

SECTION 210533 – HEAT TRACING FOR FIRE PROTECTION PIPING

Latest Edition: 2-14-2019 See Underlined Text for Edits.

(Engineers shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all “Underlines”.)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 21.

1.2 SUMMARY

- A. This Section includes the requirements for heat tracing fire suppression piping using the following:
 - 1. Plastic insulated series resistance electric cables.
 - 2. Self-regulating, parallel resistance electric cables.
 - 3. Controls.
 - 4. Accessories.
 - 5. Testing the complete heat tracing system.

1.3 ACTION SUBMITTALS

- A. Product Data: For each product specified, include manufacturers cut sheets, dimensional data, performance data, installation instructions, wirings diagrams, power requirements, specified options, and warranty information.
- B. Shop Drawings: For electric heating cable include:
 - 1. Heat tracing system shop drawings shall include elevations, sections, and attachment details. Include diagrams for power, signal, and control wiring.
 - 2. Scheduled information shall include heating capacity, length of cable, spacing, and electrical power requirement for each electric heating cable required.
 - 3. Engineering data sheets for manufactured materials shall include dimensions, rated capacities, operating characteristics, and furnished specialties and accessories.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Include a copy of the approved submittal for each product and material along with applicable maintenance data in the project operation and maintenance manual.

1.6 GUARANTEE/WARRANTY

- A. See Division 21, Specification Section “Basic Fire Protection Requirements” for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. Equipment Design and Selection: Heat tracing and specialties shall be designed and selected, for the intended use, in accordance with NFPA 13 and the scheduled capacities on the drawings and the requirements of this specification.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one (1) of the following:
 - 1. Heat Trace System and Accessories:
 - a. Brisk Heat.
 - b. Chromalox.
 - c. Delta-Therm Corporation.
 - d. Easy Heat; a division of EGS Electrical Group LLC.
 - e. Nelson Heat Trace; a division of EGS Electrical Group LLC.
 - f. Pyrotenax; a brand of Tyco Thermal Controls LLC.
 - g. Raychem; a brand of Tyco Thermal Controls LLC.
 - h. Thermon Americas Inc.

2.2 PLASTIC-INSULATED, SERIES-RESISTANCE HEATING CABLES

- A. Provide and install cable as required by NFPA 70, approved contract documents, and electrical power requirement calculations in accordance with all applicable standards and codes. Connection(s) shall be made to an approved electrical service capable of delivering the necessary power.
- B. All heat tracing system components shall be as specified below. The contractor shall be responsible for replacing any cable or device that was installed and is not included in the approved submittal.

- C. Comply with IEEE 515.1
- D. Heating Element: Single or dual stranded resistor wire. Terminate with waterproof, factory-assembled nonheating leads with connectors at both ends.
- E. Electrical Insulating Jacket: Minimum 4.0-mil (0.10-mm) Kapton with silicone, Tefzel, or polyolefin.
- F. Cable Cover: Aluminum braid [and silicone or Hylar outer jacket or TPR overjacket].
- G. Maximum Operating Temperature (Power on): [150°F] <Insert Alternate Temperature>.
- H. Maximum Exposure Temperature (Power Off): [185°F] <Insert Alternate Temperature>.
- I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 13 and NFPA 70, by a qualified testing agency, and marked for intended location and application.
- J. Capacities and Characteristics:
 - 1. Maximum Heat Output: [6 W/ft.] [7W/ft] <Insert Alternate>.
 - a) Piping Diameter: <Insert NPS>.
 - b) Number of Parallel Cables: <Insert Number>.
 - c) Spiral Wrap Pitch: <Insert inches>.
 - 2. Electrical Characteristics for Single-Circuit Connection:
 - a) Volts: [120] [208] [240] [277] [480] <Insert Alternate>.
 - b) Phase: <Insert value>.
 - c) Hertz: <Insert value>.
 - d) Full-Load Amperes: <Insert value>.
 - e) Minimum Circuit Ampacity: <Insert value>.
 - f) Maximum Overcurrent Protection: <Insert amperage>.

2.3 SELF-REGULATING, PARALLEL-RESISTANCE HEATING CABLES

- A. Provide and install cable as required by NFPA 70, approved contract documents, and electrical power requirement calculations in accordance with all applicable standards and codes. Connection(s) shall be made to an approved electrical service capable of delivering the necessary power.
- B. All heat tracing system components shall be as specified below. The Contractor shall be responsible for replacing any cable or device that was installed and is not included in the approved submittal.
- C. Comply with IEEE 515.1

- D. Heating Element: Pair of parallel [No. 16] [No. 18] AWG, [tinned] [nickel-coated], stranded copper bus wires embedded in crosslinked conductive polymer core, which varies heat output in response to temperature along with its length. Terminate with waterproof, factory-assembled, nonheating leads with connectors at one end, and seal the opposite end watertight. Cable shall be capable of crossing itself once without overheating.
- E. Electrical Insulating Jacket: Flame-retardant polyolefin.
- F. Cable Cover: [Tinned-copper] [Stainless-steel] braid[and polyolefin outer jacket with ultraviolet inhibitor].
- G. Maximum Operating Temperature (Power On): [150°F] <Insert Alternate Temperature>.
- H. Maximum Exposure Temperature (Power Off): [185°F] <Insert Alternate Temperature>.
- I. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- J. Capacities and Characteristics:
 - 1. Maximum Heating Output: [3 W/ft.] [5 W/ft.] [8 W/ft.] [10 W/ft.] [12 W/ft.] <Insert Alternate>.
 - a) Piping Diameter: <Insert NPS>.
 - b) Number of Parallel Cables: <Insert number>.
 - c) Spiral Wrap Pitch: <Insert inches>.
 - 2. Electrical Characteristics for Single-Circuit Connection:
 - a) Volts: [120] [208] [240] [277] [480] <Insert Alternate>.
 - b) Phase: <Insert Value>.
 - c) Hertz: <Insert Value>.
 - d) Full-Load Amperes: <Insert Value>.
 - e) Minimum Circuit Ampacity: <Insert Value>.
 - f) Maximum Overcurrent Protection: <Insert Amperage>.

2.4 CONTROLS

- A. All controls equipment shall be listed by Underwriter's Laboratory for use in heat tracing systems for fire suppression piping and only new equipment shall be installed. The control device for activating the heat tracing system shall be a [remote bulb unit with adjustable temperature range from [30°F to 50°F] <Insert temperature range>] [snap action; open-on-rise, single-pole switch with minimum current rating adequate for connected cable] [remote bulb on capillary, resistance temperature device, or thermistor]

for directly sensing pipe-wall temperature]. Control device shall be installed in corrosion-resistant, waterproof enclosure.

2.5 ACCESSORIES

- A. Heat tracing system accessories shall be listed by Underwriter's Laboratory and only new accessories shall be installed.
- B. Permitted cable installation accessories include fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips furnished by manufacturer or as recommended in writing by manufacturer.
- C. Warning tape shall be vinyl, at least 3 mils thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back. Warning tape shall be continuously printed with the words "ELECTRICAL TRACING."
 - 1. Width for markers on pipes with outside diameter, including insulation, less than six (6) inches: Three quarter (3/4) inch minimum.
 - 2. Width for markers on pipes with outside diameter, including insulation, six (6) inches or larger: One and one half (1-1/2) inches minimum.

PART 3 – EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

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

3.2 CABLE

- A. Install all electric heating cable where indicated and according to NFPA 13 and NFPA 70.
- B. Install electric heating cable across expansion joints according to manufacturer's written instructions; use cable to allow movement without damage to cable.
- C. Install electric heating cables after piping has been tested and before insulation is installed.
- D. Install electric heating cables in accordance with IEEE 515.1.

- E. Protect installed heating cables, including nonheating leads, from damage during construction. Remove and replace damaged heat-tracing cables.

3.3 INSULATION

- A. Install insulation over piping with electric cables according to Section “Insulation for HVAC Pipe and Duct System.”

3.4 ACCESSORIES

- A. Install warning tape on piping insulation where piping is equipped with electric heating cables.
- B. Set field-adjustable switches and circuit-breaker trip ranges.

3.5 CONNECTIONS

- A. Ground equipment according to Division 26 Specification Section “Grounding and Bonding for Electrical Systems.”
- B. Connect wiring in accordance with Division 26, Specification Section “Low-Voltage Electrical Power Conductors and Cables.”
- C. Connect heat-tracing controls to fire-alarm system as required by NFPA.

3.6 DUST, SOIL, DEBRIS

- A. The contractor shall take such steps as necessary to protect the surface and contents of rooms in which work is in operation, from damage from his/her operation. The contractor shall remove and replace ceilings and protect them against dirt and damage.
- B. The contractor will be held responsible and accountable for any damage resulting from his/her operation.

3.7 INSTALLATION, TESTS, AND ACCEPTANCE <Edit for Project>

- A. Installation, testing, and final acceptance shall be in accordance with all applicable codes, and the UMB Fire Marshal.
- B. All required test shall be performed by the contractor [with the assistance of a factory-authorized service representative] as part of this contract. The contractor shall see that proper representatives of the Owner, the Engineer, UMB Fire Marshal, Office of Facilities Management, and anyone else desiring to witness the tests shall be notified at least five (5) business days prior to the scheduled test time. The following test shall be performed and witnessed:

1. Perform tests after cable installation but before application of coverings such as insulation, wall or ceiling construction, or concrete.
 2. Test cables for electrical continuity and insulation integrity before energizing.
 3. Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.
- C. Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.
- D. Cables will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. The contractor shall furnish a written statement to the effect that all work covered under this contract has been completed and tested in accordance with specifications and plans. Copies of the written statement shall be provided to the Owner and the UMB Fire Marshal.

3.8 DOCUMENTATION

- A. The following materials shall be furnished to the University by the contractor at the conclusion of the final acceptance test:
1. Operating and maintenance instructions of controllers, alarm valves, etc. as required by NFPA 13.

3.9 DEMONSTRATION OF HEAT TRACING SYSTEMS

- A. Demonstrate equipment, specialties, and accessories. Review operating and maintenance information.
- B. Schedule demonstration with at least five (5) business days advance notice.

END OF SECTION 210533