Section 03 06 00 - Schedules for Concrete Heat Tracing for Floor Warming

EasyHeat™

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes a heat trace system for floor warming, consisting of heating cable, control and accessories. Heating cables are embedded in mortar or concrete to compensate for heat loss, keep the floor at or near room temperature, and remove the uncomfortable chill from the surface of the floor.

B. Related Sections

1. Section 03 30 00 – Cast-In Place Concrete
2. Section 07 24 00 – Exterior Insulation and Finish Systems
3. Section 25 51 00 – Integrated Automation Control of Facility Equipment

1.2 REFERENCES

A. National Electric Code (NEC)

B. CSA Standard C22.1 – Canadian Electrical Code

1.3 SYSTEM DESCRIPTION

A. System for floor warming.

B. System consists of a heating cable, thermostat and/or controller, and accessories. **[Select all that apply]**

1.4 ACTION SUBMITTALS

A. Product Data

1. Heating cable data sheet
2. Heating Cable Installation and Maintenance Instructions
3. Control, monitor and accessory instructions **[Select all that apply]**
4. Electrical Wiring Diagram of System

1.5 QUALITY ASSURANCE

A. Manufacturers' Qualifications

1. Manufacturer to show minimum of thirty (30) years of experience in manufacturing heating cables.
2. Manufacturer to provide products consistent with IEEE 515.1 requirements.

B. Installer Qualifications

1. System installer shall have complete understanding of product and product literature from manufacturer or authorized representative prior to installation.
2. Electrical connections shall be performed by a licensed electrician.

C. Regulatory Requirements and Approvals

1. Electrical Components, Devices, and Accessories: Listed and labelled as defined in NFPA 70 and marked for intended use.

1.6 DELIVERY, STORAGE AND HANDLING

A. General Requirements: Deliver, store and handle products to prevent their deterioration or damage due to moisture, temperature changes, contaminates or other causes.

B. Delivery and Acceptance Requirements: Deliver products to site in original, unopened containers or packages with intact and legible manufacturers' labels identifying the following:
    1. Product and Manufacturer
    2. Length/Quantity
    3. Installation and Maintenance Instructions
C. Storage and Handling Requirements
    1. Store the heating cable in a clean, dry location with a temperature range -40°F to 140°F (-40°C to 60°C).
    2. Protect products from mechanical damage and water ingress.

1.7 WARRANTY

A. Extended Warranty
    1. Manufacturer shall make available a minimum two (2) year warranty for heating cable. Provide one (1) year warranty for all heat trace controllers and thermostats.
    2. Contractor shall submit to owner the results of all installation tests required by the manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Contract Documents are based on manufacturer and products named below to establish a standard of quality.
B. Manufacturer
    1. Manufacturer shall be Emerson – EasyHeat
    2. Manufacturer to show minimum of thirty (30) years of experience in manufacturing heating cables.

2.2 MATERIALS

A. Heating Cables **[Select all that apply]**

    1. Heating Cable Mats for Embedding **[Select if applicable]**
        a. Heating cable shall be G Series / Sno*Melter, series resistance heating mats/cables by EasyHeat.
        b. The heating cable shall operate with line voltages of 120, 208, 240, 277, 347, 480 or 600 VAC **[Select one]** without the use of transformers.
        c. The heating cable shall consist of two solid copper conductors, cross-linked polyethylene insulation and a PVC outer sheath.
        d. The heating cable shall be factory terminated with a minimum 20-foot cold lead (unheated) length.
    2. TSR Type Heating Cable **[Select if applicable]**
        a. Shall be TSR81J (120 VAC) or TSR82J (208 - 277 VAC). **[Select one]**
        b. Shall be a self-regulating heater cable with a parallel circuit electric heater strip.
        c. Shall feature an irradiation cross-linked conductive polymer core material that is extruded over the multi-stranded, tin-plated, 16-gauge copper bus wires.
        d. The conductive core material shall increase or decrease its heat output in response to temperature changes.

e. Two inner thermoplastic jackets shall be extruded over and bonded to the core material for extra dielectric strength, moisture resistance, and protection from impact and abrasion damage.
f. A modified polyolefin over jacket shall cover the braid for added dielectric strength, moisture resistance, and protection from impact and abrasion damage.

3. MI Trace Heating Cable **[Select if applicable]**
   a. Heating cable shall be mineral insulated cable, series resistance heating cable by EasyHeat.
   b. The heating cable shall consist of solid conductors, mineral magnesium oxide (MgO) insulation and metal alloy 825 outer sheath.
   c. The heating cable shall be factory assembled with a minimum 7-foot cold lead (unheated) length.
   d. The heating cable shall operate voltages of 120, 208, 240, 277, 347, 480 or 600 VAC **[Select one]** without the use of transformers.
   e. The mineral insulated cable tag shall have the following markings:
      i. Complete heating cable model number
      ii. Agency listings

C. Mechanical Thermostats – EasyHeat C3RC **[Select if applicable]**
   a. Shall be used for controlling heat tracing systems and offers the following features:
      i. Can be used in ambient-sensing mode or line sensing mode.
      ii. Voltage: 120, 208, 240 or 277 Vac
      iii. Current: 22 Amps
      iv. Enclosure: NEMA 3R rainproof gasketed cold-drawn steel with baked-on gray enamel
      v. Adjustable temperature range: 0°F to +150°F (-15°C to +65°C)
      vi. Fixed differential temperature: +6°F (+3.3°C)
      vii. Capillary length: 10 ft (3.0 m)
      viii. Maximum bulb temperature: +190°F (+88°C)

D. Digital Controller – EasyHeat EGPC **[Select if applicable]**

1. Shall be a micro-processor based digital controller specifically designed for wall mounted electric heat tracing applications.
2. Shall provide temperature control of an individual heater segment with sensor monitoring, remote alarm contacts, and ground fault leakage detection.
3. Shall offer the following features:
   i. Ground Fault Trip function
      - A fixed 30mA trip level is provided for circuit integrity eliminating the need for separate EPD branch circuit breakers.
   ii. Temperature Input:
      - Range: 0°C to +218°C (32°F to +425°F)
      - Accuracy: +/- 1°C
      - Repeatability: +/- 1°C
      - RTD: 100-ohm platinum, 3-wire, (lead compensated up to 20 ohms)
   iii. Voltage Range: 100 Vac to 277 Vac
   iv. Heater Switching

- Configuration: Two-pole, EMR
- Ratings: 100-277 Vac, 30A continuous (resistive load only)
- Line Frequency: 50 or 60 Hz

v. Control Power
- Power Requirement: Control power from heater voltage, 110-277 VAc, 12 VA max

vi. User Interface
- Display: 4-character LCD Alphanumeric display
- Panel Indicators:
  - Actual Temp LED
  - Setpoint Temp LED
  - Alarm LED
- Keypad:
  - 4 buttons, glass-reinforced epoxy laminate faceplate
  - Next, Up, Down, Menu

vii. Environment
- Ambient Temperature: -40°C to +55°C Starting at -20°C (-4°F)
- Conformal Coating: Boards conformal coated for hostile environments

viii. Enclosure
- Type: NEMA Type 4X, UV resistant polymer
- Features: Captive cover screws

ix. Alarm Output
- Alarm: EMR Form C
- Alarm Rating: EMR Version 24-277 Vac @ 2.0A Max, 12-30Vdc
- Alarm Output: LED Indication

x. Alarm Function
- High Temperature Alarm
- Low Temperature Alarm
- Sensor Failure
- Ground Fault Trip

xi. User-Definable Options
- Deadband: Adjustable 1°C to 6°C (2°F to 10°F)
- Alarm Contacts: NO or NC operation

E. Digital Controller – EasyHeat FG/FGS **[Select if applicable]**
1. Type FG – Non-programmable **OR** Type FGS – Programmable
2. Shall have dual 120/240 Vac design and loads up to 15 Amps total system current
3. Shall have integrated GFCI
4. Shall have responsive buttons and intuitive feedback to simplify operation
   Shall have a large, blue backlit LCD display that is easy to read

F. Accessory Kits – **[Select all that apply]**

i. Power Connection Kit
- Shall be suitable for connecting up to two heating cables to customer supplied power wiring.
- Kit type: **[Select all that apply]**
  - Type TSRP3: Shall include a junction box, universal base, box adapter, one molded silicon power termination and cable end seal with

adhesive sealant, terminal blocks, pipe clamps, and associated hardware.
- Type SRP: Shall include a ½" NPT threaded conduit fitting with cable grommet, heat shrink, wire nuts, and pipe standoff (junction box not included).

ii. Power End Termination Kit – EasyHeat SRMP
- Shall be suitable for terminating heating cables inside a junction box.
- Shall contain: Five (5) molded silicone terminations and silicone adhesive.

iii. End Seal Kit – EasyHeat SRME
- Shall be suitable for sealing ends of heating cables inside a junction box.
- Shall contain: Five (5) molded silicone end seals and silicone adhesive.

iv. End Seal and Power Connection Kit – EasyHeat SRM2
- Shall be suitable for sealing ends and terminating heating cables inside a junction box.
- Shall contain: Two (2) molded silicone end seals, two (2) molded silicone terminations and silicone adhesive.

v. In-Line Splice Connection Kit – EasyHeat SRST
- Shall provide heat shrink tubing based in-line splice connection of two or three heating cables.
- Each kit shall be able to perform two sets of splices.
- Shall contain: Two (2) wire ties, two (2) uninsulated splice connectors, two (2) mastic strips, four (4) insulated splice connectors, eight (8) shrink tubes

vi. Strapping – EasyHeat PPG100
- Shall be suitable for securing heating cable to underside of an exposed concrete slab.
- Shall feature retention tabs every 1".
- Shall contain 75 ft of strapping per roll.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Preinstalling Testing

1. Prior to installing heating cable an insulation resistance test shall be performed by the installing contractor to ensure integrity of heating cable as describe in the installation & maintenance manual.

3.3 INSTALLATION

A. Acceptable Installers

1. Subject to compliance with requirements of Contract Documents, installer shall be familiar with installing heating cables and equipment.

B. The elevated slab heating system shall conform to all local building codes including but not limited to NFPA70, IEEE 515.1 Commercial Heat Tracing Applications.

C. The installer shall layout heating cable per approved shop drawings.

D. Grounding of the heat trace system shall be in accordance with section 26 05 26 “Grounding & Bonding for Electrical Systems”

E. Connections of all electrical wiring shall be in accordance with section 26 05 19 “Low-Voltage Electrical Systems”

F. Comply with the following manufacturer’s recommendations:

1. EasyHeat Commercial Floor Warming Installation Instructions (14308-001).
2. EGPC/AXPC100EGPC Controller Installation and Operating Instructions (14251-002). **[Select if applicable]**
3. C3RC Thermostat Spec and Installation Sheet (14034-001). **[Select if applicable]**
4. TSRP Power Connection Kit Installation Instructions (14036-001). **[Select if applicable]**
5. SRP Power Connection Kit Instructions (14023-001). **[Select if applicable]**
6. SRMP Power End Termination Kit Instructions (14193-001). **[Select if applicable]**
7. SRME End Seal Kit Instructions (14194-001). **[Select if applicable]**
8. SRM2 End Seal and Power End Termination Kit Instructions (14270-001). **[Select if applicable]**
9. SRST In-Line Splice Connection Kit Instructions (14017-001). **[Select if applicable]**

3.4 FIELD QUALITY CONTROL

A. Initial start-up and field testing (commissioning) of the system shall be performed by a technician per the owner’s requirements.

B. Field Tests and Inspections in accordance with the EasyHeat Commercial Floor Warming Installation Instructions (14308-001) recorded and included in submittals to owner:

1. The following test shall be performed at the intervals listed below the test criteria:
   a. Continuity test
   b. Insulation resistance on reel: **[Select all that apply]**
      - TSR cable: 2500 VDC, 20 megaohm minimum
      - MI Trace cable**:** 500 VDC, 20 megaohm minimum
      - Mats: 500 VDC, 10 megaohm minimum
2. Test intervals:
   a. Before installing the heating cable
   b. After heating cable has been attached to welded-wire mesh or rebar (concrete)
   c. After final pour (concrete)
   d. Prior to initial start-up (commissioning)
   e. As part of the regular system maintenance

3.5 MAINTENANCE

A. Maintenance Service

1. Comply with manufacturer’s recommendations in the applicable Installation and Maintenance Instructions.

END OF SECTION