

INFLOOR[®]

HEATING SYSTEMS



ELECTRIC CABLE GUIDE

LIMITED WARRANTY AND LIABILITY

Infloor® Radiant Heating, Inc. warrants to the original purchaser only, that if there are any defects in material or workmanship in any electric mat or cable during the first fifteen years after the date of its purchase, we will refund the purchase price paid for the mat or cable, not including any labor or other installation costs.

Our obligation to refund the purchase price described above is conditioned upon (a) the installation of the mat or cable conforming to the specifications set forth in our installation instructions and (b) the mat or cable not having been damaged by mechanical or electrical activities unrelated to the operation of the mat or cable.

A refund of your purchase price as described above shall be your sole and exclusive remedy for a breach of this warranty. This limited warranty does not cover any costs relating to the repair or replacement of any mat or cable. Our mats and cables are embedded in a mortar base, and then covered with ceramic tile, marble or equivalent finished flooring material. A failed mat or cable usually cannot be easily repaired. Replacement of a failed mat or cable will require that the finished flooring material under which it is embedded be removed to permit replacement of the mat or cable. **We will not reimburse any costs relating to the repair or replacement of any mat or cable.**

We shall not be liable for any incidental, special or consequential damages as a result of any breach of this warranty or otherwise, whether or not caused by negligence. 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.

We make no other express warranty regarding any electric mat or cable. No affirmation of fact or promise made by us, by words or action, shall constitute a warranty. If any model or sample was shown to you, the model or sample was used merely to illustrate the general type and quality of the goods and not to represent that the goods would necessarily be of that type or nature. **No agent, employee or representative of ours has authority to bind us to any affirmation, representation or warranty concerning the goods sold unless such affirmation, representation or warranty is specifically incorporated by written agreement.**

Any implied warranty of merchantability or fitness for particular purpose that may arise in connection with the sale of this product shall be limited in duration to fifteen (15) years from the date of purchase. We disclaim all other implied warranties, unless we are prohibited by law from doing so, in which case all such implied warranties shall expire at the earliest time permitted by applicable law. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation 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.

To obtain a refund under this warranty, please send a description of the defect and proof of purchase, postage paid, to Infloor at the addresses noted herein.

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WELCOME

Thank you for choosing the Infloor® electric cable or mat system for floor warming. This product has been designed to gently warm flooring materials such as marble, ceramic, glass and porcelain tile; slate; granite and poured or dimensional stone, in addition to laminate and engineered hardwood products. Electric cable or mat systems greatly enhance the comfort level of these beautiful flooring materials.

Infloor electric cable or mat floor warming systems utilize state-of-the-art heating cables, hardware and electrical controls for an economical and long lasting floor warming system. Infloor electric cable or mat systems are designed for use inside residential and commercial buildings of standard North American construction. Infloor electric cable or mat is not designed as a primary source of space heating for any room in which it is installed.

Throughout this guide and installation instructions you will encounter some terminology used to help identify the key components of your Infloor electric cable or mat system and how they are installed. These terms are italicized (for example, *Heated Area*) each time they appear and are graphically illustrated and explained in the Heating Cable System Terminology and Key of the accompanying foldout Cable Installation Instructions.

SKILL LEVEL

It is recommended that Infloor electric cable or mat systems be installed by professional electricians, or by skilled "Do-It-Yourselfers" who have adequate knowledge of flooring and electrical wiring, and in accordance with all applicable national and local electrical and building codes and ordinances, regulations and inspection procedures. Electrical inspection may be required during and/or after system installation. Consult with your local electrical inspection authority before beginning installation. Keep this booklet for future reference, and pass on to any future users of the system.

CONSIDERATIONS FOR INSTALLATION

Infloor electric cable or mat systems are available in a variety of sizes. Floor areas may be warmed with a single cable or by using a combination of cables, provided the area to be heated is equal to the sum of the coverage area of the individual cables. Infloor electric cable or mat systems are normally installed using a 3" spacing between cable runs (*Standard Heating Cable Spacing*). However, for rooms located above unheated areas, including concrete slabs on grade, the recommended spacing is 3"- 1½"- 3"- 1½", etc., between cable runs (*Alternating Heating Cable Spacing*). Both cable configurations are illustrated in Figures 1a and 1b. The SAME spacing should be used over the entire installation, as non-uniform spacing will result in areas that are either significantly cooler or warmer than other areas.

FIGURE 1a
Standard
Cable Spacing

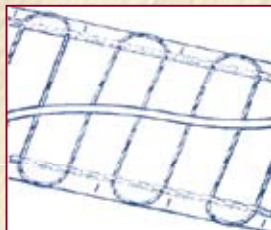
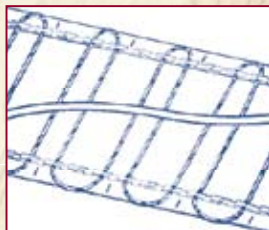


FIGURE 1b
Alternate
Cable Spacing



It is recommended to carefully measure the actual floor area to be heated (*Heated Area*) and use the product selection chart in Figure 2 to verify that each cable you have chosen is the correct size and voltage. For example, in a room with a measured area of 18 square feet using standard heating cable spacing at 120 volts, it is recommended that you use a "Red" set. While actual maximum coverage of this set is 16 sq-ft (*Heated area*), the apparent 2 sq-ft. shortage is accommodated by adjusting spacing in areas that are seldom walked upon (*Low Traffic Areas*) or by leaving a *Border Dimension* (distance between perimeter of heating cable and surrounding walls) of 6" rather than the minimum 1½". It is possible to space heating cable farther apart or closer together than recommended in low traffic areas, as long as cable spacing is never less than 1½" and there are never more than 6 consecutive cable runs at 1½" spacing.

If you attempt to use a cable whose coverage range is less than the actual heated area (by spacing the heating cables more than 3" apart), the floor will not warm to a comfortable temperature.

FIGURE 1

120V CABLE SELECTION

Heated Area per Design Installation

STANDARD SPACING (3")	ATL.SPACING (3"-1½"-3" etc.)	PART NUMBER	CABLE LENGTH	OHMS	AMPS
9 - 13 sq ft	7 - 9 sq ft	38150	42 ft	109.20	1.1
14 - 18 sq ft	10 - 13 sq ft	38151	62 ft	74.65	1.6
19 - 26 sq ft	14 - 19 sq ft	38152	86 ft	55.38	2.2
27 - 34 sq ft	20 - 26 sq ft	38153	121 ft	39.69	3.0
35 - 42 sq ft	27 - 33 sq ft	38154	155 ft	30.07	4.0
43 - 54 sq ft	34 - 39 sq ft	38155	190 ft	23.56	5.1
55 - 65 sq ft	40 - 48 sq ft	38156	235 ft	18.80	6.4

FIGURE 2

240V CABLE SELECTION

Heated Area per Design Installation

STANDARD SPACING (3")	ATL.SPACING (3"-1½"-3" etc.)	PART NUMBER	CABLE LENGTH	OHMS	AMPS
18 - 25 sq ft	13 - 19 sq ft	38250	84 ft	218.18	1.1
26 - 35 sq ft	20 - 27 sq ft	38251	124 ft	150.00	1.6
48 - 55 sq ft	35 - 44 sq ft	38252	210 ft	92.31	2.6
60 - 70 sq ft	45 - 54 sq ft	38253	258 ft	72.73	3.3
71 - 83 sq ft	55 - 63 sq ft	38254	310 ft	60.00	4.0
90 - 100 sq ft	64 - 75 sq ft	38255	380 ft	47.06	5.1
110 - 130 sq ft	84 - 94 sq ft	38256	473 ft	38.10	6.3
131 - 145 sq ft	95 - 108 sq ft	38257	549 ft	32.00	7.5
146 - 165 sq ft	109 - 125 sq ft	38258	626 ft	28.57	8.4
166 - 184 sq ft	126 - 138 sq ft	38259	700 ft	27.27	8.8
185 - 204 sq ft	139 - 153 sq ft	38260	780 ft	25.00	9.6
205 - 225 sq ft	154 - 169 sq ft	38261	860 ft	22.43	10.7

CONSIDERATIONS FOR INSTALLATION

(continued)

SELECTING THE HEATING CONTROL DEVICE

A floor temperature-sensing thermostat may be used to control the cable system. The selected heating controller must have the appropriate voltage, current and agency approvals for the location in which it is being installed. Infloor's series of line voltage floor temperature-sensing thermostats are recommended as these products are designed to control the floor temperature at a comfortable temperature (see catalog type of thermostat controls). Please contact Infloor Radiant Heating (800-588-4470) for more information.

Voltage regulators such as light dimmers typically used for incandescent lights, can also be used for heating control. These devices regulate the voltage applied to the cables, which controls heat output and the subsequent floor temperature. These units usually provide satisfactory control, but floor temperature can drift if ambient thermal conditions change in the installation location.

Other heating control options, such as light switches, are not recommended as they do not have the ability to adjust power to the cables to maintain a comfortable floor temperature.

Contact relays ("contactors"), which permit the control of multiple cable sets from a single thermostat, are widely available. Consult your local electrical inspection authority for the appropriate method of installing and wiring these devices.

PLANNING THE FLOORING INSTALLATION

In accordance with recommended flooring installation practices, it is important that the sub-floor on which the tile is set is sufficiently rigid. It may be necessary to install an underlayment such as backer board and/or mesh and mortar to achieve a solid application surface to ensure the floor is stable, smooth and clean. Tile experts typically require 1½" thick sub-floor base for ceramic tile. Consult your local building department, tile dealer, the Tile Council of America or the Tile, Terazzo and Marble Association of Canada for methods and materials. **NOTE:** If using metal mesh, always apply a scratch coat prior to laying cables – the metal mesh can be sharp enough to cut the heating cable.

Moisture barriers are often used to contain large water spills in bathrooms. These barriers are typically composed of a waterproof thin film (max. 0.080" thick). These barriers can be used in conjunction with electric cable or mat systems by laying the cable on the floor first, then covering with a scratch coat of cement-based underlayment. The moisture barrier is then installed on top of the scratch coat, and the flooring completed in the usual manner. Heat from the cables, which typically run at a temperature of 104°F (40°C) will usually not affect moisture barriers, but consult with the manufacturer to be certain.

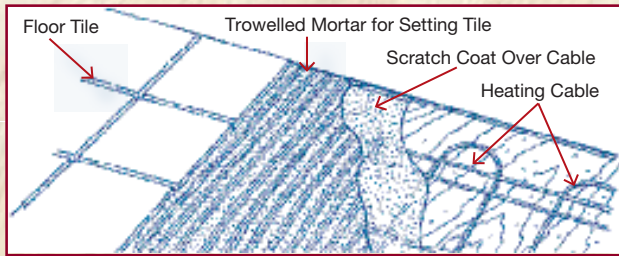
CONSIDERATIONS FOR INSTALLATION

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TILE FLOORING CONSIDERATIONS

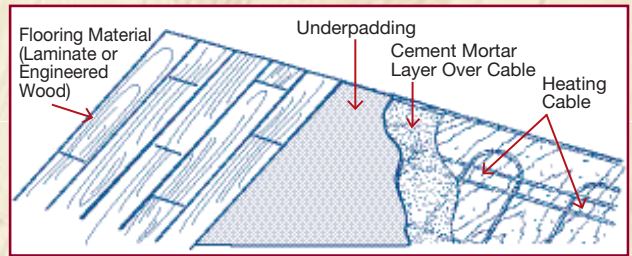
For optimum performance, the top of the heating cables should be a maximum of $\frac{3}{4}$ " below the finished floor surface. However, if the floor is insulated below, it is possible to increase this depth to $2\frac{1}{2}$ ". The Infloor electric heating cables or mats must be completely embedded in a cement-based layer of mortar prior to installation of the flooring material. This will add about $\frac{3}{16}$ " to the floor height (Figure 3). It is good practice to keep a few spare tiles in the event that the cable must be serviced at some later date. Tile manufacturers frequently change or discontinue floor tiles, so the specific model on your floor may not be available in the future.

FIGURE 3



Cut-away View of Heated Floor Components for Tile Surfaces

FIGURE 4



Cut-away View of Heated Floor Components for Laminate and Engineered Wood Surfaces

LAMINATE OR ENGINEERED WOOD FLOORING CONSIDERATIONS

Infloor electric heating cables or mats are also suitable for applications under floating laminate and engineered wood floors that are glued or snapped together. Electric cables or mats may not be used with any type of "nail down" flooring, as the nails will damage the cable. Electric cables or mats may not be installed under natural wood floors because the heat from the cables will cause these floors to warp, crack and/or discolor. Before beginning installation, check with the flooring manufacturer to verify that their materials are suitable for electric radiant underfloor heating.

As with tile applications, the Infloor electric heating cables and mats must be completely embedded in a cement-based layer of mortar prior to installation of the flooring material, which will add about $\frac{1}{8}$ " to the floor height (Figure 4). It is recommended that special attention be given to the application and leveling of this mortar layer, as an uneven layer may result in an uneven finished floor surface. Cement-based self-leveling mortar compounds may be most appropriate in engineered wood or laminate applications, but consult with your flooring supplier for advice.

Typically, laminate floors are installed with a layer of underpadding. This underpadding acts as an insulator, inhibiting heat transfer to the floor surface. It is recommended that the underpadding material not exceed $\frac{3}{16}$ " to ensure the floor heating is not negatively affected. A heating controller, such as an Infloor programmable floor sensing thermostat, must be used in any laminate or engineered wood floor installation to reduce the possibility of adverse affects on flooring that may occur due to unregulated long-term exposure to heat.

INSTALLATION and TIPS

INSTALLATION

When you are ready to begin installation of your electric cable or mat floor warming system, please refer to the Electric Cable Installation Instructions enclosed with this Guide. The instructions are presented as a series of step-by-step, illustrative photos on a convenient booklet.

OPERATING TIPS

When first energized, the electric cable or mat system may take up to 3 hours to fully warm your floor, although the actual time may vary depending on the ambient conditions.

Energy consumption will vary depending on user preferences (warmer floors require more energy), but typically will be about 70% of installed capacity when the system is energized. For example, if about 200 Watts (0.2 KW) are installed and operated for about 80 hours per week (about half of the time), energy consumption will be about 10 kWh per week ($0.2 \times 80 \times 0.7$).

At 10 cents per kWh, the weekly energy cost would be about \$1.00. Note that the heat generated by the electric cable or mat system will be, to some extent, redistributed in the home, thereby offsetting the heat required from the primary space-heating source.

Energy consumption can be minimized by turning the system off when floor heating is not required, but time must also be allotted to re-warm the floor once the heating cycle is resumed. Infloor's programmable "setback" thermostats can reduce this time to less than one hour by decreasing the temperature set point during each of the setback periods to a user-specified value.

Avoid placing thick mats or rugs on your heated floor, especially in the area where the sensor of a floor thermostat is located; such surface coverings impede the transfer of heat away from the cables and will cause the floor area beneath them to be warmer than in other areas. The use of bath mats and area rugs is acceptable, provided they are no more than ¼" in thickness. Avoid mats with rubber or vinyl type backing, as these may decompose in the presence of heat resulting in floor staining.

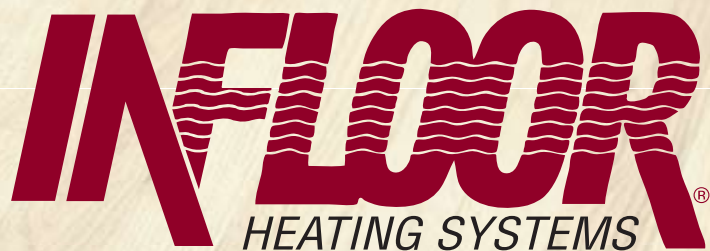
Avoid placing floor-level furniture such as futons or mattresses onto the floor directly over heated areas. This will also impede the transfer of heat away from the cables.

TROUBLESHOOTING TIPS

If the overall floor surface feels unusually cool after the system has been energized for more than three hours, verify that the heating controller is correctly installed and functioning properly; check with the associated heating controller's operating manual and/or contact the manufacturer.

If the overall floor surface feels unusually hot when the system is energized, or if the circuit breaker trips when the system is energized, the cable may be damaged. De-energize the system immediately and contact Infloor® Radiant Heating at 800-588-4470 for assistance.

NOTE: In the event that the heating cable has been damaged, the fault can typically be located and field repaired with minimal flooring removal.



FOR MORE INFORMATION

1-800-588-4470

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