Tank Immersion Heaters-For Process Water, Liquid Storage Tanks, Oil Tanks & Other Vessels

Installation, Operation, and Maintenance Instructions

1.0 Handling

1.1 Unpack and handle with care to avoid damage to heater and components. Elements may come in contact with each other during shipment. Minor adjustments to elements may be required prior to installation to separate them. Extensive bending of elements should be avoided since dielectric strength between coil and sheath may be compromised. NPH heaters are built to comply with CSA (Canadian Standards Association) dielectric requirements, it may be necessary due to atmospheric conditions / humidity, to perform a dielectric test prior to startup. (Refer to **low megohm condition and test** below). ***Caution*****:** Do not support or suspend heater from termination, wiring or tubular metal sheathing.

1.2 Make sure heater is protected from contamination during storage. An indoor, dry environment is preferred.
Low Megohm Condition and Megohm Precheck : During shipping and/or storage, the possibility of moisture absorption by the insulation material within the element is possible. 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. To ensure proper megohm values a minimum 500 VDC megohm meter (Megger) should be used to ensure that the megohm reading between the heater terminal and the heater sheath is more than 10 megohms when the unit is at room temperature. If several units are interconnected, the megohm of the heater is obtained by taking the reading and dividing by the number of interconnected elements. This reading should be greater than 10 megohms. If a low megohm value exists, two alternative methods can be used to remedy the

situation. The best method is to remove all terminal hardware including thermostat if provided, and bake out the heater at no higher than 250°F (120°C) overnight or until an acceptable reading is reached. The second method is to energize the unit at low voltage in air until the megohm is at an acceptable
reading. Care should be taken to prevent the heater sheath from exceeding 750°F (398°C) for Incoloy® and steel elements and
400°F (204°C) for copper elements.

1.3 Refer to Application Data link below for additional information related to heater system design and selection.

http://www.nphheaters.com/quote/industrial_process_heaters/determinatio n_guide.pdf

2.0 Safety

2.1 ***WARNING*****:** Make sure power supply is turned off before installation or service of electric heater to prevent electrical shock or damage to equipment.

2.2 ***WARNING*****:** Circuit should have separate disconnect means which shall be capable of being locked in the open position and also in sight from the heater.

2.3 ***WARNING*****:** Wiring must conform to the National Electric Code and Local Regulations and should be performed by a a qualified electrician. **Make sure the heater hook–up wiring is of a suitable temperature rating, amperage rating and for that location.**

2.4 ***WARNING*****:** When servicing, handle with caution, the heater surface may be hot.

2.5 ***WARNING*****:** Do not install heater into a medium or an environment that could result in an explosion, fire, or hazardous condition. Contact NPH regarding heaters that are specifically designed for hazardous locations.

3.0 Installation and Operation

Protection of heater elements from over temperature
The use of temperature controls to regulate heating process and prevent heater over temperature is highly recommended to ensure safe heater operation. It is the users responsibility to ensure safety of the installation.

WARNING: Install high temperature control protection in systems where an over temperature fault condition could present a fire hazard or other hazard. Failure to install temperature control protection where a potential hazard exists could result in damage to equipment and property, and injury to personnel. Failure of components in a temperature control loop, such as the temperature sensor, heater control relay or main temperature control, can result in damage to a product in process, a melt down of a heater, and / or damaging fire. To
protect against this possibility, over temperature protection must be provided to interrupt or remove power from the heater circuit.

In order to help prevent premature failure and a potentially hazardous condition in cases where consequences of failure may be severe, use an appropriate third party approved liquid level protection device. The liquid level should be such that the entire heater is fully submerged with enough liquid above the heater to adequately dissipate heat from itself as under normal operating conditions.

3.1 ***Caution*:** Make sure the heater supply voltage is the same as the rated heater voltage.

3.2 ***Caution*:** Heater should be properly grounded to prevent electrical shock hazard.

3.3 ***Caution*:** Do not support or suspend heater from termination or wiring.

3.4 A common cause of heater failure is contamination of the the internal heater components through the termination end of the heater. Make sure the heater is protected from contamination in the final application.

3.5 Make sure heater termination is not exposed to water or other liquids. Make sure that no dripping from condensation on cold water pipes or other sources can fall on any exposed

electrical wiring connections or components.

3.6. Termination's should be properly tightened and connected to hook-up wiring. A loose connection will result in over- heating at the connection and could lead to premature failure. Where possible, use a wrench or pliers to prevent twisting of the terminals during installation.

3.7 It is good practice to avoid routing of thermocouples with power wiring. Use separate conduit. Thermocouples, thermostat capillary tubes, and wiring should be kept clear of heater terminals by distance or appropriate insulation.

3.8 Most Flanged heaters are designed for direct immersion into a liquid. Heater tubes must be installed into the system so that the tubes are covered by liquid at all times during operation. Care should be taken to avoid air entrapment
or pockets of overheated fluid around the heater tubes.

3.9 Flanged heaters mounted into tanks should be installed horizontally near the tank bottom to allow natural circulation. Agitation of the liquid in the tank will improve system performance. Heaters should be located to avoid sludge build around the heaters or heater tubes.

3.10 Make sure pipe immersion applications allow free circulation around heater tubes.

3.11 Flange must be properly tightened into mating fitting to ensure a leak tight joint. Check joints for leaks.

3.12 System should include a flow switch, low liquid level cut-off switch, over temperature switch, or other safety device (depending on type of system). Heater tubes designed for direct immersion will fail if operated in air.

3.13 Circulating or forced flow systems must have unrestricted flow to ensure proper control performance, heater life, and system integrity.

3.14 Heater wiring should be performed per diagram supplied with unit or refer to our following website page for common circuits below:

http://www.nphheaters.com/quote/industrial_process_heaters/common_wiring.pdf

3.15 Do not exceed 105% of rated voltage. Higher voltages result in higher wattage output which could damage the heater, system, or medium heated.

3.16 Units equipped with a thermostat -

3.16.1 Do not exceed amperage rating of thermostat.

3.16.2 Thermostats are designed for heater control only and are not intended for use as a direct control of motors, pumps, or other devices.

3.16.3 Do not use thermostat as a power disconnection means for the heater assembly.

3.17 Check for proper installation of conduits and covers to ensure terminal box protection. Make sure gaskets seat properly on units equipped with moisture resistant terminal boxes.

4.0 Maintenance

4.1 For most applications, some heater maintenance is required.

4.2 Disconnect line switch prior to any testing or work on the heater

4.3 Check heater termination's after the initial 8 hours and tighten any loose terminal and jumper connections.

4.4 Recheck wiring periodically to ensure wiring has not become damaged, worn, or loose due to vibration or other application related conditions. Tighten, repair, or replace as needed.

4.5 Immersion heater should be checked periodically for scaling or mineral deposits on heater tubes and cleaned as required. Initially, once a week and thereafter once a month or longer.

5.0 Trouble Shooting

5.1 ***WARNING*****:** Disconnect power supply to heater(s) before performing any trouble shooting procedures.

5.2 Check supply voltage to heater to ensure there is power.

5.3 Check wiring circuit- make sure heater is properly wired and all supporting controls, relays, contractors, and other circuit related switches are also properly wired and functional.

5.4 Check heater(s) - No heat due to a heater failure is generally due to an open heater circuit. Check heater resistance across both terminals or leads. A reading of infinity (no continuity) indicates an open circuit within the element and the heater must be replaced.

5.5 Longer than normal heat up time for units with more than one heating element may be the result of an individual heating element failure.

5.6 Poor temperature control is often the result of improper circulation of the medium being heated or improper positioning of the temperature sensors relative to the heater tubes. Increased circulation of medium over the heater or relocating the temperature sensor usually improves temperature control performance.

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