

Specification: Raychem® XL-Trace® Freeze Protection System

1 General

Furnish and Install a complete UL Listed, CSA Certified, or FM Approved system of heating cables, components, and controls to (choose one: prevent pipes from freezing, provide freeze protection of sprinkler system piping, provide flow maintenance of grease lines, provide flow maintenance for fuel oil).

2 Materials

2.1 The self-regulating heating cable shall consist of two (2) 16 AWG nickel-copper bus wires embedded in parallel in a self-regulating polymer core that varies its power output to respond to temperature all along its length, allowing the heating cable to be cut to length in the field. The heating cable shall be covered by a radiation-crosslinked, modified polyolefin dielectric jacket. To provide a ground path and to enhance the heating cable's ruggedness, the heating cable shall have a braid of tinned copper and an outer jacket of (select: modified polyolefin (-CR) or fluoropolymer (-CT)), as required per section 427-23 of the NEC-1996.

For installation on plastic piping, the heating cable shall be applied using aluminum tape (AT-180).

2.2 In order to conserve energy and to prevent overheating, the heating cable shall have a self-regulating factor of at least 90 percent. The self-regulation factor is defined as the percentage reduction, without thermostatic control, of the heating cable output going from 40°F pipe temperature operation to 150°F pipe temperature operation.

2.3 The heating cable shall operate on line voltages of (select: 120, 208, 220, 240, or 277) volts without the use of transformers.

2.4 The heating cable for metal-pipe freeze protection shall be sized according to the table below. The required heating cable output rating is in watts per foot at 50°F. (Heating cable selection based on 1 inch fiberglass insulation on metal piping.)

Pipe size (inches)	Minimum Ambient Temperature	
	0°F	-20°F
3 or less	5 watts	5 watts
4	5 watts	8 watts
6	8 watts	8 watts
8	8 watts	2 strips-5 watts
10	2 strips-5 watts	2 strips-8 watts

2.5 The heating cable shall be XL-Trace cable as manufactured by Raychem Corporation.

2.6 Power connection, end seal, splice, and tee kit components shall be applied in the field.

2.7 Heating cable circuit shall be protected by a ground-fault device for equipment protection. This requirement is in accordance with section 427-22 of the NEC-1996.

3 Components

All heating-cable components shall be UL Listed, CSA Certified, or FM Approved for use as part of the system to provide (choose one: pipe freeze protection, flow maintenance). Component enclosures shall be rated NEMA 4X to prevent water ingress and corrosion. Installation shall not require the installing contractor to cut into the heating-cable core to expose the bus wires. Connection systems that require the installing contractor to strip the bus wires or that use crimps or terminal blocks, shall not be acceptable. All components that make an electrical connection shall be reenterable for servicing. No component shall use silicone to seal the electrical connections. An exception will be made in areas where a conduit transition is required.

4 System Control

Option 1: Manual Control

The system shall be controlled by a switch, either directly or through an appropriate contactor.

Option 2: Thermostatic Control–Ambient Sensing

The system shall be controlled by an ambient sensing thermostat (choose: AMC-1A or AMC-F5) set at 40°F either directly or through an appropriate contactor.

Option 3: Thermostatic Control–Line Sensing

The system shall be controlled by a line sensing thermostat (choose: AMC-F5 fixed at 40°F or AMC-1B variable set point) set at 40°F either directly or through an appropriate contactor.

5 Execution

5.1 Installation:

- A. System must be installed per manufacturer's recommendations.
- B. Apply the heating cable linearly on the pipe after piping has been successfully pressure-tested. Secure the heating cable to piping with cable ties or fiberglass tape.
- C. Apply "Electric Traced" labels to the outside of the thermal insulation.

5.5 Tests:

After installation and before and after installing the thermal insulation, subject heating cable to testing using a 2500-Vdc Megger, Minimum insulation resistance shall be 20 megohms or greater.

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