

DIVISION 23 8313 Radiant Electric Heating Cables

LOW VOLTAGE FLOOR WARMING / SPACE HEATING CABLE SYSTEM

PART 1 GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
 - 1. Furnish and install low voltage electric cable heating element floor warming / space heating system as described in Contract Documents.
- B. Related Sections:
 - 1. Section 035300 – Concrete Topping: Installation coordination with concrete floor material and details.
 - 2. Section 033000 – Cast-In-Place Concrete.
 - 3. Section 096000 – Flooring: Installation coordination with specific floor materials and details.
 - 4. Section 260600 – Schedules for Electrical: Materials and Installation of wiring and electrical power source.

1.2 SYSTEM DESCRIPTION

- A. The system shall consist of all equipment and materials for a complete floor warming / space heating system to be installed.
- B. The area covered and heat density (measured by Watts or BTU equivalent) per linear foot of heating element or square foot of area for each Heatizon System product are determined by the spacing between adjacent runs of heating element, the total length of heating element, and the size of the transformer. See manufacturer's installation instructions for more detailed information.
- C. For space heating applications, a heat-loss calculation should be performed to design the required output of the system.
- D. System should not exceed 15 watts per square foot.

1.3 ELECTRICAL CODES AND STANDARDS

- A. The entire design and installation of the Heatizon Tuff Cable® System shall comply with the Manufacturer's Installation Manual.
- B. National Electrical Code (NEC) for US installations; Canadian Standards Association (CSA) for Canadian Installations. (Current Editions).
- C. Requirements of the "Authority Having Jurisdiction".
- D. All Tuff Cable® Heaters shall be approved to CSA and UL Standards for this application.
 - 1. Self-regulating cables are not acceptable for this application.
 - 2. Cables that are not copper stranded conductors are not acceptable for this application.
 - 3. Line voltage cables are not acceptable for this application.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturers technical product data and written installation instructions for snow melting cable system.
- B. Shop Drawings:
 - 1. At Architect's request, submit drawings showing layout of system Control Unit, activation device, grounding connections, and heating cables required to provide complete operating system. Include the following:
 - a. Locations for activation devices.
 - b. Location of low-voltage heating cable step-down transformer and control box.
 - c. Cold-lead cable runs from transformer to heating element connection points.
 - d. Heating element layout and spacing.
 - e. Cold-lead jumpers between non-adjacent areas.
 - f. Connections between cold-lead and heating element.
 - g. Low-voltage wiring between control box and activation device.
 - h. Location of aerial or slab-mounted temperature/moisture sensor(s).
 - i. Low-voltage wiring between sensor(s) and activation device(s).
 - j. Differentiate between:
 - 1. Control wiring.
 - 2. Heating element.
 - 3. Cold-lead.
 - 4. Branch-circuit wiring.
 - k. Differentiate between zones of heating element.
- C. Operation and Maintenance Data:
 - 1. Submit manufacturer's written maintenance and operation instructions for system.
- D. Warranty:
 - 1. Submit copy of system manufacturer's standard warranty for system.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Firm regularly engaged in manufacturing of electric cable heating elements, of type, sizes and ratings required, whose products have been in satisfactory use in similar service for not less than five years.
- B. Installer Qualifications:
 - 1. Licensed Contractor with a minimum of two years successful certified experience installing projects utilizing for low-voltage electric cable heating element systems equal to systems specified in this section.
- C. Regulatory Requirements:
 - 1. Comply with applicable local electrical code requirements of local authorities having jurisdiction.
 - 2. Provide products that are listed, recognized, and labeled by Nationally Recognized Testing Laboratory (NRTL) that include but are not limited to:
 - a. ETL subsidiary of Intertek.
 - b. Canadian Standards Association (CSA).
 - c. Underwriters Laboratories (UL).
 - 3. Conform to requirements for Standard for Safety for Electric Radiant Heating Panels and Heating Panel Sets (UL - 1693, 3rd Edition, dated October 14, 2011).
 - 4. Conforms with requirements of "Power Units other than Class 2" (UL-1012)
 - 5. Conform with requirements of "Dry-Type General Purpose and Power Transformers" (UL - 1561).
 - 6. Conform to "Requirements for Electrical Resistance Heating Cables and Heating Device Sets" (CSA - 22.2, No 130-03, dated January, 2008)

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle in accordance with manufacturer's written instructions. Store the materials in dry indoor location off the ground.
- B. Remove damaged materials from job site and replace with new at no additional cost to Owner.

1.7 WARRANTY

- A. Provide Manufacturer's Standard Warranty with following requirements:
 - 1. Control Unit Components: 1 year
 - 2. Power Transformer: 5 years
 - 3. Heating Element: 25 years

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Approved Manufacturers:
 - 1. Heatizon Systems, 9 Morris Lane, Clifton Park, New York 12065 (888) 448-0555
www.comfortradiant.com – info@comfortradiant.com
 - 2. Substitutions: Not Permitted

2.2 COMPONENTS

- A. Heating Element:
 - 1. Copper stranded cable insulated with chemical- and gasoline-resistant thermoplastic vinyl and sheathed with nylon jacket for corrosion and mechanical protection.
 - 2. Rated for operating at variable output of 0 to 12 watts per linear foot.
 - 3. Maximum Operating Voltage: 0.118 volts per linear foot of heating element.
 - 4. Maximum Secondary Voltage: Not to exceed 65.5 volts.
 - 5. Heating Element Operating Temperature: Not to exceed 80 degrees C.
 - 6. Heatizon Systems Tuff Cable number E101 (UL E174340).
- B. Heating Cable Power Transformer:
 - 1. Properly sized so cable heating element operation is less than 96 amps.
 - 2. Multi tapped on primary side to allow for operation of supply of 120, 208, 240, and/or 277 volts.
 - 3. Multi tapped on secondary side to allow proper operation when operating range of heating elements lengths.
 - 4. Heatizon Systems Options:
 - a. S050 (0.5kVA)
 - b. S101 (1kVA)
 - c. S102 (2kVA)
 - d. S103 (3kVA)
 - e. S104 (4kVA)
 - f. S105 (5kVA)
 - g. S106 (6kVA)
 - h. S202 (2x 2kVA) (single primary with dual secondary's)
 - i. S203 (2x3kVA) (single primary with dual secondary's)
- C. Control Unit:
 - 1. Provide unit that:
 - a. Soft starts transformer.
 - b. Monitors overall system for proper and safe operation.
 - c. Interfaces with activation device.

- d. Shuts system off in event of fault.
 - e. Provides protection for overcurrent, undercurrent and high temperature transformer (CBX6T and CBX23T models have a 24VAC power supply for Activation Device).
2. Provide means of faults and fault status.
 3. Fitted with power service disconnect rated for system operating range.
 4. Heatizon Systems Control Box: SLC500, CBX6, CBX6T, CBX23, CBX23T, and RADIANT8 (CBX6T, CBX23T, and RADIANT8 models have a 24VAC power supply for Activation Devices).
- D. Activation Device:
1. Provide unit with a dry contact.
 2. Provide one or more of the following:
 - a. Programmable Thermostat Ambient: Model M321.
 - b. Programmable Thermostat Floor: Model M321RS.
 - c. 12 hour Mechanical Timer: Model M325D.
 - d. 24 hour Programmable Timer: Model M323.
 3. Multiple Circuits for Control, Monitoring, and Load Management:
 - a. Where controls exceed 3 in total on one activation scheme, use M329 12 Channel Selector Box or M346 Monitor Station.
 - b. Where remote monitoring is necessary use M346 Monitor Station
 - c. Where individual zone control in necessary us M329 12 Channel Selector Box or M346 Monitor Station.
 - d. Where separate activation and control with M330 Relay Panel Series line voltage products use M346 Monitor Station.

2.3 ACCESSORIES

- A. Insulation:
1. Concrete slab and pavers:
 - a. Provide ¾" or 1" thick extruded polystyrene insulation below concrete slab prior to concrete pour. Insulation shall be rated at the appropriate mechanical properties for each application.
- B. Reinforcing:
1. Provide welded wire fabric of the appropriate pattern and gauge to accommodate the spacing of the heating element in new pour applications. Wire fabric will hold heating element in place while concrete is poured. Concrete or Plastic chairs support the welded wire fabric and the heating element at the appropriate depth from the surface of the slab.
- C. Control Joints:
1. Jumper under any and all joints and markers in asphalt and concrete using Heatizon JUMPERKIT joint/marker jumper kit.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine wood or concrete subfloor for proper installation, cleanliness, or condition that may hinder successful installation of low-voltage electric heating system.
1. Notify Contractor in writing of items needing correction.
 2. Do not install floor warming system until faulty conditions are corrected.

3.2 INSTALLATION

- A. Interface with Other Work: Coordinate installation of heating system with appropriate sections of Division 26 Electrical.

- B. Install heating system, including Heating Element, Transformer, Control Unit, and Activation Device, in accordance with Manufacturer's written instructions and approved Shop Drawings.
- C. Attach manufacturer's supplied red octagonal warning sign (STOP! DANGER!) spaced equally on Floor Warming System on surface in which system is installed.
- D. Install floor covering as soon as possible after heating element installation.

3.2 FIELD QUALITY CONTROL

- A. Testing as directed by System Manufacturer:
 - 1. Prior to covering, visually inspect the heating element and cold leads for cuts, shorts, and other damage; repair as necessary.
 - 2. Check for continuity to any conductive material, including but not limited to metal; eliminate as necessary.
 - 3. Conduct After-Installation Element Tests per manufacturer's installation instructions. Test system in presence of Architect, Contractor, and Owner's Representative, to be certain system functions in accordance with design intent.
- B. Verify that all heating element is completely embedded.
- C. Immediately prior to and immediately following concrete pour, check each cable element system for electrical continuity and check for electrical isolation (resistance) to ground and any metallic materials near cable heating element.

3.3 DEMONSTRATION

- A. Provide adequate demonstration and training to Owner in operation and maintenance of system.

END OF SECTION