SECTION 16121
HEAT TRACE CABLES & CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Gutter and pipe freeze protection heat trace cable.
   2. Controls for heat trace.

B. Related Sections:
   1. Section 16110 - Raceways
   2. Section 16470

1.02 REFERENCES

A. National Electrical Code (NEC/NFPS 70) (Current Edition)
B. National Fire Protection Association (NFPA)
C. National Electrical manufacturers Association (NEMA)
D. American National Standards Institute (ANSI)
E. Institute of Electrical and Electronic Engineers (IEEE)
F. All applicable local codes and UCB standards.

PART 2 - PRODUCTS

2.01 HEAT TRACE CABLE FOR PIPE FREEZE PROTECTION

A. Heating cables shall be self regulating, such that they vary their output in response to temperature variations along the length of a traced pipe. Heating cable to be used for a given application shall be based on the design and operating environment requirements. The following self-regulating heating cables are approved:

   1. Self-regulating heating cable design shall be capable of maintaining process temperatures up to 150º F (65º) and continuous exposure to temperatures of 185º (85º) while de-energized.
2. Cable must be capable of being cut to a desired length to suit the installation conditions and must form a continuous heating circuit.

3. The heating cable shall consist of two parallel 16 AWG (minimum) nickel-plated copper bus wires embedded in a semi-conductive polymer core that forms a continuous matrix heating element. A polyethylene dielectric insulating jacket is extruded over the heating element core.

4. A metallic braid of tinned copper shall cover the basic cable. The braid shall provide a nominal coverage of 80%.

5. The cable shall be further covered with a polyolefin overjacket.

6. Long-term stability shall be established by the service life performance test per IEEE Std 515.1.

7. Cable shall be BYLIN, Chromalux, Thermacon or UCBEE approved equal.

2.02 CONTROLS FOR PIPE FREEZE PROTECTION

A. Provide controller that can sense outside air temperature. When temperature drops to 34º heat trace shall be energized and deenergize the heat trace when the temperature rises above 36º. The setting must be capable of field adjustment.

2.03 DESIGN PIPE FREEZE PROTECTION

A. The equipment, materials and installation shall be suited for the electrical classification of the area involved.

B. A minimum safety factor of 10% shall be used to determine heat loss.

C. Heat loss calculations shall consider that the thermal insulation may be oversized to allow space for the heating cable(s).

D. Heater cable lengths for piping shall include cable on all in-line components including but not limited to: flanges, pumps, valves, pipe supports/hangers, vents/drains and instruments.

2.04 INSTALLATION

A. Refer to manufacturer’s installation instructions and design guide for proper installation and layout methods. Deviations from these instructions could result in performance characteristics different than intended.

B. All installations and terminations must conform to the NEC and any other applicable national or local code requirements.

C. All heat tracing circuits shall be equipped with ground –fault equipment protection in accordance with applicable codes and standards.
D. Heating cable shall be attached to pipes on maximum one-foot intervals.

E. Heating cable shall be installed such that all in-line devices and equipment may be easily removed and reinstalled without cutting the heating cable.

F. Heating cable shall be installed on the lower quadrant of horizontal pipe whenever possible to avoid mechanical damage. Cable shall be located on the outside radius of all 45° and 90° pipe elbows.

2.05 TESTING

A. Heating cable shall be tested with a megohmmeter (megger) between the heating cable bus wires and the heating cable metallic braid. While a 2,500 Vdc megger test is recommended, the minimum acceptable level for testing is 500Vdc. This test should be performed a minimum of three times:

1. Prior to installation while the cable is still on reel(s).

2. After installation of heating cable and completion of circuit fabrication kits (including any splice kits) but prior to installation of thermal insulation.

3. After installation of thermal insulation, but prior to connecting cable to power.

B. The minimum acceptable level for the meger readings is 20 megohms, regardless of the circuit length.

C. Results of the meger readings shall be recorded and submitted to the UCBEE.

2.06 HEAT TRACE CABLE FOR GUTTER DE-ICING/SNOW MELTING

A. The heating cable shall be UL and CSA listed specifically as electric gutter de-icing and snow-melting equipment.

B. The heating cable shall be of parallel resistance construction capable of being cut to length and terminated in the field.

C. The heating cable shall consist of two parallel nickel-plated copper bus wires embedded in a radiation cross-linked self-regulating conductive polymer core specifically designed for snow and ice melting. The heating cable shall include a polyolefin dielectric jacket rated 300 VAC at 105° C, a tinned-copper braid (14 AWG equivalent wire size), and a UV stabilized polyolefin overjacket.

D. Cable shall be Bylin, Chromalox, or Thermacron or UCBEE approved equal.
2.07 CONTROLS FOR GUTTER DE-ICING/SNOW MELTING HEAT TRACE

A. Gutter de-icing/snow melting shall have dual controls.
   1. Controls shall consist of both temperature and moisture. Temperature must be 34º F or lower and moisture must be present in gutter for heat trace to operate. If moisture is not present and temperature is below 34º heat trace is not to operate. Both conditions must be met in order for heat trace to operate.

B. Controller shall be Environmental Technology, Inc. Model APS-4 snow switch or approved equal by UCBEE sized for the application, i.e., number of zones controlled.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Gutter/Downspout Heating System shall be installed in accordance with the manufacturer’s Design and Installation Manual. Any deviations shall be reviewed and approved by the manufacturer/UCBEE.

B. Priority of location for installation shall be:
   1. All north facing gutters
   2. All gutters above entry ways
   3. Areas where ice dams will occur

C. Coordinate with the RIM System and SRH / WFP heating cable installers, the gutter and downspout installers and the control panel wiring and section conduit and junction box wiring installers.

D. The electrical contractor shall test the heating cables and submit results to UCBEE for review and approval.

END OF SECTION 16121