

EASYHEAT[®] WARM TILES[®]

SECTION 09 30 00

Ceramic Tile, Glass Tile, Stone Tile
Floating Engineered Wood and Laminate Floor Systems

ELECTRIC FLOOR WARMING CABLE SYSTEM And ELECTRIC FLOOR WARMING MAT SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electric floor warming systems using electric floor heating cables and mats embedded in mortar.
- B. For use under ceramic tile, glass tile and natural stone installations.
- C. For use under floating engineered wood and laminate floors.

1.2 RELATED SECTIONS

- A. Section 03 00 00 - Concrete.
- B. Section 04 40 00 - Masonry - Stone assemblies.
- C. Section 06 10 00 - Rough Carpentry.
- D. Section 07 20 00 - Thermal protection - Insulation.
- E. Section 09 60 00 - Flooring.
- F. Section 26 00 00 - Basic Electrical Methods and Materials.

1.3 REFERENCES

- A. The Standards and approval files and categories listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. Underwriters Laboratory (UL):
 - 1. General UL Listing - KQYZ.E30029 – Heaters, Radiant Heating Equipment.
 - 2. UL Standard 758 - Appliance Wiring Materials.
 - 3. UL Standard 1693 - Electric Radiant Heating Panels and Heating Panel Sets.
 - 4. UL Standard 1673 - Electric Radiant Heating Cables.
 - 5. UL Standard 873 - Temperature-Indicating and Regulating Equipment.

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- C. Canadian Standards Association (CSA):
 - 1. CAN/CSA Class 2872-01 - Requirements for Heaters - Cable and Cable Sets, Series Cable, Series Sets, Parallel Cable, Parallel Kits.
 - 2. CSA Standard C22.2 No. 130.2-93 "Heat Cable Systems for use in other than Industrial Establishments."
 - 3. CAN/CSA C22.1-06 Canadian Electrical Code, Part 1. "Safety Standard for Electrical Installations," Section 62.
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70, National Electrical Code (NEC), Sec. 424.
- E. American National Standards Institute (ANSI):
 - 1. ANSI A108: Installation Standards for the Installation of Ceramic Tile - Material and Installation Standards - Current Edition.
- F. Tile Council Of North America (TCNA):
 - 1. TCNA Handbook for Ceramic Tile Installation - Current Edition - All appropriate methods relating to the installation of tile or stone.
 - 2. TCNA #RH115 - Latex-Portland Cement Mortar, Electric System.
 - 3. TCNA #RH116 - Cementitious Self-leveling Underlayment, Bonded Electric System Thin-set.
 - 4. TCNA #RH130 - EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar, Electric System.
 - 5. TCNA #RH135 - Backer Board, Electric System, Thin-set.
 - 6. TCNA #RH140 - 19.2" o.c. Joist Spacing with Cementitious Self-leveling Underlayment, Electric System.
- G. Tile Council Of North America (TCNA):
 - 1. Dimensional Stone Design Manual –Current Edition – Chapter 14 Horizontal Surfaces – Interior Stone Flooring – Section 4.0 Heated Floor Systems.
- H. EASYHEAT Warm Tiles References:
 - 1. EASYHEAT Warm Tiles Electric Floor Warming Cable System Installation Manual.
 - 2. EASYHEAT Warm Tiles Electric Floor Warming Mat System Installation Manual.
 - 3. EASYHEAT Warm Tiles Installation Tutorials at www.warmtiles.com.
 - 4. EASYHEAT Warm Tiles Architectural Details over Suitable Substrates for Mat and Cable Systems.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Performance Requirements: Provide electric floor warming system manufactured and installed to comply with regulating agencies and authorities, and maintain performance criteria stated by the manufacturer without defects.
 - 2. Show compliance with UL, CSA.
 - 3. Show compliance with TCNA (ASTM 627) Robinson Floor Test for Evaluating Ceramic Tile Floor Systems.
 - 4. Provide Good Housekeeping Seal for a floor warming system.
 - 5. Show compliance with any applicable ANSI, MIA or TCNA standards as they relate to the installation of tile or stone.

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1.5 SUBMITTALS

- A. Submit under provisions of Administrative Requirements Section 01 30 00.
- B. Submit in accordance with Conditions of the Contract and Division 1 submittal procedures section.
- C. Submit manufacturer's product data sheet and installation instructions.
- D. Shop Drawings:
 - 1. Provide installation drawings indicating detailed cable/mat layout for each room, cable/mat dimensions, thermostat locations, and/or other details required for installation of the system. Include electrical schematics, if required.
- E. Samples: Submit sample of cable/mat and thermostat, if required.
- F. Documentation:
 - 1. Provide manufacturer's cable/mat detailed instructions for site preparation and product installation.
 - 2. Provide manufacturer's cable/mat electrical power requirements, heat output in watts delivered to the structure to show it has the capacity to utilize 12-18 watts per square foot.
 - 3. Provide manufacturer's data sheet indicating products comply with specified requirements.
 - 4. Provide documentation indicating the installer is experienced and capable of properly installing the manufacturer's products.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Manufacturer to show a minimum ten years experience in electric floor warming.
 - 2. Manufacturer to provide products of consistent quality in appearance and physical properties.
 - 3. Manufacturer to only provide products that have been 100% tested during manufacturing.
 - 4. Manufacturer to show use of the highest quality products in the production of warming cables and thermostats.
 - 5. Cable/mat, thermostats, and related items to be from single vendor source to ensure consistent quality and compatibility.
- B. Floor warming system Installer to have complete understanding of product and product literature from manufacturer prior to installation. Electrical rough-in and connections shall be performed by a licensed electrician.
- C. Regulatory Requirements and Approvals: Provide a radiant floor warming system that complies with the following requirements.
 - 1. Heating cables for installation in cement-based mortar shall be listed to UL 1673 and CSA C22.2 No. 130.
 - 2. Heating mats for installation in cement-based mortar shall be listed to UL 1693 and CSA C22.2 No. 130.
 - 3. Floor-sensing thermostats (controls) shall be GFCI Class A (5 mA) protected

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for bathroom applications (USA Installations only) and GFEP for all other applications and listed to UL 873 and C22.2 No. 24.

- D. Product Certifications - Show certification as follows:
 - 1. Robinson Floor Test (ASTM C627): Product to meet Light Commercial and Extra Heavy Duty Standards Rating.
 - 2. Quality Control Test: Manufacturer to submit finished cable/mat assembly to volt dielectric test for insulation integrity and perform resistance verification check.
 - 3. Verify cable/mat is affixed with UL sticker on power lead indicating resistance, total output, and voltage.
 - 4. Ceramic tile, stone or other floor finish to be confirmed by its manufacturer or importer that it is suitable for the intended use.

- E. Pre-installation Guidelines:
 - 1. Review manufacturer's installation instructions, project requirements, substrate conditions, floor coverings, and warranty requirements.
 - 2. Review project timeline to verify compliance and make modifications if required.
 - 3. Coordinate work with electrical and flooring contactors to establish areas of responsibility.
 - 4. Jobsite meeting of floor warming installer, general contractor, and flooring contractor to inspect site conditions, installation methods and procedures.

- F. Mock-Up: Provide a mock-up for evaluation of surface preparation, installation and finish workmanship.
 - 1. Mock-up to include at least a 24" x 24" area or a minimum of 4 tiles or stone, to represent the color range of the finish material.
 - 2. Site Project Sample Standard – First portion of work installed to be used as the standard for the remainder of the job.
 - 3. Do not proceed with remaining work until workmanship, color, and finish are approved.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Division 1 product requirements compliance.
- B. Follow ordering instructions and lead-time requirements from manufacturer to avoid delays in construction.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Store materials unopened and protected from exposure to harmful site conditions until ready for installation.

1.8 WARRANTY

- A. Refer to conditions of the contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit manufacturer's standard 15 year warranty document executed by authorized company official.
 - 1. Installer to provide warranty for their installation.

2. Warranty is provided to the original owner.
3. Warranty Period for Cable/Mat: Refer to manufacturer's 15-year warranty against failure due to defect in material or manufacturing workmanship, beginning with the date of purchase.
4. Warranty Period for Thermostat: Refer to manufacturer's 18 month warranty against failure due to defect in material or manufacturing workmanship, beginning with the date of purchase.

1.9 HEATING SYSTEM START-UP

- A. Heating System start up to proceed as specified by mortar and finish good manufacturer, allowing for the appropriate cure times for products used.
- B. Verify compliance to National Electrical Code (NEC) and local code requirements for all electrical components prior to start-up.

1.10 OWNER'S INSTRUCTIONS

- A. Owner to verify knowledge of operation and maintenance of installed system.
- B. Owner to verify knowledge of manufacturer's installation instructions for installed components within the system.
- C. Owner to verify knowledge of all operating instruction documents for thermostats and controls.
- D. Owner to have copies of any detailed layout drawings and/or photos for cables/mat before floor coverings are installed.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturer: Easy Heat USA, located at, 2 Connecticut South Drive East Granby, CT 06026 Tel: 877-656-6331 Fax: 888-600-6692 and Easy Heat Canada, located at, 99 Union St, Elmira, ON N3B 3L7 Tel: 800-794-3766 Fax: 800-361-4574 Website: www.warmtiles.com.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of section 01 60 00.
 1. Products, components and services specified are manufactured by and/or available from the specified equipment manufacturer, as a single source.
 2. Alternative equipment manufacturers shall submit required data for all electrical, mechanical, structural, engineering, design layout and finish goods revisions for an equivalent system for approval 30 days prior to bid.
- D. Manufacturer to provide electric floor warming cable/mat, thermostats and accessories as specified.

2.2 ELECTRIC RADIANT FLOOR WARMING CABLE, FOR PLACEMENT IN MORTAR

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- A. Floor heating cable to meet the following requirements:
 - 1. Uniform floor warming system.
 - 2. Custom Design Layout for any configuration.
 - 3. Dual copper based alloy conductors insulated with Fluoropolymer. The conductors are enclosed by a PVC rounder that is covered by copper ground braid and a Nylon jacket. The dual conductor cold lead is 10' and consists of two separate insulated conductors covered by copper ground braids and covered with an outer PVC jacket. Strapping and clips included for ease of application.
 - 4. Produces 12-18 watts per sq. ft.
 - 5. For 120 VAC, 208 VAC, or 240 VAC operation only.
 - 6. Thermostat installed with floor assembly, with on/off switch.

2.3 ELECTRIC RADIANT FLOOR WARMING MAT, FOR PLACEMENT IN MORTAR

- A. Floor heating mat to have the following construction:
 - 1. Uniform floor warming system.
 - 2. Pre-fabricated self-adhesive mat system provides ease of application.
 - 3. Mat Construction: Self-Adhesive Mat system (SAM). Dual copper based alloy conductors insulated with Fluoropolymer. The conductors are enclosed by a PVC rounder that is covered by copper ground braid and a PVC jacket. The dual conductor cold lead is 15' and consists of two separate insulated conductors covered by a copper ground braid and covered with an outer PVC jacket. The heating cable is bonded to a fiberglass mesh by means of tape strands.
 - 4. Produces 15 watts per sq. ft.
 - 5. For 120 VAC, 208 VAC, or 240 VAC operation only.
 - 6. Thermostat installed in floor assembly with on/off switch.

2.4 THERMOSTAT

- A. Use thermostats provided by manufacturer.
 - 1. Warm Tiles FTS model thermostat to have the following capabilities:
 - a. Consistent control with sensor embedded in the mortar below the tiles for accurate comfort levels.
 - b. Comfort level programming, as well as simple off-position selector switch.
 - c. Pre-programmed set-back mode can reduce energy use by over 50%.
 - d. Programmed for easy set up.
 - e. Manual operation setting.
 - f. Programmable 7 day or 5/2 day options.
 - g. Built-in ground fault protection.
 - h. Optional decorator door.
 - i. Installation accessories included.
 - j. Rated at 16 amps.
 - 2. Warm Tiles ET model thermostat to have the following capabilities:
 - a. Consistent control with sensor embedded in the mortar below the tiles for accurate comfort levels.
 - b. Simple on/off position selector switch.

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- c. Programmed for easy set up.
- d. Manual operation setting.
- e. LCD Display.
- f. Built-in ground fault protection.
- g. Optional decorator door.
- h. Installation accessories included.
- i. Rated at 16 amps.

2.5 OTHER ACCESSORIES

- A. Use accessories associated with the installation of the floor warming system as recommended by or available from the manufacturer.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings.

3.2 EXAMINATION

- A. Site Verification of Conditions:
 - 1. Verify that site conditions are acceptable for installation of the electric floor warming system. Refer to manufacturer installation manual for cable/mat for information.
 - 2. Verify that the floor surfaces to be covered, with the cable/mat floor warming system, and the finish material, are sound and conform to system and product requirements, including deflection criteria and code requirements (IRC for residential applications and IBC for commercial applications).
 - 3. When the mat system is used with concrete, the concrete slab is to have a steel trowel and fine broom finish, clean and free of dirt, curing compounds or any contaminants that would prevent a good bond.
 - 4. Do not proceed with installation of the electric floor warming system until unacceptable conditions are corrected.
 - 5. Beginning of work constitutes acceptance of substrate or surface conditions.

3.3 INSTALLATION OF FLOOR WARMING SYSTEM

- A. Electric radiant floor warming cable, for placement in mortar.
 - 1. Complete installation shall conform to appropriate local codes.
 - 2. Install floor warming cables in accordance with detailed layout drawings and/or manufacturer's printed instructions.
 - 3. Perform electrical resistance test to verify product integrity before beginning work.
 - 4. Verify measurements of area specified are correct per cable size. Cable cannot be cut to length to fit.
 - 5. Secure the cable to the surface of the floor using strapping product with specified spacing per specifications.
 - 6. Perform electrical resistance test to verify product integrity again.
 - 7. Secure thermostat floor sensor into heating cable area.

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8. Bring electrical power source to thermostat location.
 9. Pull heating cable power leads into thermostat electrical box.
 10. Photograph installation for records.
 11. Perform electrical resistance test to verify product integrity again.
 12. Embed floor warming cable system in thin-set mortar or self-leveling underlayment following manufacturer directions.
 13. For tiled showers and areas requiring waterproofing, the floor warming system must be installed beneath the waterproofing to protect the floor warming system from damage and electrical shock.
 14. Install tile, stone, or glass tile according to the appropriate TCNA Installation Method and written Instructions.
 15. Install other finish surfaces per industry standards and manufacturer's written instructions.
 16. Connect thermostat to heating cable power leads, floor sensor, and power source. Test system briefly and shut down.
 17. Do not place system into full operation until floor mortars are fully cured per mortar manufacturer specifications.
- B. Electric radiant floor warming mat, for placement in mortar
1. Complete installation shall conform to appropriate local codes.
 2. Install floor warming mat in accordance with detailed layout drawings and/or manufacturer's printed instructions.
 3. Perform electrical resistance test to verify product integrity before beginning work.
 4. Verify measurements of area specified are correct per mat size. Mat cannot be cut to length to fit.
 5. Place self adhesive mat system to the substrate.
 6. Perform electrical resistance test to verify product integrity again.
 7. Secure thermostat floor sensor into heating cable area.
 8. Bring electrical power source to thermostat location.
 9. Pull heating cable power leads into thermostat electrical box.
 10. Photograph installation for records.
 11. Perform electrical resistance test to verify product integrity again.
 12. Embed floor warming cable system in thin-set mortar or self-leveling underlayment following manufacturer directions.
 13. For tiled showers and areas requiring waterproofing, the floor warming system must be installed beneath the waterproofing to protect the floor warming system from damage and electrical shock
 14. Install tile, stone, or glass tile according to the appropriate TCNA Installation Method and written Instructions.
 15. Install other finish surfaces per industry standards and manufacturer's written instructions.
 16. Connect thermostat to heating cable power leads, floor sensor, and power source. Test system briefly and shut down.
 17. Do not place system into full operation until floor mortars are fully cured per mortar manufacturer specifications.

3.4 TILE AND STONE INSTALLATION GUIDELINES

- A. Follow manufacturer's directions for installation of underlayments, membranes, mortar, thin-set and grout.

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- B. Follow specific TCNA requirements for the installation method used - TCNA RH115, RH116, RH130, RH135, or RH140.
- C. Prior to commencing tile work, the installer shall inspect tile substrate surfaces. Prepare substrate surface to meet industry standards. All surfaces shall be structurally sound, clean, dry, and free of oily and waxy films and all foreign matter. Concrete surfaces shall be free of form oil, curing compounds, laitance, and cracks.
- D. For tiled showers and areas requiring waterproof membranes, install waterproof membranes over the floor warming system to protect the floor warming system from damage and electrical shock.
- E. For crack isolation membranes and waterproof membranes follow manufacturer installation instructions for proper placement and cure times when using with the floor warming system.
- F. Install tile with the appropriate ANSI A108 specification, making sure to key in the thin-set mortar into the surface and achieving full contact between the tile and area being tiled. The method used should produce maximum thin-set coverage with the corners and edges fully supported.
- G. Grout tile following appropriate cure times by the manufacturer.
- H. Protect the finished area from damage due to residual construction to ensure the finish product will be preserved in an acceptable and clean condition until it is ready for use.
- I. Establish a maintenance program that is in accord with the finish material used.

3.5 FLOATING ENGINEERED WOOD AND LAMINATE FLOORS

- A. Follow manufacturer's directions for installation of underlayment and components of the finish system being installed.
- B. Close adherence to manufacturer's directions for monitoring relative humidity, type and design of wood, specific system requirements and future maintenance schedule.
- C. Floor warming systems cannot be used with nail down wood floor finishes.

3.6 FIELD QUALITY CONTROL

- A. To ensure system integrity, do not damage the system or cut warming cable for any reason. Cover heating cable/mat against site damage until completion of floor covering installation.
- B. Perform electrical resistance measurements and record for the cable/mat installation, as required before, during, and after product installation.
- C. Test system briefly after installation for function and integrity but do not place system into full operation until floor mortars are fully cured per mortar manufacturer specifications.
- D. During the installation process of the floor warming system and the floor finishing

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material provide a quality control plan to verify installer's compliance to industry standards and of manufacturer's instruction.

- E. Keep records of system products, test results, and photographs from inspection.
- F. Use the Site Project Sample Standard established in the Quality Assurance Section to monitor the specific finish outcome and the entire installation quality.

3.7 TESTING

- A. Observe installation products' cure times or other finish materials requirements before putting floor warming system into full operation.
- B. Perform operation of electric floor warming system per system requirement.

3.8 PROTECTION

- A. Protect finished installation from damage caused by subsequent construction activity on the site.
- B. Protect tile, natural stone and other finished goods per manufacturer instruction and cure times.
- C. Provide owner with copy of photos and drawings of product locations to assist with any future design.
- D. Replace or restore finishes that were damaged or dirtied by subsequent work.

END OF SECTION