

ThermoTile® Heat Cable

Radiant Floor Heat Cable with  ThermoSoft® inside.

Installation Guidelines

Congratulations on your purchase of revolutionary ThermoTile floor heat cable – one of the easiest ways to enjoy the luxury of safe, soothing, warm floors.

Radiant floor heating systems are designed for use as primary or supplemental heat sources in residential or light commercial applications for use under tile, stone, hardwood, engineered hardwood, vinyl, carpet*, and laminate flooring.

- Easy to install.
- Takes the cold chill off tile and other hard surface floors.
- Brings soothing warmth to specific rooms or cold areas.
- Complements home heating systems to make rooms more comfortable.
- Saves energy up to 40% compared to convective heating.
- Can be used as a sole room heating source.**
- Does not circulate pollutants, dust, dirt, allergens or dry air.
- Maintenance free, strong, durable and water proof.
- Special double coating resists scratching, abrasion and corrosion.
- Suitable for most floor coverings when imbedded in mortar.
- Zero EMF (electromagnetic field).



*For carpet - verify installation is in compliance with local electrical code

**To use ThermoTile as the sole room heating source, make sure your BTU requirements are met by the total Watts of ThermoTile installed. 1,000 Watts = 3,413 BTU's/hour.

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Cautions

THIS EQUIPMENT SHALL BE INSTALLED ONLY BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE APPARATUS AND THE RISKS INVOLVED.

THE INSTALLATION OF THIS HEATING SYSTEM SHALL BE IN ACCORDANCE WITH THIS DOCUMENT AND REGULATIONS OF THE AUTHORITY HAVING JURISDICTION INCLUDING THE NATIONAL ELECTRICAL CODE (NEC), NFPA 70 AND CAN/CSA-C22.1, CANADIAN ELECTRICAL CODE, PART I (CEC).

ALL CONDUIT FITTINGS, AND ELECTRICAL ACCESSORIES MUST BE LISTED FOR THE US AND CERTIFIED FOR CANADA.

WARNING - as described in these instructions, lead wires are not come into contact with the heating cable as DAMAGE TO SUPPLY CONDUCTOR INSULATION MAY OCCUR IF CONDUCTORS ARE ROUTED to contact heating cable. REFER TO INSTALLATION INSTRUCTIONS FOR RECOMMENDED MEANS OF ROUTING SUPPLY CONDUCTORS.

THE TYPE AND THICKNESS OF FLOOR COVERING MATERIALS USED WITH THIS PRODUCT MUST NOT EXCEED A THERMAL INSULATION "R" VALUE OF 1.0.

EXAMPLE "R" VALUES:

<i>CARPET ¼" THICK</i>	<i>= R 1.0</i>
<i>CERAMIC, MOSAIC TILE .25" THICK</i>	<i>= R0.15</i>
<i>LAMINATE FLOORING</i>	<i>= R 0.675</i>
<i>PLYWOOD 0.5" THICK</i>	<i>= R 0.63</i>

NATURAL STONE (GRANITE, LIMESTONE, MARBLE, SANDSTONE) 1" THICK = 0.38-0.114
WOOD FLOORING = R 0.80 MAXIMUM

DO NOT OVERLAP HEATING CABLES OR ALLOW HEATING CABLES TO CROSS-OVER.

CAUTION: USE COPPER ONLY AS SUPPLY CONDUCTORS

DO NOT INSTALL THERMOTILE HEAT CABLE WHEN THE AMBIENT TEMPERATURE IS BELOW 32°F.

MINIMUM HEATING CABLE BEND RADIUS = 0.4 IN.

DO NOT BEND THE SPLICE AND END SEAL ASSEMBLIES.

THERE ARE NO SPECIAL CRIMPING TOOLS REQUIRED FOR THIS PRODUCT.

CAUTION: A GROUND FAULT PROTECTION DEVICE MUST BE USED WITH THIS HEATING DEVICE

Cautions (cont.)

ATTENTION: CE PRODUIT DOIT ÊTRE UTILISÉ AVEC UNE PROTECTION DE MISE À LA TERRE

ATTENTION: CONIFIER L'INSTALLATION DE CE CABLEERIEL AUN PERSONNEL QUALIFIE, QUI CONNAIT BIEN L'APPAREIL ET LES RISQUES INHERENTS.

CE SYSTEME DE PANNEAUX CHAUFFANTE DOIT ETRE INSTALLECONFORMEMENT AUX EXIGENCES DE TOUS LES POUVOIRS DE REGLEMENTATION.

ATTENTION: UTILISER DES CONDUCTEURS EN CUIVRE SEULEMENT.

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Radiant Floor Heating Cable

Installation Guidelines

Overview

There are four main sections to installing ThermoTile floor heating cable:

- Electrical installation.....**Section 1**
- ThermoTile Installation.....**Section 2**
- Floor Covering Installation.....**Section 3**
- Final wiring and connections.....**Section 4**

It is required that the circuit have a GFCI (ground fault circuit interrupter) installed*. The GFCI must be Listed for the US and Certified for Canada.

Never energize the cable rolled up!

Control Switch

There are several control switch options in both **120V** and **240V** versions.

1. To achieve precise temperature regulation, and an economical operating cost, a **thermostat** with a **floor sensor** is to be installed under your floor. The thermostat will automatically cycle on and off to maintain the set temperature.
2. To achieve maximum energy savings, a **programmable thermostat** with floor sensor can be installed. The programmable thermostat can be programmed to go to different temperature levels or on and off at different times of the day.

Make sure that the **Amperage rating** of the thermostat not exceeded by the total Amps of the ThermoTile cables being installed.

*Most of our thermostats include a 5 mA **GFCI**. If the selected thermostat does not have a GFCI one must be installed in the circuit.

Model TTC HEAT CABLE SPECIFICATIONS

Volts	Cable Model	Cable Length	Coverage S.F. @ 3" spacing	Watts	Amps
120	TTC 28 - 120	28	7	84	0.7
120	TTC 31 - 120	31	7.8	93	0.78
120	TTC 39 - 120	39	9.8	117	0.98
120	TTC 42 - 120	42	10.5	126	1.05
120	TTC 56 - 120	56	14	168	1.4
120	TTC 59 - 120	59	14.8	177	1.48
120	TTC 95 - 120	95	23.8	285	2.38
120	TTC 123 - 120	123	30.8	369	3.08
120	TTC 206 - 120	206	51.5	618	5.15
120	TTC 228 - 120	228	57	684	5.7
120	TTC 290 - 120	290	72.5	870	7.25
120	TTC 345 - 120	345	86.3	1035	8.63
120	TTC 412 - 120	412	103	1236	10.3
240	TTC 56 - 240	56	14	168	0.7
240	TTC 61 - 240	61	15.3	183	0.76
240	TTC 78 - 240	78	19.5	234	0.98
240	TTC 84 - 240	84	21	252	1.05
240	TTC 111 - 240	111	27.8	333	1.39
240	TTC 117 - 240	117	29.3	351	1.46
240	TTC 189 - 240	189	47.3	567	2.36
240	TTC 245 - 240	245	61.3	735	3.06
240	TTC 412 - 240	412	103	1236	5.15
240	TTC 457 - 240	457	114.3	1371	5.71
240	TTC 579 - 240	579	144.8	1737	7.24
240	TTC 691 - 240	691	172.8	2073	8.64

Model TTC HEAT CABLE SPECIFICATIONS @ 208V

Volts	Cable Model	Cable Length	Coverage S.F. @ 2.5" spacing	Watts	Amps
208	TTC 56 - 240	56	11.7	126	0.61
208	TTC 61 - 240	61	12.7	137	0.66
208	TTC 78 - 240	78	16.3	176	0.85
208	TTC 84 - 240	84	17.5	189	0.91
208	TTC 111 - 240	111	23.1	250	1.2
208	TTC 117 - 240	117	24.4	264	1.27
208	TTC 189 - 240	189	39.4	426	2.05
208	TTC 245 - 240	245	51	552	2.65
208	TTC 412 - 240	412	85.8	928	4.46
208	TTC 457 - 240	457	95.2	1030	4.95
208	TTC 579 - 240	579	120.6	1305	6.27
208	TTC 691 - 240	691	144	1557	7.49

Sec.1. Electrical Installation

Ground fault circuit interrupter (GFCI) – (Over-current Protection)

1. A ground fault circuit interrupter (GFCI) is required for all installations.
 - Note: Follow all local building and electrical codes.
 - It is possible to branch from an existing circuit if the Amps provided by the circuit are sufficient to supply the Amp load of the ThermoTile floor heating cables and all the other appliances that are or will be connected to the circuit. If the Amp supply is not sufficient, install a dedicated circuit. Consult with a qualified electrician to determine if the circuit can handle the load.

The size of the circuit is determined by the total Amp load of the heating cables. You may need multiple circuit breakers, multiple thermostats or a contactor/relay for installations larger than 15 Amps. See the chart on page 1 for determining the Amps drawn by each *ThermoTile* cable. Total Amps for all of the cables installed must not exceed the circuit Amperage or the 15 Amp limit of the thermostat.

Install Electrical Boxes

2. Plan the location of the electrical box for the thermostat. Each ThermoTile cable has 10' lead wires. Place the electrical box within reach of the lead wires or extend the heating cable along the floor until the cold lead wire reaches the box. Do not extend the heating cable up into the conduit or wall. Alternatively, junction all leads at a junction box and extend appropriate conductor in the wall to the thermostat box.
3. For the programmable thermostat, install a 1-gang (2" wide) or 2-gang (4" wide) electrical box with 1-gang mud ring. Note: the 4" box provides more room to work with multiple lead wires. If using our manual (MTC style) thermostat, install a 2.25" or 4" electrical box. Electrical boxes are typically located 4-5' from the floor for readability. The heating cable lead wires can be connected in a junction box with appropriate conductor wire to the thermostat electric box.
4. The floor sensor wire can be extended up to 50' if necessary by splicing comparable 20 gauge, multi-stranded, insulated, electrical wire and waterproofing the splice.

Bottom Plate Work

Drill or saw holes at the bottom plate (See Fig 2A.) One hole is for routing the power leads and the other hole is for routing the thermostat sensor wire. These holes should

be directly below the electrical box. Per NEC 300.4 the non-heating lead will need to be protected by a Listed metal protector plate (nail plate).

5. Remove one of the knock-outs in the electrical box to route the lead wires.
6. It is required by code to install conduit for the non-heated lead wires. Install ½" minimum conduit from the bottom plate up to the electrical box. Install ¾" conduit if necessary to make room for more lead wires when using multiple ThermoTile heating cables. See Figure 2A. Attach the conduit to the electrical box with an appropriate locknut. Close the bottom end of the conduit flush with the wall and fit with insulated bushing to prevent chafing of wire on exposed edge.
7. A floor thermostat comes with a floor sensor wire. Do not install the floor sensor wire in the same conduit as the floor heat cable lead wires. Install the floor sensor wire in a separate conduit or simply attach it to the stud with appropriate fasteners. Be careful not to cut or penetrate the sensor wire. **Check the resistance of the sensor wire to be sure it is near 14.8 kOhms at 68°F or 12.0 kOhms at 77°F.** (See "Measuring Resistance"). **If installing a redundant sensor, install the probe end under the floor and leave the other end inside the thermostat box but do not connect it. Only one floor sensor should be connected to the thermostat.**
8. Open a second knock-out in the bottom of the electrical box. Feed the sensor wire through the knock-out down through the cut-out in the bottom plate, and out into the floor area where the ThermoTile heating cable will be installed.

Wiring

9. Install appropriate electrical wire (conductor) from the power source following all codes. Leave extra wire at the control switch/thermostat box for making connections.
10. Refer to the Typical Wiring Diagrams (FIG. 3.1 and 3.2) at the end of these installation guidelines.

Sec. 2. ThermoTile Installation

Planning

Plan the heated area of the floor so that the desired area of the floor can be heated with a combination of the available cable sizes. When planning your heated floor area, keep the following important points in mind:

- **DO NOT CUT, pierce or sharply bend greater than 0.4 in.** the ThermoTile heating cables.
- **DO NOT CUT THE HEATING CABLE.**
- Do not overlap ThermoTile heating cables. Never energize the cable rolled up!
- ThermoTile's lead wires should be routed from the end of the cables to the nearest wall and electrical junction box. Lead wires must be routed up the wall in a listed conduit. *A licensed electrician must make all electrical connections.*
- Do not cross lead wires over or under the heating cables or the sensor wire.
- Do not install ThermoTile heating cables under built-in cabinets or furniture with a solid surface base. Excessive heat will accumulate under these items and may damage the ThermoTile heating cables. **DO NOT PLACE PET BEDS IN THE HEATED AREA. LOCAL OVERHEATING CAN OCCUR, WHICH WILL PERMANENTLY DAMAGE THE HEATING SYSTEM.**
- ThermoTile heating cables can be installed up to the face of cabinet kick plates and 2- 3" away from the wall and metal objects such as toilet ring, floor drains, etc. This spacing will prevent the heat cables from damage by nailing baseboard or other objects to the floor perimeter and will prevent melting the toilet ring.
- Plan where door stops, sliding door tracks or other objects will be installed so that fasteners do not damage the heating system after the installation.

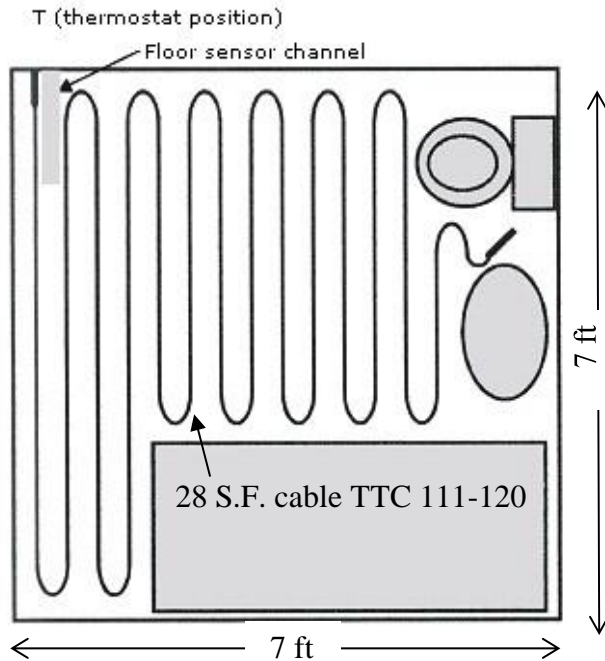
It is important to measure the room correctly and avoid all permanent fixtures such as bathtubs, showers, kitchen cabinets and appliances. Avoid thermally blocking heated areas to prevent localized heat buildup and possible damage to the heat cable and floor covering. Allow a non-heated perimeter clearance by deducting about 5% from the total floor covering area.

Power Output requirements.

Refer to the table below; cable spacing can be varied to achieve different heat levels.

Power Output	Cable Average Spacing
14.4 W/ft ²	2.5 inches
12 W/ft ²	3.0 inches

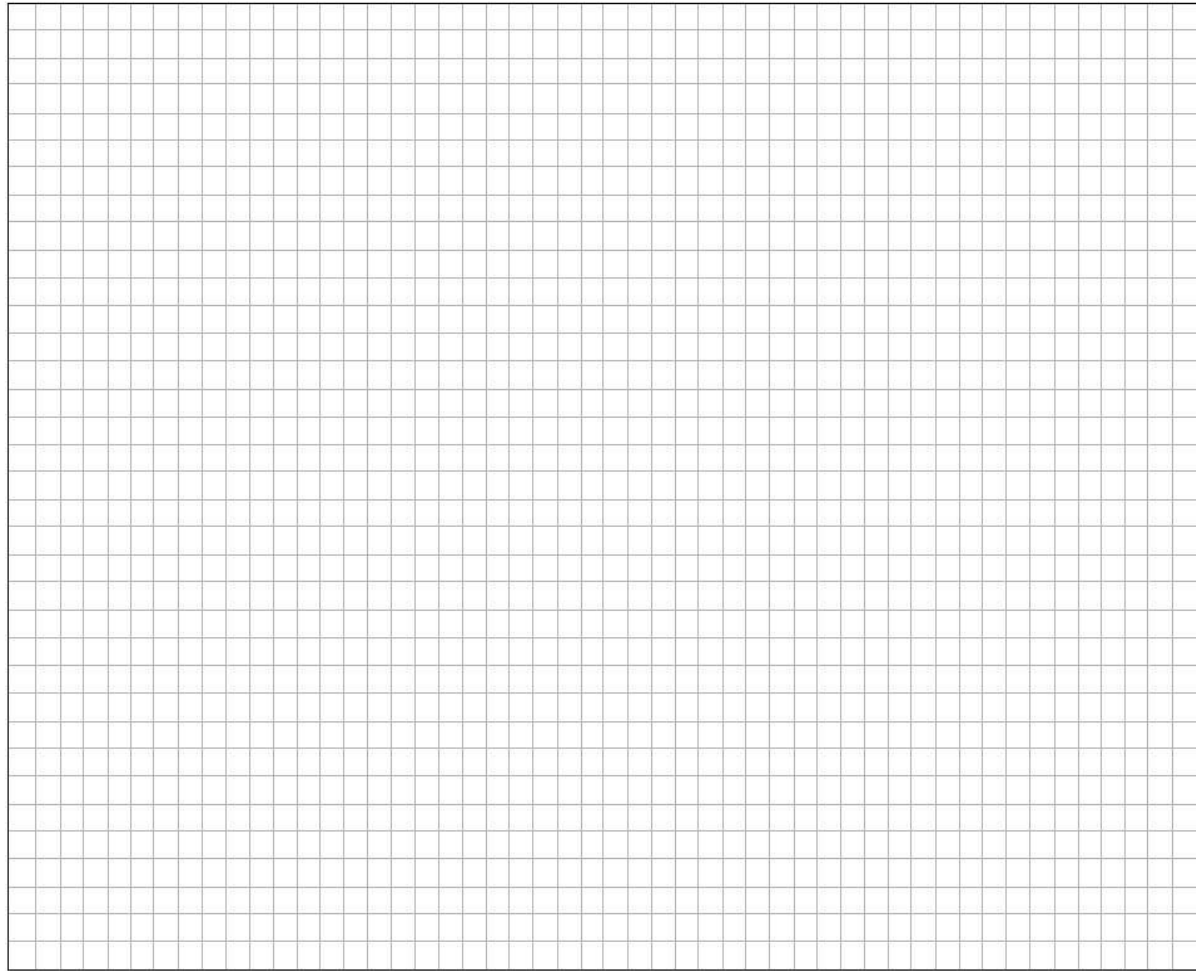
INSTALLATION PLAN



Please retain a detailed layout plan using the example to the left as a guide.

Take care to show the following:

- Product used
- Thermostat position
- Junction box position
- Start and end of cable run
- Floor probe position
- Any fixed furniture/fittings
- Room dimensions



The diagram shows a bathroom that is just over 49 sq. ft. The total usable area is however 32 sq. ft. Therefore, for optimum heat output the correct cable to use is heat cable Model TTC111-120 or HC20-120 covering 28 sq. ft. at 3" spacing.

This example also highlights the advantage of the heat cable twin conductor heating cable requiring connection to the electricity supply at one end only thereby removing the need to design the layout to get the cable back to the termination/thermostat point.

(If in doubt and on receipt of a marked and scaled drawing your supplier will calculate the appropriate amount of cable required).

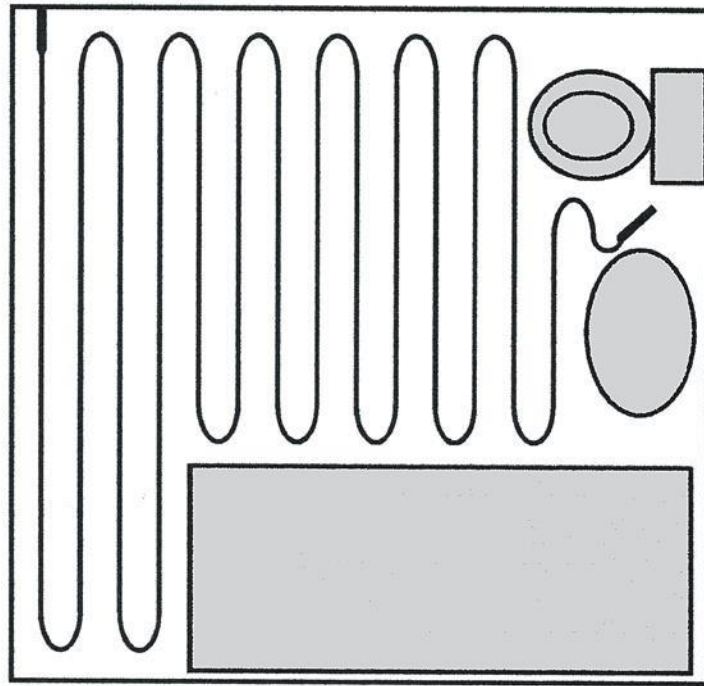


Figure 1.

Floor Preparation

Cables can be laid onto most existing floor surfaces that are sound and suitably prepared. The cables can also be installed onto specifically designed membranes (Prodesso, Prova FlexHeat+ and the Schluter Ditra-Heat membranes.) Any existing floor coverings such as carpet or vinyl must be removed if laying the cable directly on the subfloor.

Important Notes:

Install ThermoTile before applying the final thin-set layer or self-leveling mortar.

For best results, we recommend:

1. Use latex, acrylic or polymer modified Portland cement (thin-set) mortar for laying tiles.

2. Use a latex, acrylic or epoxy grout for grouting between the tiles. Epoxy grouts provide high strength, good thermal shock resistance and fast cure.

ThermoTile Preparation

1. Remove the ThermoTile heating cables from the box. Attach both lead wires (120V: black & white; 240V black & red) to a digital ohmmeter to measure the resistance. Compare the resistance measured to the resistance recorded by the factory on the label **attached** to the cable. **Also measure the resistance between each heating cable and the ground wire.** If the resistance is not within acceptable tolerance as specified on the label, **or if there is a resistance value between either heating cable and ground**, call our customer service number for assistance. Damage may have occurred during shipping. Do not proceed with the installation. Keep a record of resistance measures as they will be needed for warranty purposes (see Sec. 5) and “Measuring Resistance” section.
2. Leave the factory labels attached to the lead wires for later inspection. Save warning label #1, it must be placed near or on the face of the control (see Section 4, Step #4.)

If Installing with a Membrane see “Layout using Membrane for Heat Cable”

If using FixFast™ straps see “Layout Using FixFast™”

Layout using Membrane for Heat Cable (See Figs. 1 2A-G)

3. Attach the membrane to the subfloor using a thin-set mortar. The membrane will need to cover the entire floor space. Use a trowel to press the membrane into the mortar, use a roller if available. Ensure the membrane is fully adhered to the subfloor.
4. Install ThermoTile heating cables using the recommended stud spacing. Refer to diagrams 2C-2H for recommended spacing based on application. Leave at least 3" of space between the ThermoTile cables and the wall, metal objects such as tub and floor drains, 4-6" from the toilet ring. It is OK to place ThermoTile up to the edge of counter and cabinet kick plates. Heat will radiate 1.5" from the edge of the cable. Do not staple over ThermoTile heating cables.
5. Lay out cable with lead wires running to the nearest wall where the electrical box is located. Electrical connections to the thermostat will be made later.
6. Allow at least 2-3" of floor space between the wall and ThermoTile to run the lead wire. At least 3" of the lead wire must be buried under thin-set mortar. Do not stress or bend the lead wire splice connection. Use duct tape or hot glue to hold lead wires in place – DO NOT STAPLE over any wires. Chisel a groove in the floor if necessary to lower the lead wire or sensor probe.
7. ThermoTile cables should be completely flat on the floor, do not overlap the cable. There should always be a space between heating cables of 3 inches.
8. The thermostat sensor wire should be routed from the thermostat electric box to the floor and extended at least 6-12 inches into the heated area evenly spaced between ThermoTile heating cable. Tape or hot glue the sensor wire in place to prevent it from moving during tiling. See Fig. 2B.
9. Before installing your floor (Section 3), use the ohmmeter to record the resistance measurement of the ThermoTile heating cable (see p. 22 "Measuring Resistance"). If the resistance is more than $\pm 10\%$ of the factory recorded resistance or if there is any resistance between the heating cables and ground, call our customer service number for assistance. Damage may have occurred during installation. Do not proceed with the installation. Keep a record of resistance measures (Section 5) for warranty.
 - Be careful to always protect the ThermoTile heating cables and sensor during the installation process.

- Make sure there are no nails or screws penetrating the floor that could damage the ThermoTile heating cables.
- **Check the resistance of the sensor wire to be sure it is near 14.8 kOhms at 68°F or 12.0 kOhms at 77°F.**

10. **DO NOT ATTEMPT TO CONNECT THE CABLES IN SERIES (ONE TO ANOTHER).**

The cables must be connected in parallel at the junction box or the thermostat box – see Sec 4. Final Wiring and Connections.

Layout Using FixFast™ (See Figs. 1 3A, 3B, 3C, 3D)

3. Attach FixFast™ to the subfloor at the ends of the cable runs and every 4' in between to securely and tautly hold the heat cable flat on the floor and to keep cable rows straight and parallel. After cutting cable hold down strap to length, file to remove sharp edge. Use short screws, double sided tape or hot glue to affix the cable hold down strap to the subfloor. Carefully press metal tabs with fingers so as not to cut into heat cable.
4. Install ThermoTile heating cables using the cable hold down strap at 3" spacing. Leave at least 3" of space between the ThermoTile cables and the wall, metal objects such as tub and floor drains, 4-6" from the toilet ring. It is OK to place ThermoTile up to the edge of counter and cabinet kick plates. Heat will radiate 1.5" from the edge of the cable. Do not staple over ThermoTile heating cables.
5. Lay out cable with lead wires running to the nearest wall where the electrical box is located. Electrical connections to the thermostat will be made later.
6. Allow at least 2-3" of floor space between the wall and ThermoTile to run the lead wire. At least 3" of the lead wire must be buried under thin-set mortar. Do not stress or bend the lead wire splice connection. Use duct tape or hot glue to hold lead wires in place – DO NOT STAPLE over any wires. Chisel a groove in the floor if necessary to lower the lead wire or sensor probe.
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 - Be careful to always protect the ThermoTile heating cables and sensor during the installation process.

- Make sure there are no nails or screws penetrating the floor that could damage the ThermoTile heating cables.
- **Check the resistance of the sensor wire to be sure it is near 14.8 kOhms at 68°F or 12.0 kOhms at 77°F.**

10. **DO NOT ATTEMPT TO CONNECT THE CABLES IN SERIES (ONE TO ANOTHER).**

The cables must be connected in parallel at the junction box or the thermostat box – see Sec 4. Final Wiring and Connections.

Sec.3. Final Floor Installation

Before installing the floor, it is recommended to photograph the heating cable layout for subsequent understanding of heating cable placement.

Mortar and Self-Leveling Applications

Choose the best installation method for your application. Consult with building professionals for specific details regarding proper installation. Always install floor coverings according to manufacturers' recommendations. Install ceramic tile, porcelain, marble and stone according to Tile Council of America and ANSI specifications. If installing non-masonry coverings, follow flooring manufacturer and industry recommendations. If using non-masonry floor coverings, cover ThermoTile cable in a self-leveling mortar as explained below. All applications require a minimum ½" mortar total. Mortar beds thicker than 1/2" work fine with but take longer to heat up initially.

Thin-set and Thick-set Mortar Applications

Example 1 or 2 (page 12).

After installing ThermoTile on backer board, plywood or slab, cover ThermoTile with a thin-set mortar bond coat and lay the tile. All applications require a minimum 3/8" mortar total.

Example 3 (page 12)

Use a thicker self-leveling mortar bed to strengthen the floor, let dry, then lay down ThermoTile and apply a thin-set mortar bond coat and lay the tile. All applications require a minimum 3/8" mortar total.

Self-leveling Mortar Applications – for Non-Masonry Floor Coverings

Example 4 or 5 (page 12)

Self-leveling mortar is **the most appropriate application for installing engineered wood, vinyl, laminate, or carpet floor coverings**. Attach ThermoTile to the subfloor, then pour self-leveling mortar according to the manufacturers' specifications. Install floor covering after the mortar has cured.

Special Precautions:

Insulation: Do not install rigid insulation directly above backer board or mortar.

Mosaic Tile: Embed ThermoTile in a skim coat or thin mortar bed (1/4"-3/8"), then thin-set the mosaic tile according to typical practice.

Expansion Joints: Do not install heating cables through an expansion joint. Install cables right up to but not through the expansion.

Sub-floor Insulation: If possible, install insulation as shown in the diagrams on page 12. Insulation enhances performance and efficiency.

Trowel Size:

Select a proper size trowel for the installation of tile or stone. We recommended using a square or "U" notch trowel with notch size appropriate for the size and type of tile installed (minimum 1/4"x3/8"x1/4"). A plastic trowel is ideal for minimizing the risk of abrasion of the heating cables.



Mortar & Grout

Latex or acrylic modified Portland cement mortar (thin-set) and acrylic grout is recommended to minimize grout cracking.

WARNING: Do not bang trowel on the ThermoTile heating cable. This could cut the heating cable. When cleaning excess thin-set mortar from between tiles before grouting, do not use sharp objects or go deep enough to cut the heating cable. Contact customer service for tile removal suggestions.

SUGGESTION: To avoid installation damage to heating cable, float a thin 3/16"-1/4" layer of thin set or apply 3/16" self-leveling cement and let dry. Test working cables by energizing for one minute. In a second step, lay tile with notched trowel as normal. If troweling directly over ThermoTile, we recommend using one of our plastic notched trowels that prevents nicking the heating cable.

Install Floor Covering

SUGGESTION: Throughout the floor installation, connect cables to InstAlarm™ installation monitor, an Ohmmeter or continuity meter with an alarm that will sound if continuity is broken (if the cable is cut or damaged causing a short). This will alert you to the need for repair or replacement before finishing the floor covering installation. It is also a good idea to power up and test the system for one minute prior to installing the final floor to verify the cable heats up and the GFCI does not trip. See section 4 for wiring connections.



DISCONNECT POWER BEFORE INSTALLING FINAL FLOOR COVERING.

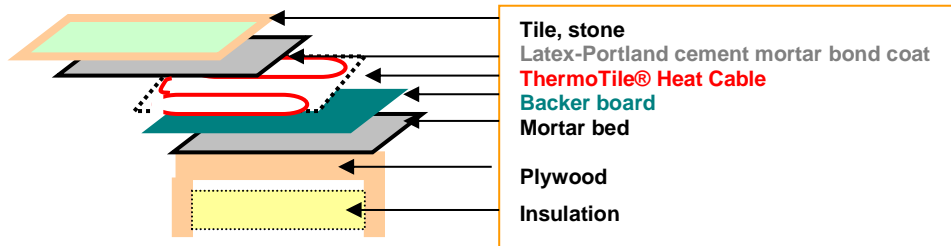
Follow industry or manufacturers' recommendations.

For tile or stone, we recommend following the **Tile Council of America** guidelines and **ANSI** specifications as minimum standards for installation. Floor covering R value should not exceed R= 1. All floor coverings must be in direct contact with the cement-based material that covers ThermoTile. Do not elevate the floor above the mortar. Air gaps can adversely affect heat cable performance.

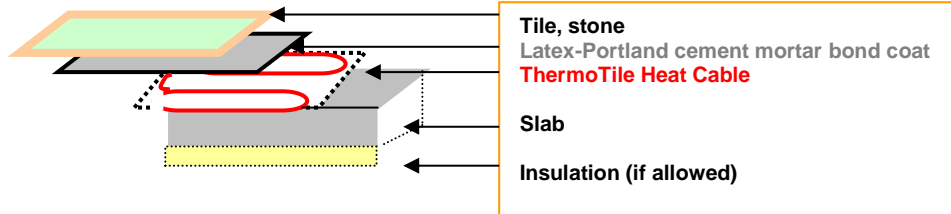
Final Resistance Measure

After installing your floor, use the ohmmeter to record the final resistance measurement of the ThermoTile heating cable (see "Measuring Resistance"). If the resistance does not measure in the tolerance marked on the factory reading label or if there is any resistance between the heating cables and ground, call our customer service number for assistance. Damage may have occurred during floor installation. Keep a record of all three resistance measures as they will be needed for warranty purposes (see Section 5).

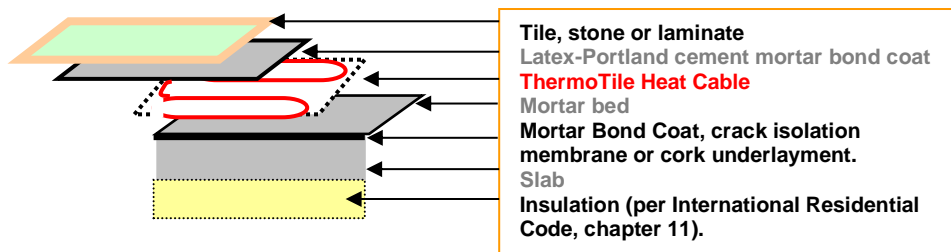
Example 1 Thin-set Mortar* over Framed Floor (dry –set or latex cement mortar TCA#F144-2k)



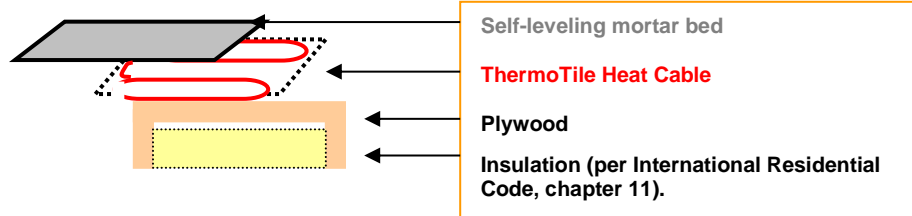
Example 2 Thin-Set Mortar* over Slab (dry –set or latex cement on slab TCA#F113-2k)



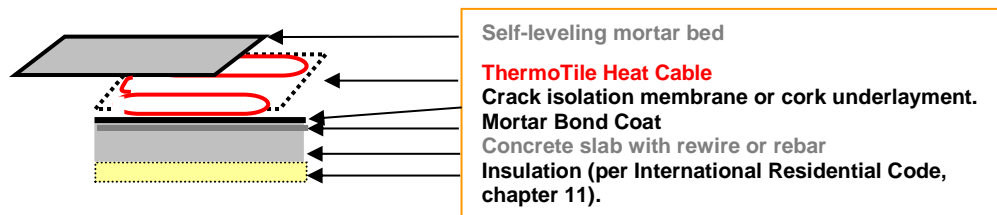
Example 3 Thick-set Mortar* Bed over Slab (Cement Mortar Bonded TCA#F112-2k)



Example 4 Self-Leveling Mortar* over Frame Floor (carpet, vinyl, laminate)



Example 5 Self-Leveling Mortar* over Slab on Grade (carpet, vinyl, laminate)



*All applications require a minimum 3/8" mortar total.

Sec. 4. Final Wiring and Connections

CAUTION: ELECTRICAL CIRCUIT POWER MUST BE TURNED OFF

1. Install the thermostat in the electrical box according to the installation instructions provided with the thermostat. Connect the power cable leads, floor sensor, and power supply wiring as shown in the instructions that came with and are diagramed on the back of the thermostat. Reference Figure 3 for general wiring diagrams.
2. Route ThermoTile lead wires to a junction box or to the thermostat or control switch electric box. Connect the heating cables together and to the thermostat by **wiring the heating cable lead wires in parallel (not series) as follows**: white-to-white (neutral), black-to-black (line) and ground-to-ground (bare metal wires); NOTE: 240V wires are black and red. Connect ground wires to the power source ground or if using the MTC style thermostat to the terminal marked PE. The total Amp load of ThermoTile cables must not exceed the thermostat's 15 Amp limit or the Amperage rating of the circuit or other control switch without using an appropriately rated power module (sold separately) see Fig. 3.1 (120V circuit) or Fig. 3.2 (240V circuit).
3. Use the appropriate size cover ring to mount the thermostat to the electrical box.
4. Indicate which branch circuits supply the ThermoTile heating cable and retain the UL labels for each ThermoTile cable in a convenient location, i.e., taped to the circuit breaker box, for reference by the electrical inspector or homeowner. Leave one UL label attached to the ThermoTile cable. Attach the warning label in a convenient location to show the room location where ThermoTile is installed.
5. After all controls are installed, power up the system briefly to test operation of all components.
6. Refer to instructions provided with the thermostat for proper setting. Keep instructions in a safe place for future reference.

Sec. 5. Resistance Measures

For each ThermoTile cable, use this convenient worksheet to record resistance measures. Retain this record for warranty purposes. (See page 22 "Measuring Resistance").

Factory <u>Information</u> (From UL label)	Resistance <u>Measure 1</u> (Out of the box)	Resistance <u>Measure #2</u> (After laying ThermoTile)	Resistance <u>Measure #3</u> (After laying floor covering)
Serial number _____ Cable Size _____ Volts _____ Factory Resistance _____ Ohms	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.
Serial number _____ Cable Size _____ Volts _____ Factory Resistance _____ Ohms	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.
Serial number _____ Cable Size _____ Volts _____ Factory Resistance _____ Ohms	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.
Serial number _____ Cable Size _____ Volts _____ Factory Resistance _____ Ohms	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.
Serial number _____ Cable Size _____ Volts _____ Factory Resistance _____ Ohms	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.	_____ (Ohms) <input type="checkbox"/> \checkmark No resistance between heating wires/ground.

Figure 1

ThermoTile® Cable Installation Guidelines

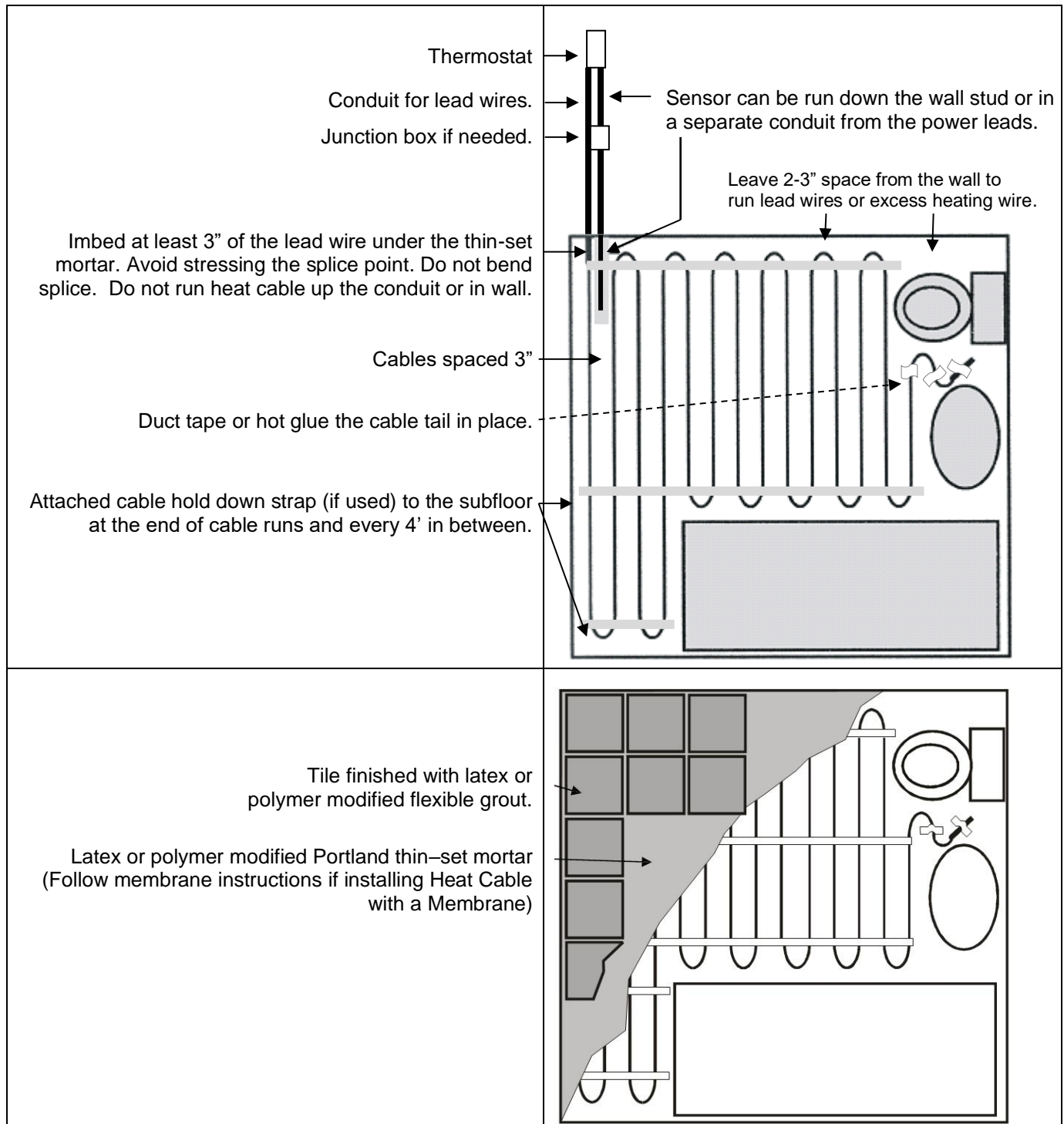
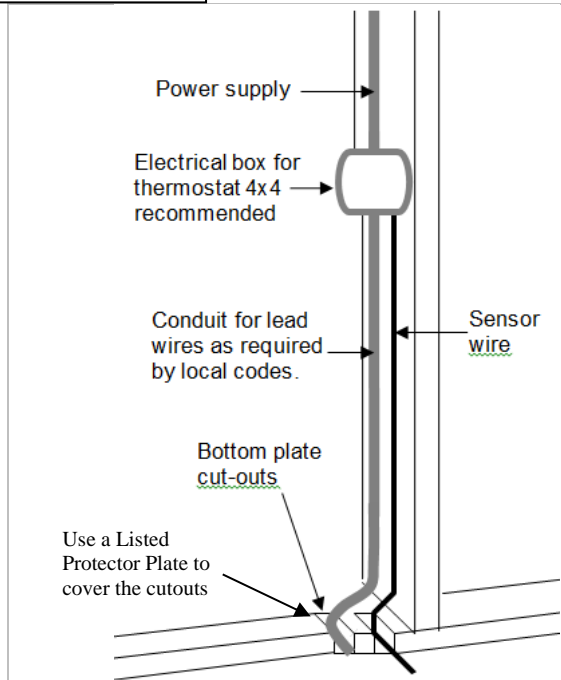
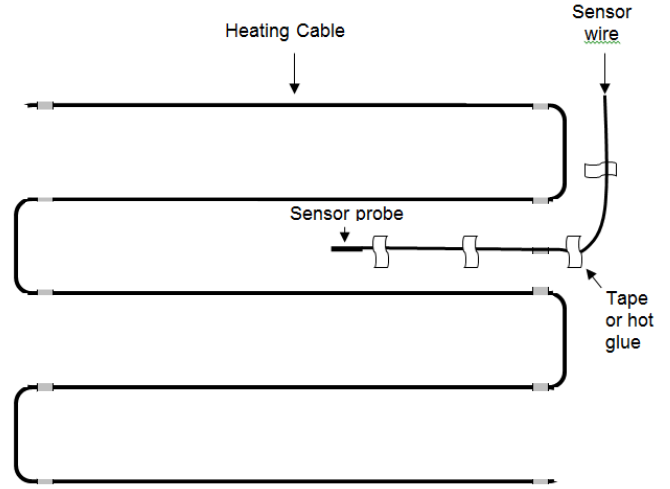


Figure 2

ThermoTile® Cable Installation Guidelines

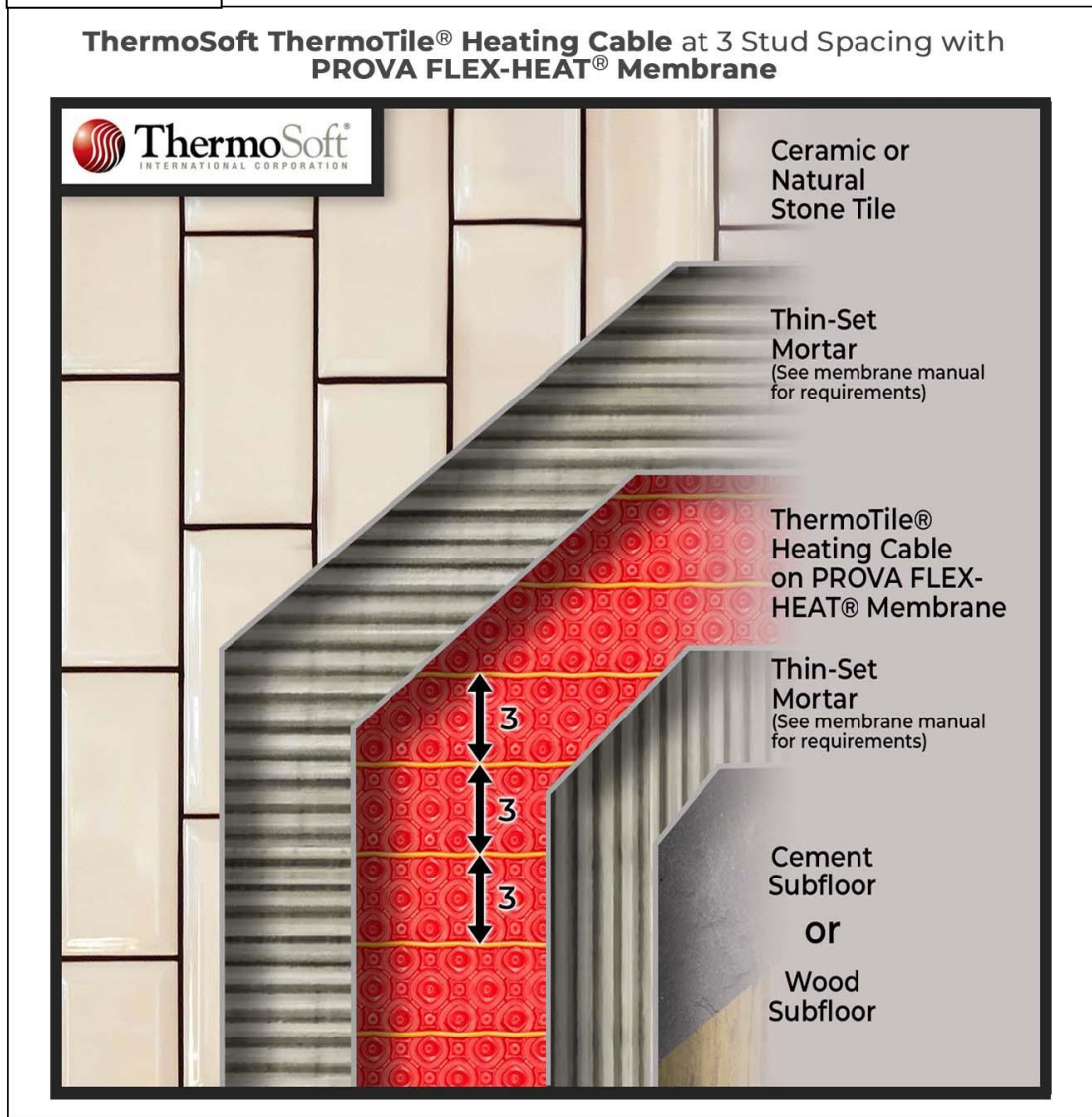
**Fig. 2A - Electrical Rough-in**

Locate thermostat sensor probe equally spaced between two heating cables and hot glue or duct tape to hold in place while tiling.

Fig. 2B - Sensor Location

ThermoTile® Cable Installation Guidelines

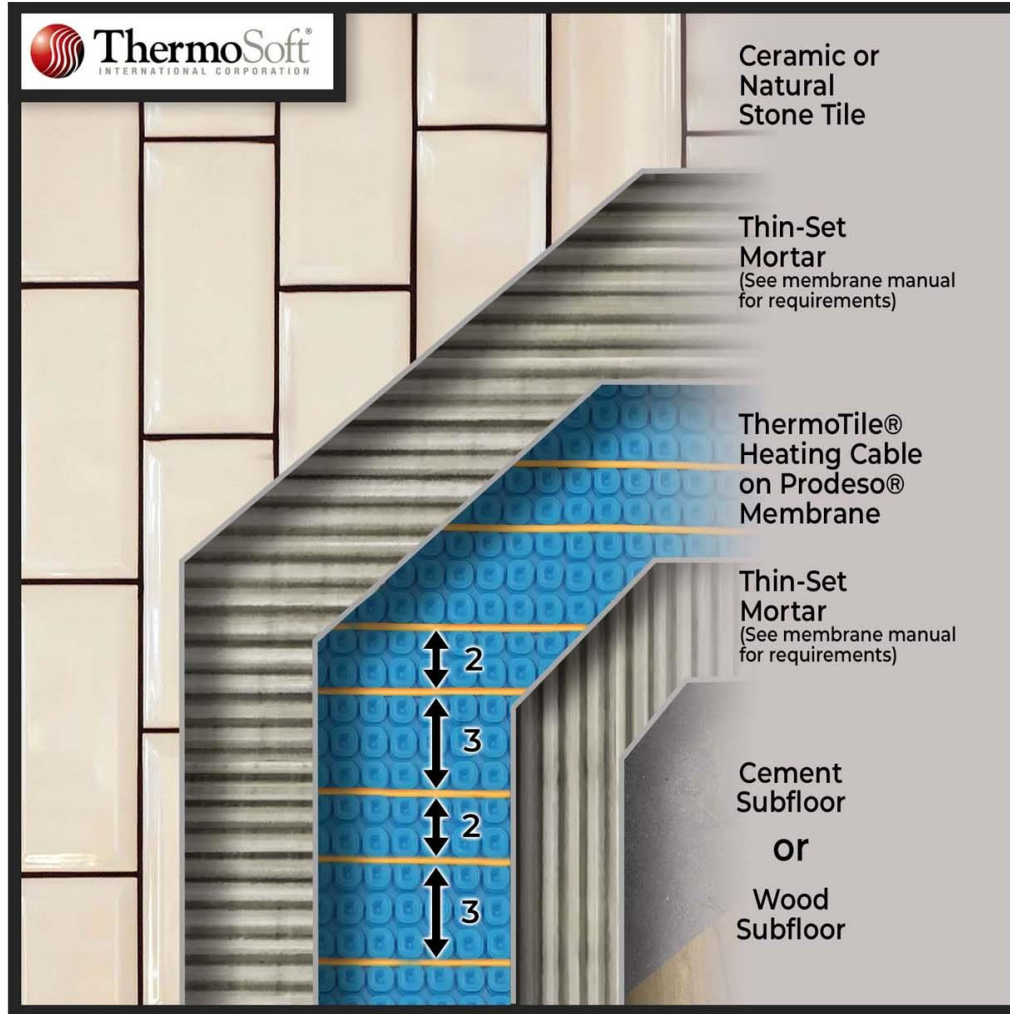
Figure 2C



ThermoTile® Cable Installation Guidelines

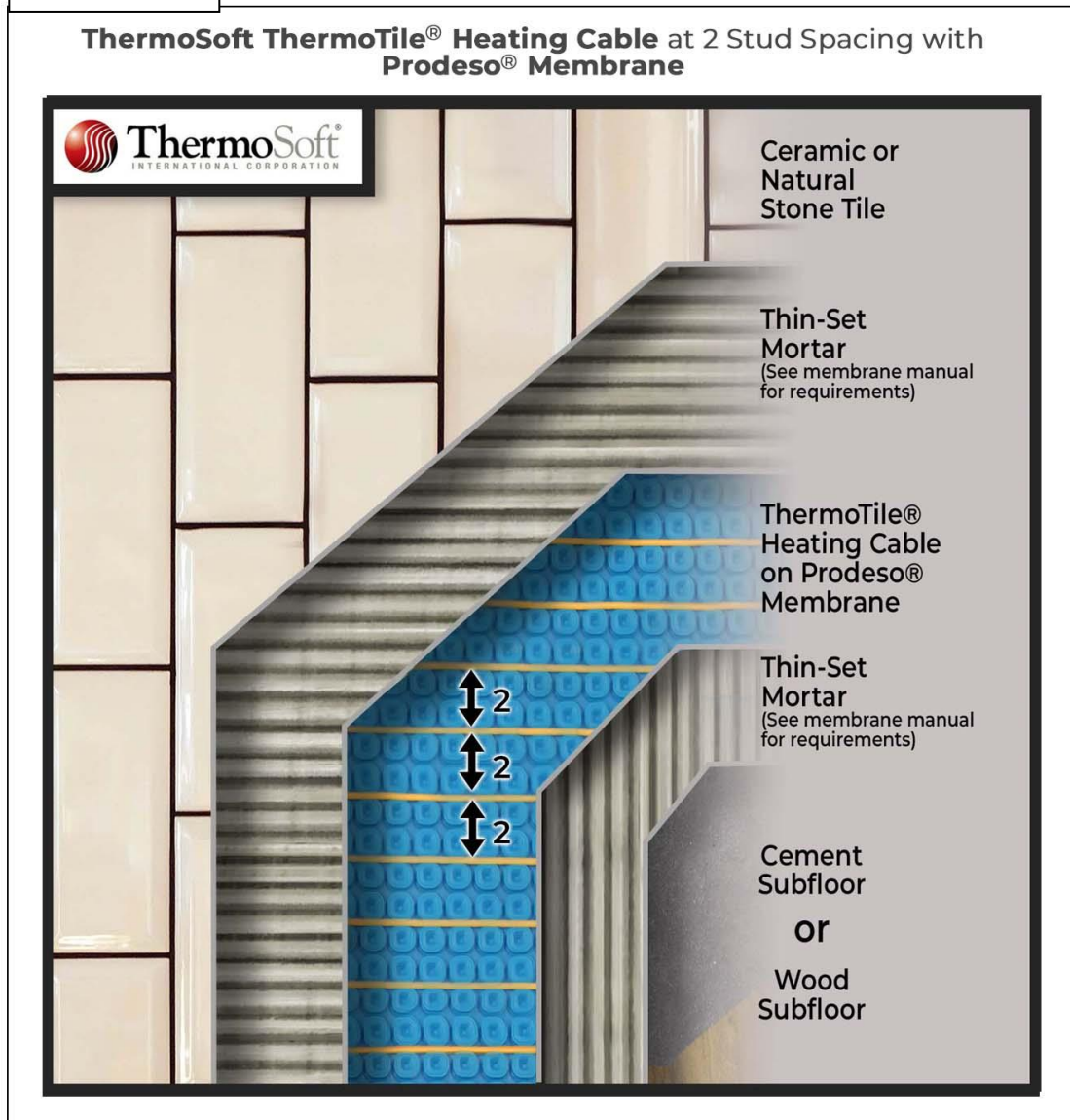
Figure 2D

ThermoSoft ThermoTile® Heating Cable at alternating 2/3 Stud Spacing with Prodeso® Membrane



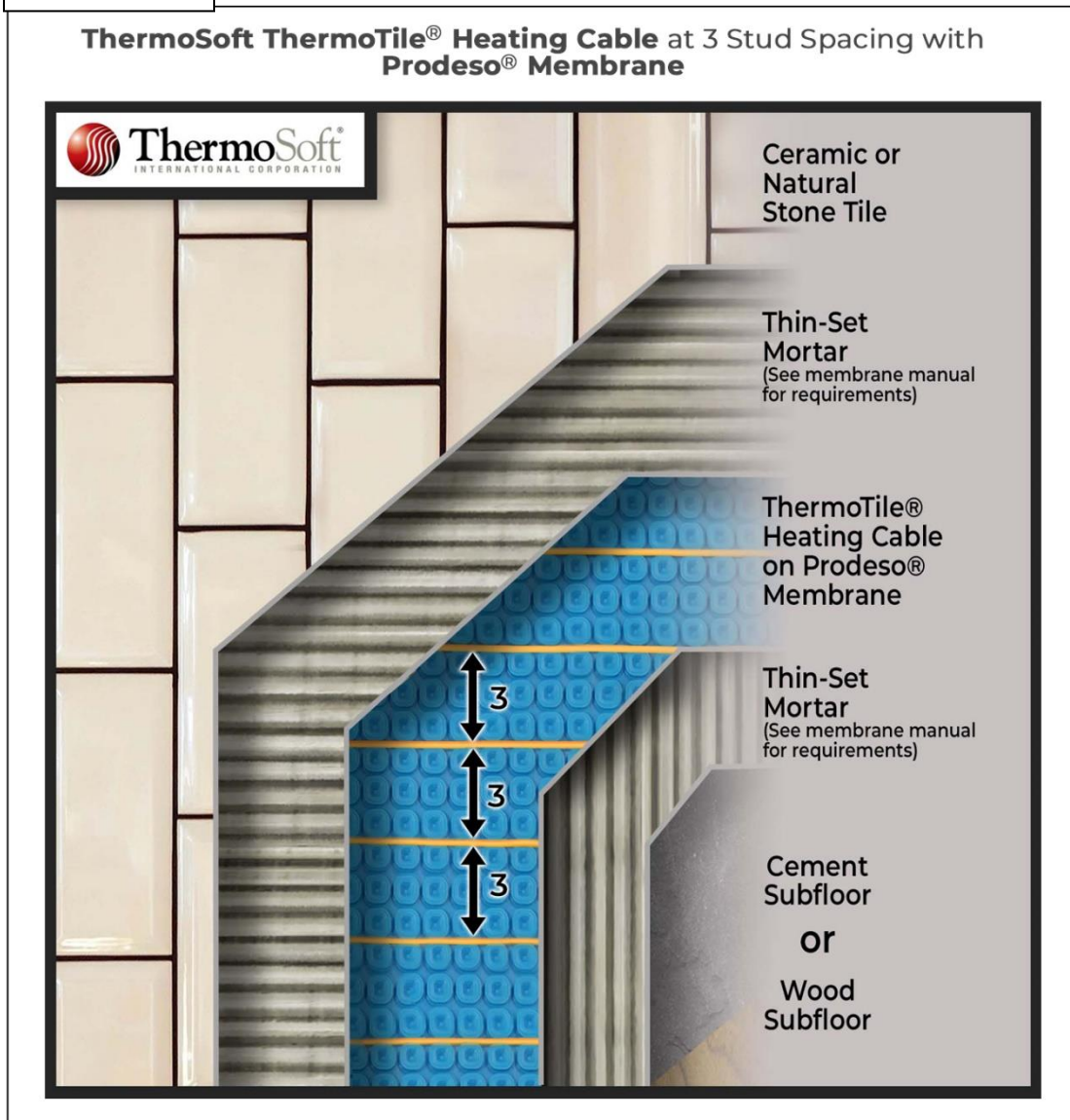
ThermoTile® Cable Installation Guidelines

Figure 2E



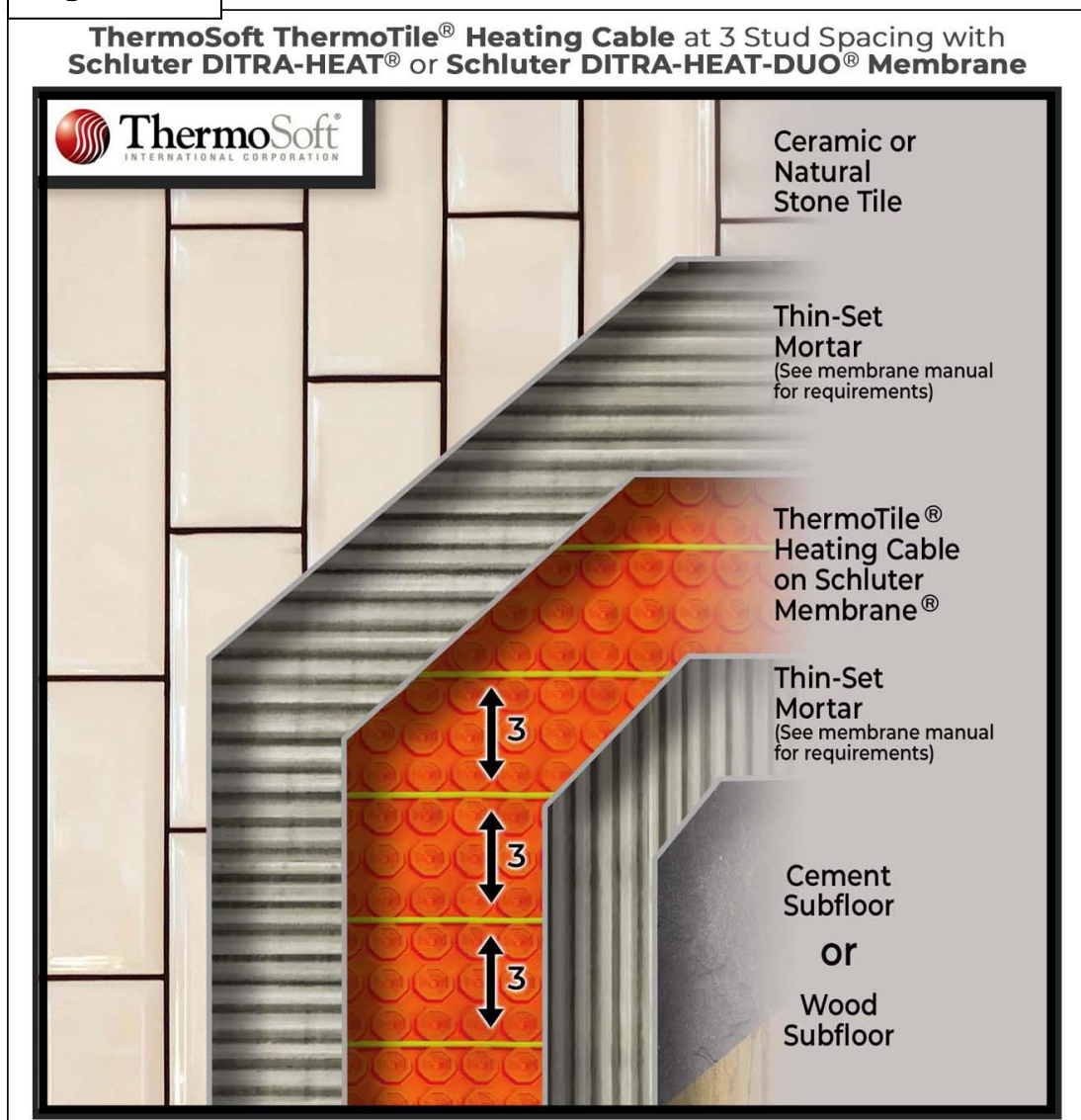
ThermoTile® Cable Installation Guidelines

Figure 2F



ThermoTile® Cable Installation Guidelines

Figure 2G



ThermoTile® Cable Installation Guidelines

Figure 2H

ThermoSoft ThermoTile® Heating Cable at alternating 2/3 Stud Spacing with Schluter DITRA-HEAT® or Schluter DITRA-HEAT-DUO® Membrane

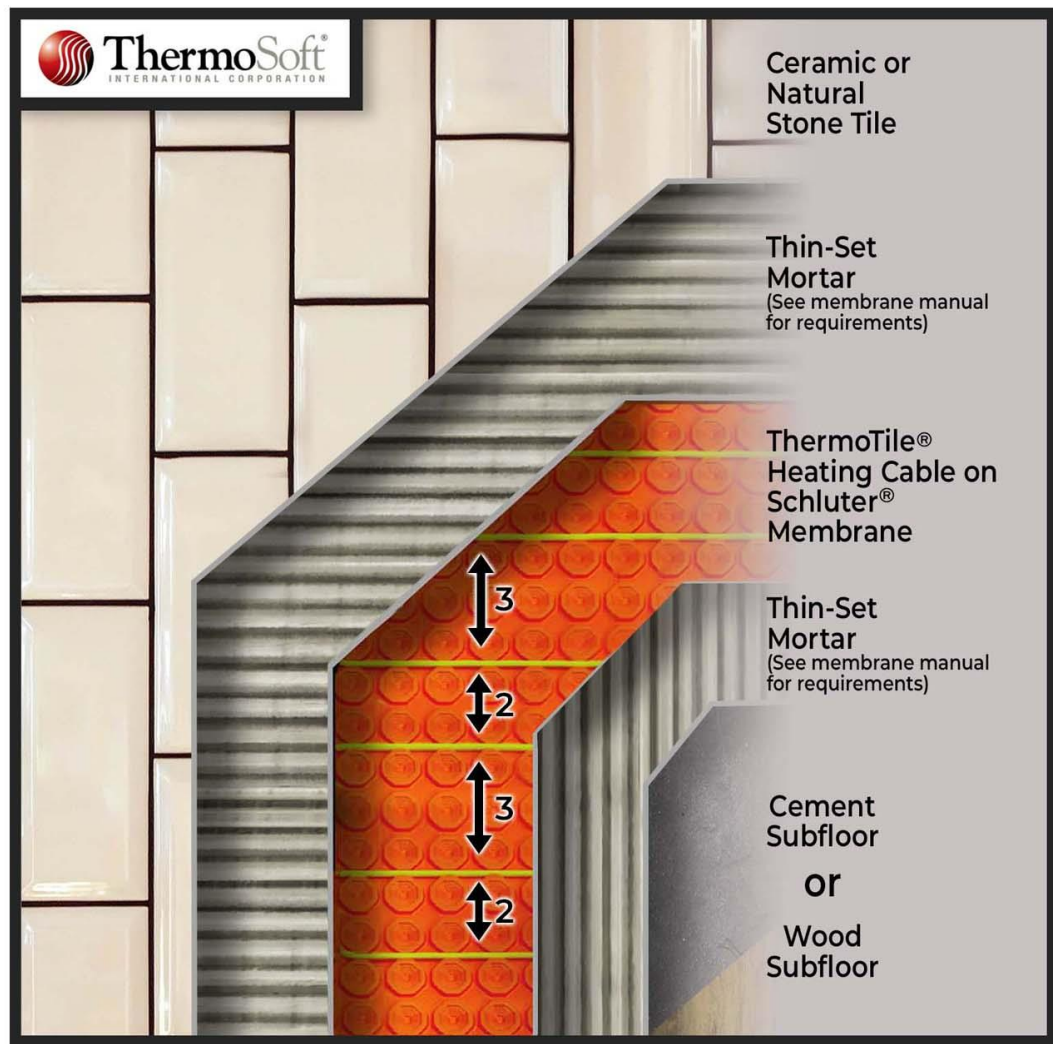
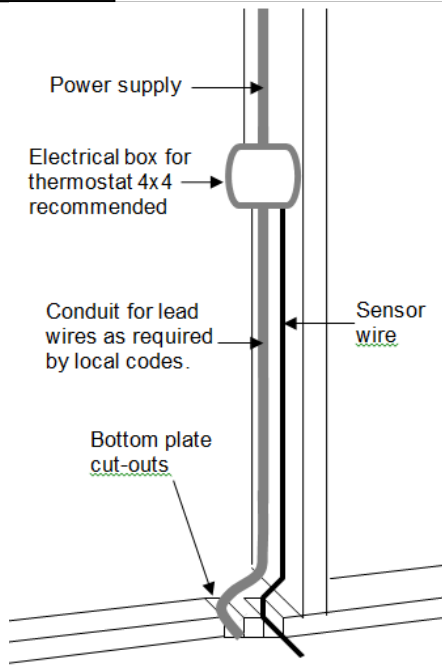
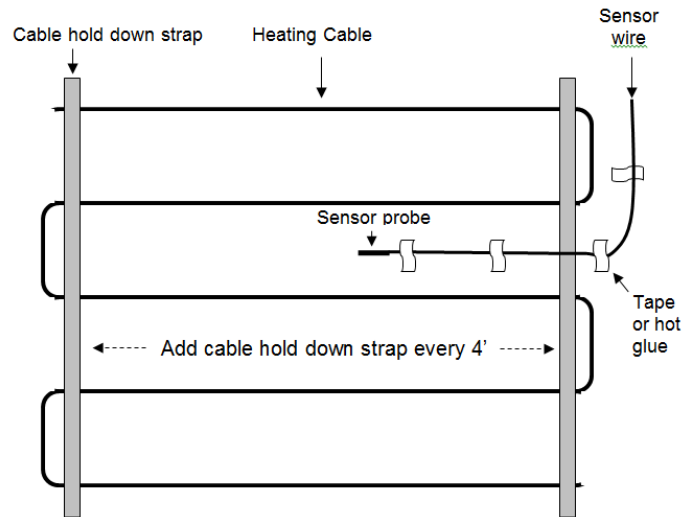


Figure 3**ThermoTile® Cable Installation Guidelines****Fig. 3A - Electrical Rough-in**

Locate thermostat sensor probe equally spaced between two heating cables and hot glue or duct tape to hold in place while tiling.

Fig. 3B - Sensor Location**Fig. 3C – FixFast™ cable hold down strap.**

1. Secure FixFast to the subfloor using nails, screws or hot glue.
2. Lift FixFast™ loop, place heat cable.
3. Fold FixFast tab over heat cable.
4. Fold FixFast loop over heat cable.
5. Repeat above placing heat cable every 3".
6. Carefully press tabs with fingers so as not to cut into heat cable.

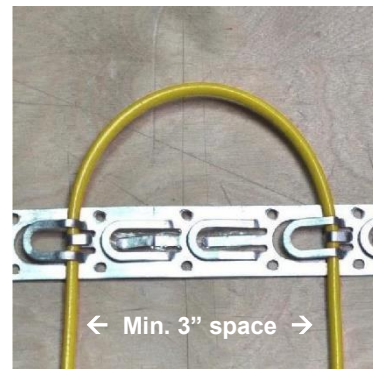


Figure 3.1

ThermoTile® Cable Installation Guidelines Thermostat Wiring Diagrams

Refer to Instructions that came with your specific thermostat

Typical Electrical Wiring Diagram w/thermostat control (120V)

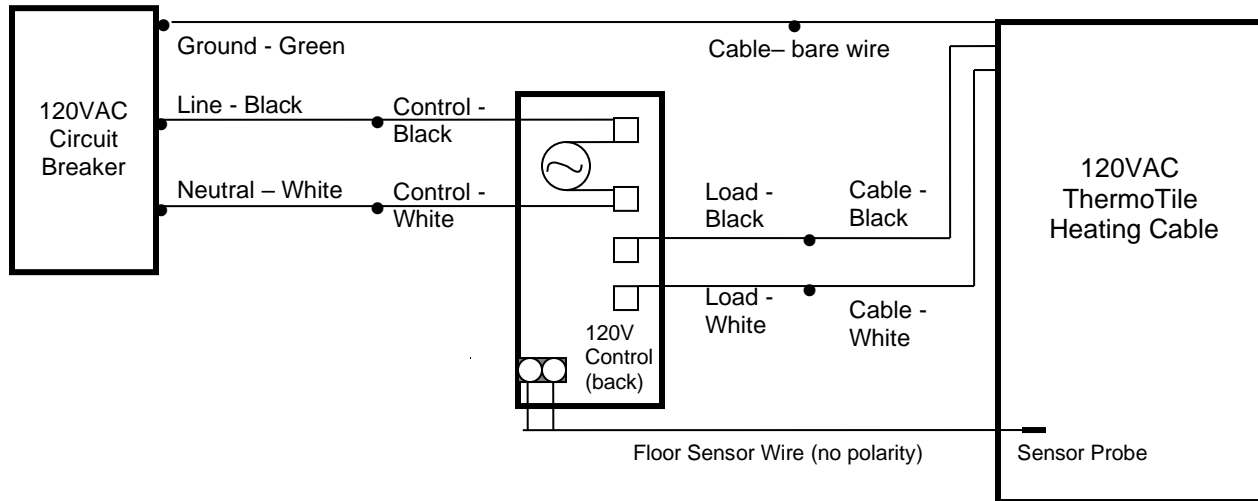
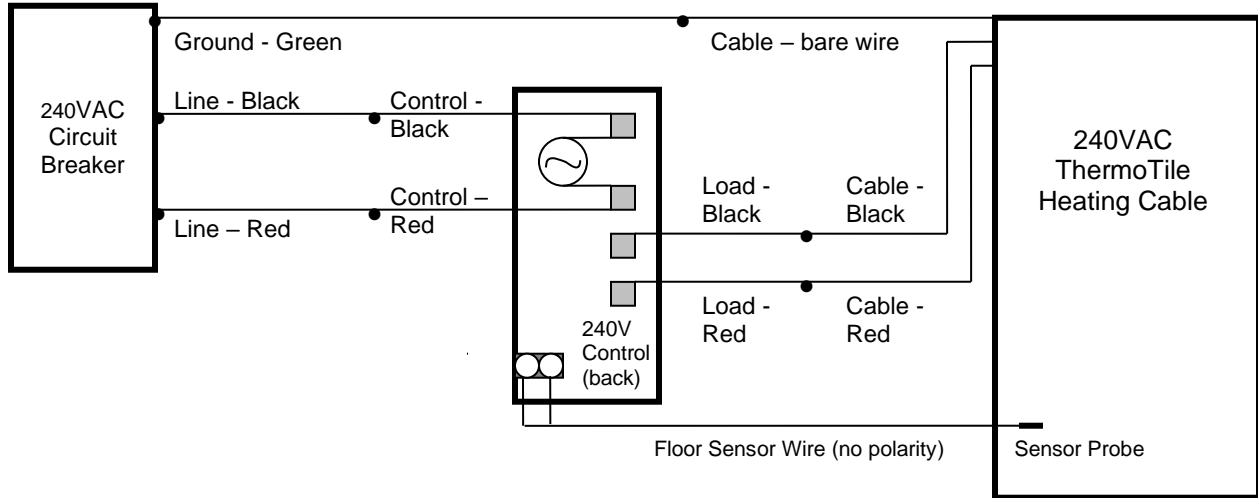


Figure 3.2

ThermoTile® Cable Installation Guidelines Control Wiring Diagrams

Refer to Instructions that came with your specific thermostat

Typical Electrical Wiring Diagram w/thermostat control (240V)



All electrical work must be done by a qualified, licensed electrician in accordance with local building and electrical codes, and the National Electrical Code (NEC), especially Article 424, Part IX of the NEC, ANSI/NFPA 70 and Section 62 of CEC Part I.

Measuring Resistance

Insert probes into multimeter marked $V\Omega mA$ and COM. Color of probe does not matter.

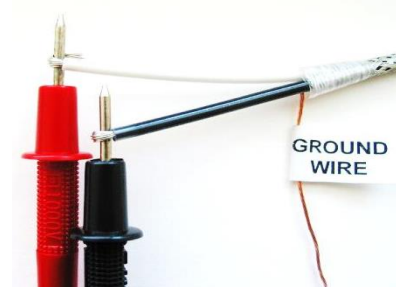
Set multimeter to section marked with the Ohm symbol: Ω and 200 Ohms or if the heating cable has resistance over 200 Ohms, then set the multi-meter to 2000 (see circle).

Note: when measuring the resistance of the thermostat floor sensor, set the meter to 20K.

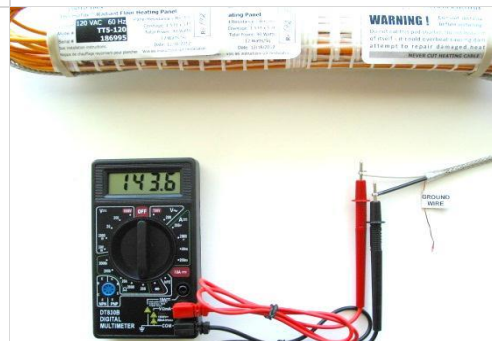


Wrap black and white lead wires from 120V cables (or black and red lead wires from 240V cables) around the multimeter probes (color of probe does not matter).

Avoid touching the probes during measurement as it could affect the accuracy of the resistance value.



Record the resistance value displayed by the multimeter, in this example 143.6.

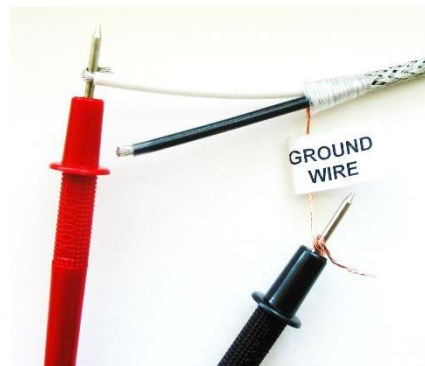


Compare the resistance measurement with the value recorded on the factory label, in this case 142.8. If the difference is within $\pm 5\%$, the resistance of the cable is OK.



Measure the resistance between each lead wire and the ground wire. There should be an open circuit or infinite resistance between the lead wires and the ground wire.

Infinite resistance is displayed by the multimeter as 1 on the left side of the display or as .OL on other multimeters.



ThermoTile® LIFETIME LIMITED WARRANTY

RADIANT FLOOR HEATING CABLE

Thermosoft International Corporation ("Manufacturer") warrants that its ThermoTile radiant floor heating cable ("Product") is free from defects in manufacturing, materials and workmanship in manufacture and will perform under normal use for as long as the homeowner owns the home where ThermoTile was installed ("Limited Warranty Period"). Manufacturer is not responsible for damage to cables caused on the job. This warranty shall not be valid under the following conditions: 1) The preparation, conditions and installation of the Product is not in accordance with industry standards, Manufacturer's installation guidelines, floor covering manufacturers' installation guidelines, the Tile Council of America for ceramic, porcelain and natural stone applications, The National Electric Code (NEC), the Canadian Electric Code (CEC) and all applicable local electrical and building codes 2) the lateral sub-floor crack exceeds one-quarter inch (1/4 inch); 3) the installation is not conducted as per Manufacturer's written instructions; 4) the sub-floor is not within tolerances of vapor emissions per industry standards; 5) defective materials such as mortar, tile, grout, or adhesive are used in the installation; 6) vertical cracking, settling or displacement occurs; 7) there exists a failure of floor patching or leveling materials, or use of non-approved patching or leveling materials; or 8) improper installation materials or methods are used, 9) local overheating is caused by use not in accordance with Manufacturer's instructions, 10) the Product is not connected to the power source by a licensed electrician, 11) the owner fails to retain and supply resistance measurements recorded during installation as specified by the Manufacturer's instructions 12) the Product's heating cables are cut, punctured or tampered with. This limited warranty is extended to the original owner of the property where the Product is installed (the "Owner") and does not cover damage to the floor or floor covering. This Limited Lifetime Warranty is further subject to the exclusions and limitations provided below and on the reverse side.

TO OBTAIN WARRANTY SERVICE, FOLLOW THE INSTRUCTIONS IN STEP 4 BELOW. UPON RECEIPT OF THE DEFECTIVE PRODUCT, PAPERWORK, RECEIPT AND RESISTANCE MEASURES, MANUFACTURER WILL EXAMINE AND TEST THE PRODUCT. IF IT IS DETERMINED THAT THE PRODUCT WAS PROPERLY INSTALLED AND FAILED DURING NORMAL USE AS A RESULT OF A MANUFACTURING, DEFECT, , THE MANUFACTURER WILL REMEDY THE DEFECT OR FAILURE WITHOUT CHARGE TO THE OWNER PROVIDED MANUFACTURER RECEIVES NOTICE OF THE WARRANTY CLAIM IN THE MANNER PROVIDED BELOW WITHIN THE LIMITED WARRANTY PERIOD. THE REMEDY FOR ANY SUCH DEFECT IS LIMITED, AT MANUFACTURER'S OPTION, TO THE REPAIR, REPLACEMENT, OR REFUND OF THE PURCHASE PRICE OF THE PRODUCT. THE WARRANTY PERIOD FOR THE REPLACEMENT PRODUCT WILL EXPIRE WHEN THE OWNER SELLS THE HOME.

THIS LIMITED WARRANTY DOES NOT APPLY TO THE THERMOSTATIC CONTROL UNIT WHICH IS A SEPARATELY PURCHASED COMPONENT THAT CARRIES ITS OWN WARRANTY. CONTROLS SOLD UNDER THE THERMOSOFT NAME ARE WARRANTED FOR ONE YEAR.

MANUFACTURER WARRANTS THAT THE PRODUCT PRODUCES THE RATED WATT OUTPUT LISTED ON THE PRODUCT LABEL WHEN OPERATED AT THE RATED VOLTAGE. MANUFACTURER MAKES NO REPRESENTATION CONCERNING THE TEMPERATURE LEVEL THAT WILL BE PRODUCED BY THE PRODUCT.

MANUFACTURER ASSUMES NO LIABILITY FOR THE COST OF FLOOR COVERING MATERIALS OR THE COST TO REMOVE OR REPLACE THEM.

IMPORTANT: FOR THIS WARRANTY TO BE VALID, THIS PRODUCT MUST BE CONNECTED TO THE ELECTRICAL SOURCE AND PROPERLY GROUNDED ACCORDING TO THE INSTRUCTIONS BY A LICENSED ELECTRICIAN.

THIS LIMITED WARRANTY IS FURTHER SUBJECT TO THE CONDITIONS, LIMITATIONS, AND EXCLUSIONS PROVIDED ON THE REVERSE SIDE.

CONDITIONS/EXCLUSIONS TO THE LIMITED WARRANTY

THIS LIMITED LIFETIME WARRANTY IS FURTHER MADE SUBJECT TO THE FOLLOWING CONDITIONS AND EXCLUSIONS, PLEASE READ THE FOLLOWING CAREFULLY:

1. Required Installation. To be covered by this Limited Lifetime Warranty, the Product must be installed indoors following the Manufacturer's recommended installation instructions for the Product and the flooring manufacturer's recommended installation instructions for the floor covering. This Product may not be used directly over expansion joints.

2. Limitation on Causes of Defects Covered Under Warranty. This limited warranty covers only defects in manufacturing materials or workmanship and does not cover defects, malfunctions or failures resulting from any other cause including, without limitation: (i) improper or inadequate installation; (ii) damage caused by trades people or visitors to the job site or by cutting or puncturing or other post installation damage to the heating cable; (iii) defects caused by fire, flood, tornado, hurricane, earthquake, acts of God, differential settlement, insect infestation, extraordinary environmental conditions, riot or other civil insurrections, or acts of war or conflict; (iii) defects caused by abusive conditions or accidents, such as but not limited to cutting, severe impact or abnormal vibrations; (iv) installation or use of the Product in any manner not recommended by the Manufacturer; and, (v) defects caused by improper or inadequate maintenance, cleaning, use or care of any floor installed over the Product, including without limitation, the use of improper or unrecommended cleaning solutions or cleaning practices.

3. Controlling Document. This warranty is the sole and exclusive description of warranties applicable to the Product. Any written or oral representation, warranties or guarantees concerning the Product which are inconsistent with or beyond the scope of the description contained herein are superseded by this document and deemed inapplicable or void.

4. Required Procedures to Submit a Warranty Claim. In order to obtain performance of any warranty obligation, the Owner must do the following:

Contact the Manufacturer at the number listed below or by mail at the address listed below, and request a claim form. Complete and return the claim form along with the defective Product, Product Label showing serial number, the original dated sales receipt and a copy of the resistance measures recorded during installation to the Manufacturer by certified mail return receipt requested within the Limited Warranty Period. The phone number and address to contact the Manufacturer for these purposes is as follows:

Thermosoft International Corporation

Attention: ThermoTile® Warranty Claim Department
701 Corporate Woods Parkway
Vernon Hills, IL 60061

Phone: (847) 279-3800 Fax: (847) 279-8845

THIS LIMITED WARRANTY IS GIVEN IN LIEU OF IMPLIED WARRANTIES. IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE ARE DISCLAIMED.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE. TO THE EXTENT ALLOWED BY APPLICABLE LAWS, MANUFACTURER HEREBY DISCLAIMS ANY AND ALL SUCH RIGHTS.

UNDER NO CIRCUMSTANCES SHALL MANUFACTURER BE LIABLE TO THE OWNER, OR ANY OTHER PERSON FOR ANY CONSEQUENTIAL, INCIDENTAL, ECONOMIC, DIRECT, INDIRECT, GENERAL, OR SPECIAL DAMAGES ARISING OUT OF ANY BREACH OF WARRANTY, EXPRESS OR IMPLIED, UNDER THIS CONTRACT.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS LIMITED WARRANTY HEREBY SUPERSEDES ALL PRE-EXISTING WARRANTIES, EITHER EXPRESS OR IMPLIED, RELATING TO THE PRODUCT.