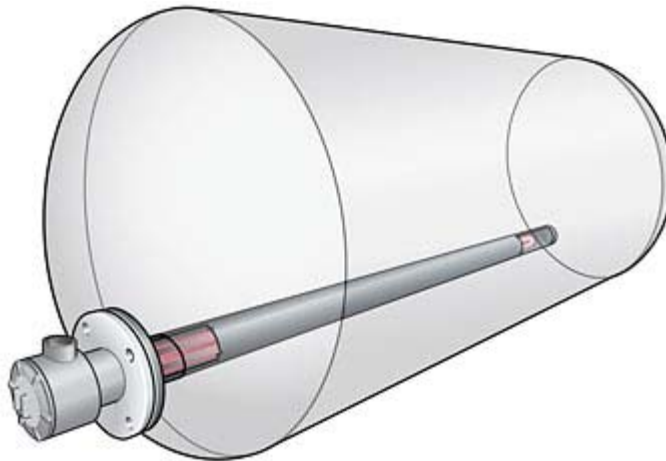




## Pipe Insert Heaters



**Flange Style Pipe Insert Heater Placed in Tank**

### PRODUCT DESCRIPTION

#### Indirect Heating of Tanks

Indirect heating uses a heat transfer medium to transfer the heat to the tank. Indirect methods can vary from external heating of the tank using the tank wall as the heating medium to utilizing a heat transfer medium to carry the heat to the tank. In addition, **pipe insert heaters** have been included in this category because they use an air space between the element and the process to convey the heat. There are various advantages to indirect heating. The biggest advantage is that the heater can typically be serviced without draining the tank. Second, indirect heating often allows watt density exposed to the process fluid to be lowered by spreading the heat over a larger surface. Finally, overheat conditions can be limited in many instances by simply limiting the temperature of the heat transfer medium. There are a few minor disadvantages to indirect heating that may be critical to your process.

The primary disadvantage is the thermal lag caused by using a heat transfer medium to carry the heat. The delay is caused by the fact that the heater must first heat the heat transfer medium before the heat transfer medium can heat the process. If there is a large mass of heat transfer medium, larger heating capacities will be required to raise temperatures.

## **Heating Using Pipe Insert Heaters**

A pipe insert heater uses an element inserted into a sealed pipe. The advantage to the pipe insert heater is that the element is isolated from the process. This allows the element to be removed without draining the tank, isolates hazardous or corrosive materials from deteriorating the element, and if sized properly may allow the heat to be distributed over a larger surface area reducing the watt density exposed to the process. Consideration of element expansion both in length and in the element supports on the inner diameter must be considered when designing a pipe insert heater. The internal heaters of **pipe insert heaters** consist of screw plugs, flanged heaters, or open coil elements (OCE) inserted into a pipe. Pipe insert heaters must have a separate temperature controller mounted outside of the pipe to regulate the process temperature. An over temperature device should be installed and attached to the top of the pipe at the highest point. Packaged Systems offer a control panel with the necessary switchgear and temperature controls along with the heaters.

The Incoloy sheathed element(s) inside the pipe are carefully designed for this application, and transfer their heat to the inside pipe wall by convection and radiation. The large surface area of the pipe in contact with your liquid greatly reduces the intensity making the **pipe insert heater** ideally suited for heating:

- Very viscous materials like Bunker C Fuel Oil
- Temperature sensitive materials like honey, glucose & liquid sugars
- Bulk storage of corrosive Material

These products demand a low watt density, and are often in large storage tanks. Indirect heating works perfectly in these applications. Heat transfers to the inside of the pipe wall, through the pipe wall then distributed over the much larger surface area of the pipe. The result is a low watt density to heat the liquid and easy removal of the heater, without ever draining the tank.

## **Application:**

Incoloy 800 is used for all pipe insert heating applications. Maximum sheath temperature 1400°F. Watt densities of 10-30 W/Sq. in are mainly used.

## **Terminal Enclosures:**

- ▣ NEMA 1 Sheet Metal Housing (Intended for indoor use only)
- ▣ NEMA 4 (**Standard**) Moisture Resistant Terminal Housing
- ▣ NEMA 4X Epoxy Painted or Stainless Steel Moisture Resistant Terminal Housing

- NEMA 7 Hazardous Location Terminal Housing

### **Thermostat Application**

Since the thermostat will be located inside the pipe, it will be measuring the internal pipe temperature. The thermostat is intended for high limit purposes and is not suitable for process control. A separate temperature sensor, like a type “J” thermocouple will be required to control the process.

### **Complete Pipe Insert Heating Systems**

Screw plug and Flanged assemblies are available complete with a pipe when installation of a pipe into the tank is not feasible or desirable. The pipe wells are 2” or 2 ½” NPT schedule 40 carbon steel in the standard designs. Stainless steel pipes and connection fittings are available for chemical corrosion for or immersion into food products.

### **Installation Instructions for Pipe Insert Heaters**

- Before installing, check your pipe insert heater for any damage that may have occurred during shipment.
- Check to insure that the line voltage is the same as that stamped on the nameplate.
- Do not bend the heating elements. If bending is necessary, consult factory.
- **Important:** Mount heater in the tank so that the liquid level will always be above the effective heated portion of the heater. If the heater is not properly submerged, it may overheat and damage the heating elements and create a possible fire hazard due to excessive sheath temperatures.
- Where work will pass over or near equipment, additional protection such as a metal guard may be needed.
- Heater must not be operated in sludge.
- Install the heater using a high quality pipe sealing compound on the threads. Screw the heater into the opening. Tighten sufficiently with wrench applied on the hex portion of the screw plug.

**Note:** Locate Heater as low as possible for maximum liquid storage capacity. Heat does not move downward.

**Warning:** *Hazard of Shock. Any installation involving electric heaters must be effectively grounded in accordance with the National Electrical Code.*

### **Wiring**

- Electric wiring to heater must be installed in accordance with the National Electrical Code and with local codes by a qualified person as defined in the NEC. **WARNING:** *Use copper conductors only.*

- When element wattages are not equal, heaters must not be connected in series.
- Electrical wiring to heater should be contained in rigid conduit or in sealed flexible hose to keep corrosive vapors and liquids out of the terminal housing.
- If flexible cord is employed, a watertight connector should be used for entry of the cord into the terminal box. Outdoor applications require liquid-tight conduit and connectors.
- Bring the power line wires through the opening in the terminal box. Connect line wires as shown in the wiring diagram.

## Operation

- Do not operate heaters at voltages in excess of that stamped on the heater since excess voltage will shorten heater life.
- Always maintain a minimum of 2" of liquid above the heater to prevent exposure of the effective heated length. If the heater is not properly submerged, it may overheat and shorten heater life.

### **Do not operate heater if tank is dry.**

- Be sure all trapped air is removed from a closed tank. Bleed the air out of the liquid piping system and heater housing prior to energizing.

**Note: The tank or heating chamber in closed tank systems must be kept filled with liquid at all times.**

- Keep heating elements above sediment deposits.
- **Low Megohm Condition** — The refractory materials used in electric heaters may absorb moisture during transit or when subject to a humid environment. This moisture absorption results in a cold insulation resistance of less than twenty megohms. Normally, this megohm value corrects itself after heatup and does not affect heater efficiency or life. A low megohm condition can easily be corrected by removing the terminal hardware and terminal enclosure and baking the heater in an oven at 350°F for several hours, preferably overnight. **Note:** The lid must be removed from the housing. An alternate procedure is to energize the heaters at low voltage until the megohm reading returns to normal. When energizing heaters in air, the sheath temperature should not exceed 750°F.

## Maintenance

**WARNING: *Hazard of Shock. Disconnect all power to heater before servicing or replacing heaters.***

- Heaters should be checked periodically for coatings and corrosion and cleaned if necessary.

- The tank should be checked regularly for sediment around the heater pipe insert as sediment can act as an insulator and shorten heater life.
- Remove any accumulated sludge deposits from around pipe and from tank.
- Check for loose terminal connections and tighten if necessary.
- If corrosion is indicated in the terminal housing, check terminal box gasket and replace if necessary. Check conduit layout to correct conditions that allow corrosion to enter the terminal housing.
- Clean terminal ends of all contamination



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