater's surface. Silicone rubber heaters are very flexible and resistant to most chemicals. They are especially suited for heating irregular shapes and curved surfaces.

In industrial environments, mechanical vibrations are common. Flexible heaters are built to withstand these challenges—they resist vibrations, mechanical shocks, and repeated movements without issue. Silicone, in particular, is highly durable. It can flex repeatedly without stretching or tearing, making it a reliable and long-lasting solution for demanding applications.



Etch-foiled silicone rubber heaters can be produced in variety of custom shapes and sizes, from as small as a 1" square to 18"x24". Even larger elements can be produced using wire-bound construction. Silicone heaters are a superior product when weight, durability, precision heat and thermal control are required.