Electric Heat Tracing

Maintenance and Troubleshooting Guide for Frost Heave Prevention

THERMON®

The Heat Tracing Specialists®

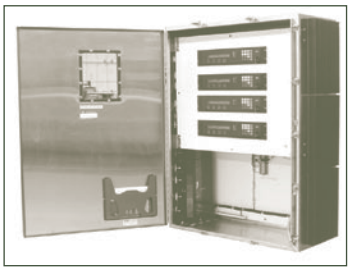
Introduction

A complete electric heat tracing system will typically include the following components:

1. Electric heat tracing cable (self-regulating and parallel constant watt).

2. Power and end termination kit.

3. Temperature controller.



The absence of any of these items can cause a system to malfunction or represent a safety hazard.

Cable Testing

After a heat tracing circuit has been installed and fabricated, the heating cable should be tested to ensure electrical resistance integrity. The cable should be tested with at least a 500 Vdc megohmmeter (megger) between the heating cable bus wires and the heating cable metallic braid. It is recommended that the test voltage for polymer-insulated heating cables be 2500 Vdc.

After properly terminating the cable, connect the positive lead of the megger to the bus wires and the negative lead to the metallic braid. The minimum acceptable level for the megger reading for any polymer-insulated heat tracing cable is **20 megohms**.

Final Inspection

The heating circuit can now be tested for proper operation. This includes measuring and recording the connected voltage, steady-state current draw, length and type of cable. (See the Inspection Report Form.)

Maintenance

Once the heat tracing system has been installed, an ongoing preventive maintenance program should be implemented using qualified personnel. Support documentation providing general information and an operating history of the specific circuits in the system should be maintained.

The results of the operational testing described above form the testing “base line” or normal range. Subsequent measurements should be recorded periodically and compared to this base-line data to help identify potential malfunctions.

Inspection Report Form for Electric Heat Tracing

Location	System	Reference Drawing(s)	Circuit #

CIRCUIT INFORMATION		
Heater Cat. No.	Circuit Length	Brkr. Panel No.
Power Connection	Design Voltage	Brkr. Pole(s) No.
	Ground-Fault Protection (type)	
	Ground-Fault Trip Setting	
Heater Controller		

VISUAL							
Panel Number	Date						
	Initial						
Heating System Components							
Enclosures, Boxes Sealed							
Presence of Moisture							
Sign of Corrosion							
Heater Lead Discoloration							
Heating and/or High Limit Controller							
Operating Properly							
Controller Setpoint							

ELECTRICAL						
Dielectric Insulation Resistance Testing (bypass controller if applicable) Refer to IEEE 515-2004, Section 7.2.2						
Test Voltage						
Megger Value						
Heater Supply Voltage						
Value at Power Source						
Value at Field Connection						
Heater Circuit Current Reading						
Amps Reading at 5 min.						
Ground-Fault Current						

Comments and Actions

Performed by	Company	Date
Approved by	Company	Date

Troubleshooting

The following information is intended to assist in troubleshooting electric heat tracing systems. The primary objective is to provide an enhanced understanding of the elements of a successful heat tracing installation.

If an electric heat tracing circuit is suspected to be damaged, a dielectric insulation resistance (megger) test should be performed using a 2500 Vdc megohmmeter for polymer-insulated heating cables. Periodic testing with accurate records will establish a "normal" range of operation (refer to the Inspection Report Form). Dielectric insulation resistance readings which deviate from the normal range can quickly reveal a damaged circuit.

I. No heat/no current	A. Loss of power (voltage)	A. Restore power to tracing circuit (check circuit breaker and electrical connections). Poorly made terminations can cause EPD-type breakers to trip unexpectedly
	B. Controller setpoint too low	B. Adjust setpoint
	C. Controller failure	C. Repair sensor or controller
II. Low system temperature	A. Controller setpoint too low	A. Adjust setpoint
	B. Low voltage (check at power connection point)	B. Adjust voltage to meet design requirements [1]
III. High system temperature	A. Controller "on" continuously	A. Adjust setpoint or replace sensor
	B. Controller failed with contacts closed	B. Replace sensor or controller
IV. Excessive cycling	A. Controller differential too narrow	A. Widen differential or replace controller to avoid premature contact failure

Notes . . .

1. The operation of most electric heat tracing cables is dramatically affected by changes in the supply voltage. Before making any changes, consult the cable manufacturer with information on the alternate voltages available. Otherwise, cable failure and/or an electrical safety hazard may result in some situations.

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