SECTION 40 41 00
HEAT TRACING FOR PROCESS PIPING

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes a UL/ULC Listed Heat Tracing Systems for Process Piping
B. Self-Regulating Heating Cable
C. Connection Kits for joining heating cable sections
D. Electronic Heat Trace Controller
E. Heating Cable Installation Accessories

1.2 RELATED SECTIONS

A. Section 22 07 19 – Process Piping Insulation
B. Section 22 08 00 – Commissioning of Process Systems
C. Section 22 09 00 – Instrumentation & Control for Process Systems
D. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
E. Section 26 05 26 – Grounding and Bonding for Electrical Systems

1.3 REFERENCES

A. IEEE 515-2012: Standard for testing, design, installation and maintenance of electrical resistance trace heating for industrial applications.
B. CSA C22.2 NO. 130-03-2008 Requirements for Electrical Resistance Heating Cables and Heating Device Sets.
C. National Electric Code (NEC): NFPA70

1.4 ACTION SUBMITTALS

A. Product Data: For UL/ULC Listed Heat Tracing Systems for Process Piping including the following:

1. Manufacturer's Data Sheets for Heat Cable, Components, Controller & Installation Accessories.
2. Installation Instructions for Heat Tracing Systems for Process Piping
3. Electrical Wiring Diagram for Controller, Sensors & Interface to BMS

1.5 CLOSEOUT SUBMITTALS

A. Operation & Maintenance Manuals for Heat Tracing Systems for Process Piping

1.6 QUALITY ASSURANCE

A. Manufacturers Qualifications
    1. Minimum of 10 years of experience in design, engineering, manufacturer and support of Heat Tracing Systems.
    2. Manufacturer shall be ISO-9001:2008 Registered
B. Installer Qualifications
    1. System installer shall have a complete understanding of product from manufacturer prior to installation of Heat Tracing Systems for Process Piping System.
    2. Electrical Connections shall be performed by a licensed electrician.

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1.7 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging and dry location with a temperature range of 0°F (-18°C) to 100°F (38°C) until ready for installation.

B. Protect Heating Cable from exposure to moisture, water & mechanical damage until ready for installation.

Specifier: Retain one or both of the paragraphs below based upon Project requirements

1.8 WARRANTY

A. Provide manufacturer's standard warranty form which manufacturer warrants against defect in material and workmanship under normal use and regular service and maintenance for a period of one year from the date of shipment of the products by Chromalox.:

1. Heating Cable & Components: One Year
2. Controls & Sensors: One Year

A. Provide manufacturer's extended warranty of ten (10) years from the date of installation on heating cable and components by completing warranty registration card within the timeline indicated on the extended warranty.

(1) Install heating cable system per manufacturer's instructions on their Installation & Operation Manual
(2) Maintain & complete the installation & maintenance log.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: Subject to compliance with requirements, provide a Heat Tracing Systems for Process Piping by Chromalox, Pittsburgh,, PA, 800-443-2640, www.cromalox.com .

1. Submit comparable products of one of the following for approval by Engineer:
   a. [Specifier: insert name of manufacturer of comparable product.]
   b. Submit requests for substitution in accordance with Instructions to Bidders and Division 01 General

B. MATERIALS

1. Heating Cables
   (a) Basis of design shall be Chromalox SRL Self-Regulating, Heating Cable specifically designed for the intended application, tested and approved to CSA 22.2 No 130-03 and IEEE 515 requirements.
   (b) The self-regulating, heating cable shall consist of two (2) 16 AWG nickel-copper bus wires embedded in a radiation cross-linked, continuous, self-regulating polymer core.
   (c) The self-regulating, heating cable shall have a fluoropolymer, dielectric jacket cover.
   (d) The self-regulating, heating cable shall have a tinned-copper ground braid.
   (e) The heating cable shall be part of a UL FM or CSA Listed.
   (f) The manufacturer shall provide design heat loss information on all piping and select a self-regulating, heating cable from the table below to prevent freezing of the pipe:

Heater Output @ 50°F	Voltage	Maximum Exposure Temperature
3 Watts / Lineal Ft	120 & 208-277	185°F
5 Watts / Lineal Ft	120 & 208-277	185°F

8 Watts / Lineal Ft	120 & 208-277	185°F
10 Watts / Lineal Ft	120 & 208-277	185°F

2) Connection Kits
   a) Heating Cable Connection Kits shall be Chromalox U series or similar units.
   b) Manufacturer to provide connection kits for power, splice, tee and end seal.
   c) All Splices, Tees & End Seals shall be installed above the insulation per NEC.
   d) Power Connection Kits shall be NEMA 4X & C1D2 rated.
   e) Connection Kits shall be UV stabilized for installation outdoors.
   f) Connections kits shall be UL/CSA Listed.

3) Heating Cable Accessories
   (a) Heating cable shall be attached to process piping with Chromalox FT-3 glass fiber, glass tape. Use of metal zip ties is prohibited for the attachment of the heating cable to the process piping.
   (b) Contractor shall provide Chromalox CL-1 Heating Tracing Labels every 10', opposite sides of pipe to identify process piping with heat tracing cable installed on it.

4) Controller
   (a) Basis of design is Chromalox IntelliTrace ITC2 controller for two (2) circuits.
   (b) Unit shall operate at 100-277 VAC and rated @ 40A per circuit
   (c) Unit shall include a 10" High Resolution VGA Display with touch screen computer with ability to communicate with owner supplied PC for data logging and monitoring via IntelliTrace Software.
   (d) Unit shall include ON/OFF, PID or Manual SSR power control with a selectable Soft Start program
   (e) Unit shall include two (2) sensors inputs per circuit.
   (f) Unit shall include 2 x common alarm outputs (1 x AC, 1 x DC), Alarms for Low/High Temperature & Current, GFEP (Ground Fault Equipment Protection) & Sensor Failure, ModBus RTU/RS485 (or /RS422) Communications and user selectable manual output on failed sensor.
   (g) Unit shall be housed in a NEMA 4X, type 304, stainless steel enclosure with hinged door.

Specifier: If connection to BACnet network is required – please include item J below.

   (j) Unit shall include BACnet protocol converter for connecting all IntelliTrace ITLS controllers to BACnet network. Protocol Converter shall be Chromalox model contained in a NEMA4 Enclosure with separate power supply.

5) Temperature Sensors – One (1) required per Circuit

   (a) Provide one Chromalox RBF-185M-HT 304 18RD-91SB/C a 100 ohm, three wire, line sensing, temperature sensor.
   (b) Unit shall have a type 304 Stainless Steel sheathed probe with 3" temperature sensor & 6" cold lead length.
   (c) Unit shall include a type 316 stainless steel connection head with ¾" NPT fitting for conduit connections.
   (d) Unit shall be FM Listed for Class 1, Division 1, Groups A, B, C, D

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PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer to field verify process piping sizes & lengths as shown on drawings.

B. Installer to verify that power is available, in proper location and ready for use.

C. Installer to verify that all process piping has been properly prepared for heating cable installation. Notify General Contractor or Construction Manager of unsatisfactory conditions exist prior to Process Pipe Freeze Protection System.

3.2 INSTALLATION

A. The process pipe freeze protection installation shall conform to all local building codes including but limited to NFPA70, IEEE 515 industrial Heat Tracing Applications.

B. The installer shall comply with the Chromalox's Process Pipe Freeze Protection System installation, operation & maintenance instructions.

C. The installer shall layout heating cable per approved shop drawings.

D. Grounding of the Process Pipe Freeze Protection System shall be in accordance with section 26 05 26 "Grounding & Bonding for Electrical Systems"

E. Connections of all electrical wiring shall be in accordance with section 26 05 19 "Low-Voltage Electrical Systems"

3.3 FIELD QUALITY CONTROL

A. Start-Up and testing of the Process Pipe Freeze Protection System shall be performed by factory technician or factory representative per the owner's requirements.

B. Field Testing & Inspections

1. The system shall be commissioned in accordance to the Chromalox Installation, Operation & Maintenance Manual.
2. The heating cable circuit integrity shall be tested using a 2500 Vdc megohmmeter at the following intervals below. Minimum acceptable insulation resistance shall be 1000 megohms or greater.
    a. Before installing the heating cable
    b. After heating cable has been installed onto the roof or gutter
    c. After installing connection kits
    d. Prior to initial start-up (commissioning)
    f. As part of the regular system maintenance
3. The technician shall verify that the IntelliTrace ITLS Controller parameters are set properly for the Process Pipe Freeze Protection System requirements.
4. The technician shall verify that the temperature sensors are correctly connected to the controller.
5. The installer shall submit test results to owner after commissioning.

3.4. ADJUSTING AND CLEANING

A. Keep ambient temperature sensors clean of dirt and debris

3.5 MAINTENANCE

A. Comply with Manufacturers recommendations IOM Manual Process Pipe Freeze Protection System.

END OF SECTION