

Easy to install
Low operating costs
New or retrofit construction
Installs under most floor coverings
Superior quality
15 year warranty

Floor heating system

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Important Safeguards and Warnings

WARNING: Shock and fire hazard

If the heat system is damaged or not installed properly, fire or shock could occur resulting in serious personal injuries or damage to property. You must carefully follow the warnings and instructions contained in this manual.

- A thermostat **MUST** be used with heat wire.
- It is important that this equipment is installed only by qualified electricians who are familiar with the proper sizing, installation, construction and operation of floor warming system and the hazards involved. The installation must comply with all national and local electrical codes. If you are unfamiliar with these requirements, contact an electrician.
- The heating cable is designed for under floor heating purposes only. Be sure that the floor is not penetrated by nails, screws, or similar devices that can cause damage on first installation or during subsequent floor repairs in the future.
- If the heat system is damaged, it must be replaced. Do not attempt to splice or repair any part of the system.

1 General Information

1.1 Use of the Manual

This manual describes the heat floor heating system — how to layout the room, select the product, and install the system.

1.2 Safety Guidelines

The safety and reliability of any floor heating system depends on proper design, installation, and testing. Incorrect installation or mishandling of the product can cause damage to the heating cable, system components and property, and can create a risk of fire or shock. The guidelines and instructions contained in this guide are important. Follow them carefully to minimize these risks and to ensure that the heat system performs reliably.

Pay special attention to the following:

- Instructions marked  Important
- Safety warnings identified as  **WARNING**

1.3 Remember to measure resistance

The resistance should be measured between the two conductors, white and black. Compare this resistance reading to the resistance specified in the Product Selection “Table 1 or Table 2”. The value should be within $\pm 10\%$.

Also, measure the resistance between the white, black and shielding/ground wire. Both should read infinity.

Please refer to “5 Commissioning” for instructions on how to measure the resistance.



Important: measure the resistance four times during the installation process

Remember to always measure, verify and record the actual resistance throughout the installation process

- Out of the box
- After installation
- After thin set cement or self-leveler application
- After installation of floor tiles

1.4 15-year Limited Warranty

For a period of fifteen (15) years from the date of purchase The Tile Shop warrants that the heat heating cable is free from defects in material, design and workmanship. See warranty details.



2 Heat System

2.1 Heat Specifications

Cable Construction:	Twin conductor
Rated Voltage:	120V,240V
Output:	3.7W/ft $\pm 10\%$
Bending radius:	6D
Cable Diameter:	1/5"
Conductor Insulation:	fluoropolymer
Outer Insulation:	PVC
Max. Ambient Temp.:	85°F (30°C)
Min. Installation Temp.:	40°F (5°C)
Cold lead	2-wire 16 AWG plus ground braid; 10ft (3m) length

2.2 Thermostat Specifications

Functions:	On/Off control, digital display, 7-day programmable
Supply Voltage :	120/240 V \pm 15%, 50/60 Hz
Maximum switching current :	16 Amp
Temperature control range :	40 to 104°F (5 to 40°C)
Ambient range :	32 to 104°F (0 to 40°C)
Floor temperature sensor :	2-wire, 10-foot lead wire



Important

- Read the instructions carefully before installing heat cable.
- Remember to measure the resistance four times.
- Do not install heat cable in walls or ceilings.
- The cable must be embedded in mortar, thinset, concrete or similar material.
- The minimum installation temperature is 40E (5H).
- **The heating cable cannot be cut to length, crossed over itself, or installed too close.**
- It is recommended to use copper wire only.
- Remember to check that the supply voltage matches the voltage of the heat cable.
- Only for indoor installation.
- Metal structures or materials used for the support of or on which the heat cable is installed must be grounded in accordance with CSA Standard C22.1, section 10 and the NEC.

3 Floor Heating Design and Product Selection

3.1 Design the Installation

Step 1: Measure the heated area

Determine the heated area of the floor where there are no permanent fixtures or furniture such as showers, toilets, vanities, or cabinets. Measure the heated area of the floor. See Figure 1.

Step 2: Plan the design

Determine the optimum floor heating cable layout for your heated area to ensure coverage. Select a spot for the thermostat in the wall above the heated area where it can be reached by the 10-foot cold lead on the heat cable, and the 10-foot floor temperature sensor. Please refer to Figure 2.

 **Important**

The predetermined heat cable spacing must be maintained to ensure proper floor heating. Do not change the heat cable spacing when you lay out the cable or the floor may have cold spots.

Figure 1: Directly on concrete

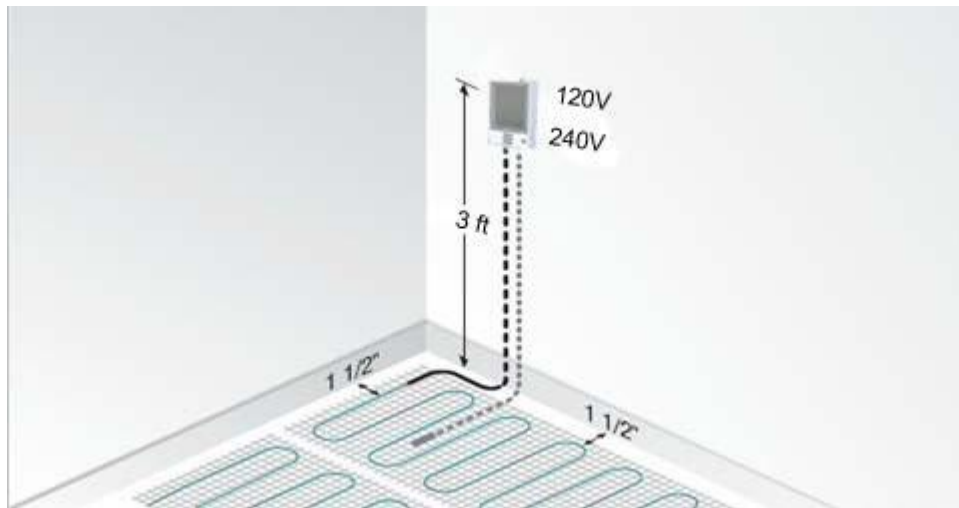
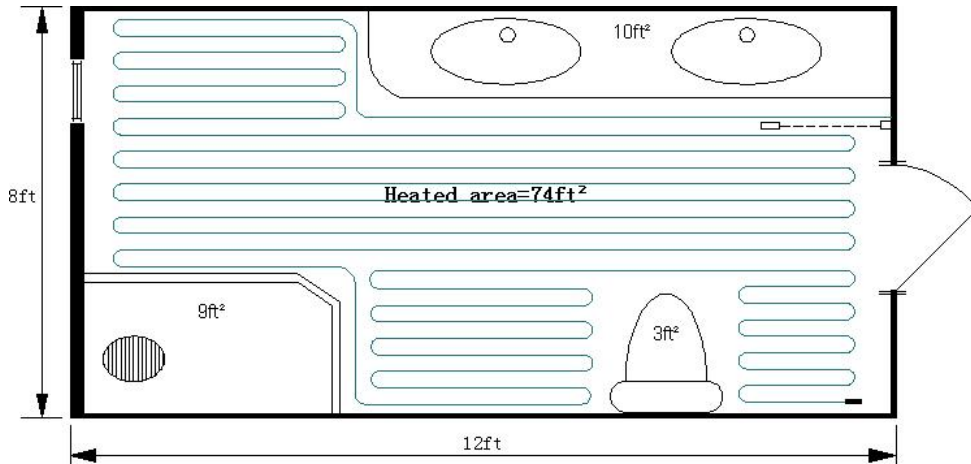


Figure 2: Typical cold lead and floor temperature sensor

3.2 Confirm Your Product Selection

Confirm that your heat cable is no larger than the heated area. Following the example from Figure 1, if the heated area is 74 ft², select the 70 ft² heat cable.

Table 1:120V Product Selection

120V Catalog Number	Length		Approximate heat coverage (sq. ft.)			Watts (3.7W/ft.)	Amps	ohms
	ft.	m	2.4" spacing	Standard 3.6" spacing	4.8" spacing			
3.7 warmcable-0060-1	16.5	5.05	3.3	5.0	6.7	60	0.5	240.0
3.7 warmcable-0120-1	33.0	10.1	6.7	10.0	13.3	120	1.0	120.0
3.7 warmcable-0180-1	49.5	15.1	10.0	15.0	20.0	180	1.5	80.0
3.7 warmcable-0240-1	66.0	20.1	13.3	20.0	26.7	240	2.0	60.0
3.7 warmcable-0300-1	82.5	25.1	16.7	25.0	33.3	300	2.5	48.0
3.7 warmcable-0360-1	99.0	30.2	20.0	30.0	40.0	360	3.0	40.0
3.7 warmcable-0420-1	115.5	35.2	23.3	35.0	46.7	420	3.5	34.3
3.7 warmcable-0480-1	132.0	40.2	26.7	40.0	53.3	480	4.0	30.0
3.7 warmcable-0540-1	148.5	45.3	30.0	45.0	60.0	540	4.5	26.7
3.7 warmcable-0600-1	165.0	50.3	33.3	50.0	66.7	600	5.0	24.0
3.7 warmcable-0720-1	198.0	60.4	40.0	60.0	80.0	720	6.0	20.0
3.7 warmcable-0840-1	231.0	70.4	46.7	70.0	93.3	840	7.0	17.1
3.7 warmcable-0960-1	264.0	80.5	53.3	80.0	106.7	960	8.0	15.0
3.7 warmcable-1080-1	297.0	90.5	60.0	90.0	120.0	1080	9.0	13.3
3.7 warmcable-1200-1	330.0	100.6	66.7	100.0	133.3	1200	10.0	12.0
3.7 warmcable-1320-1	363.0	110.6	73.3	110.0	146.7	1320	11.0	10.9
3.7 warmcable-1440-1	396.0	120.7	80.0	120.0	160.0	1440	12.0	10.0
3.7 warmcable-1560-1	429.0	130.8	86.7	130.0	173.3	1560	13.0	9.2
3.7 warmcable-1680-1	462.0	140.8	93.3	140.0	186.7	1680	14.0	8.6
3.7 warmcable-1800-1	495.0	150.9	100.0	150.0	200.0	1800	15.0	8.0

Table 2:240V Product Selection

240V Catalog Number	Length		Approximate heat coverage (sq.ft.)			Watts (3.7W/ft.)	Amps	ohms
	ft.	m	2.4" spacing	Standard 3.6" spacing	4.8" spacing			
3.7 warmcable-0120-2	33.0	10.1	6.7	10.0	13.3	120	0.5	480.0
3.7 warmcable-0180-2	49.5	15.1	10.0	15.0	20.0	180	0.8	320.0
3.7 warmcable-0240-2	66.0	20.2	13.3	20.0	26.7	240	1.0	240.0
3.7 warmcable-0300-2	82.5	25.1	16.7	25.0	33.3	300	1.3	192.0
3.7 warmcable-0360-2	99.0	30.2	20.0	30.0	40.0	360	1.5	160.0
3.7 warmcable-0420-2	115.5	35.2	23.3	35.0	46.7	420	1.8	137.1
3.7 warmcable-0480-2	132.0	40.2	26.7	40.0	53.3	480	2.0	120.0
3.7 warmcable-0540-2	148.5	45.3	30.0	45.0	60.0	540	2.3	106.7
3.7 warmcable-0600-2	165.0	50.2	33.3	50.0	66.7	600	2.5	96.0
3.7 warmcable-0720-2	198.0	60.4	40.0	60.0	80.0	720	3.0	80.0
3.7 warmcable-0840-2	231.0	70.4	46.7	70.0	93.3	840	3.5	68.6
3.7 warmcable-0960-2	264.0	80.4	53.3	80.0	106.7	960	4.0	60.0
3.7 warmcable-1080-2	297.0	90.6	60.0	90.0	120.0	1080	4.5	53.3
3.7 warmcable-1200-2	330.0	100.6	66.7	100.0	133.3	1200	5.0	48.0
3.7 warmcable-1440-2	396.0	120.8	80.0	120.0	160.0	1440	6.0	40.0
3.7 warmcable-1680-2	462.0	140.8	93.3	140.0	186.7	1680	7.0	34.3
3.7 warmcable-1920-2	528.0	161.0	106.7	160.0	213.3	1920	8.0	30.0
3.7 warmcable-2160-2	594.0	181.0	120.0	180.0	240.0	2160	9.0	26.7
3.7 warmcable-2400-2	660.0	201.2	133.3	200.0	266.7	2400	10.0	24.0
3.7 warmcable-2640-2	726.0	221.2	146.7	220.0	293.3	2640	11.0	21.8
3.7 warmcable-2880-2	792.0	241.4	160.0	240.0	320.0	2880	12.0	20.0
3.7 warmcable-3120-2	858.0	261.6	173.3	260.0	346.7	3120	13.0	18.5
3.7 warmcable-3360-2	924.0	281.6	186.7	280.0	373.3	3360	14.0	17.1
3.7 warmcable-3600-2	990.0	301.8	200.0	300.0	400.0	3600	15.0	16.0

4 installation



Important: Tools and materials required

You will require the following items to install and test the floor heating system:

Scissors	Utility Knife	Wire Strippers
Tape Measure	Screwdriver	Nail Plate
Digital Multimeter	Drill	Hammer-Chisel
heat Wire	Wire Strap or Prodeso Heat Membrane	heat Thermostat
Flexible Conduit		

You will also need the appropriate tools and materials to install your particular floor. These will likely include products like heat cable or heat Membrane, thin-set mortar, backer board, tile, a notched trowel, and any other tools for your specific floor.

Follow these steps to ensure a successful heat cable installation.

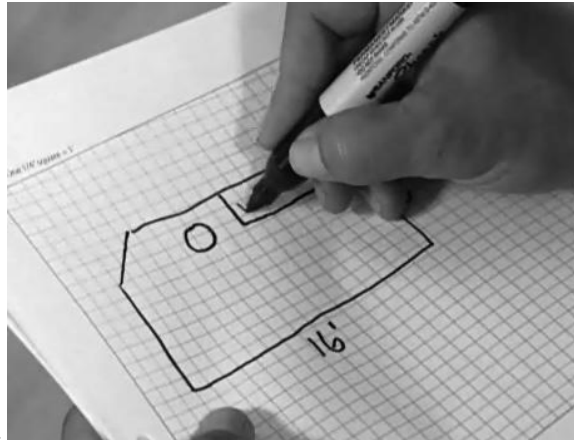
Step 1: PLAN LAYOUT

Make a sketch layout or a floor plan of the room; include all permanent furnishings such as toilets, bathtubs, appliances, cabinetry, etc. Indicate all dimensions required to determine the available floor area and the position of the heat thermostat.



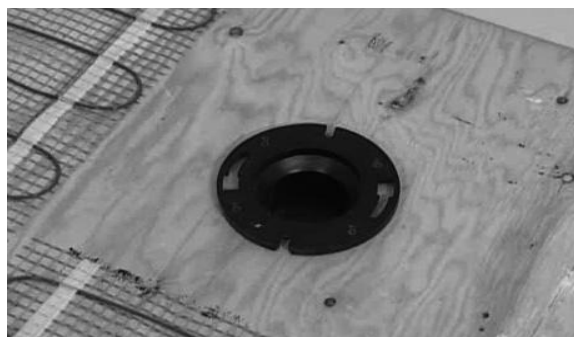
Important

The Tile Shop recommends that the installation is documented with photos to note the location of connections and the sensor.



Step 2: TRANSFER LAYOUT TO FLOOR

Draw an outline of the layout on the room floor including a foot print of all furnishings that are not yet installed. Unroll the first few feet of the heat heating cable. The starting point of the cable must be placed within 10 ft. from the thermostat. Using your floor plan determine your desired spacing of cable (standard 3 c-c) and strapping or Prodeso Membrane.



 **Important**

Minimum distance between the cables must be 2” or greater. Mark the position of the connection point between the power lead and the blue heat heating cable. **This connection must be concealed in thinset or self-leveling cement.** When using a floor temperature sensing thermostat, mark the sensor position in the middle of 2 heating cables, about 10” away from the wall (within the heated area), as close as possible to the thermostat.

Step 3: INSTALL SENSOR

If using a floor temperature sensing thermostat, install the sensor now, either in conduit tube, or directly to the subfloor. It is recommended that the sensor be installed in conduit tube. This will allow the sensor to be easily replaced in the unlikely event of failure.



The sensor and/or tube needs to be installed between the thermostat wall box and the sensor position. The conduit tube must be partially countersunk into the subfloor. Cut a channel approximately 5/16” deep × 5/16” wide in the floor and wall up to the thermostat for the sensor conduit. The conduit has to go from the thermostat and minimum of 10” away from the wall towards the middle of the floor.

 **Important**

The sensor conduit must be centered in the cable loop (between two blue heating wires). Use duct tape to close the end of the conduit so that thinset can't penetrate the conduit. Use duct tape to hold the sensor conduit into the groove to prevent it from floating up when the mortar or thinset is poured. If the sensor is installed directly in the mortar bed, use duct tape to secure to subfloor.

Step 4: PREPARE SUBFLOOR SURFACE

Clean and vacuum the floor thoroughly and remove dust and debris from the floor that may damage the heating cable.



Ensure that the subfloor is secure and stable. Carefully fill in all cracks to prevent any potential damage to the new tiles resulting from shifts in the subfloor.

Step 5: MEASURE THE RESISTANCE (THE FIRST TIME)

Use a digital ohm meter to measure the resistance of the heat and compare it to “Table 1 or Table 2”. Record the measured resistance on the warranty card. Documenting the resistance at each stage of installation is required for warranty purposes. Also, measure the resistance between the

white, black and shielding/ground wire. Both should read infinity.
Please refer to “5 Commissioning” for instructions on how to measure the resistance.

Step 6: BEGIN LAYING THE Heat

Place the cable so that the connection point and the temperature sensor are in their intended positions and bring the power lead cable to the thermostat or connection box.

Begin laying the heat heating cable according to the layout developed in Step 1.

DO NOT CUT OR SHORTEN THE BLUE HEATING CABLE!

Do not expose it to any mechanical stress. Avoid walking on the heating cable. **Wear only shoes with soft soles.** Use heat strapping to secure the cable to the subfloor. Attach the heat strapping with spray adhesive, nails, staples, or double-sided tape. Please refer to Step 8 for instructions on how to use the heat strapping.



ENSURE THAT THE SENSOR CONDUIT HAS BEEN PROPERLY INSTALLED BEFORE P

It is highly recommend to take photographs of the installed heat before installing the flooring.

Step 7: MEASURE THE RESISTANCE (THE SECOND TIME)

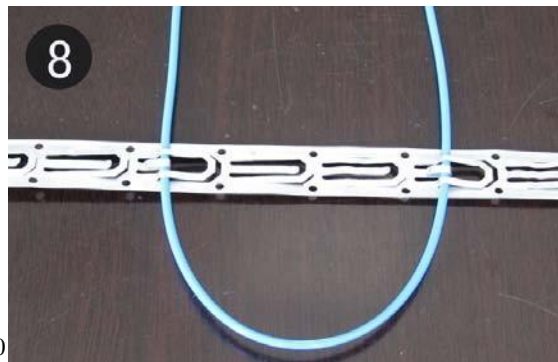
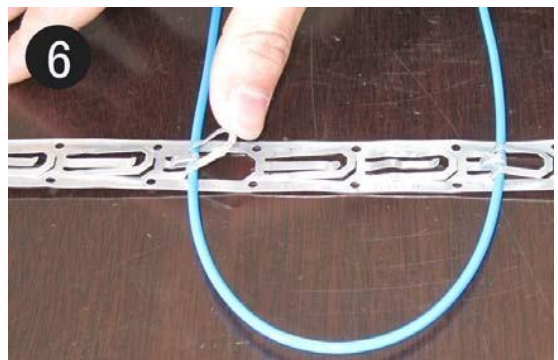
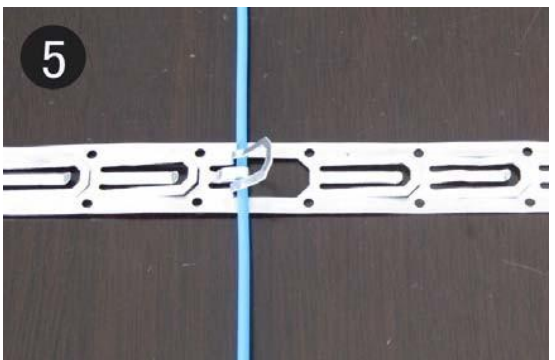
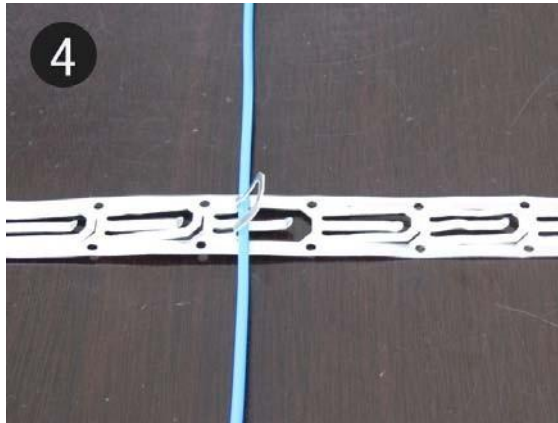
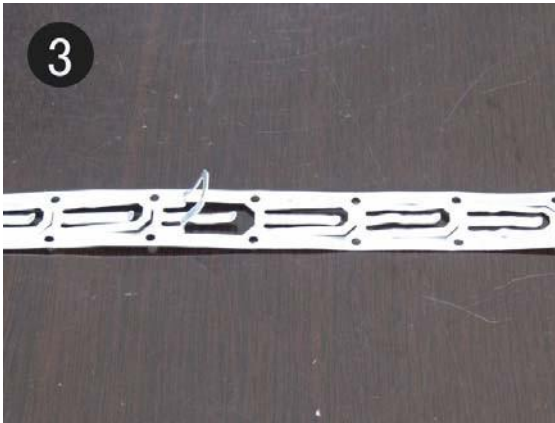
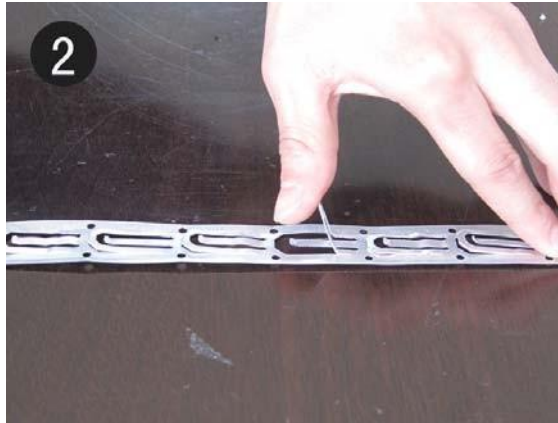
Please refer to Step 5.

Step 8: heat STRAPPING INSTRUCTIONS

Space the strapping at a distance of 2' to 3' (maximum recommended strap spacing is 3 feet).

Secure the strapping to the subfloor with adhesive, staples, nails, or double-sided tape.

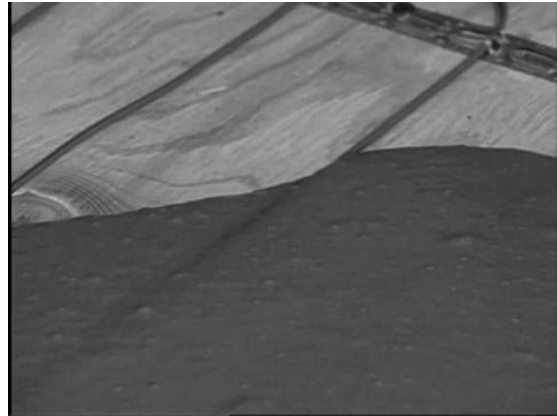
Standard cable spacing is 3" c-c.



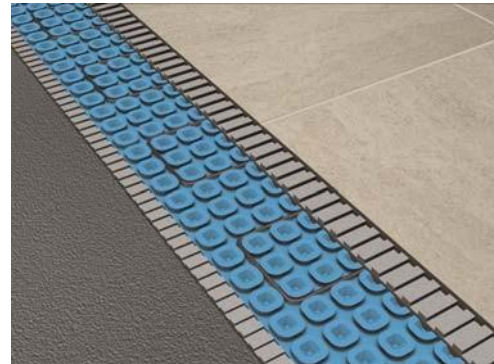
Step 9: Embed the floor heating cable in heat or Heat Membrane

Option 1: Self Leveling Compound

For tiling applications, proceed with the installation of the tiles by covering the heating cables with a heat as directed by the tile manufacturer. Ensure that the thinset mortar covers the entire heating cable as the tiles are installed.



Option 2: Heat Membrane



For engineered wood or laminate floor coverings, it is recommended to consult the flooring manufacturer for maximum temperature allowance (use a thermostat with a floor temperature limiter). Ensure that all moisture in the self-leveling cement has been fully eliminated in accordance with the drying times recommended by the cement manufacturer (consult the manufacturer for exact drying time).



Important

The system must not be turned on until the thinset cement has fully dried. A minimum of two weeks is recommended.

Step 10: MEASURE THE RESISTANCE (THE THIRD TIME)

Please refer to Step 5.

Step 11: Install the tile

To install the tile, apply a layer of acrylic or latex modified thin-set using the ridged side of your trowel. Tile and grout the floor using best industry practices and in accordance with instructions provided by the manufacturer of the tile.

Step 12: CONNECT POWER SUPPLY AND THERMOSTAT

The connection of the power supply and the heat thermostat must be done by a qualified electrician in accordance with the National Electrical Code (NEC) and the Canadian Electrical Code (CEC). The electrician should connect the floor sensor to the thermostat, take the final resistance reading and record it on the warranty card, see Step 13.

Note: You need to mark the appropriate circuit breaker reference label indicating which branch circuit supplies the circuits to those electric space heating cables.

Step 13: MEASURE THE RESISTANCE (THE FOURTH TIME)

Please refer to Step 5.

Step 14: RECORD INFORMATION AND AFFIX LABELS

It is important for the homeowner to mail in the certificate immediately after installing the system (cable and thermostat). Failure to do so could void the manufacturer's warranty. The warranty is subject to the guarantee conditions listed on the warranty certificate.

Keep a copy of the warranty card for your reference.

Step 15: ENJOY THE COMFORT OF Heat

The heat heating system is now ready to use. Increase the floor temperature gradually and adjust it until it reaches a comfortable level depending on the type of room and your personal preferences.

5 Testing



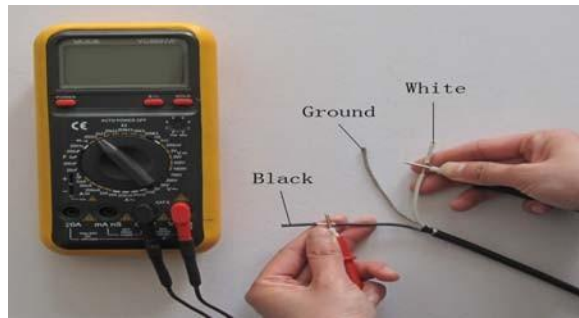
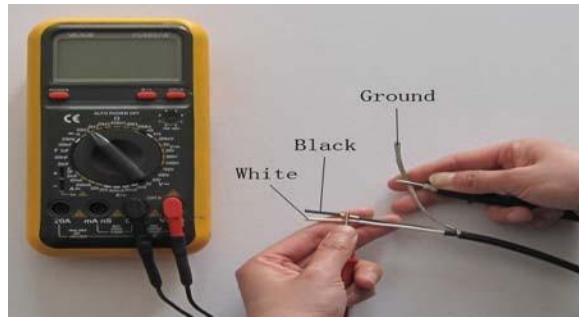
Important

You must perform the Insulation Resistance Test, the Heating Cable Resistance Test, and the Sensor Resistance Test four times (Please refer to Step 4 installation) during the installation process.

5.1 Insulation Resistance Test

This test ensures that the insulating jackets of the cable are not damaged. A low value indicates the cable has been damaged and must be replaced.

1. Connect the ground wire to the black lead and both power wires to the red lead of the multimeter.
2. Make sure the meter reads “Open” or “OL.” If you get a different reading, contact The Tile Shop.
3. Record these readings on the warranty card.



5.2 Heating Cable Resistance Test

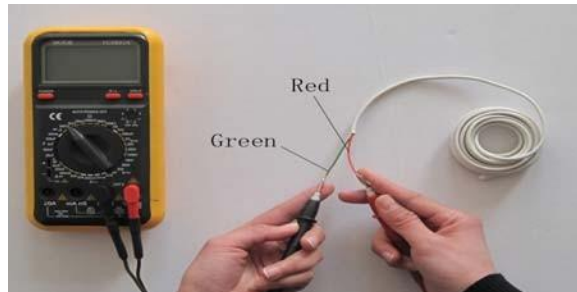
This test measures the resistance of the heat and is used to determine circuit integrity.

1. Set your multimeter to the 200 or 2000 ohm range.
2. Connect the multimeter leads to the black and white cold lead wires.
3. Compare this resistance reading to the resistance specified in the Product Selection “Table 1 or Table 2”. The value should be within $\pm 10\%$. If you get a different reading, contact The Tile Shop.
4. Record these readings on the warranty card.

5.3 Sensor Resistance Test

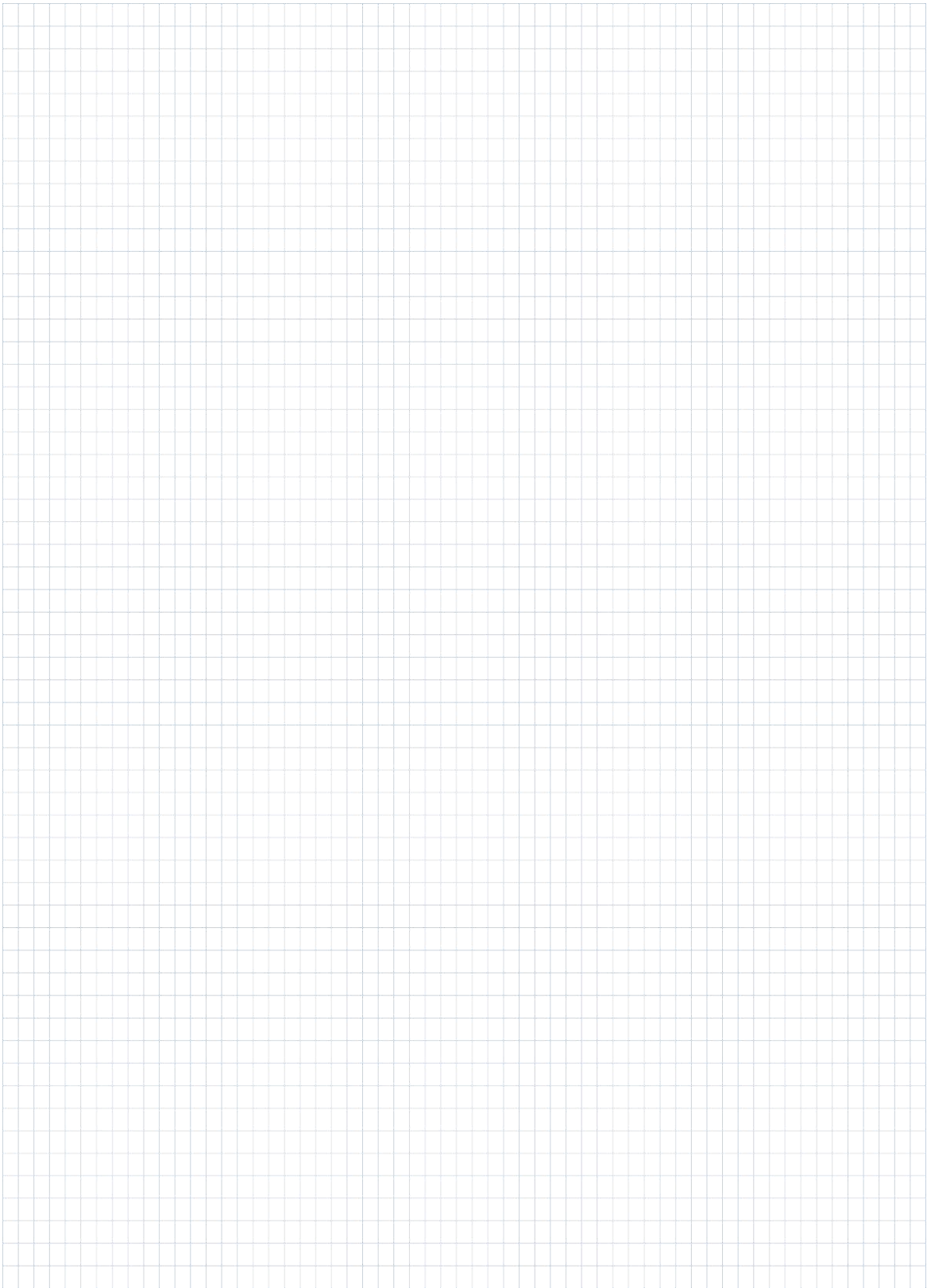
This test measures the resistance of the floor sensor and is used to verify the sensor integrity.

1. Set your multimeter to the 200K ohm range.
2. Connect the multimeter leads to the red and green lead wires.
3. Make sure the meter reads between 9-25K ohms. If you get a different reading, contact The Tile Shop.
4. Record these readings on the warranty card.



6 Troubleshooting

Symptom	Probable Causes	Corrective Action
Floor doesn't heat	<p>No voltage.</p> <p>Circuit breaker tripped.</p> <p>Ground-fault tripped in the thermostat.</p> <p>Thermostat not turned on.</p> <p>Cable not connected to heat thermostat.</p> <p>Floor temperature sensor not connected.</p> <p>Faulty sensor.</p>	<p>Check circuit breaker.</p> <p>Ensure that there are not too many cables or other appliances connected on the same circuit. The heat may require a dedicated circuit. See the Product Selection "Table 1 or Table 2" of this manual.</p> <p>Refer to heat Thermostat Installation and Operation Manual.</p> <p>Refer to Section 4 of this manual, and the heat Thermostat Installation and Operation Manual.</p> <p>Refer to heat Thermostat Installation and Operation Manual.</p> <p>Refer to heat Thermostat Installation and Operation Manual.</p>
Floor warm all the time	Clock not set correctly.	Refer to heat Thermostat Installation and Operation Manual.
Floor not warm enough	heat thermostat setting not set correctly.	Refer to heat Thermostat Installation and Operation Manual.



WARRANTY

15-year Limited Warranty

We warrants its electric floor-warming cables (the Product) to be free from defects in materials and workmanship for fifteen (15) years from the date of manufacture. Thermostats and controls sold are warranted for parts and materials for one (1) year from the date of purchase. The sole remedy for controls is product replacement. This warranty is transferable to subsequent owners.

Under this Limited Warranty, will provide the following: If a Product is determined by defective in materials and workmanship, and has not been damaged as a result of abuse, misapplication or modification, the Company will refund all or part of the amount paid for the product(s) determined to be defective in accordance with the following: 100% for the first five (5) years, then prorated on a diminishing 15-year scale for the remaining warranty period.

For example:

- (1) Product found defective in the 5th year will receive the full price paid for the specific Product at the time of purchase;
- (2) Product found defective in the 10th year, with 5 years remaining in the warranty period, will receive 10/15ths of the amount paid for specific product at the time of purchase.

In order to make a claim, you must:

- (a) Provide the Company with sufficient details relating to the nature of the defect, the installation, the history of operation, and any repairs that may have been made.
- (b) At the Company's discretion and at the owner's expense, ship the Product to the Company or the Company's local representative or distributor.
- (c) Provide proof that the Product was installed in accordance with the applicable Product Installation Manual and any special written design or installation guidelines for this project.
- (d) Provide proof that the Product was installed in accordance with the National Electrical Code (NEC) or the Canadian Electrical Code (CEC), and all applicable local building and electrical codes.
- (e) Provide a retail sales receipt or proof of purchase.

The following are not covered by this Limited Warranty:

- (a) Any incidental or consequential damage, including inconvenience, loss of time or loss of income.
- (b) Any labor or materials required to repair or replace the Product or control, not authorized in writing by the Company.
- (c) Any labor or materials required to remove, repair or replace flooring materials.
- (d) Any freight or delivery costs related to the Product, the control, or any related flooring or electrical products.

WE assumes no responsibility under this warranty for any damage to the Product caused by any tradespeople, visitors on the job site, or any other party, or damage caused as a result of post-installation work. The staff is available to answer any questions regarding the proper installation or application of the Product at. For further guidance about installation, or if the Product appears to be damaged, you must call us before proceeding with the installation, or proposed repair.

The Tile Shop can accept no responsibility for possible errors in catalogues, brochures, other printed materials, and website information. We reserves the right to alter its products without notice. This also applies to products already on order provided that such alteration can be made without subsequent changes being necessary in specifications already agreed upon.

Some states do not allow the exclusion or limitation of incidental or consequential damages and some states do not allow limitations on how long implied warranties may last. Therefore, the above limitations or exclusions may not apply to you. This warranty gives you specific legal rights and you may also have other rights, which vary from state to state.