

**SECTION 230533 HEAT TRACING FOR HVAC PIPING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, apply to this Section.

1.2 SUMMARY

- A. This Section includes heat tracing with the following electric heating cables:
  - 1. Self-regulating, parallel resistance.

1.3 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.
  - 1. Schedule heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.
- B. Shop Drawings: For electric heating cable. Include plans, sections, details, and attachments to other work.
  - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For electric heating cables to include in operation and maintenance manuals.
- E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. All heating-cable components shall be UL Listed, CSA Certified, or FM Approved for use as part of the system to provide pipe freeze protection.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace electric heating cable that fails in materials or workmanship within specified warranty period. Refer to Section 01850 for further requirements.

PART 2 - PRODUCTS

2.1 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide a comparable product by one of the following:
  - 1. Raychem; a division of Tyco Thermal Controls.
  - 2. Chromalox, Inc.; Wiegard Industrial Division; Emerson Electric Company.
  - 3. Delta-Therm Corporation.
  - 4. Or approved equivalent.
- B. Heating Element: Pair of parallel No. 16 AWG, nickel-coated stranded copper bus wires embedded in cross-linked conductive polymer core, which varies heat output in response to temperature along its length. Terminate with waterproof, factory-assembled non-heating leads with connectors at one end and seal the opposite end watertight. Cable shall be capable of crossing over itself once without overheating.
- C. Self Regulating Control: 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 deg F pipe temperature operation to 150 deg F pipe temperature operation.
- D. Electrical Insulating Jacket: Flame-retardant polyolefin.
- E. Cable Cover: Tinned-copper braid, and polyolefin outer jacket with UV inhibitor.
- F. Capacities and Characteristics:
  - 1. The heating cable for metal –pipe freeze protection shall be sized according to the table shown below. The required heating cable output rating is in watts per foot at 50 deg F.

Pipe Size (Inches)	Minimum Ambient Temperature (0 deg F)
3 or less	5 Watts
4	5 Watts
6	5 Watts
8	8 Watts
10	2 strips – 5 Watts

- 2. Coordinate electrical power requirements and line voltages with electrical contractor and electrical contract drawings.

## 2.2 CONTROLS

- A. Remote bulb unit with adjustable temperature range from 30 to 50 deg F.
- B. Snap action; open-on-rise, single-pole switch with minimum current rating adequate for connected cable.
- C. Remote bulb on capillary, resistance temperature device, or thermistor for directly sensing pipe-wall temperature.
- D. Corrosion-resistant, waterproof control enclosure.

## 2.3 ACCESSORIES

- A. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer, or as recommended in writing by manufacturer.
- B. Warning Labels: Refer to Division 23 Section "Identification for HVAC Piping and Equipment."
- C. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at least 3 mils thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.
  - 1. Width for Markers on Pipes with OD, Including Insulation, Less Than 6 Inches: 3/4 inch minimum.
  - 2. Width for Markers on Pipes with OD, Including Insulation, 6 Inches or Larger: 1-1/2 inches minimum.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces and substrates to receive electric heating cables for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install electric heating cable across expansion joints according to manufacturer's written recommendations using slack cable to allow movement without damage to cable.
- B. Install electric heating cables after piping has been tested and before insulation is installed.

- C. Install electric heating cables according to IEEE 515.1.
- D. Install insulation over piping with electric cables according to Division 23 Section "Piping Insulation."
- E. Install warning tape on piping insulation where piping is equipped with electric heating cables.
- F. Set field-adjustable switches and circuit-breaker trip ranges.
- G. Protect installed heating cables, including non-heating leads, from damage.

### 3.3 CONNECTIONS

- A. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- B. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

### 3.4 FIELD QUALITY CONTROL

- A. Testing: Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
  - 1. Test cables for electrical continuity and insulation integrity before energizing.
  - 2. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- B. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounting cables.
- C. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 230533