

USER INSTRUCTIONS FOR TUBULAR HEATING ELEMENTS

GENERAL



WARNING: The system installer is responsible for the safety of this equipment and should install adequate safety and backup temperature limit controls. Provide pressure relief where applicable.



WARNING: DO NOT mount or operate in an atmosphere containing combustible gases, vapors, dusts, or fibers.

The safety and performance of tubular heating elements are dependent upon proper handling, installation, control and maintenance. It is advised that you conduct your own tests to determine the safety and suitability of this heater in your specific application. All products are dielectric tested as defined in UL 1030 before shipment unless a different criterion is requested by the customer.



WARNING: Risk of combustion due to direct contact, radiant heat, or dripping molten metal. Keep area below and an area 5 feet surrounding free of combustible materials.

On liquid systems, damage to the fluid could occur if the heater is allowed to exceed the maximum film temperature recommended by the manufacturer.



WARNING: Risk of burn. When required, thermal insulation must be provided to prevent human or animal contact with hot surfaces.

It is the ultimate responsibility of the user to verify that the construction materials provided in the tubular heating element is suitable for use with the process fluid. Specifically, corrosion issues must be reviewed. Heater watt density and operating temperature must be properly matched to the application. We can provide assistance if operating conditions are provided, but cannot be responsible for heater failure due to corrosion or excessive temperature.

INSTALLATION



CAUTION: Installation is to be performed by qualified personnel familiar with the National Electrical Code and all local codes and standards. It is the responsibility of the installer to verify the safety and suitability of the installation.

Moisture Seal:

For elements with an end seal, ensure the proper seal is selected based on the maximum temperature possible associated with the temperature limiting controls. Contact factory if unsure of temperature limitations on any provided element end seals.



WARNING: Ensure all electrical connections are tight. Failure to do so may result in property damage or personal injury due to fire.



WARNING: Hazardous voltages are present. Lock-out & tag branch circuit disconnect switch before working on this heater. Ensure that all operationally live touch points are properly guarded to prevent electric shock hazards.

Branch Circuit Protection / Incoming Wire:

The electrical installation should include a service disconnect switch, branch circuit over-current protection and proper short circuit protection as defined by local and national electrical codes. Ensure heating elements are properly grounded. Type and temperature of wire should be suitable for application.

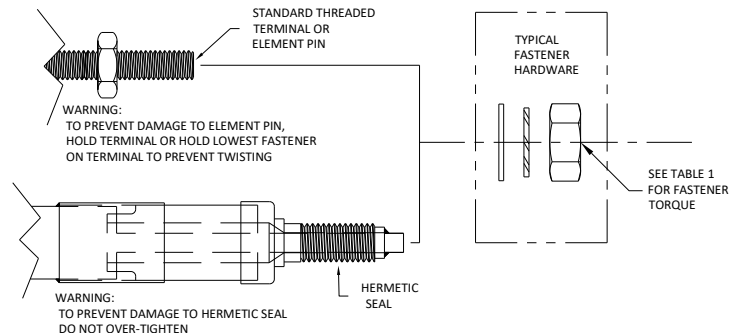
Wiring Terminals:

Protect the terminals of heating elements from drippings, condensation, fumes, spray or any other substance that could result in element contamination. In outdoor applications, moisture resistant housings are required.

Torque Values for Threaded Terminals

Table 1:

APPLICATION	THREAD SIZE	TORQUE (IN-LB)
STANDARD	#6-32	8
STANDARD	#8-32	16
STANDARD	#10-32	20
STANDARD	1/4-20	65
HERMETIC	1/4-28	30



OPERATION



WARNING: Risk of Fire. Failure to comply with the following could result in personal injury or property damage.

Do not operate heaters at voltages that exceed the marked ratings. Excess voltage can shorten heater life and result in unsafe operating conditions.

Start-Up Inspection:

Before energizing the heater, the following items should be inspected with the heater power disconnected:

1. For liquid application, ensure immersed section of heater is completely submerged.
2. All electrical terminations are tight.
3. The applied voltage is the same as the voltage rating marked on the heating element.
4. Proper disconnecting means, overcurrent protection and short circuit protection have been installed.
5. Heating elements are properly grounded.
6. Heater megohm reading is greater than or equal to 1 megohm.
7. Proper temperature controls and safety limiting devices are in place.
8. All required thermal and dielectric insulation is in place.
9. Heater is securely installed in the application.

Low Megohm Condition:

During shipment and/or storage, moisture absorption by the insulation material within the element is possible. It is recommended to perform an insulation resistance test using a 500 VDC megohm meter between the element terminals and element sheath prior to energizing. If the measured resistance is less than 1 megohm, bake in oven at 250°F or energize the heating element at a reduced voltage in air until the megohm reading is at an acceptable level.

Contaminants:



WARNING: Contaminate accumulation in the element refractory material, element over-temperature or sheath corrosion may cause a ground fault to the element sheath. Install proper ground fault protection as required by local codes.

Heaters should not be operated in environments with conditions that can compromise the integrity of the electrical insulation inside the heater. The following are examples of contaminants that can create shock hazards due to generated leakage currents:

- Water or water vapors
- Dirt, grease, oil or oil vapors
- Corrosive liquids and vapors

MAINTENANCE



WARNING: Hazardous voltages are present. Disconnect all power before working on this equipment. Lock-out & tag branch circuit disconnect switch to ensure unintentional power application.

- Check all field and factory-made electrical connections for tightness.
- Check all wiring for deterioration at least once a year.
- Inspect element sheath for signs of corrosion, overheating or the buildup of solids.
- Liquid immersed heaters should be removed from tank and checked periodically for scale buildup. Clean as required.

TROUBLESHOOTING

Problem	Cause / Correction
No Power	<ul style="list-style-type: none"> • Check that the disconnect switch is in the 'ON' position. • Ensure fuses are not blown. Replace fuses as necessary.
Fuses blowing or circuit breaker trip	<ul style="list-style-type: none"> • Check heater electrical rating. Verify correct voltage applied. • Check fuse rating. Fuses should be sized at least 25% more than the full load amperage of the heater. • Disconnect heater power source and measure resistance to ground. Measured resistance should be no less than 1 megohm. Refer to 'OPERATION' section.
Application not heating to desired temperature	<ul style="list-style-type: none"> • Check heater electrical rating. Verify voltage and amp draw. • Too much heat loss. Higher wattage heater may be required.