Section 15770

HEAT TRACING

PART 1 GENERAL

1.01 SUMMARY

A. Provide heat tracing as indicated on Plans and in compliance with Contract Documents.

B. Section Includes:

Self-regulating heat tapes and control equipment.

1.02 MEASUREMENT AND PAYMENT

No separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this a component part.

1.03 REFERENCES

This specification references the following publications in their current editions. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

A. NFPA-70: National Electrical Code (NEC)

B. NEMA 250: Enclosures for Electrical Equipment (1,000 volts maximum)

C. ICEA S-95-658 / NEMA WC70: Nonshielded 0-2 kV Cables

D. OSHA 1910.7: Definition and requirements for a nationally recognized testing laboratory

1.04 SUBMITTALS

Submit the following to the Project Manager, in accordance with Section 01330 – "Submittal Procedures:"

A. Shop Drawings:

1. Product technical data including manufacturer's cut sheets and catalog data

2. Instructions for handling and storage

3. Show isometric layout of pipe tracing cables over piping layout.

4. Power requirements for each circuit based upon actual length of heat tracing and maintained temperature.

5. Circuit breaker rating based upon inrush current at minimum expected start-up temperature.

6. Length of heat tracing for each pipe size and run

7. Coordinate and verify length and Watts/FT of heat tracing required based upon pipe size and insulation thickness.

8. Include the calculations to support the output of the heat tracing.

9. Wiring diagrams showing physical locations of thermostats and heat trace power supply.

10. Include installation details and connection diagrams sufficient to install pipe tracing cable system.

11. Dimensions and weight

12. Conformance certificate

1.05 RELATED REQUIREMENTS

A. Cable shall meet all the requirements of ICEA S-95-658 / NEMA WC70.

B. National Electrical Code: Components and installation shall comply with NFPA 70.

C. Section 01330 – “Submittal Procedures”

1.06 QUALITY ASSURANCE

A. Conformance Certificate and Quality Assurance Release:

Submit a conformance certificate signed by the person responsible for product quality. The certificate shall specifically identify the purchased material or equipment; such as by the project name and location, purchase order number, supplements, and item number where applicable, including materials and services provided by others. The certificate shall indicate that requirements have been met and identify any approved deviations.

B. Items provided under this section shall be listed or labeled by UL or other Nationally Recognized Testing Laboratory (NRTL).

1. Term "NRTL" shall be as defined in OSHA Regulation 1910.7.

2. Terms "listed" and "labeled" shall be as defined in National Electrical Code, Article 100.

1.07 SYSTEM DESCRIPTION

Provide pipe tracing cable system capable of maintaining pipe contents at temperature of 40 degrees F when outside ambient temperature is -20 degrees F with 20 mph wind.

1.08 DELIVERY, STORAGE, AND HANDLING

Ship wire and cable on manufacturer's standard reel sizes unless otherwise specified. Where cut lengths are specified, mark reel footage accordingly. Each reel shall contain one continuous length of cable. Provide impact protection by wood lagging or suitable barrier across the traverse of the reel. Provide moisture protection by using manufacturer's standard procedure or heat shrinkable self-sealing end caps applied to both ends of the cable. Store cable such that it is not exposed to sunlight or other UV rays.

1.09 – 1.13 (NOT USED)

PART 2 PRODUCTS

2.01 MANUFACTURER(S)

A. Thermon

B. Chemelex

C. Chromalox

D. Or Approved equal

2.02 MATERIALS AND/OR EQUIPMENT

A. Cable Design

1. Voltage: 120 or 240 volts, 60 Hertz, single phase as shown on Plans for electrical connection

2. Circuit breaker:

   Provide a circuit breaker in Panelboard for heat trace branch circuit. See "ATTACHMENT" for details on type of circuit breaker.

3. Safety factor: 10 percent

4. Parallel design, current flow across cable

5. Heat output w/ft (w/m) constant, independent of length

6. Capable of overlapping without creation of hot spots

7. Cut to any length in field

8. Self-regulating heat output

9. Braided metallic shield

10. Outer plastic jacket

B. Controls

1. Thermostatic ambient sensing control on each tape set at 40 degrees F (4 degrees C).

a. Provide non-adjustable thermostats, calibrated and tested at factory to operate pipe heating system when temperature of pipe drops to 40 degrees F (4 degrees C).

b. Provide non-adjustable thermostats, calibrated and tested at factory to close alarm contacts when temperature of pipe drops to 35 degrees F (2 degrees C) at coldest location.

c. Thermostats to have repeatability and maximum temperature differential of 2 degrees F (1 degrees C).

d. Provide thermostats with NEMA 4 enclosures or as required to suit environment.

2. Provide proper fittings necessary, all required components and accessories (such as power connection boxes, end seals, straps, tape and fitting brackets) and appurtenances for field connection of system to conduit and wiring without need for procurement of special fittings or wiring devices.

3. Heat tracing requirements are defined in “SCHEDULE OF HEAT TRACE APPLICATIONS” (See "ATTACHMENT").

2.03 – 2.04 (NOT USED)

PART 3 EXECUTION

3.01 GENERAL / MANUFACTURER(S) (NOT USED)

3.02 PREPARATION

Install materials after piping has been tested and approved.

3.03 EXAMINATION, INSTALLATION, APPLICATION AND CONSTRUCTION

A. Examination

1. Examine areas and conditions under which pipe tracing cables to be installed and notify Project Manager, in writing, of conditions detrimental to proper and timely completion of Work.

B. Installation

1. Coordinate circuit connection points and voltages with Plans.

2. Insulate and heat trace wet pipe systems as indicated on Plans.

3. Install in accordance with manufacturer's written instructions.

   a. Each circuit shall not exceed the manufacturer's recommended maximum length.

4. For metallic piping:

   a. Heat tracing shall be installed completely wired.

   b. Cut heat trace to lengths as required and secure to pipe with glass or polyester fiber tape.

5. For non-metallic piping:

   a. Allow for extra heat trace output because non-metallic pipe has a lower heat transfer.

      1) Heat tracing shall be installed completely wired.

   b. Cut heat trace to lengths as required and secure to pipe with aluminum tape throughout the length of the trace.

6. Protection and Control Requirements:

   a. Apply "electrically traced" signs to outside of thermal insulation.

   b. Provide protection by a circuit breaker located in the Panelboard for heat trace branch circuit. See "ATTACHMENT" for details on type of circuit breaker.

      1) Breaker amperage rating shall be coordinated with Contractor when different than the Plans.

   c. Provide two (2) line sensing thermostats, one (1) for power and one (1) for alarm.

   d. The alarm thermostat shall be placed on the opposite end of the circuit from the power thermostat or power connection to allow for annunciation of partial failure of a circuit or the loss of power from a tripped GFEPCI circuit breaker.

   e. Provide a monitoring module that monitors the voltage (circuit breaker status) to each circuit.

f. The alarm from the alarm thermostat and monitor module shall be annunciated on the indicated control system.

7. Heat tracing system powered from a standard circuit breaker, coordinate size with Contractor.

a. Heat tracing system shall be protected by a power distribution and monitoring panel or a microprocessor based temperature control and monitor module that annunciates a ground fault condition.

3.04 REPAIR/RESTORATION (NOT USED)

3.05 FIELD QUALITY CONTROL

A. Examine material for defects prior to installation.

B. Examine final installation for damage and defects in workmanship prior to startup and installation of insulation.

C. Prior to installation of insulation, start pipe tracing system and check for temperature increase over full length of each tracing cable.

3.06 TESTING

Megger the cables at the manufacturer’s recommended voltage level three (3) times.

1. Before installation

2. After attachment to pipe, but before insulation is installed

3. After pipe insulation is installed, but before energization

3.07 – 3.09 (NOT USED)

3.10 SCHEDULES

See "ATTACHMENT"

ATTACHMENT

[Design Engineer is to complete blanks per site requirements]

A. CIRCUIT BREAKER

Type of Circuit Breaker: Class B GFCI circuit breaker or GFEPCI (6-50Ma)

[Design Engineer will decide based on site conditions]

B. SCHEDULES

1. The HVAC heat tracing schedule can be found on drawing(s) _____.
2. The Plumbing heat tracing schedule can be found on drawing(s) _____.
3. The Process Mechanical heat tracing schedule can be found on drawing(s) _____.
4. Heat tracing requirements are presented in the schedule below.

SCHEDULE OF HEAT TRACE APPLICATIONS					
Application	**Process Fluid**	**Maintained Temperature (°F)**	**Insulation (Thickness / Material)**	**Manufacturer / Model**	**Flow Rate (gpm)**

END OF SECTION