****

**SECTION XXXXXX**

**FREEZE PROTECTION HEAT TRACING**

1. GENERAL
   1. SECTION INCLUDES
      1. Field terminated Self Regulating (SR) heating cable.
      2. Thermostats.
      3. Pipe heat tracing accessories and installation material for a complete operating system.
   2. REFERENCES
      1. Canadian Standards Association (CSA).
      2. Factory Mutual (FM).
      3. National Electric Code (NEC).
      4. Underwriters Laboratories (UL).
   3. SUBMITTALS  
      1. Submit under provisions of Section XXXXXX.
      2. Manufacturer's data sheets.
      3. Installation Instructions.
   4. QUALITY ASSURANCE
      1. Manufacturer Qualifications:
         1. Minimum 50 years of experience in design, engineering, manufacture and support of specified system and components.
      2. Product Requirements:
         1. Pipe Trace or Tank Trace – Freeze Protection: Consult the manufacturer’s Pipe Tracing Design Guide to determine recommended w/ft. for installation. Design shall consider maintenance temperature, ambient temperature, pipe size, insulation type, insulation thickness and environmental conditions.
         2. Heating equipment furnished under this section shall be supplied by a single manufacturer.
   5. DELIVERY, STORAGE, AND HANDLING
      1. Store products in manufacturer's unopened packaging until ready for installation.
   6. PROJECT CONDITIONS
      1. Coordinate installation of heating cable with Electrical Contractor and General Contractor.
      2. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Do not install products under environmental conditions outside manufacturer's absolute limits.
2. PRODUCTS
   1. MANUFACTURERS
      1. System shall be manufactured by:

Delta-Therm Corporation, 6711 Sands Rd Suite A, Crystal Lake, IL 60014, Phone: 800-526-7887, Fax: 847-526-4456, Email: info@Delta-Therm.com, Web: www.Delta-Therm.com

B. Substitutions: No substitutions permitted.

* 1. HEATING CABLE
     1. IN Series or CO Series, Field Terminated Self Regulating (SR) cable assembly:
        1. Self- Regulating (SR) cable construction shall consist of two 16 AWG, stranded, nickel plated copper bus wires between which a positive temperature coefficient conductive polymer heating element is placed.
        2. Cable shall have tinned copper braid with:
           1. Non-organic corrosive resistant thermoplastic jacket.
           2. Organic corrosive resistant fluoropolymer jacket.
        3. Cable shall be terminated using approved manufacturer’s power connection and end termination kit.
        4. Cable rating shall be:
           1. 120 VAC
           2. 208 VAC
           3. 240 VAC
           4. 277 VAC
  2. CONTROLS
     1. PowerTrace ETC, UL Listed Single Circuit type Monitoring Control:
        1. Control input voltages shall be 120VAC, 208VAC, 240VAC, or 277VAC.
        2. Enclosure shall be NEMA 4X FRP.
        3. Control shall have adjustable setpoint temperature range from 32o F to 800o F
        4. Enclosure shall have three button key pad and digital LED display on the front panel door.
        5. Control shall monitor pipe temperature.
        6. Control shall have 30mA ground fault alarm.
        7. Control shall have RTD failure alarm.
        8. Control shall have low and high temperature alarm.
        9. Control shall monitor current and have a low current alarm.
        10. Single circuit monitoring control shall be:
            1. ETC-120
            2. ETC-208/240
            3. ETC-277 (UL Pending)
     2. OTS-F1, UL Listed Thermostat:

1. Thermostat shall be Ambient sensing.

2. Enclosure shall be NEMA 4X rated.

3. Thermostat shall have a fixed set point of 40° F.

4. Thermostat shall have an electrical rating of 22 Amps.

5. Thermostat rating shall be:

* + - * 1. 120 VAC
        2. 208 VAC
        3. 240 VAC
        4. 277 VAC
    1. Power Control Panel with G.F.P.E.:
       1. Controller shall have:
          1. NEMA rated panel enclosure with one Ground Fault protective device per circuit and one green “working” LED and one red “trip” LED per circuit.
          2. NEMA rating of NEMA 1, NEMA 4, NEMA 4X.
          3. One red “System On” LED, one green “Control Power On” LED, and one Amber “Trip Indicator” LED on panel door.
          4. Interior G.F. Test button and include Dry alarm contacts.
          5. Power Control Panel Model shall be:

GFPE-2-N

GFPE-4-N

GFPE-6-N

GFPE-8-N

GFPE-12-N

2.4 ACCESSORIES

A. Fiberglass tape, caution labels, aluminum tape, stainless- steel banding, and monitor light.

PART 3 EXECUTION

* 1. EXAMINATION
     1. Installer to verify field measurements are as shown on Drawings.
     2. Installer to verify that required power is available, in proper location, and ready for use.
     3. Do not begin installation until piping has been properly prepared.
  2. INSTALLATION
     1. Complete installation shall conform to all applicable codes.
     2. Install heating cables in accordance with detailed layout drawings and manufacturer's instructions.
     3. Locate heating cable on pipe per manufacturer's instructions.
     4. Where heating cable is scheduled to heat plastic pipe, attach aluminum tape along the length of pipe and band heating cable on aluminum tape to evenly distribute heat.
  3. FIELD QUALITY CONTROL
     1. Test continuity of heating cable.
     2. Perform Insulation Resistance (IR) test on each heating cable before, during, and after pipe insulation has been installed. Insulation resistance should be greater than 10 megohms.
     3. Enter the total resistance and insulation resistance readings on the warranty card.
     4. Annually check system for loose or damaged cable.
  4. PROTECTION
     1. Protect installed products until completion of project.
     2. Repair or replace damaged products before Substantial Completion.

END OF SECTION