PART 1 - GENERAL REQUIREMENTS

1.01 SUMMARY

A. This Section includes pipe freeze protection system, grease waste temperature maintenance system, and installation instructions.

B. Related Sections: The following sections contain requirements that relate to this Section:

1. Division 22 Section “Plumbing Insulation” for piping insulation and installation requirements.
2. Division 23 Section “Direct-Digital Control for HVAC” for interlock of alarms with building automation system and alarm wiring.
3. Division 26 Section “Common Work Results for Electrical” required electrical devices.
4. Division 26 Sections "Enclosed Switches and Circuit Breakers" for field-installed disconnects.

1.02 SUBMITTALS

A. Refer to Division 1 and Division 22 Section “General Plumbing Requirements” for administrative and procedural requirements for submittals.

B. Product Data: Submit product data on the following items:

1. Pipe Freeze Protection System

C. Submit complete heat trace calculations and drawings including:

1. Floor plans designating pipes to be heat traced
2. Control panel quantities and locations
3. Pipe heat loss and required heat trace cable watts per foot and number of runs
4. Total cable length, maximum cable length and required number of circuits
5. Electrical requirements

1.03 QUALITY ASSURANCE

A. Pipe freeze protection system shall be listed and classified by Underwriter’s Laboratories, Inc. as suitable for purpose intended.

PART 2 - PRODUCTS AND MATERIALS

2.01 MANUFACTURERS

A. Manufacturer: System components shall be factory tested with manufacturers’ standard tests to ensure that all devices, components, and systems are in proper

working order before shipment. Coordinate with Division 23 contractor to provide single manufacturer for all Division 22 and Division 23 heat trace components. Subject to compliance with requirements, provide piping materials and specialties from one of the following:

1. Pipe Freeze Protection System

    a) Chromalox
    b) Nextron
    c) Nelson
    d) Tyco Thermal Controls/Raychem

2.02 PIPE FREEZE PROTECTION SYSTEM

A. In general the system shall include the following items:

1. Heating cable control panel.
2. Transformer(s).
3. Outdoor ambient thermostat(s). Pipe mounted temperature sensor.
4. Junction boxes.
5. Parallel circuit heating cable.
6. Branch circuit wiring and conduit.
7. Other items necessary for a complete system.

B. Heating Cable and Accessories:

1. Parallel circuit, jacketed cable, self-limiting, designed to operate on voltage as specified on the drawings. Cable shall consist of two nickel-copper bus wires embedded in parallel in a self regulating polymer core. Cable shall be capable of varying its output along its length. Provide wattage as required for piping and insulation involved per manufacturer's recommendations.
2. Heating cable shall be covered by a polyolefin dielectric jacket.
3. Heating cable shall be grounded with a braid of tinned copper.
4. Where indicated on the drawings, heating cable shall have polyolefin outer jacket for protection against aqueous inorganic chemicals. Where indicated on the drawings, heating cable shall have fluoropolymer outer jacket for protection against organic chemicals or corrosives.
5. Termination fittings for direct connection to junction boxes.
6. Junction Boxes: Junction boxes shall be NEMA 4X Watertight, even where located indoors.

C. Control Panel:

1. NEMA 4X Fiberglass Reinforced Plastic enclosure for outdoor installation with hinged access door with window and furnished with the following:
2. Microprocessor based controller with LED display with keypad interface and non-volatile memory.

3. Ground fault circuit protection capable of checking heating cable circuit faults
4. LED Indicator Lights: Current mode, heater on, alarm conditions and receive / transmit data.
5. Alarm Conditions: RTD failure, high/low temperature, high/low current, hi/low resistance and high/low voltage, ground fault alarm, trip, loss of programmed values and electromechanical relay failure.
6. Alarm Contacts: One single pole single throw rated at 0.75 amp 120 to 277 volt relay and one dry pilot duty only relay rated at 48 VAC / DC 50 milliamps, 10VA maximum resistive switching
7. Power strip for connecting 277 volt single phase at 30 amps maximum.
8. Temperature Control Sensors: Total of two three wire 100 Ohm RTD's with 10 foot long stainless steel sheath, ambient temperature range of –76°F to 1058°F with an accuracy of ±3°F and a repeatability of ±3°F.

D. Temperature Control Sensor

1. Provide outdoor ambient thermostat with adjustable contacts set to close on decreasing temperature.
2. Provide pipe mounted sensor with adjustable setpoint set to close on decreasing temperature.

PART 3 - EXECUTION

3.01 PIPE FREEZE PROTECTION SYSTEM INSTALLATION

A. Furnish and install a pipe freeze protection system to prevent the following piping from freezing where located in unheated areas:

1. Domestic water piping.
2. Sanitary P-traps.
3. Horizontal sanitary piping
4. Horizontal and vertical grease waste piping and P-traps
5. Condensate drain piping.

B. Installation:

1. Cut cable to length as required to suit pipe lengths and watt per foot requirements.
2. Install and test heating cable after pipe is pressure tested and before pipe is insulated.
3. Secure cable to pipe with cable ties or belts and install according to manufacturer's instructions.
4. Install cable on piping in accordance with manufacturer's recommendations for a minimum ambient temperature of minus 20 degrees F.
5. Install junction boxes where necessary.
6. Install control panels at the locations indicated.

7. For plastic piping, apply heating cable using aluminum tape.

C. Connections:

1. Electrical wiring and connections are specified in Division 26 Section "Common Work Results for Electrical".
2. Coordinate interlock of heat trace system control panel alarm conditions with the building automation system. Alarm wiring and alarm interlock with the building automation system are specified in Division 23 Section "Direct-Digital Control for HVAC".

D. Insulation:

1. Install and test electric heat trace prior to installation of insulation. Insulation is specified in Division 22 section "Plumbing Insulation".

E. Factory Tests:

1. Conduct manufacturers' standard tests on all system components to assure that all devices, components, and systems are in proper working order before shipment.

F. Field Tests:

1. Before and after installation of the thermal insulation, test heating cable with megohmeter between the heating cable bus wires and metallic braid. Minimum insulation resistance shall be 20 megohms regardless of length.
2. Submit test report of megohmeter readings to the Owner.

END OF SECTION