

Electrical Safety Precautions

FOR ELECTRICAL HEAT TRACING



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ELECTRICAL SAFETY PRECAUTIONS

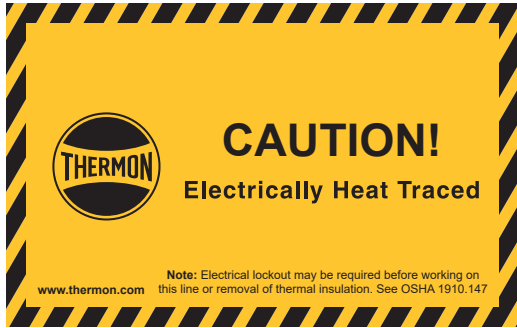
Avoiding electrical hazards associated with electrical heat tracing requires protective measures in several different areas. A designer/installer must pay attention to circuit and equipment identification, analysis of hazards and exposure to those hazards, warnings, listing, and labeling. The designer/installer must also consider the mechanics of establishing an electrically safe work condition.

In designing, installing, or maintaining electrical heat tracing systems, the following actions should be considered.

IDENTIFICATION

1. Clearly label the outer surface of thermal insulation (after final dressing is installed). Labels should be installed on piping, vessels, pumps and similar equipment.

The label should indicate that electrical heating conductors are installed under the insulation. At least one label should be visible from any location. On insulated pipe lines, labels should be installed at intervals no greater than 10 feet (3 meters) and on alternating sides of the pipe. If insulation is removed or replaced, make sure that the label is replaced.



2. Clearly label any controller used to supply and/or protect electrical heat tracing circuits and/or products. Information on the label should contain the circuit being controlled/protected by the controller.
3. Clearly label any power supply panel and/or circuit protective device used to supply and/or protect electrical heat tracing circuits. The label should indicate the circuit being supplied or protected. If the protective device serves as the circuit isolation device for lockout purposes, the label should indicate this information.
4. Clearly label any power transformers, power circuits, raceways, and cable trays or other routing methods used for providing electric power to heat tracing. The label should indicate that the equipment/raceway supplies heating circuits.

ANALYSIS

1. Determine the amount of electrical energy available at the source of electrical power used to supply electric heating circuits. (NOTE: The amount of available energy is dependent upon the design of the circuit supplying energy.)
2. Analyze the overall electrical arc flash and shock hazards associated with the voltage, short circuit current available, and circuit-protective device clearing time. Consider each point in the electrical system/facility where personnel may be exposed.
3. With engineering supervision, establish the flash protection boundary by doing the following:
 - Identify the voltage level and its associated limited/restricted/prohibited approach boundaries. Define the distance from any potential exposed energized electrical conductor or circuit part where the incident energy exceeds 1.2 cal/square cm.
 - If available energy is less than 16 kA, establish the flash protection boundary using the formula in NFPA 70E, Part II, Paragraph 2-1.3.3.2 or in Appendix B-2.3.2 or B-2.3.3.
 - If available energy is at least 16 kA but less than 50 kA, establish the flash protection boundary using the formula in NFPA 70E, Appendix B-5.1 or B-5.2.
4. Clearly label the electrical equipment enclosures (front, back, and ends) to show the approach boundaries determined in the analysis. If employee is to approach any live part closer than the Prohibited Space shown in NFPA 70E, Part II, Table 2-1.3.4, he/she must be insulated or guarded from the live parts.
5. Clearly label the electrical equipment enclosures (front/back, ends) to show the incident energy at 18 inches (46 cm) and at 36 inches (91 cm) from the arc flash hazard source.

DESIGN/INSTALLATION

1. Provide/install only electrical heat tracing and electrical power supply or control equipment that has been evaluated, tested, and listed by a nationally recognized testing laboratory (NRTL).
2. Install listed electrical equipment according to any directions from the listing agency.
3. Apply electrical heat tracing and its electrical power supply and control equipment according to the National Electrical Code® (NEC®).
4. Provide necessary equipment or circuit disconnecting devices (for lockout) for each circuit or item of equipment.

SITE PRACTICE

1. Provide protective clothing, personal protective equipment, and other protective equipment needed to protect employees from potential arc flash and shock hazards identified in the analysis.
2. Provide training to create qualified employees capable of understanding the purpose/function of the electrical heat tracing, its electrical power supply/control equipment, and how to recognize and avoid the hazards associated with its operation and maintenance.
3. Treat all electrical conductors and circuit parts as though they are energized until they are placed in an electrically safe work condition by doing the following:
 - Identify the circuit or equipment to be de-energized and all possible sources of electrical energy supplies to the specific circuit or equipment.
 - Interrupt the load currents appropriately, and then open the circuit disconnecting device(s).
 - Visually verify, where possible, that the appropriated circuit disconnecting device is indeed open.
 - Apply lockout/tagout devices according to a documented and established procedure.
 - Test for absence of voltage with an approved voltmeter (where the voltmeter is tested on a known circuit voltage prior to and immediately following application).
 - Ground the phase conductors or circuit parts before touching them where the possibility of induced voltages or stored electrical energy exists.
 - Apply ground-connecting devices rated for the available fault duty where the conductors or circuit parts being de-energized could possible contact other exposed energized conductors or circuit parts.



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