

## SECTION 15831 - ELECTRIC HEATING CABLES

## PART 1 - GENERAL

## 1.1 DESCRIPTION OF WORK:

- A. Extent of electric heating cable work is indicated by drawings and schedules and as specified herein.
- B. Applications for electric heating cables required for the project include the following:
  - 1. Ceiling heating.
  - 2. Floor heating.
  - 3. Heat-tracing.
  - 4. Hot-water temperature maintenance.
  - 5. Ice-stopping.
  - 6. Snow-melting.
- C. Refer to Division 16 sections for wires/cables, electrical raceways, boxes and fittings, and wiring devices which are required in conjunction with electric heating cables; not work of this section.

## 1.2 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data and installation instructions for electric heating cables.
- B. Shop Drawings: Submit scaled layout drawings of electric heating cables including, but not necessarily limited to, layout, locations, elevations, wall and floor penetrations, and connections.
- C. Record Drawings: At project closeout, submit record drawings; in accordance with requirements of Division 15.
- D. Wiring Diagrams: Submit wiring diagrams for electric heating cables showing layout, including grid networks and cable runs, of heating cables and associated devices. Include requirements for proper spacing between cables, and show locations of connectors and connections to electrical power feeders. Differentiate between portions of wiring that are manufacturer-installed and portions that are field-installed.
- E. Maintenance Data: Submit maintenance data and parts lists for compressed air systems materials and products. Include this data, product data, shop drawings, record drawings, and wiring diagrams in maintenance manual; in accordance with requirements of Division 15.

## 1.3 QUALITY ASSURANCE:

- A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of electric heating cables, of types, sizes and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.
- B. Installer's Qualifications: Firm with at least 2 years of successful installation experience with projects utilizing electric heating cable work similar to that required for this project.
- C. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local electrical code requirements of the authority having jurisdiction and NEC as applicable to construction and installation of electric heating cables.
2. UL Compliance: Comply with applicable torquing requirements of UL Std 486A, "Wire Connectors and Soldering Lugs for Use with Copper Conductors." Provide electric heating cables and components which are UL-listed and labeled.
3. IEEE Compliance: Comply with applicable recommended installation practices of IEEE Std 241, "Recommended Practice for Electric Power Systems in Commercial Buildings", pertaining to electric heating cables.
4. NEMA Compliance: Provide electric heating cables and accessories which comply with NEMA standards.

#### 1.4 DELIVERY, STORAGE AND HANDLING:

- A. Deliver electric heating cables in factory-fabricated type containers or wrappings, which properly protect cables from damage.
- B. Store electric heating cables in original packaging and protect from weather and construction traffic. Wherever possible, store indoors; where necessary to store outdoors, store above grade and enclose with watertight wrapping.
- C. Handle electric heating cables carefully to prevent physical damage to cables and components. Do not install damaged cables; remove from site and replace damaged cables with new.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide electric heating cables of one of the following (for each type of cable):
  1. Easy-Heat WireKraft Div; Bristol Corporation.
  2. Thermon
  3. Raychem Corporation.
  4. Smith-Gates Corporation.
  5. Chromalox Div; Emerson Electric Company.

#### 2.2 ELECTRIC HEATING CABLES:

- A. Radiant Heating Cables: Provide self-regulating electric radiant heating cables which are suitable for embedment installation in floors or ceilings; of temperature, wattage and voltage ratings indicated. Select heater consisting of 2-16 AWG tinned-copper bus wires parallel embedded in a radiation cross-linked conductive polymer core which varies its power output to respond to temperature along its length, allowing the heater to be crossed over itself without overheating, to be cut to length in the field, and to have no heater-to-cold lead connections buried in the slab. Cover heater with a radiation cross-linked modified polyolefin dielectric jacket and protect with a tinned-copper braid and a polyolefin outer jacket.
- B. Radiant Ceiling Heating Cables: Provide electric radiant heating cables which are suitable for ceiling installation; of wattage and voltage ratings, Hz, BTUH's, and for the quantity and lengths indicated. Terminate cables with 7-feet of factory-assembled non-heating leads with connectors.

- C. Snow-melting Heating Cables: Provide self-regulating electric heating cables and components which are suitable for embedment installation in asphalt and concrete paving material. Select heater consisting of 2-16 AWG tinned-copper bus wires parallel embedded in a self-regulating polymer core which varies its power output to respond to temperature along its length, allowing the heater to be crossed over itself without overheating, to be cut to length in the field, and to have no heater-to-cold lead connections buried in the slab. Cover heater with a cross-linked fluoropolymer dielectric jacket and protect with a tinned-copper braid and a polyolefin, or fluoropolymer outer jacket.
- D. Snow-melting Heating Cables: Provide electric heating cables which are suitable for embedment in asphalt and concrete paving material; of temperature, wattage and voltage ratings, Hz, BTUH's, and for the quantity and lengths indicated; terminate cable with 10' of factory-assembled non-heating leads and connectors. Construct cable of copper nickel alloy resistance wires spiraled on fiberglass core, with 0.043", or greater, layer of 105 deg. C polyvinyl chloride (PVC) insulation over spiraled wire. Provide sheath of 0.004", or greater, layer of nylon over PVC. Construct ground heater cable by encasing with 16 strands of #30 braided copper wire.
- E. Pipe Freeze Protection Heating Cables: Provide self-regulating heat-tracing electric heating cable and components which are suitable for freeze protection of metal or plastic piping. Select heater consisting of 2-16 AWG tinned-copper bus wires parallel embedded in a radiation cross-linked conductive polymer core that varies its power output to respond to temperature along its length, allowing the heater to be crossed over itself without overheating, to be cut to length in the field, and to be used directly on plastic pipe. Cover heater with a radiation cross-linked modified polyolefin dielectric jacket. Provide heater with a self-regulating factor of greater than 90 percent to conserve energy and to prevent overheating. Self-regulation factor is defined as the percentage reduction, without thermostatic control, of the heater output ranging from 40 deg. F (4 deg. C) pipe temperature operation to 150 deg. F (65 deg. C) pipe temperature operation.
- F. Roof and Gutter De-icing Heating Systems: Provide self-regulating electric heating cable and components which are suitable for use on roofs and in gutters for snow and ice melting. Select heater consisting of 2-16 AWG tinned-copper bus wires embedded in parallel in a radiation cross-linked conductive polymer core that varies its heat output to respond to temperature along its length, allowing the heater to be crossed over itself without overheating, to be used safely in contact with wood, PVC, EDPM, neoprene and asphalt building materials, and to be cut to length in the field. Cover heater with a radiation cross-linked modified polyolefin dielectric jacket and protect with a tinned-copper braid and a polyolefin outer jacket. Provide self-regulating heater with a power output of 10 watts per foot where it contacts ice and snow and 5 watts per foot in air.
- G. Hot-Water Temperature Maintenance Cable: Provide self-regulating electric heating cables which are suitable for wrapping pipes and fittings to compensate for heat loss along the hot-water supply piping and to maintain water temperature. Select cable with 2-16 AWG tinned-copper wires embedded parallel in a self-regulating polymer core that varies its power output to respond to temperature along its length, allowing the heater to be wrapped along the piping and to be crossed over itself, where necessary, without heating. Sheath the heater in a cross-linked fluoropolymer dielectric jacket and protect with outer jacket of tinned copper braid and polyolefin, or fluoropolymer. Provide hot-water temperature maintenance cable which can be cut to length in the field, and which possesses the following ratings and construction features:

System Temperature Rating:120 deg. F (49 deg. C).  
 Supply Voltage:208-volts.  
 Maximum Circuit Length:575 feet.

- H. Electric Heating System Controls: Provide electric radiant heating cable thermostats, with temperature range from 35 to 95 deg. F (2 to 32 deg. C), operating voltage of 125, 60 Hz, and with manually operated OFF-position switch, as recommended by cable manufacturer.
- I. Electric Heating System Controls: Electric heating cable temperature controls and snow detectors are specified in other Division-16 electric heating control sections.
- J. Electric Heating System Accessories: Provide heating system accessories including, but not limited to, tapes, cable ties, warning labels, end seals and splices, and installation clips for the application indicated and for a complete system.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION:

- A. Examine areas and conditions under which electric heating cables are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Ensure that surfaces, and pipes to which electric heating cables are to be installed are free of burrs and sharp protrusions and that pipes have been pressure tested for leakage. Also ensure that surfaces and substrates where cables are installed are plumb and level. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

#### 3.2 INSTALLATION OF ELECTRIC HEATING CABLES:

- A. Install electric heating cables including components as indicated, in accordance with equipment manufacturer's written instructions, applicable portions of NEC, and with recognized industry practices to ensure that units fulfill requirements. Comply with applicable installation requirements of NECA's "Standard of Installation".
- B. Coordinate with other work including flooring, concrete, roofing, insulation, finish work, and electrical work as necessary to interface installation of electric heating cables with other work.
- C. Protect installed electric heating cables, including leads, from damage and crushing by construction work.
- D. Connect electrical power, fasten end-seals, and accomplish splicing of electric heating cables properly in accordance with requirements.
- E. Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Std 486A and B.

#### 3.3 GROUNDING:

- A. Provide equipment grounding connections for electric heating cables as indicated. Tighten connections to comply with tightening torques specified in UL Std 486A to assure permanent and effective grounding.

#### 3.4 FIELD QUALITY CONTROL:

- A. Prior to energizing electrical power circuitry, test installed electric heating cabling, including splice and tee connections, for electrical continuity.

- B. After applying initial plaster, concrete coat, or thermal insulation, test cables for continuity and insulation resistance of 10 megohms, or greater, measured to ground. Where leakage is detected, remove cabling and replace with new and proceed with retesting to demonstrate compliance.
- C. After attaching electric heating cables to pipe, roof, or wire mesh, test cables for continuity and insulation resistance of 10 megohms, or greater, measured to ground. Where leakage is detected, remove cabling and replace with new and proceed with retesting to demonstrate compliance.
- D. Subsequent to wire and cable installation, energize electric heating cables and demonstrate functioning in accordance with requirements. Where possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

END OF SECTION 15831