USER INSTRUCTIONS FOR BOLT HEATERS

APPLICATION

Due to the wide variety of applications, trial installations may be necessary to properly determine required heat output.

In general, most applications attempt to produce an expansion (or stretch) of 0.0015 per inch of length on alloy bolts. This will produce a bolt stress of 45,000 psi at the root of the thread. The portion of the bolting member to be heated, excluding threads, is usually approximately 65% of the total length.

The following chart outlines suggested clearance holes for common bolt sizes to produce the above stretch using standard bolt heaters:

Bolt Size	Clearance Hole	Heater Diameter
1.75 to 2.00	0.500	0.438
2.25 to 2.50	0.625	0.553
2.75 to 3.00	0.750	0.688
3.25 to 3.50	0.875	0.813

Bolt Size	Clearance Hole	Heater Diameter
3.50 to 3.75	1.000	0.938
4.25 to 5.00	1.125	1.047
5.25 to 6.00	1.500	1.324

Bolt heaters are specifically designed to provide the maximum watt density rating on the heated tube length. This results in a relatively short anticipated heater life due to this high concentration of heat. We use the highest quality materials commonly available to manufacture these heaters and maintains rigid quality control procedures in order to ensure a reliable product. All products are dielectric tested as defined in UL 1030 before shipment unless a different criterion is requested by the customer.

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.

WARNING: Hazardous voltages are present. Lock-out & tag branch circuit disconnect switch before working on this heater. Ensure that the power supply is disconnected before working on this equipment.

Incoming Wire:
Type and temperature of wire should be suitable for application.

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 bolt heater is properly grounded.

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

Wiring Terminals:
Protect the bolt heater terminals from drippings, condensation, fumes, spray or any other substance that could result in heater contamination.

Bolt Hole Sizing:
Closer clearances between the bolt hole and the heater will result in better heat transfer and longer heater life. Generally, the clearance should not be less than 0.032 inches for ease of installation nor greater than 0.064 inches to support proper heat transfer. With 0.064 inch clearance, the maximum heater temperature will be reached in about 30 minutes. Continuous operation of the heater beyond a 30 minute period may cause immediate failure of the heater and is not recommended.

Storage:
Care should be taken to store heaters properly prior to use. Heaters must be stored inside in dry heated locations. Do not store in wet or humid locations. If heaters have been stored for more than sixty (60) days or have not been used for over thirty (30) days between operations, an insulation resistance test should be conducted to check for moisture absorption. (See section titled 'Low Megohm Condition' on next page.)

OPERATION

WARNING: Risk of burn. Bolt heater must be completely inserted into the bolt hole during operation. Ensure the heater is cooled before removing heater from the bolt hole.

WARNING: Bolt heaters operate at high temperatures with relatively short life. Ultimate failure should be anticipated and precautions taken to prevent an electrical or shock hazard.

WARNING: Do not operate heater 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 bolt heater, the following items should be inspected with the heater power disconnected:

1. Ensure heater is completely inserted into the bolt hole.
2. All electrical terminations are tight.
3. The applied voltage is the same as the voltage rating marked on the bolt heater.
4. Bolt heater is properly grounded.
5. Proper disconnecting means, overcurrent protection and short circuit protection have been installed.
6. Megohm reading is greater than or equal to 1 megohm.

Low Megohm Condition:

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

Contaminants:

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

The following are examples of contaminates that can create shock hazards due to generated leakage currents:

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

Heater Life Expectancy:

Due to the extreme application of bolt heaters, it is not possible to accurately predict the life expectancy of this product. However, field reports indicate life expectancies in excess of 200 hours can be experienced.

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 heater sheath for signs of corrosion, overheating or the buildup of solids.

TROUBLESHOOTING

Problem	Cause / Correction
No Power	• 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	• 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	• Check heater electrical rating. Verify voltage and amp draw. • Too much heat loss. Higher wattage heater may be required.