

Specification: Raychem® RaySol® Floor Warming System

This is the product portion of a specification for the RaySol System. For a complete specification that includes installation and testing recommendations, contact your Raychem representative.

Floor Warming and Heat Loss Replacement

1 General

Furnish and install a UL Listed and CSA Certified (select: concrete floor warming or heat loss replacement) system composed of RaySol heating cable, components, and controls.

2 Products

- 2.1 The heating cable and termination components shall be UL Listed for Radiant Heating and CSA Certified for Designation 1B.
- 2.2 The heating cable shall consist of two (2) nickel-copper bus wires embedded in parallel in a radiation-crosslinked polymer core that varies its power output in response to temperature all along its length, allowing the heating cable to be installed in conduit without overheating, to be cut to length in the field, and to have no heating-cable-to-cold-lead connections buried in the slab. The heating cable shall be covered with a radiation-crosslinked modified polyolefin dielectric jacket and protected by a tinned-copper braid and a fluoropolymer outer jacket. A constant-wattage-type heating cable is not acceptable.
- 2.3 The heating cable shall operate on (select: 110, 120, 208, 220, 240, or 277) volts without the use of transformers.
- 2.4 The heating cable shall be RaySol 1 or RaySol 2 as manufactured by Raychem Corporation.
- 2.5 The power connection, end seal, and splice kits shall be applied in the field.
- 2.6 Each circuit shall be protected by a 30-mA ground-fault protection device.

3 Performance

- 3.1 The heating cable shall meet the following performance criteria:
 - For floor heat loss replacement: A minimum temperature of 70°F (±5°F) or 2 watts/ft².
 - For floor warming: A minimum temperature of 80°F (±5°F) or 6 watts/ft².
 - A maximum thermal output at 40°F of 16.5 watts/ft.
- 3.2 The heating cable spacing shall be determined by an application-specific, steady-state, finite-difference, thermal analysis of the floor to be warmed.
- 3.3 The program output shall show slab temperature based on the depth and thermal conductivities of the floor layers, ambient temperatures, voltage, and heating cable output. A copy of the program output shall be submitted to the engineer for approval.

4 Installation

- 4.1 The heating cable shall be installed according to the manufacturer's recommendations, the instructions supplied with the heating cable and components, and the instructions in the RaySol Installation Manual (H54693).
- 4.2 If in conduit, the heating cable shall be installed at least 1 ½ inches below the finished surface of the floor at the spacing indicated on the drawings.
- 4.3 The heating cable shall be protected from damage during installation. Heating cable repairs and splices shall be made using a splice kit provided by Raychem.

5 Testing

- 5.1 After installation, prior to concrete pour, the cable shall be meggered at 2500 Vdc, from conductor to braid. Resistance readings shall be 20 megohms to infinity. After concrete pour, the cables shall be retested. Submit test record to the engineer.

Tile and Marble Floor Warming

1 General

Furnish and install a UL Listed and CSA Certified tile and marble floor warming system composed of RaySol heating cable, components, and controls.

2 Products

- 2.1 The heating cable and termination components shall be UL Listed for Radiant Heating and CSA Certified for Designation 1B.
- 2.2 The heating cable shall consist of two (2) nickel-copper bus wires embedded in parallel in a radiation-crosslinked polymer core that varies its power output in response to temperature all along its length, allowing the heating cable to be installed in conduit without overheating, to be cut to length in the field, and to have no heating-cable-to-cold-lead connections buried in the slab. The heating cable shall be covered with a radiation-crosslinked modified polyolefin dielectric jacket and protected by a tinned-copper braid and a fluoropolymer outer jacket. A constant-wattage-type heating cable is not acceptable.
- 2.3 The heating cable shall operate on (select: 110 or 120) volts without the use of transformers.
- 2.4 The heating cable shall be RaySol 1 as manufactured by Raychem Corporation.
- 2.5 The power connection, end seal, and splice kits shall be applied in the field.
- 2.6 Each circuit shall be protected by a 5-mA sensitivity ground-fault protection device.

3 Performance

- 3.1 The heating cable shall meet the following performance criteria:
 - The floor temperature shall be maintained above 80°F.
 - The maximum thermal output at 40°F shall be 16.5 watts/ft.
- 3.2 The heating cable spacing shall be determined by an application-specific, steady-state, finite-difference, thermal analysis of the floor to be warmed.
- 3.3 The program output shall show slab temperature based on the depth and thermal conductivities of the floor layers, ambient temperatures, voltage, and heating cable output. A copy of the program output shall be submitted to the engineer for approval.

4 Installation

- 4.1 The heating cable shall be installed according to the manufacturer's recommendations, the instructions supplied with the heating cable and components, and the instructions in the RaySol Installation Manual (H54693).
- 4.2 The heating cable shall be protected from the setting bed to the junction box by installing it inside 1/2-inch-minimum EMT conduit or rigid plastic or metal conduit.
- 4.3 The protective conduit shall be extended at least six inches into the setting bed. Install bushings on both ends of the conduit.
- 4.4 The heating cable shall be protected from damage during installation. Heating cable repairs and splices shall be made using only approved splice kits provided by Raychem.

5 Testing

- 5.1 After installation, prior to placing the mortar setting bed, the cable shall be meggered at 2500 Vdc, from conductor to braid. Reistance readings shall be 20 megohms or greater. After placing the setting bed, the cables shall be retested. Do not install tile or marble over heating cables that fail the Megger test. After the floor is complete, repeat the test and submit test records to the engineer. Do not energize heating cables with Megger readings of less than 20 megohms.

Freezer Frost Heave Prevention

1 General

Furnish and install a UL Listed and CSA Certified freezer-frost-heave-prevention system composed of RaySol heating cable, components, and controls.

2 Products

- 2.1 The heating cable and termination components shall be UL Listed for Radiant Heating and CSA Certified for Designation 1B.
- 2.2 The heating cable shall consist of two (2) nickel-copper bus wires embedded in parallel in a radiation-crosslinked polymer core that varies its power output in response to temperature all along its length, allowing the heating cable to be installed in conduit without overheating, to be cut to length in the field, and to have no heating-cable-to-cold-lead connections buried in the slab. The heating cable shall be covered with a radiation-crosslinked modified polyolefin dielectric jacket and protected by a tinned-copper braid and a fluoropolymer outer jacket. A constant-wattage-type heating cable is not acceptable.
- 2.3 The heating cable shall operate on (select: 110, 120, 208, 220, 240, or 277) volts without the use of transformers.
- 2.4 The heating cable shall be RaySol 1 or RaySol 2 as manufactured by Raychem Corporation.
- 2.5 The power connection, and end seal shall be applied in the field.
- 2.6 Each circuit shall be protected by a 30-mA ground-fault protection device.

3 Performance

- 3.1 The heating cable shall meet the following performance criteria: The subfloor temperature at the coldest section in contact with either sand or soil shall be 40°F, with the freezer load (cooling load imposed on the system by the frost heave prevention) ranging between but not exceeding 0.3 to 2.3 watts/ft depending on the R-factor of the floor insulation and cable spacing.
- 3.2 The heating cable spacing shall be determined by an application-specific, steady-state, finite-difference, thermal analysis of the floor to be warmed.
- 3.3 The program output shall show slab temperature based on the depth and thermal conductivities of the floor layers, ambient temperatures, voltage, and heating cable output. A copy of the program output shall be submitted to the engineer for approval.

4 Installation

- 4.1 The heating cable shall be installed according to the manufacturer's recommendations, the instructions supplied with the heating cable and components, and the instructions in the RaySol Installation Manual (H54693).
- 4.2 The heating cable shall be installed in conduit according to the manufacturer's instructions.
- 4.3 The conduit shall be extended to the junction box. Do not use wire pulling compound. No splices within the conduit are allowed.

5 Testing

- 5.1 After installation, prior to concrete pour, the cable shall be meggered at 2500 Vdc, from conductor to braid. Resistance readings shall be 20 megohms to infinity. After concrete pour, the cables shall be retested. Submit test record to the engineer.

Tyco, Raychem and RaySol are trademarks of Tyco Thermal Controls LLC or its affiliates.

Worldwide Headquarters
Tyco Thermal Controls
 300 Constitution Drive
 Menlo Park, CA 94025-1164
 USA
 Tel (800) 545-6258
 Fax (800) 596-5004
 info@tycothermal.com
 www.tycothermal.com

Canada
Tyco Thermal Controls
 250 West Street
 Trenton, Ontario
 Canada K8V 5S2
 Tel (800) 545-6258
 Fax (800) 596-5004

Important: All information, including illustrations, is believed to be reliable. Users, however, should independently evaluate the suitability of each product for their particular application. Tyco Thermal Controls makes no warranties as to the accuracy or completeness of the information, and disclaims any liability regarding its use. Tyco Thermal Controls' only obligations are those in the Tyco Thermal Controls Standard Terms and Conditions of Sale for this product, and in no case will Tyco Thermal Controls or its distributors be liable for any incidental, indirect, or consequential damages arising from the sale, resale, use, or misuse of the product. Specifications are subject to change without notice. In addition, Tyco Thermal Controls reserves the right to make changes—without notification to Buyer—to processing or materials that do not affect compliance with any applicable specification.