

SURROUND COMFORT™

ENVELOPING WARMTH

INSTALLATION GUIDE GREEN CABLE™ CONCRETE

This kit includes a Green Cable™ Concrete and the appropriate amount of FLEXTHERM adhesive tape required for the installation. Refer to the product package for cable and accessories specifications.

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YOUR SAFETY IS IMPORTANT TO US

This guide contains instructions regarding safety as well as precautions to take to ensure a compliant and successful installation. Please pay a special attention to this symbol and follow any instruction given.



Congratulations, you are now a FLEXTHERM Floor Warming & Heating System owner. To ensure the best possible installation, please read the following guide before you begin. Please refer to the *A choice that adds up* document and to the Green Cable Concrete technical data sheet to ensure that you have all the necessary materials for your project. Ensure that the installation is in accordance with the current construction standards in your region.

This product is designed to be installed at a regular spacing of 10 cm (4") or 15 cm (6"). Choose the mesh according to the designated cable spacing. Installation at spacings other than those herein to mentioned can be done upon prescription by a professional only. Under no circumstances can the spacing be modified during the installation. Refer to the project estimate or to the product technical sheet to confirm the spacing for this installation.

This product can be used as an added touch of comfort at your feet or as a principal source of heating (provided the heat loss of the room falls below the energy installation capabilities). The Green Cable Concrete is designed to generate 161 W/m (15 W/ft²) when installed at a 10 cm (4") spacing or 108 W/m² (10 W/ft²) when installed at a 15 cm (6") spacing. The floor temperature attainable is dependent on the insulation of the room and of the slab, room fenestration, type of floor covering used, etc. To learn more about the performance of the system for your particular installation, refer to the professional (architect, engineer) that manages your project.

This system is designed and approved for interior room heating in wet or dry environments, subject to local electrical standards.

For any additional information, please consult FLEXTHERM and/or their authorized dealers.

HEATING CABLE, SERIES TYPE 1B and 2D

This cable is an electrical appliance and should be installed according the local and/or national electrical codes. Its installation should be entrusted to duly qualified personnel where required by law.

REQUIRED MATERIALS AND TOOLS

In order to install the system, you will need the following:

1. FLEXTHERM Floor Warming and Heating Cable kit including: heating cable(s), FLEXTHERM adhesive tape.
2. FLEXTHERM thermostat and floor probe*
3. Expanded electrical connection box
4. Ohmmeter (or multimeter)
5. Megohmmeter
6. Mesh (square size corresponding to the selected spacing: 4"X4" or 6"X6")
7. Bricks or shims (to raise the mesh)
8. Styrofoam panel reinforced with a plywood (for cable protection during concrete pour)
9. Various tools: measuring tape; calculator; electrical tape; a 2.5 cm (1") diameter and 30 cm (1 ft.) long stick or pipe for the dispenser box; spray paints or equivalent to mark wall location, permanent fixtures, etc.

* Optional kit including a cable conduit and a probe specifically designed for embedding in concrete is available (product no FLS1250)

SURFACE PREPARATION

The design, construction and power of the Green Cable Concrete make it a product specifically engineered for embedding in the sub-floor. It can be buried in a concrete slab or within sand coat (refer to the appendix for installation in regards to this technique).

Prepare the surface that will receive the reinforced concrete slab in accordance with the local and national code in effect in your area. Mark the limits of the area to be heated, the future partitions, walls, contraction joints and any other obstacle that has to be skirted (main drain, column, fixed furniture, etc.).

To minimize heat loss, lay a high density incompressible insulating material over a bed of crushed stone or gravel or graded sand.

The cable is secured to the mesh used to reinforce the slab. To maximize their performance, cables should be placed at approximately 5 cm (2") from the surface. Place the mesh on bricks or shims so that it is level and reaches the designated height.

ROOM MEASUREMENTS VERIFICATION



IMPORTANT: Accurate measurements are the key to a successful installation. Verify your measurements in order to ensure that the appropriate material for the project has been selected.

CABLE VERIFICATION

The FLEXTHERM seal on the cable warrants the integrity of the cable. As a quality assurance measure, each cable has been subjected to a 1500 V AC dielectric test and a 1500 V insulation resistance test.

Before removing the seal and installing the system, the cable insulation and resistance should be verified to ensure the cable conformity. You will have to verify the cable integrity two more times during the installation: once the cable is secured to the mesh and once it is covered with concrete. These tests are conducted three times to make certain that no leakage was caused to the cable during the different stages of the installation.

RESISTANCE VERIFICATION

Use an ohmmeter (or a multimeter) to measure the resistance between the black and red leads. (*picture 1*). In order to obtain valid results, perform this test at room temperature of 20 °C (68 °F). Record the results on the warranty card. The measurement should be similar to the resistance indicated on the cable label ($\pm 5\%$). A measurement that does not correlate with these parameters is a sign of potential leakage.

INSULATION VERIFICATION

Use a megohmmeter to verify the cable insulation integrity. Connect the appliance black cable to the system ground wire (the green lead) and the red cable to the heating element (black or red leads), and then send a 1000 V current (*picture 2*). This result should be "infinite" ohms. Should there be a current leakage between the heating element and the insulation the appliance will indicate a result between 0 and 1000 M Ω .

RECORD THE RESULTS



IMPORTANT: Record the results obtained to these two tests on the warranty card every time you perform them: before breaking the seal, after the cable is secured to the mesh and after it is buried in concrete. These results must be recorded on the warranty card in order to preserve the system's warranty.

Should the results obtained not conform, do not break the cable seal and contact FLEXTHERM technical service.

PRELIMINARY ELECTRICAL INSTALLATION

CIRCUIT

Floor heating systems should be connected to heating dedicated electrical circuits. The amperage used by the cables, as indicated on the cable labels, will determine the required circuit intensity. Please take note that the maximum load that can be supported by FLEXTHERM thermostat is 15 A. More than one circuit will be necessary should the system require more than 15 A. For a load greater than 15 A, a master/expansion conversion kit with the appropriate number of expansion units are required. For further information regarding their connection, please refer to the literature included with those products. A FLEXTHERM thermostat can control up to 10 expansion units.

ELECTRICAL CONNECTION BOX

Once the circuit(s) is (are) installed in the electrical panel, determine where the thermostat connection box will be installed. It should be in an accessible location in the same room and at an appropriate height.



Picture 1



Picture 2

Use an expanded thermostat connection box or a 4" X 4" box for the system connection (plan one connection box for each 15 A circuit). On the first end of the cable is a three-meter (ten-foot) cold lead to make the appropriate connection.



Picture 3

COLD LEAD

The cold lead is the non heating part on the first end of the cable that will run in the wall to connect the system to the thermostat. The cold lead is flat and red and is connected to the heating cable with a mechanical joint. Just like the heating cable, the mechanical joint must be installed in the floor and embedded in the concrete slab.

Determine the location where the mechanical joint will be fastened. Slide the cold lead inside a cable conduit according to the local and national code in force in your area. Pull on the cable until the mechanical joint is at a distance of about 30 cm (12") from the cable conduit bottom edge (picture 3). Anchor it to the mesh with FLEXTHERM adhesive tape (picture 4). Ensure that the mechanical joint is attached outside of the cable conduit and in an area zone where concrete will be poured.

In a multiple cable installation, repeat these steps for each cable installed.



Picture 4

CABLE INSTALLATION



WARNING: INSTALLATION GUIDELINES PRIOR TO INSTALLATION, TAKE NOTE THAT...

- The cable cannot be overlapped, crossed, cut, shortened, nor modified.
- In the sections where meshes are stacked, ensure that the cable will be installed on the top mesh. This will avoid the cable being crushed between them.
- Never overlap or cross contraction joints and/or future partitions.
- Never install heating cable in a section of the slab over which the following elements are planned: partitions, closets, cabinets or fixed furniture under which air does not flow freely.
- The heating cable should never be, under any consideration, installed in/on the walls.
- All the heating portion of the cable, up to the cold lead, must be installed in the concrete slab. The mechanical joint must also be embedded in the concrete.



IMPORTANT! INSTALLATION GUIDELINES PRIOR TO INSTALLATION, TAKE NOTE THAT...

- The cable should be installed at a minimum distance of:
 - 13 to 25 mm (½ to 1") from the base (underside) of a counter or fixed furniture;
 - 8 cm (3") from walls or non heated sections;
 - 15 cm (6") from toilet drain or main drain;
 - 20 cm (8") from any other heating system on the floor.
- The installation of the system should never be performed under -30 °C (-22 °F) ambient air temperature.
- As per the electrical standards, install one system per room and connect it to its own thermostat (or validate if applicable in your area).
- The heating cable must be installed at an even spacing between the cables: it must remain unchanged throughout the installation.
- When meshes are stacked, ensured that they are firmly secured so as they do not move from one another causing the heating cable to be stretched out. To stack the mesh, align a row of full squares directly on top of another. For the whole length of the superposed mesh, attach, at a distance of a foot, at least two corners of the squares to each other.
- FLEXTHERM adhesive tape is the only approved anchoring device. The use of any other anchoring method will immediately void the warranty.
- Restrict access to the site between the installation of the cable and the concrete pour.

INSTALLATION PLAN

Above all, plan your installation while taking into account the above mentioned prerogatives. It is recommended to make an installation plan in order to foresee direction changes, obstacle skirting, buffer zones, etc. Buffer zones are areas that are not essential to heat (i.e. behind the toilet, behind a door, or any other low traffic area) that can accommodate any excess cable.

Using spray paints, draw the obstacles and partitions to be by passed directly onto the mesh (*picture 5*). Plan the installation to fit the entire cable in the room: the heating cable shall not extend beyond the room or area in which it originates. Ensure that the buffer zones are easily accessible to accommodate any excess cable while abiding by all the installation instructions. If multiple cables are required for the installation, each run of the cable should be carefully planned to ensure that the spacing between the cables and other instructions are always met. Plan an installation diagram that will not overlap the contraction or expansion joints.

SECURING THE CABLE TO THE MESH

Install the cable to the mesh in a winding path manner. The required amount of adhesive tape is included in your kit.

Fasten the cable with the adhesive tape as the work progresses always respecting the pre-determined spacing. To do so, wind the tape around the cable and the mesh in a spiral fashion (*picture 6*). One turn per square is sufficient to maintain the cable in place. Being secured in this manner, the cable is kept in place evenly (*picture 7*). Apply a slight tension to the cable to ensure that it remains parallel. When changing the cable direction, or at the end of a run (loop), ensure that the cable maintain a minimum 3 cm (1¼") radius curb.

Note that the cable direction can be changed during the installation. To get around obstacles such as diagonal walls, fixed furniture etc., fasten the cable to the mesh in such a way that it follows the shape of the obstacle. When there is insufficient space for the cable to return change the direction of the cable (*picture 8*).

Cables must be installed in runs lesser than 3 m (10 ft). Divide the room in smaller sections, should your room exceed 3 m (10 ft).

All the heating portion of the cable must be fastened to the mesh.

WET ENVIRONMENT INSTALLATION

The Green Cable Concrete can be installed in a wet environment such as European style shower floor, indoor pool deck and sauna. However, additional precautions must be observed.

- Cable control must be located at least 1 m (3'3") away from the wet zone so that it cannot be reached by a person in that area.
- It is recommended that a shower have its own cable.
- The installation must be done in accordance with all other instructions given for dry area, such as minimum distance from the drain, ban of installation cable in the walls, etc.

FLOOR PROBE INSTALLATION

To install the probe wire, first install the cable conduit included in the FLS1250 kit for this purpose. This cable conduit protects the probe (including the capillary) and makes its replacement easier, should it become necessary. The bottom of the cable conduit should be embedded in the slab and go up to the connection box. Attach this cable conduit to the one that already holds the cold lead. Place the cable conduit in such a way that the probe capillary (the bottom part) is at a distance of 60 cm (2 ft) within the heated zone.



Picture 5



Picture 6



Picture 7



Picture 8

Do not cross the probe cable conduit over the heating cable. Slide the probe capillary in, until it has reached the tip of the cable conduit. Install the tip of the cable conduit to the mesh centered between the heating cables. The probe should be placed in a neutral location, not near any other heating or cooling sources.

Once the probe installation is complete, verify its integrity with a multimeter (refer to the thermostat installation guide for more details).



Picture 9

SECURING THE COLD LEAD TO THE CONNECTION BOX

The cable identification label must remain on the cable. Removing it will automatically nullify the cable warranty. To pass the cold lead through the connection box wrap the label around it. Tape the label with electrical tape to maintain it in place. Secure the cable to the box connector hub.

CABLE VERIFICATION

Once the cable installation is over, once again verify the cable's integrity as explained in the first section "Cable Verification". Record the results on the warranty card. Should the cable have been damaged during installation, do not proceed with the concrete pouring. Contact the FLEXTHERM Technical Service.



Picture 10

SAFE PRACTICES DURING THE CONCRETE POUR

Some precautions need to be taken in order to prevent cable damage when pouring concrete over a mesh on which an heating cable has been installed:

- Be careful with the cable when walking on the mesh. Ensure that enough bricks or shims were placed under the mesh to fully support traffic and concrete.
- Always use a concrete pump to pour the concrete. The use of a wheelbarrow is prohibited.
- Always lay the concrete pump pipe (especially the pipe gasket) over a styrofoam panel reinforced with a plywood (plywood side up) to prevent any leakage caused by the gasket (picture 9). Never lay the pipe directly on the mesh (picture 10).
- When pouring the concrete, always lift the pipe so that it does not touch the cable (picture 11).
- Always use non-indented scrapers to spread the concrete over the mesh and take precautions to avoid getting caught on the cable during this operation.
- Shake the mesh with care during concrete compaction to prevent any damage to the cables.



Picture 11

CABLE VERIFICATION

Once the concrete has been poured, verify the cable's integrity one more time, as described in the "Cable Verification" section at the beginning of this guide. Record the results on the warranty card.

CURING PERIOD

Do not turn your system on, nor proceed with floor covering installation, immediately after the concrete is poured. The system can be operated only after the concrete has completely cured. Refer to your professional instructions or your local building code to verify the curing time for the product you are using.

CONNECTION TO THE THERMOSTAT



DANGER: RISK OF SEVERE ELECTROCUTION.

Turn off the power of the designated electrical circuit prior to connecting the system controls.

SINGLE-CIRCUIT INSTALLATIONS

Connect the system's green wire (ground) to the terminal in the connection box. Proceed as per the instructions in the electronic thermostat installation manual. Identify the circuit on the electrical panel.

MULTIPLE-CIRCUIT INSTALLATIONS

Should your installation require more than one circuit, you will need one thermostat, one master/expansion conversion kit, and the appropriate amount of expansion units, as indicated in the "Preliminary Electrical Installation" section. For their connection, refer to the instruction guide provided with those items. Identify the circuits on the electrical panel.

COMPATIBLE THERMOSTATS

Use FLEXTHERM thermostats to operate the system. These thermostats are equipped with a class A ground fault circuit interrupter (GFCI) that will protect the system in case of fault. To preserve the system's warranty, the use of a control equipped with a class A GFCI (5 mA) is required.

KEEP INSTALLATION AND UTILIZATION GUIDES

Please keep the thermostat instructions in a safe place for future reference.

FLOOR COVERING INSTALLATION

COMPATIBLE FLOOR COVERINGS

COMPATIBILITY OF FLOOR COVERINGS			
FLOOR COVERING	SPACING POWER	10 cm (4 in)	15 cm (6 in)
		161 W/m ² (15 W/ft ²)	108 W/m ² (10 W/ft ²)
CERAMIC		✓	✓
NATURAL STONE		✓	✓
ENGINEERED WOOD *			✓
VINYL *			✓
FLOATING FLOOR *			✓
LINOLEUM*			✓
PARQUET *			✓
CARPET * (WITHOUT RUBBER BACKING OR CARPET PADDING)			✓

Always check with the flooring manufacturer to ensure compatibility with floor heating systems.

PRECAUTIONS TO TAKE DURING FLOORING INSTALLATION

Install the floor covering in accordance with the manufacturer recommendations (parquet floor, tiled floor, etc.). Never screw or nail in the floor.

All floor covering must be in direct contact with the concrete slab that encases the heating cable. Do not elevate the floor above the concrete mass below: air gaps will act as insulating agents and would retain the heat from reaching the flooring.

LIMITED WARRANTY

The **Green Cable Concrete** bears a 10-year limited warranty. Please refer to the FLEXTHERM limited Warranty Statement inserted with this document.

Return the Limited Warranty Registration Card filled with the results of the three (3) cable verifications (resistance and insulation) or in order to preserve the Limited Warranty of your system.



NOTE REGARDING THE FLOOR STABILITY

The stability of the floor covering may vary from one to the other. Adhesive manufacturers and the Tile Council of America (TCA) strongly recommend the use of expansion joints on the perimeter of the room and obstacles as well as across the room (reference TCA article EJ-171).

Should you require more information regarding tile setting contact the TCA (www.tileusa.com).

SYSTEM START-UP

USE OF RUGS

Do not lay a rug on a floor covering under which there is a floor heating system, the heat that would get trapped and could alter your rug or your floor covering. The use of a bath mat is acceptable as long as it is taken off the floor once the bath period is over.

For the same reason, do not lay a piece of furniture under which air cannot freely circulate on a floor under which there is a heating system.

MAINTENANCE

FLEXTHERM's *Floor Warming and Heating System* is maintenance free. It has virtually an unlimited life span. Should it stop heating, immediately contact FLEXTHERM Customer Service.

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