

## DIVISION 23 8313 Radiant Electric Heating Cables

### SNOW MELTING / DE-ICING SYSTEM SELF REGULATING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish a system of heating cables for a snow melting system.
- B. Related Sections:
  - 1. Section 32 0630 – Sidewalks: Installation coordination with concrete pavements.
  - 2. Section 32 1400 – Unit Paving: Installation coordination with unit pavers.
  - 3. Section 03 3000 – Cast-In-Place Concrete.
  - 4. Section 26 0600 – 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 snow melting system to be installed as described in Contract Documents.
- 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 Systems product are determined by the heat output and the spacing between adjacent runs of heating element. See manufacturer's installation instructions for more detailed information.
- C. The extent of the snow and ice melting system is as shown on specification sheets and architectural drawings. Whenever possible, The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) design criterion should be followed. Control Joints shall be identified and marked for jumpers.

##### 1.3 ELECTRICAL CODES AND STANDARDS

- A. The entire design and installation of the Heatizon Hott-Wire® SR Cable System shall comply with the Manufacture'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 Hott-Wire® SR Cable Heaters shall be approved to CSA and UL Standards for this application.
  - 1. Constant Wattage cables are not acceptable for this application.
  - 2. Cables not able to withstand maximum exposure temperature of 149°F (65°C) 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 relay or contactor panel, activation device, grounding connections, and heating cables required to provide complete operating system. Including the following:
    - a. Locations for activation devices.
    - b. Locations of relay panel, contactor panel, junction boxes, feeder wires, and load wires.
    - c. Circuit feeder runs from relay or contactor panel / junction box to heating element connection points.
    - d. Connection points between circuit feeders and heating element.
    - e. Wiring between relay panel and activation device.
    - f. Location of aerial or roof and gutter temperature moisture sensor(s).
    - g. Differentiate between:
      - 1) Control wiring.
      - 2) Heating element.
      - 3) Cold Lead.
      - 4) Branch-circuit wiring.
    - h. 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 services for not less than five years.
- B. Installer Qualifications:
  - 1. Licensed Electrical Contractor with a minimum of two years successful certified experience installing projects utilizing electric heating cable 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 or recognized and labeled by Nationally Recognized Testing Laboratory (NRTL) that includes, but not limited to :
    - a. ETL subsidiary of Intertek.
    - b. Canadian Standards Association (CSA).
    - c. Underwriters Laboratories (UL).
  - 3. Conform to requirements of "Standard for Safety Electric Space Heating Cables" (UL – 1673, 3<sup>rd</sup> Edition, dated September 13, 2010).
  - 4. Conform to "Requirements for Electrical Resistance Heating Cables and Heating Device Sets" (CSA – 22.2, No 130, 3<sup>rd</sup> Edition, dated January 2008).

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle in accordance with manufacturer's written instructions. Store 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 the Manufacturer Standards with the following requirements:
  - 1. Hott-Wire® SR Cable heating element: Ten year
  - 2. Relay Panel, Contactor Panel, and Activation Devices: One year

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Approved Manufacturers:
  - 1. Heatizon Systems, 4137 South 500 West, Murray, Utah 84123 888-239-1232  
[www.heatizon.com](http://www.heatizon.com) – [info@heatizon.com](mailto:info@heatizon.com)
  - 2. Substitutions: Not Permitted.

### 2.2 COMPONENTS

- A. Heating element
  - 1. Hott-Wire® SR Cable and all accessories shall be supplied by Heatizon Systems (Tel: 888-239-1232, Fax: 801-293-3077)
  - 2. Shall consist of two (2) 16 AWG nickel-copper bus wires embedded in parallel in a Radiation Cross-Linked Polyolefin Core that varies its power output to respond to temperature along the entire length, allowing the heating cable to be cut to length in the field. The core is surrounded by a liner then a Radiation Cross-Linked Modified Polyolefin Jacket covers the heating cable core and liner. To provide a ground path and to enhance the heating cable's ruggedness, the heating cable shall have a Tinned Copper Braid (-C), as required by Article 427.23(A) of the NEC-2011. An ultraviolet stabilized weatherproof over-jacket composed of: Modified Polyolefin shall cover the grounding braid. The cable shall be suited for use in concrete, a mortar bed, and other cementitious materials.
  - 3. For energy efficiency and in order to provide heat output that is sufficient for floor and space heating, the heating cable shall have a nominal rating, in correlation with selection of the heating cable, of 5, 9, or 12 watts per lineal foot in Iced Water @ 32°F.
  - 4. The heating cable shall operate on line voltages of (select: 120, 208, 220, 240, or 277) volts.
  - 5. Power connection, end seal, splice kit, and tee kit components shall be supplied by Heatizon Systems and applied in the field.
  - 6. A ground-fault device for equipment protection, rated at 30-mA trip, shall protect heating cable circuit. This requirement is in accordance with Article 426 of the NEC-2011.
- B. Relay Control Panel or Contactor Panel
  - 1. Heatizon M330 Relay Panel Control Series
    - a. M330 Series Relay Panel accommodating 2, 4, 6, or 8, 30A resistive poles with manual activation switches.
    - b. M330G Series Relay Panel accommodating 2, 4, 6, or 8, 30A resistive poles with built in Ground Fault Equipment Protection and manual activation switches.
    - c. M330G-40 Series Relay Panel accommodating 2, 4, 6, or 8, 40A resistive poles with built in Ground Fault Equipment Protection and manual activation switches.
    - d. M330-50 Series Relay Panel accommodating 2, 4, 6, or 8, 50A resistive poles with manual activation switches
  - 2. Heatizon M530 Contactor Panel Series
    - a. M530-1 Contactor Panel accommodating 4, 50A resistive poles.

- b. M530-2 Contactor Panel accommodating 8, 50A resistive poles.
  - c. M530-3 Contactor Panel accommodating 12, 50A resistive poles.
  - d. M530-4 Contactor Panel accommodating 16, 50A resistive poles.
- C. Activation
- 1. All Hott-Wire® SR Cable circuits shall be activated by a Heatizon Systems approved activator for Hott-Wire® SR Cable:
    - a. The system shall be controlled by an automatic snow/ice sensor (preferred) which detects precipitation occurring at temperatures below 38° F (4 ° C). The most common are pavement mounted sensors or aerial mounted sensors. Example Models: M431 / M326A / M326ARS
    - b. Multiple Circuits for Control, Monitoring and Power Distribution:
      - 1) Where the rating of the activator would be exceeded, it shall be used in conjunction with a Heatizon Relay Control Panel (M330 Series) or Contactor Panel (M530 Series) for activation of multiple heater circuits.

## 2.3 ACCESSORIES

- A. Insulation:
- 1. Concrete slab and pavers: 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 SRJMPKIT joint/marker jumper kit.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where heating element is to be installed for proper installation, cleanliness, or condition that may hinder successful installation of the Hott-Wire® SR Cable snow melting system.
- 1. Notify Contractor in writing of items needing correction.
  - 2. Do not install Hott-Wire® SR Cable snow melting system until faulty conditions are corrected.

### 3.2 INSTALLATION

- A. Interface with Other Work:
- 1. Coordinate installation of Hott-Wire® SR Cable snow melting system with appropriate sections of Division 26 Electrical.
- B. The current Heatizon Hott-Wire® SR Cable Installation Manual shall be considered as part of this specification.
- C. The heating cable sheaths shall not touch or cross one another nor shall the heating portion of cables cross expansion joints.

- D. Heatizon Hott-Wire® SR Cable Jumpers shall be used when expansion joints are required in the system design.
- E. The heating cables are to be installed at the specified spacing and in accordance with Heatizon recommended ASHRAE Snow Melting Requirements. Spacing should not be greater than 9 inches to ensure reasonably uniform distribution of heat.
- F. All junction boxes shall be located in accessible areas. Junction boxes shall not be located in the heated slab, but shall be located above grade level. Covers shall be kept on boxes when not being accessed.
- G. All terminations shall be protected from the weather and from physical damage and bonded to the system ground.
- H. Any field alternations or deviations shall proceed only after authorization has been issued by engineer. All changes shall be accurately recorded by the contractor and shall be turned over to the engineer upon completion of the heating system scope of work.
- I. Attach manufacturer's supplied yellow octagonal warning sign (STOP! DANGER!) on surface in which system is installed.

### **3.3 FIELD QUALITY CONTROL**

- A. Testing as directed by system manufacturer.
  - 1. Field testing of insulation resistance and continuity of the units shall be carried out with a 2500VDC Megohmmeter insulation tester and recorded by the Electrical Contractor.
  - 2. Testing shall be performed by the Electrical Contractor done in the following order:
    - a. Prior to Installation of Hott-Wire® SR Heating Cable (when removed from package).
    - b. After Installation of Hott-Wire® SR Heating Cable on Substrate.
    - c. After Hott-Wire® SR Cable is embedded in asphalt, paved concrete, mortar, or sand bed and pavers.
  - 3. Verify that all heating element is completely embedded.

### **3.4 RESISTANCE RECORDING**

- A. Insulation resistance shall be consistently not less than 20 megohms during each test.
- B. A complete system startup shall be performed to verify successful operation.
- C. Resistance readings shall be recorded in the Hott-Wire® SR Cable Design and Installation Manual

### **3.5 DEMONSTRATION**

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

END OF SECTION

## DIVISION 23 8313 Radiant Electric Heating Cables

### MINERAL INSULATED SNOW MELTING / DE-ICING SYSTEM IN CONCRETE OR ASPHALT

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and Install MI Cable type snow melting system.
- B. Related Sections:
  - 1. Section 32 0630 – Sidewalks: Installation coordination with concrete pavements.
  - 2. Section 32 1400 – Unit Paving: Installation coordination with unit pavers.
  - 3. Section 03 3000 – Cast-In-Place Concrete.
  - 4. Section 26 0600 – 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 snow melting system.
- 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 product are determined by the heat output and the spacing between adjacent runs of heating element. See manufacturer's installation instructions for more detailed information.
- C. The extent of the snow and ice melting system is as shown on specification sheets and architectural drawings. Whenever possible, The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) design criterion should be followed. Control Joints shall be identified and marked for jumpers.

##### 1.3 ELECTRICAL CODES AND STANDARDS

- A. The entire design and installation of the Heatizon Hott-Wire® MI Cable System shall comply with the Manufacture'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 Hott-Wire® MI 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 shielded are not acceptable for this application.
  - 3. Cables where the conductors are not insulated by fiberglass 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 relay or contactor panel, activation device, grounding connections, and heating cables required to provide complete operating system. Including the following:
    - a. Locations for activation devices.
    - b. Locations of relay panel, contactor panel, junction boxes, feeder wires, and load wires.
    - c. Circuit feeder runs from relay or contactor panel / junction box to heating element connection points.
    - d. Connection points between circuit feeders and heating element.
    - e. Wiring between relay panel and activation device.
    - f. Location of aerial or roof and gutter temperature moisture sensor(s).
    - g. Differentiate between:
      - 1) Control wiring.
      - 2) Heating element.
      - 3) Cold Lead.
      - 4) Branch-circuit wiring.
    - h. 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 services for not less than five years.
  
- B. Installer Qualifications:
  - 1. Licensed Electrical Contractor with a minimum of two years successful certified experience installing projects utilizing electric heating cable 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 or recognized and labeled by Nationally Recognized Testing Laboratory (NRTL) that includes, but not limited to :
    - a. ETL subsidiary of Intertek.
    - b. Canadian Standards Association (CSA).
    - c. Underwriters Laboratories (UL).
  - 3. Conform to requirements of "Standard for Safety Electric Space Heating Cables" (UL – 1673, 3<sup>rd</sup> Edition, dated September 13, 2010).
  - 4. Conform to "Requirements for Electrical Resistance Heating Cables and Heating Device Sets" (CSA – 22.2, No 130, 3<sup>rd</sup> Edition, dated January 2008).

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle in accordance with manufacturer's written instructions. Store materials in a 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 the Manufacturers Standards with the following requirements:
  - 1. Hott-Wire® MI Cable heating element: 10 year
  - 2. Relay Panel, Contactor Panel, and Activation Devices: 1 year

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Approved Manufacturers:
  - 1. Heatizon Systems, 4137 South 500 West, Murray, Utah 84123 888-239-1232  
[www.heatizon.com](http://www.heatizon.com) – [info@heatizon.com](mailto:info@heatizon.com)
  - 2. Substitutions: Not Permitted.

### 2.2 COMPONENTS

- A. Heating element
  - 1. Hott-Wire® MI Cable shall be supplied by Heatizon Systems (Tel: 888-239-1232, Fax: 801-293-3077)
  - 2. Shall be fiberglass insulated, with a copper or resistance alloy conductor and a seamless copper sheath.
  - 3. Constructed in such a manner that no combustible materials are allowed between the resistance alloy conductor and outer metal sheath.
  - 4. All heater core materials shall be inorganic and will not deteriorate with age.
  - 5. Jacketed with high density polyethylene (HDPE) to further resist corrosion.
  - 6. Pre-fabricated by Heatizon Systems to the length required and shall not be altered in the field. The heated section shall be joined to a PVC jacketed copper sheath cold lead section by a pre-fabricated joint by Heatizon Systems.
  - 7. Cold lead shall be twenty five feet long or a predetermined custom length and can be extended at a junction box with circuit feeders.
  - 8. To ensure maximum snow melting rate, heat output shall not self regulate (decrease as the temperature of the slab increases).
  - 9. The heating cable shall operate on line voltages of (select: 120, 208, 240, 277, 347, 480, or 600) volts.
- B. Relay Control Panel or Contactor Panel
  - 1. Heatizon M330 Relay Panel Control Series
    - a. M330 Series Relay Panel accommodating 2, 4, 6, or 8, 30A resistive poles with manual activation switches.
    - b. M330G Series Relay Panel accommodating 2, 4, 6, or 8, 30A resistive poles with built in Ground Fault Equipment Protection and manual activation switches.
    - c. M330G-40 Series Relay Panel accommodating 2, 4, 6, or 8, 40A resistive poles with built in Ground Fault Equipment Protection and manual activation switches.
    - d. M330-50 Series Relay Panel accommodating 2, 4, 6, or 8, 50A resistive poles with manual activation switches
  - 2. Heatizon M530 Contactor Panel Series



- a. M530-1 Contactor Panel accommodating 4, 50A resistive poles.
- b. M530-2 Contactor Panel accommodating 8, 50A resistive poles.
- c. M530-3 Contactor Panel accommodating 12, 50A resistive poles.
- d. M530-4 Contactor Panel accommodating 16, 50A resistive poles.

C. Activation

1. All Hott-Wire® MI Cable circuits shall be activated by a Heatizon Systems approved activator for Hott-Wire® MI Cable:
  - a. The system shall be controlled by an automatic snow/ice sensor (preferred) which detects precipitation occurring at temperatures below 38° F (4 ° C). The most common are pavement mounted sensors or aerial mounted sensors. Example Models: M431 / M326A / M326ARS
  - b. Multiple Circuits for Control, Monitoring and Power Distribution:
    - 1) Where the rating of the activator would be exceeded, it shall be used in conjunction with a Heatizon Relay Control Panel (M330 Series) or Contactor Panel (M530 Series) for activation of multiple heater circuits.

## 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 through any and all joints and markers in asphalt and concrete using Heatizon MICABJMPKIT joint/marker jumper kit.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where heating element is to be installed for proper installation, cleanliness, or condition that may hinder successful installation of the Hott-Wire® MI Cable snow melting system.
1. Notify Contractor in writing of items needing correction.
  2. Do not install Hott-Wire® MI Cable snow melting system until faulty conditions are corrected.

### 3.2 INSTALLATION

A. Interface with Other Work:

1. Coordinate installation of Hott-Wire® MI Cable snow melt system with appropriate sections of Division 26 Electrical.

- B. The current Heatizon Hott-Wire® MI Cable Installation Manual shall be considered as part of this specification.

- C. The heating cable sheaths shall not touch or cross one another nor shall the heating portion of cables cross expansion joints.
- D. Heatizon Hott-Wire® MI Cable Jumpers shall be used when expansion joints are required in the system design.
- E. The heating cables are to be installed at the specified spacing and in accordance with recommended ASHRAE Snow Melting Requirements. Spacing should not be greater than 9 inches to ensure reasonably uniform distribution of heat.
- F. All junction boxes shall be located in accessible areas. Junction boxes shall not be located in the heated slab, but shall be located above grade level. Covers shall be kept on boxes when not being accessed.
- G. All terminations shall be protected from the weather and from physical damage and bonded to the system ground.
- H. Any field alternations or deviations shall proceed only after authorization has been issued by engineer. All changes shall be accurately recorded by the contractor and shall be turned over to the engineer upon completion of the heating system scope of work.
- I. Attach manufacturer's supplied yellow octagonal warning sign (STOP! DANGER!) on surface in which system is installed.

### **3.3 FIELD QUALITY CONTROL**

- A. Testing as directed by system manufacturer.
  - 1. Field testing of insulation resistance and continuity of the units shall be carried out with a 500VDC Megohmmeter insulation tester and recorded by the Electrical Contractor.
  - 2. Testing shall be performed by the Electrical Contractor done in the following order:
    - a. Prior to Installation of Hott-Wire® MI Heating Cable (when removed from package).
    - b. After Installation of Hott-Wire® MI Heating Cable on Substrate.
    - c. After Hott-Wire® MI Cable is embedded in asphalt, paved concrete, mortar, or sand bed and pavers.
  - 3. Verify that all heating element is completely embedded.

### **3.4 RESISTANCE RECORDING**

- A. Insulation resistance shall be consistently not less than 20 megohms during each test.
- B. A complete system startup shall be performed to verify successful operation.
- C. Resistance readings shall be recorded in the Hott-Wire® MI Cable Design and Installation Manual

### **3.5 DEMONSTRATION**

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

END OF SECTION