

**CARBONIC HEAT  
TECHNOLOGIES®**

**ELECTRIC RADIANT FLOOR HEATING FIRM**

# **INSTALLATION GUIDE**



**CONTACT INFORMATION**

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**THIS PRODUCT SHOULD ONLY BE INSTALLED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THE APPARATUS AND ANY RISKS INVOLVED.**

**READ ALL INFORMATION PROVIDED IN THIS GUIDE BEFORE ATTEMPTING TO INSTALL THIS PRODUCT.**



**CARBONIC HEAT  
TECHNOLOGIES®**

**FOR PART NUMBERS:** CHK-25-120, CHK-25-240, CHK-50-120, CHK-50-240, CHK-75-120, CHK-75-240, CHK-100-240, CHF1, CHF3, CHF4, CHF-550

**THE DOCUMENTATION PROVIDED HEREIN PERTAINS SOLELY TO THE USE AND INSTALLATION OF CARBONIC HEAT FILM, CARBONIC HEAT RADIANT FLOORS, OEM ACCESSORIES, AND PRODUCTS PRODUCED BY CARBONIC HEAT LLC SUBJECT FILMTER AND SPECIFICATIONS ARE SUBJECT TOCHANGE.**

**For updated information on our products please refer to our website**

**WWW.CARBONICWARMFLOORS.COM**

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**CARBONIC HEAT  
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# GENERAL NOTES & INFORMATION

## READ ALL INFORMATION PROVIDED IN THIS GUIDE BEFORE ATTEMPTING TO INSTALL THIS PRODUCT

The installation of this heating product must be in accordance with both the manufacturer's instructions, and the regulations of the authority having jurisdiction. Failure to do so will result in a voided warranty.

Caution must be taken to guard against risk of electric shock, fire, and bodily injury during installation of this product.

All floors & subfloors should be prepared in accordance to ANSI & TCNA specifications. All masonry, adhesives, moisture barriers, and bonding agents used in the installation must be fully cured (per the manufacturer's recommendations - but not less than 28 days) prior to energizing the product for the first time. All components must be recognized and rated for their use.

**NEVER OVERLAP, LAYER, OR STACK THE HEATING FILM ON TOP OF  
ANOTHER PIECE OF THE HEATING FILM.**

The installation of this heating product must always be connected to a DEDICATED electrical circuit.

The system shall be installed with a disconnecting means.

The system should always be disconnected from its power source during service, this includes service to the thermostat.

All systems MUST be installed with a GFCI compliant thermostat or breaker.

The supply wire or terminals cannot be repaired. If the wire or terminal is damaged, it must be replaced.

The National Electric Code (NEC) does not allow the placement of nails, staples, or other fasteners through the carbon heating or copper bus bar zones. If a nail or staple is accidentally placed through this area, they must be removed and securely tape sealed on both sides of heating film.

Prior to installation please consult the local codes. If any of the INFORMATION in this guide is not consistent with local codes, the local codes should be followed. However, electrical wiring is required to be run from a circuit breaker or other electrical circuit to the control. It is recommended that a qualified electrician perform these installation steps. Please be aware that local codes may require that this product and/or the control to be installed by an electrician and inspected by electrical inspector.

Operating the system without a floor covering in place will void the warranty of the product.

**ALL REQUIRED INSPECTIONS MUST BE COMPLETED BEFORE COVERING THE HEATING FILM INSTALLATION.**

- 1. DO NOT** install the heating film under large appliances such as refrigerators, freezers, washers, or dryers (as the heat can be detrimental to the operation of the appliances).
- 2. DO NOT** install the heating film under large, flat-bottomed furniture, built in cabinetry, vanities, or in any application in which air circulation over the floor is limited (as the heat can be detrimental to the products).
- 3. DO NOT** install the heating film in wall cavities, or in ceilings.
- 4. DO NOT** install the heating film in food pantries or under floating vanities (as the heat can be detrimental to the products stored in these areas).
- 5. DO NOT** overlap, layer, or stack the heating film on top of another piece of the heating film.
- 6. DO NOT** install the heating film over pre-existing linoleum, PVC, or vinyl floor coverings. (All must be removed, including all pre-existing adhesive, prior to the installation of the heating film).

# THANK YOU FOR SELECTING CARBONIC HEAT FLOORS

This informational manual is provided as a guide to installing Carbonic Heat Film/Carbonic Heat Systems, including design suggestions, installation steps, precautions, limitations, and floor covering guidelines.

## SPECIFICATIONS FOR HEATING FILM:

**Applications:** Indoor Floor Heating

**Listings:** ETL Listed for U.S. and Canada  
under ANSI/UL 1693 and CAN/CSA  
C22.2 No.130.2-93, File No.  
20140325-E465902, ETL 4007353,  
CE 120509, TUV K5140/E112

**Controls:** heating film must be controlled by a  
Carbonic Heat Floors approved direct  
voltage floor heat-sensing thermostat. **Voltage:**  
120 VAC Max 75 square feet (6.97  
sq. m) 50/60hz,  
240 VAC Max 150 square feet  
(13.94 sq. m) 50/60 Hz

**Watts:** 15 W/sq. feet (51 BTU/sq. ft.), 166.1 W/sq. Meter

**Maximum circuit load:** 15 Amps

**Maximum circuit overload protection:** 20 Amp breaker GFCI: (Ground Fault  
Circuit Interrupter) required for each circuit (included in the thermostat control).

**Maximum bend radius:** Not to exceed 90 degrees. Do not crease heating film.

**Maximum exposure temperature:** (Continuous and storage) 150°F (65.5°C)

**Minimum installation temperature:** 50°F (10°C)



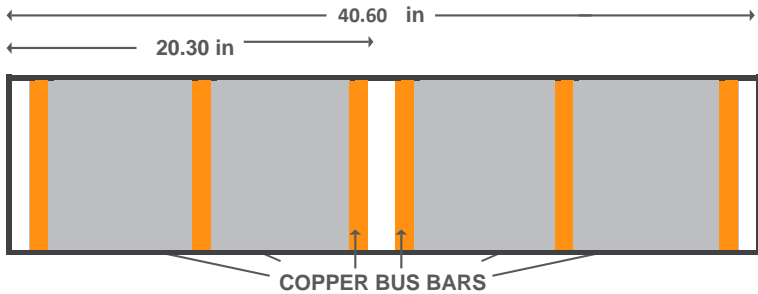
## SKILL REQUIREMENTS:

Installation must be performed by qualified persons, in accordance with local codes, ANSI/NFPA 70 (NEC Article 424), and CEC Part 1 Section 62 where applicable. All electrical work must be installed in accordance with Article 424 Part IX of the National Electric Code (NEC) ANSI/NFPA 70. "STATEMENT OF NATIONAL ELECTRIC CODE PRODUCT COMPLIANCE (NEC). This product from Carbonic Heat LLC is compliant to Article 424, Part IX of the National Electric Code (NEC), "Electric Radiant Heating Sheets and Heating Sheet Sets" and as a Heating Sheet Set. Electrical installations must use a Terminal Junction Assembly sold and provided only by Carbonic Heat LLC per NEC 424.96 (2)".

# UNDERSTANDING CARBONIC HEAT HEATING FILM

Carbonic Heat Heating Film is a revolutionary solution to today's radiant floor heating applications. The heating film is manufactured to make radiant floor heating more readily available, far more adaptable for unique applications and designs, and far easier to install than many other radiant floor heating products. Carbonic Heat Heating Film is 40.6 inches wide (it can be cut to half the width if desired for certain applications) and is available in many lengths to accommodate your specific needs. The heating film may be cut to any length with the use of scissors, a razor knife, or other cutting instruments. It must be cut at a 90-degree angle needed for each application, including the cutting of a hole for an electrical outlet, toilet flange, or floor register.

There are a few things to know about the structure of the Heating Film. Electrical current-conducting copper bus bars run down the length of the heating film (2 bus bars are required to create heat - see drawing). Should a copper bus bar be cut during the installation of the product, you may repair it by either adding an "Adder Harness" at the end or by installing a "Jumper" at the cut point. More about these later.



Under no circumstances should the active areas (gray) of the heating film be allowed to overlap itself or an adjacent piece of the heating film. The product includes three areas (the two white outer edge strips and the white center "Cut Line" strip) suitable for nailing and stapling to sub-floor, if deemed necessary, for the designed installation of the product. These strips are non-conductive and non-heat generating. All fasteners used to secure the heating film to the sub-floor (excluding adhesives), including staples or nails that are to be used, must only be placed through these designated areas and not in the active carbon (gray) heating areas. Failure to do so will cause problems with the system and/or damage the heating film and associated areas including the building structure. The heating film can be installed with either side facing up.

## EXPECTED FLOOR TEMPERATURE

Heating performance is never guaranteed. Carbonic Heat Heat Film is designed to deliver 15 W/sq. ft., with an average attainable temperature between 75°F (23.9°C) and 104°F (40°C), depending upon the subfloor, the layers of materials included in the floor installation, and the type of flooring used. The attainable floor temperature is dependent on how well the floor is insulated, the temperature of the floor prior to start up, and the overall thermal drain of the floor mass. Insulation is recommended under the heating film for best performance.

## WIRING ASSEMBLIES

Since this is a high voltage product, a connection system is required for power. A “Harness” is used to connect the heating film to a thermostat and power supply, and a Harness is used to connect multiple pieces of heating film in certain installations. Carbonic Heat Harnesses, Adders, and Jumpers are manufactured for either 120V or 240V applications. The wiring assemblies are designed for maximum efficiency and will work well for almost any layout requirements. It is important to note that there are six crimping terminals per sheet for the 120v Harness and four crimping terminals per sheet for the 240v Harness. Carbonic Heat Floors recommends using our Wago WG-1216 non-reversable connectors in installation of all harnesses.

### THERE ARE THREE TYPES OF WIRING ASSEMBLIES:



**1. Harnesses (J1, J2, J3, J4):** Harnesses are used for connecting sheet(s) of heating film with a 12-foot-long “cold lead” that is run to a thermostat, or to connect to another sheet of heating film. Harnesses are available in 120 volt and 240-volt configurations. For a single panel 120-volt application a “J-120” (J indicates one sheet, and 120 is the voltage) would be required. For a dual sheet a J-2 would be required.

For a dual sheet configuration using 240 volts a “J2-240” (J2 indicates two sheets, and 240 is the voltage) would be required. Connections for a three-sheet system would require a J3. A J4 Harness will connect four sheets of heating film together. If there are three and a half sheets needed, a J4 can be used by trimming off the unused portion of the Harness. Carbonic Heat Floors recommends using our Wago WG-1216 non-reversable connectors in installation of all harnesses.





**2. Adders (A1, A2, A3, A4):** Adders are used to attach one sheet of heating film to another, when a thermostat cold lead connection is not required. Adders are available in 120 volt and 240-volt configurations. To add a single sheet of heating film to a 120-volt system, an "A-120" (A indicates one additional sheet, 120 indicates the voltage) would be required. To add two sheets to an existing sheet use an A2. To add three sheets, an A3 will be required. An A4 will connect to four sheets to an existing sheet or sheet set. Carbonic Heat Floors recommends using our Wago WG-1216 non-reversible connectors in installation of all harnesses.



**3. Jumper (JP-60):** A Jumper can be used to reconnect a copper bus bar if it has been cut for completion of the layout. The Jumper is sixty (60") inches in length and can be used on both 120 volt and 240-volt systems. They are helpful for going through doorways, around corners, around posts, and around columns. Jumpers can also be used around cut outs for floor ports such as receptacles, registers, and floor ports.

## EDGE SEALING TAPE



It is critical to seal any cut that is made to the gray area of the heating film. The Edge Sealing Tape comes in one length (42 inches), but in two different widths: 4.8 inches wide and 2.4 inches wide. The wider Edge Sealing Tape (4.8 inches wide) is used to seal the edge of the heating film to which the wiring Harness, or Adder is attached. The narrower Edge Sealing Tape (2.4 inches wide) is used to seal any cut edges where there is no

attached wiring Harness, Adder, or any other cuts (including holes cut in between the copper bus bars) that have been made to the heating film during the installation process. The Edge Sealing Tape is a highly-adhesive fleece-backed butyl tape. The fleece backing that is the same as that used

**REMEMBER: THE EDGE SEALING TAPE MUST BE USED ON ANY GRAY EDGE, OR GRAY AREA OF THE HEATING FILM THAT HAS BEEN CUT.**

on Carbonic Heat Heat Film, making the Edge Sealing Tape compatible with all types of adhesives. A low temperature heat gun is to be used to heat sealing tape to ensure adhesion of tape at the time of installation.

## THERMOSTATS

Carbonic Heat Floors offers a variety of direct line voltage thermostats in both programmable and non-programmable models. All Carbonic Heat Floors thermostats in the United States are GFCI-protected (required by the NEC). **Each thermostat includes a floor sensor, which Carbonic Heat Floors requires for each installation. Please reference proper installation instructions on page 28-29 of this guide.** Each thermostat senses both ambient air and floor temperatures, enabling installers to set the floor temperature to the flooring manufacturer's desired set point and is best adjusted to sense floor sensor. The maximum load allowed on a standard thermostat is 15 amps. The maximum amount of total heating film allowable

**110-120VAC: 31.25 LINEAR FT = 75 FT<sup>2</sup> PER ZONE (1 THERMOSTAT)  
220-240VAC: 62.5 LINEAR FT = 150 FT<sup>2</sup> PER ZONE (1 THERMOSTAT)**

per circuit translates to the following:

Installations that require a larger amount of heating film per thermostat (over 75/150 square feet per zone) will require the use of a "master" thermostat that controls a "large room relay" power unit. Up to 750 @ 110-120/1,500 @ 220-240 square feet of heating film can be installed and combined using 10 relay units. Up to 9 Relay Units can be controlled by one Master Thermostat.

# TOOLS REQUIRED FOR INSTALLATION

## TOOLS NEEDED WHEN INSTALLING THE CARBONIC HEAT HEATING SYSTEM



**Digital Multi-Meter**



**Wire Cutters**



**Wire Stripper**



**Tape Measure**



**Flex Heat Crimping Tool  
(Part# MCT-1001)**



**Scissors**



**Heat Gun**



**Broom/Dustpan**

# INSTALLATION GUIDELINES

## THE FOLLOWING SECTION OUTLINES THE PREPARATION REQUIRED PRIOR TO INSTALLING THE HEATING FILM.

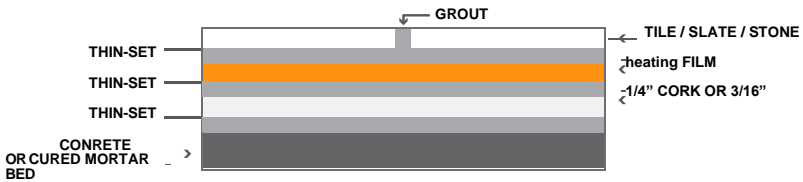
### FLOOR PREPARATION

1. Ensure slab or wood sub-floor is structurally sound (follow TCNA installation guidelines for sub-floor rigidity) 1 ¼” deck height.
2. Concrete slab must be free of waxy or oily films and curing compounds (when present, mechanical scarifying is necessary). If these chemicals are present, water will bead. If the sealer is left on the floor, the mortar for the tiles won't adhere. Remove sealer with a floor sander using medium-grit sandpaper.
3. There should not be any protrusions sticking up from the sub-floor that could impact or cause damage to the heating film such as nails, rebar, or any other potentially damaging material.
4. Level the floor per TCNA guidelines. Allow the compound to dry following manufacturer's recommendations.
5. Mop or sponge the floor with clean water to remove any traces of dust.
6. Make sure the floor is completely dry before installing Carbonic Heat Heat Film.

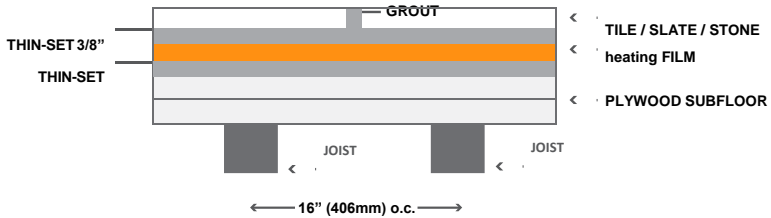
# TILE INSTALLATION

## INSULATED CONCRETE AND WOOD SUBFLOOR

**RH115 A** FLOORS, INTERIOR: RADIANT HEAT ON INSULATED CONCRETE, THIN-SET



**RH130** FLOORS, INTERIOR: RADIANT HEAT ON WOOD SUBFLOOR, THIN-SET



1. Prepare the heating film according to the steps in the General Installation Instructions beginning on page #20.
2. Install the tile on top of the heating film using an **unmodified thin set mortar** meeting the requirements of ANSI A118.1 to install ceramic and stone tile. (See notes).

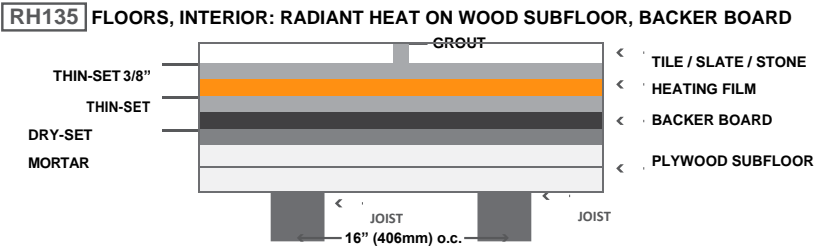
**NOTE: CARBONIC HEAT FLOORS DOES NOT RECOMMEND THE USE OF MODIFIED THIN-SET MORTARS TO SET TILE OVER THE HEATING FILM BECAUSE THESE MORTARS MUST AIR-DRY TO CURE PROPERLY. WHEN "SANDWICHED" BETWEEN TWO IMPERVIOUS LAYERS SUCH AS Carbonic Heat AND PORCELAIN TILE, DRYING TAKES PLACE VERY SLOWLY THROUGH THE OPEN GROUTJOINTS. CHECK THINSET MANUFACTURER FOR SPECIFICATIONS.**

\*Exception: Certain moisture-sensitive stones, (e.g., green marble or resin-backed tiles) may require special setting materials. Please consult the stone supplier for more information. For an acid-resistant covering, use an epoxy adhesive to set and grout the tile.

**FLOOR SENSOR (INCLUDED WITH ALL THERMOSTATS) MUST BE PROPERLY INSTALLED. SEE PAGES 28-29 FOR PROPER INSTALLATION INSTRUCTIONS.**

# TILE INSTALLATION

## WOOD SUBFLOOR WITH BACKER BOARD



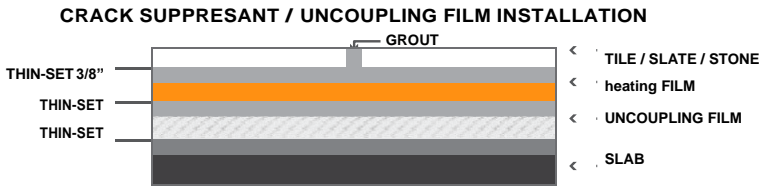
1. Install the backer board per the manufacturer's instructions.  
(Do not use wire lath products as backer board for installations of heat systems.)
2. There should be no items or protrusions sticking up from the sub-floor that could impact or cause damage to the heating film such as nails, rebar, or other potentially damaging objects.
3. Prepare the heating film according to the steps in the General Installation Instructions beginning on page #20.
4. While rolling back  $\frac{1}{2}$  of the heating film at a time, use a  $\frac{3}{16}$ "- $\frac{1}{4}$ " (5-6mm) V-notch trowel to apply thin-set to the floor. Set the heating film onto the thin-set and, using a roller, apply a continuous, even pressure with overlapping strokes.
5. Install the tile on top of the heating film using an **unmodified thin set mortar** meeting the requirements of ANSI A118.1 to install ceramic and stone/tile. (See notes)

**NOTE: ACCORDING TO THE TCNA HANDBOOK FOR CERAMIC, GLASS, AND STONE TILE INSTALLATION. THIS DRYING PERIOD CAN FLUCTUATE FROM 14 DAYS TO OVER 60 DAYS, DEPENDING ON GEOGRAPHIC LOCATION, AND THE CLIMATE CONDITIONS, SUCH AS HUMIDITY AND AMBIENT AIR TEMPERATURE.**

**FLOOR SENSOR (INCLUDED WITH ALL THERMOSTATS) MUST BE PROPERLY INSTALLED. SEE PAGES 28-29 FOR PROPER INSTALLATION INSTRUCTIONS.**

# TILE INSTALLATION

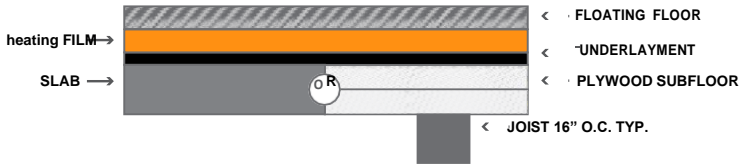
## CRACK SUPPRESSANT / UNCOUPLING FILM OR WATERPROOF MEMBRANE INSTALLATION



1. Install the crack suppressant/uncoupling material per the manufacturer's guidelines.
2. Prepare the heating film according to the steps in the General Installation Instructions beginning on page #20.
3. Apply heating film to the crack suppressant/uncoupling film using an **unmodified thin set mortar** that meets ANSI A118.1. While rolling back  $\frac{1}{2}$  sheet at a time, use a notch trowel to apply thin-set to the crack suppressant/ uncoupling film set the heating film onto the thin-set and, using a roller, apply a continuous, even pressure with overlapping strokes.
4. Install the tile on top of the heating film using an **unmodified thin set mortar** meeting the requirements of ANSI A118.1 to install ceramic and stone tile. (See notes)

**FLOOR SENSOR (INCLUDED WITH ALL THERMOSTATS) MUST BE PROPERLY INSTALLED. SEE PAGES 28-29 FOR PROPER INSTALLATION INSTRUCTIONS.**

## HEAT RATED LVT/LVP INSTALLATION FLOATING FLOOR (WOOD/CORK/LAMINATE)



1. Start by laying out the underlayment that is recommended by the laminate flooring manufacturer. When joining two sheets of underlayment together, follow the manufacturer's directions. Some manufacturers will have you overlap the underlayment, and some will have you "butt" each row against the previous one.
2. Prepare the heating film according to the steps in the General Installation Instructions beginning on page #20.
3. Install the Laminate flooring per manufacturer's installation guide.

**NOTE: CHECK WITH YOUR FLOORING MANUFACTURER FOR MAXIMUM TEMPERATURE RATINGS THAT ARE APPROPRIATE FOR YOUR FLOORING AND SET YOUR THERMOSTAT ACCORDINGLY.**

**FLOOR SENSOR (INCLUDED WITH ALL THERMOSTATS) MUST BE PROPERLY INSTALLED. SEE PAGES 28-29 FOR PROPER INSTALLATION INSTRUCTIONS.**



# INSTALLING CARBONIC HEAT KITS

## CHK-25-120, CHK-25-240

(Kit description: TYPE - SQUARE FOOTAGE- VOLTAGE, Example: Carbonic Heat Kit-25 square feet-120-volt system.)



The pre-assembled radiant heat flooring system is designed with ease of installation in mind. These kits feature a pre-attached Harness, sealed with our Edge Sealing Tape. This Kit also features a second, narrower piece of Edge Sealing Tape for sealing any edges or holes that are intentionally cut during the installation.

1. Carefully plan the layout of the heating film for the installation.
2. Cut the heating film to the required length and dimension.
3. Seal the end that has been cut, by applying the narrow (2.4" inches wide) Edge Sealing Tape.
4. There are two (2) wires that protrude approximately one (1) inch from the end of the pre-assembled, attached, and pre-taped wire Harness. These are used for adding another sheet of heating film. If you are adding a second sheet to your system please refer to Harness, Adders, and Jumpers located in the General Installation Instructions beginning on page #20. If you are not adding a second sheet, then proceed to the next step. Carbonic Heat Floors recommends using our kit provided Wago WG-1216 non-reversible connectors in installation of all additional harnesses.
5. Check the OHMs reading (see pg. #24 in this Guide).
6. A floor sensor **MUST** be installed and is included with the thermostat (See pg. 28-29 in this Guide).
7. After completing these steps please turn to the following sections for each specific floor application:

Ceramic Tile, Stone, or Slate  
Heat Rated  
LVT/LVP

Page #13-15  
Page #16-17

8. Install the thermostat according to the manufacturer's instructions.

## CHK-50-120, CHK-50-240

(Kit description: TYPE - SQUARE FOOTAGE- VOLTAGE, Example: Carbonic Heat Kit-50 square feet-120-volt system.)

The pre-assembled radiant heat flooring system is designed with ease of installation in mind. These kits feature an installation system that includes an attached Harness and Adder, completely sealed with our Edge Sealing Tape. This Kit also features two, narrower pieces of Edge Sealing Tape for sealing the custom installation.



1. Carefully plan the layout of the heating film for the installation.
2. Cut the heating film to length.
3. Seal both edges of the heating film that were cut with the narrower supplied size of the Edge Sealing Tape (part #EST-2.4-42).
4. There are two (2) wires that protrude approximately one (1) inch from the end of the per-assembled factory-attached, and Edge Seal Taped Wire Harness and Adder. These are used for adding the second sheet of heating film that was trimmed off the 50 Sq.-ft Kit. If you are adding a second sheet to your system please refer to Harness, Adders, and Jumpers located in the General Installation Instructions on page #20. If you are not adding a second sheet, then proceed to the next step. Carbonic Heat Floors recommends using our kit provided Wago WG-1216 non-reversible connectors in installation of all additional harnesses.
5. Check the OHMs reading (see pg. #24 in this Guide).
6. A floor sensor **MUST** be installed and is included with the thermostat (See pg. 28-29 in this Guide).
7. After completing these steps please turn to the following pages for each specific floor application:

Ceramic Tile, Stone, or Slate	Page #13-15
Heat Rated LVT/LVP	Page #16-17
8. Install the thermostat according to the manufacturer's instructions.

## **CHK-75-120, CHK-75-240, CHK-100-240**

(Kit description: TYPE - SQUARE FOOTAGE - VOLTAGE, Example: Carbonic Heat Kit-120 square feet-120-volt system.)

These kits are all supplied with the Carbonic Heat Film, a J-2 Harness, an A-2 Adder, Wago WG-1216 and eight (8) pieces of Edge Sealing Tape. This will be enough material to complete an 80-100 square foot room. A Crimping Tool (Part #MCT-1001), scissors, tape measure, wire cutters/strippers, and a Voltmeter will be needed to complete your job. Please follow the steps in the General Installation Instructions on pages #20 thru #29.



# GENERAL INSTALLATION INSTRUCTIONS

## LAYOUT

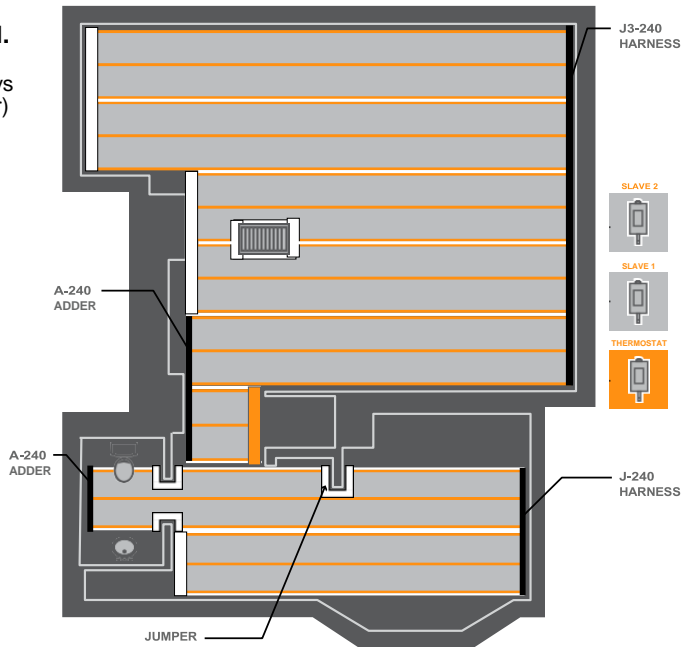
The installation of Carbonic Heat Film begins with planning a layout for the heating film. This helps the installer understand how much heating film will be needed, and which (and how many) Wiring Harnesses, Jumpers, Adders, and extra Edge Sealing Tape might be needed. Additionally, a pre-planned layout will determine thermostat (and possibly large room relay or relays) locations.

**FIRST, DETERMINE THE NUMBER OF SQUARE FEET OF HEATING FILM THAT ARE REQUIRED FOR THE INSTALLATION. THIS WILL HELP TO DETERMINE THE VOLTAGE NEEDED FOR THE INSTALLATION.**

The heating film can run on 120 volts or 240 volts. Installations using 120 volts are limited to 75 square feet of heating film per dedicated 15-amp circuit. Installations using 240 volts are capable of a maximum 150 square feet of heating film per a dedicated 20-amp circuit. Each circuit can be controlled individually by using a standard individual thermostat for complete zone control, or up to nine circuits (maximum 1,500 sq.-ft) may be controlled from one master thermostat.

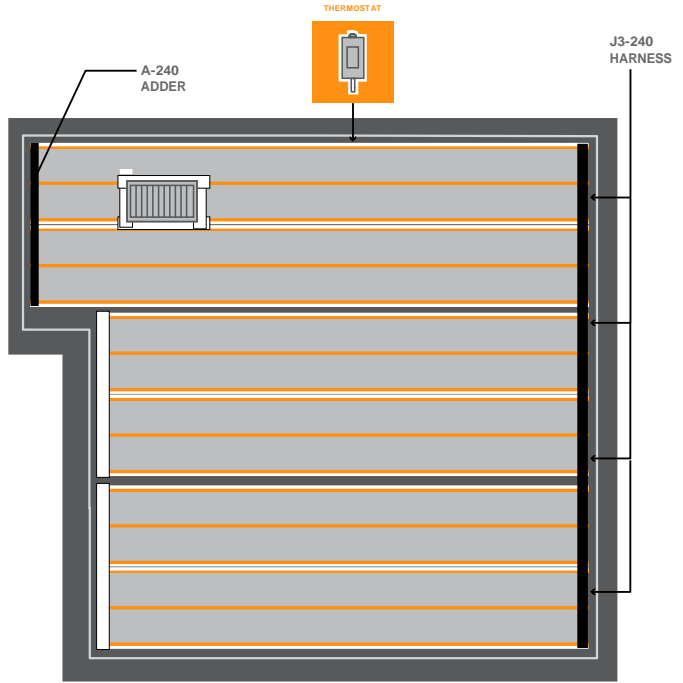
### EXAMPLE OF A 300 SQ-FT SYSTEM.

Qty 1 Master thermostat  
Qty 2 Large Room Relays  
Qty 1 JP-60 (60" Jumper)  
Qty 2 A-240 Adder  
Qty 1 J-240 Harness  
Qty 1 J3-240 Harness



**EXAMPLE OF A  
150 SQ-FT SYSTEM.**

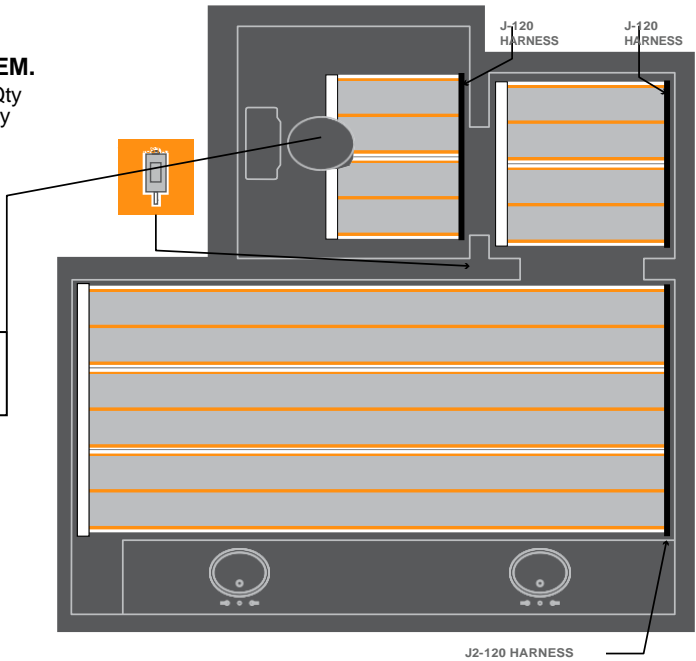
Qty 1 Thermostat Qty  
1 A-240 Adder Qty 1  
J3-240 Harness



**EXAMPLE OF A  
75 SQ-FT SYSTEM.**

Qty 1 Thermostat Qty  
2 J-120 Harness Qty  
1 J2-120 Harness

\*Position or cut  
heat film 6" short  
of the toilet ring.

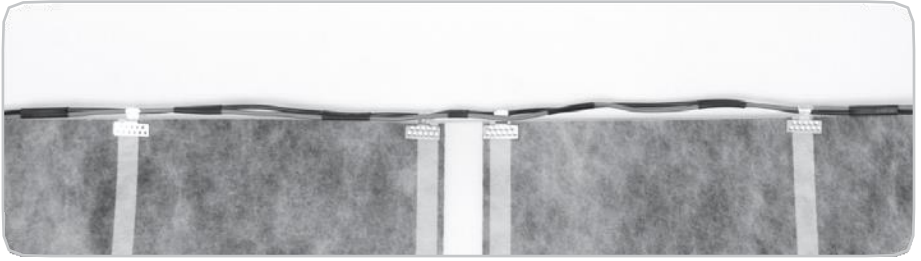


## INSTALLING THE HEATING FILM



1. Carefully plan the layout of the heating film for the installation.
2. Cut the heating film to length required.
3. Cut any holes or notches according to the installation plan (toilet flanges, electrical outlets, floor registers, doors, etc.). Sheets of heating film may be laid out, side-by-side and then wired together. White, non-heating areas (nailing strips) can be trimmed off the material as needed. The heating film can be installed with some space between sheets, if deemed necessary; however, it should be noted that “cold spots” will form if the gap is too great for the thermal heat expansion to overlap. The thermal expansion for this product is up to three (3) inches from the edge of the active heating area.

- 1. UNDER NO CIRCUMSTANCES SHOULD THE ACTIVE AREAS (GRAY) OF THE HEATING FILM BE ALLOWED TO OVERLAP ITSELF OR ONTO ADJACENT PIECES OF HEATING FILM.**
- 2. ANY TRIMMING OF THE HEATING FILM THAT INCLUDES GRAY (ACTIVE HEATING) AREAS MUST BE TAPED WITH THE EDGE SEALING TAPE.**
- 3. THE HEATING FILM MAY NOT BE INSTALLED WITHIN TEN (10) INCHES OF ANY DRAIN, INCLUDING TOILET FLANGES.**
- 4. NATIONAL ELECTRIC CODE FORBIDS THE PLACEMENT OF NAILS, STAPLES, OR OTHER FASTENERS THROUGH THE CARBON “GRAY” HEATING AREA OR COPPER BUS BAR ZONES.**
- 5. IF A NAIL OR STAPLE IS ACCIDENTALLY PLACED THROUGH ANY OF THESE AREAS, THE PENETRATION MUST BE REMOVED, AND THE HOLE NEEDS TO BE TAPED ON BOTH SIDES WITH THE EDGE SEALING TAPE.**

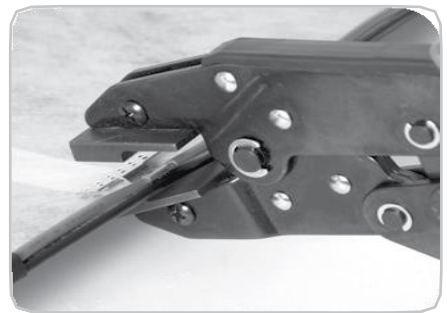


## **HARNESS, ADDERS, AND JUMPERS**

A Crimping Tool (MCT-1001) must be used to attach Harnesses, Adders, and Jumpers to the heating film.

First attach the center Terminal Crimps on the Harness so the spacing will stay “true” to the center of the heating film. This is extremely important when setting up to use a Multi-sheet Harness or a Multi-sheet Adder. Failure to do so will result in misalignment of the sheets and the installation won’t be able to continue until the spacing issue is corrected. It is important to note that there are six (6) Terminal Crimps per sheet for 120 volt and four (4) Terminal Crimps per sheet for 240-volt system.

The crimping terminals have 11 lance “bayonets” that are designed to pierce the outer insulation layer of the heating film and make connection with the copper bus bars. The Crimping Terminal is wider than the copper bus bar so it is not necessary for all the bayonets to pierce the copper bars, but care should be taken to have as many of the bayonets pierce the copper bus bars as possible. When finished, the Crimping Terminal must lay flat against the heating film and the bayonets must protrude through to the female side of the Crimping Terminal to be properly crimped.



Carbonic Heat Floors recommends using Wago WG-1216 non-reversable wire connectors in installation of all harnesses. Product data specification sheet available upon request or directly from Wago.

# TESTING THE CONNECTION AND HEATING FILM

## MEASURING OHMS

Measure the ohms (resistance) by connecting the red and black wires from the “cold lead” using a voltmeter. Compare this measured value to the “calculated” OHMs in Step #2. This measurement should be done with film at room temperature as temperature affects the resistance reading.

The integrity of the installation can be tested simply by measuring the resistance of the red and black cold lead wires prior to running the cold leads up through the conduit to the wall junction box. The following simple formula will provide you the CALCULATED RESISTANCE for the heating film installation. These calculations are based upon an average installed product temperature. These values will fluctuate +/- 20% based upon the ambient temperature in the environment in which the product is operating.

**NOTE: TO AVOID ELECTRICAL SHOCK, YOU MUST NOT CONNECT THE THERMOSTAT AND/OR A SLAVE UNIT TO THE COLD LEADS UNTIL THE TAPING PROCEDURE HAS BEEN COMPLETED (SEE NEXT STEP).**

The following formulas are voltage specific and are based on the linear length of the installed film. The value “R” represents the calculated resistance (ohms). The value “L” represents the Total linear length of heating film.

**FOR 120 VOLT INSTALLATIONS, USE THIS FORMULA:**

$$R = \frac{218}{L}$$

**Example:** A typical 10' X 10' (100 sq.-ft) room will have approximately three sheets, for a total of 30 linear feet of heating film. Divide 218 by 30, yielding a calculated ohm reading of 7.27.

**FOR 240 VOLT INSTALLATIONS, USE THIS FORMULA:**

$$R = \frac{872}{L}$$

**Example:** A typical 10' X 10' (100 sq.-ft) room will have approximately three sheets, for a total of 30 linear feet of heating film. Divide 872 by 30, yielding a calculated ohm reading of 29.07.

1 linear foot of heating film = 3.38 square feet of heating film. The linear foot calculation uses the full width (40.6 inches) of Carbonic Heat Film. If a sheet is cut in half (20.30 inches), along the center white strip cut line, then the “linear feet” is half the length.



## OHM TESTING



A digital multi-meter is required to perform the resistance test. Analog meters (which have a needle rather than digital readout) are not recommended, as they do not provide an accurate enough reading when calculating the formulas. Be sure the film is at room temperature or incorrect readings will result.

1. Calculate Resistance (ohms) as shown on the previous page #28.
2. Set the meter for the reading resistance in ohms – the symbol is  $\Omega$ .
3. Touch the meter's probes to the red and black cold lead wires from the Harness, or the crimps directly.
4. Read the resistance from the digital display.
5. Compare “calculated resistance” to “real time resistance”

If any Terminal Crimp connection was missed, the result will be that the resistance measurement will be significantly **HIGHER** than the calculated resistance. If the **MEASURED** resistance exceeds 20% of the calculated resistance, then the connections should be checked for proper contact of the Crimping Terminals to the copper bus bars. Resistance should be recorded, and a second resistance test should be performed after the flooring installation to verify that no damage has occurred to the heating FILM or Harness during the installation.

## APPLYING THE EDGE SEALING TAPE

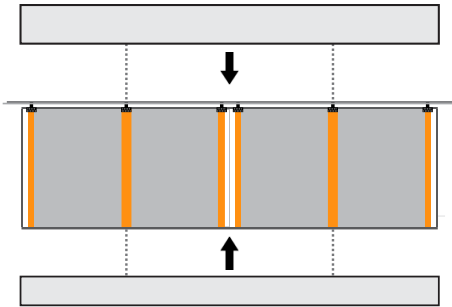


Use the Edge Sealing Tape (provided in Kits) to seal both ends of the heating film. The Edge Sealing Tape comes in two different widths (4.8” wide and 2.4” wide). The 4.8” wide tape is designed to seal the edge of the sheet to which the Harness or Adder is attached. The 2.4” wide tape is to seal the edge of the sheet that does not have a Harness or Adder attached, or any section of the heating film that has been cut as part of the installation process. Simply

attach one edge of the Tape on one side of the sheet and fold over the other half, thereby sealing each end of the heating film. You may need to purchase additional Edge Sealing Tape (part #EST-4.8-42) to enable you to completely tape over and cover/seal any holes that have been cut into the heating film (for angles, sockets, islands, etc.). Use low temperature heat gun to warm all taped areas to ensure seal of connections and bonding-ensure all connections are sealed and protected.

# TAPE

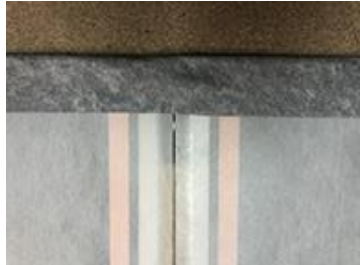
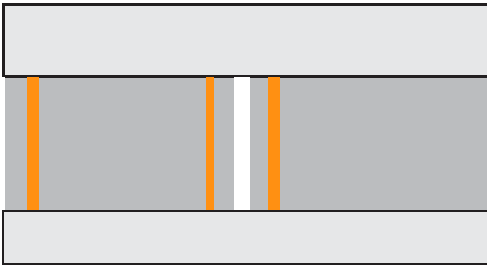
STEP 1



TAPE MUST BE APPLIED TO BOTH SIDES OF THE FILM DURING TAPING

# FINISH

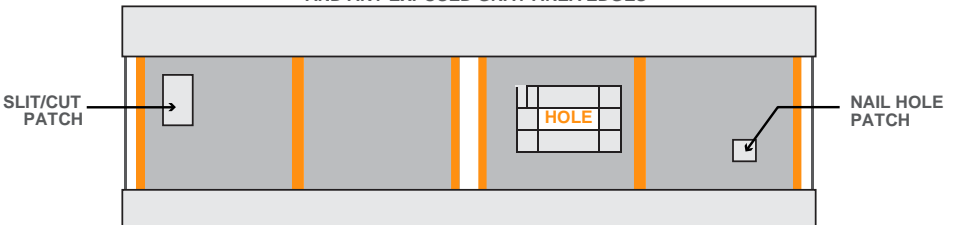
STEP 2



TAPE MUST BE APPLIED TO BOTH SIDES OF THE FILM DURING TAPING

# APPLICATIONS

FOR PATCHING HOLES, SLITS, CUTS, SCRAPES  
AND ANY EXPOSED GRAY AREA EDGES

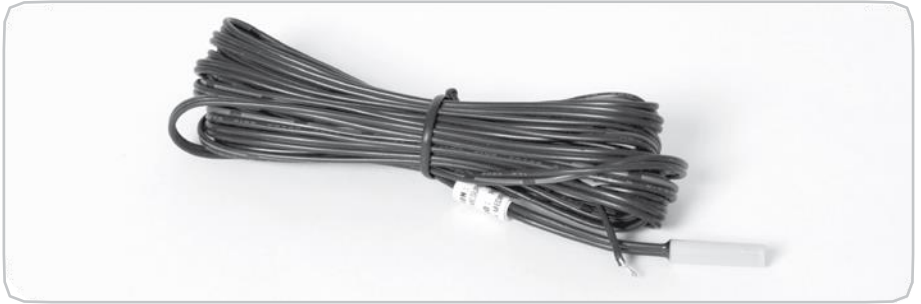


TAPE MUST BE APPLIED TO BOTH SIDES OF THE FILM DURING TAPING

**\*Use of a heat gun or hair dryer to warm all taped areas to maximize bonding of surfaces is required to complete the taping step of process.**

**NOTE: FAILURE TO PERFORM THIS STEP WILL RESULT IN CONDUCTION OF ELECTRICITY FROM THE OPEN ENDS OF THE COPPER BUS BARS WHEN EMBEDDED IN THINSET. DO NOT SUBSTITUTE TAPE.**

## INSTALLING THE FLOOR SENSOR AND RUNNING THE COLD LEADS UP WALL



Each thermostat includes a floor sensor. Install the sensor perpendicular to the wall at least 12 inches from the wall and not near other sources of heat. **The sensor MUST be mounted in the heating area to properly communicate with the thermostat. Place the end of the thermostat sensor 1.5"-2" inches in from the side or end of the heating film.** The sensor should be taped to the sheet using a piece of Edge Sealing Tape. The sensor wire is to be run to the conduit and up to the thermostat junction box. It is not uncommon to route a channel across the non-heat generating areas within the sub-floor so that the sensor is in a more level position to aid with the subsequent installation of the floor covering.

**NOTE: CHECK WITH YOUR FLOORING MANUFACTURER FOR MAXIMUM TEMPERATURE RATING THAT IS APPROPRIATE FOR YOUR FLOORING AND SET YOUR THERMOSTAT ACCORDINGLY.**



## ELECTRICAL REQUIREMENTS



A single-gang junction box or a double-gang box is required for the thermostat and slave connections. Two conduits should be placed from the junction box to the bottom of the rough-in wall. One conduit is for the cold leads from the heating film and the other conduit is for the floor sensor. The floor sensor wire should not be placed in the same conduit as the supply leads. Ensure the sensor wire is attached to the heat mat, with tape and is located within the grey heat area to ensure proper heat communication registers to the thermostat.

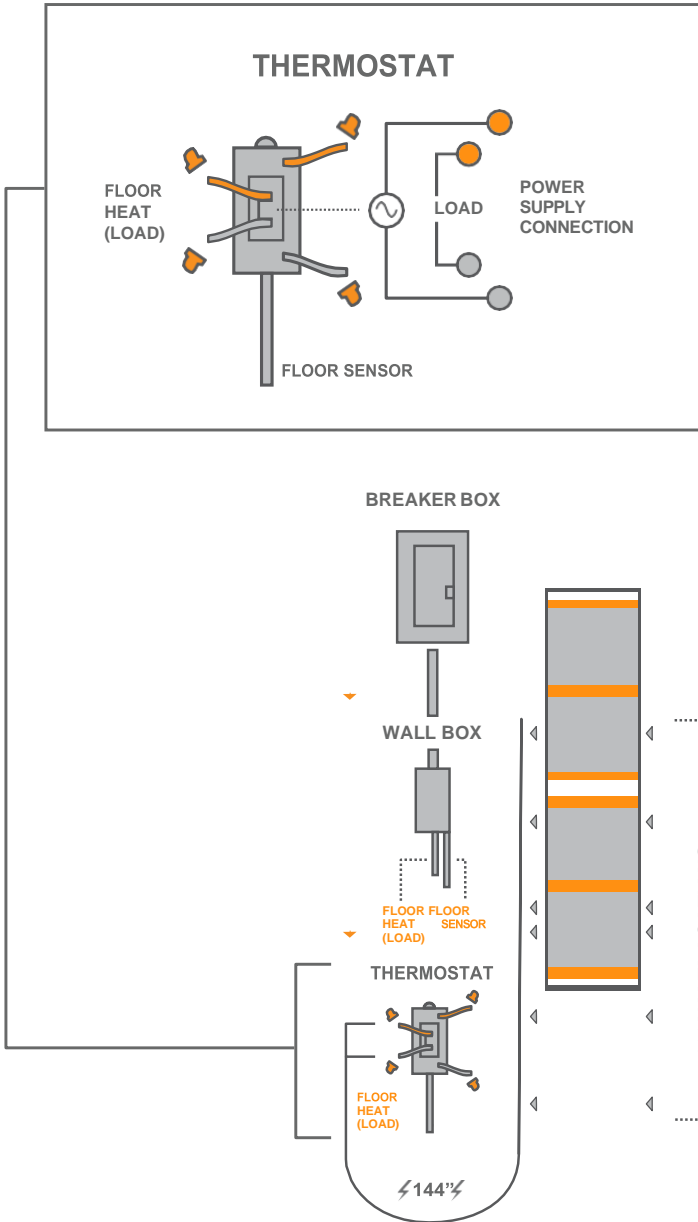
**NOTE: TO REMAIN COMPLIANT WITH THE NATIONAL ELECTRICAL CODE (NEC, ARTICLE 424 PART IX) THE ELECTRICAL INSTALLATION MUST USE A TERMINAL JUNCTION TO BE CONSIDERED A HEATING SHEET SET. THIS IS A REQUIRED PART OF THE INSTALLATION PROCEDURE. THE HEATING FILM CAN ONLY BE INSTALLED ON A DEDICATED ELECTRICAL CIRCUIT(S), NOT TO EXCEED 80% OF THE BREAKER'S RATED CAPACITY. POWER IS USED @ 15 WATTS PER SQUARE FOOT OF HEATING FILM, WITH A THERMAL OUTPUT OF 51 BRITISH THERMAL UNITS (BTU'S) PER SQUARE FOOT OF HEATING FILM.**

## ATTACHING THE THERMOSTAT

Before installation of the thermostat, always make sure the power is off. The installation should be done by a qualified electrician in accordance with all current electrical and building regulations. The installer needs to follow the thermostat manufacturer's instruction manual. Once the thermostat has been installed, complete the set-up programming and make sure to program the floor sensor temperature to the flooring manufacturer's desired temperature.

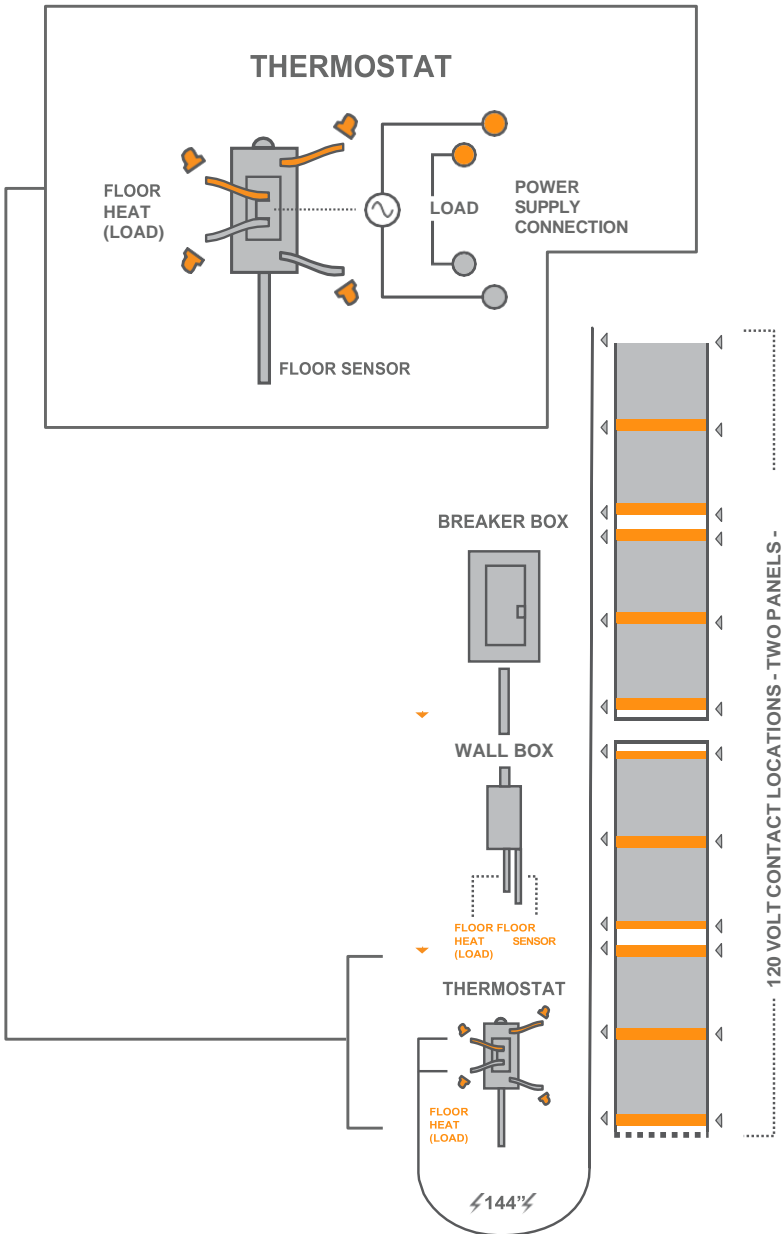
# 120 VOLT CONFIGURATIONS

## SINGLE SHEET SET UP



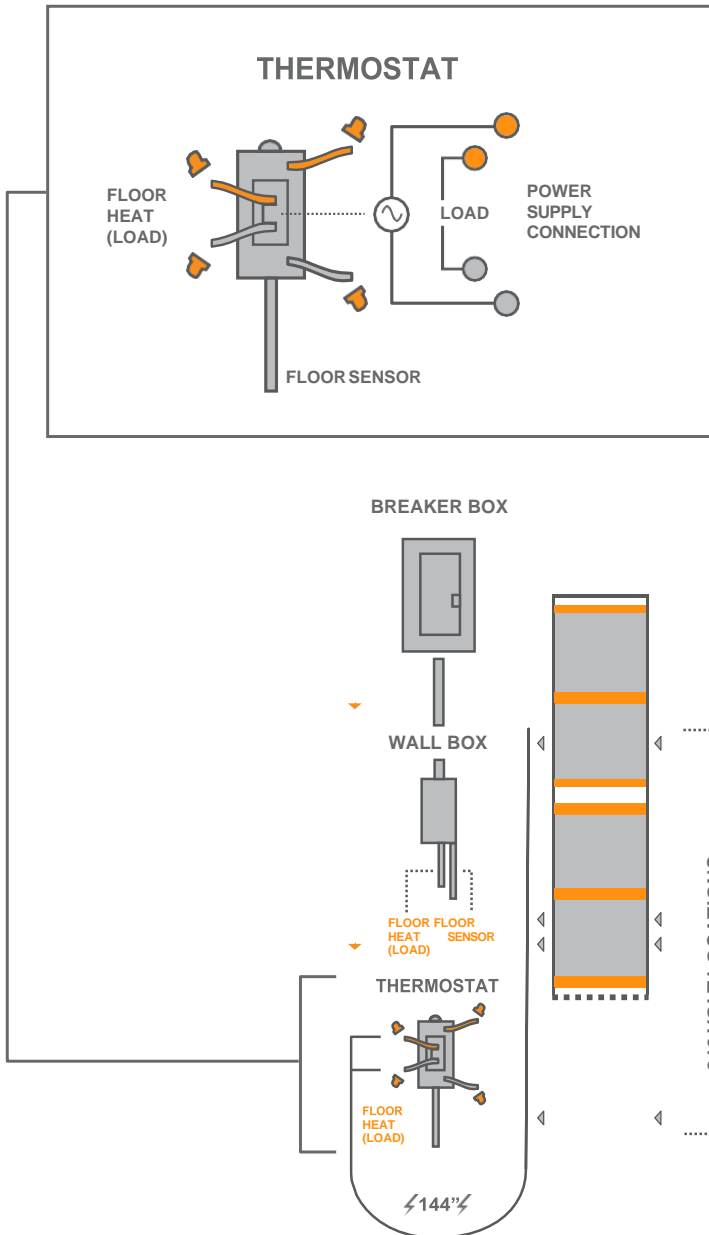
# 120 VOLT CONFIGURATIONS

## MULTI-SHEET SET UP



# 240 VOLT CONFIGURATIONS

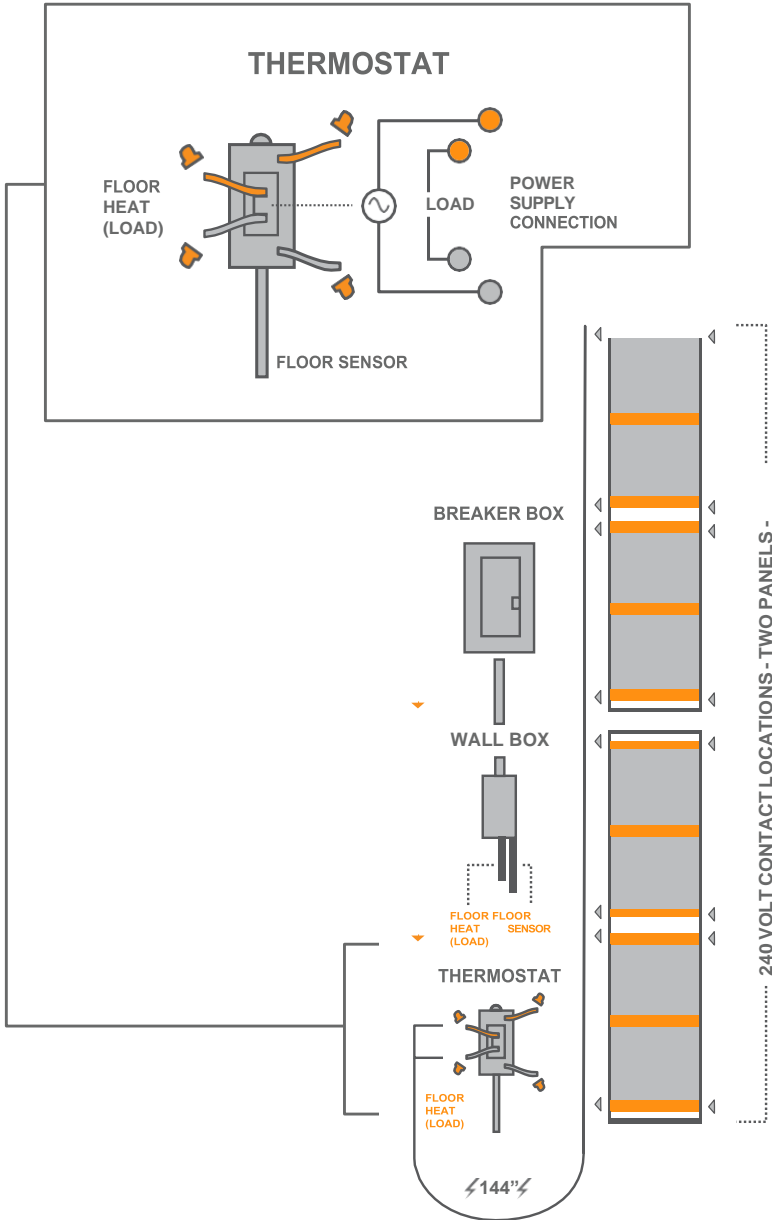
## SINGLE SHEET SET UP



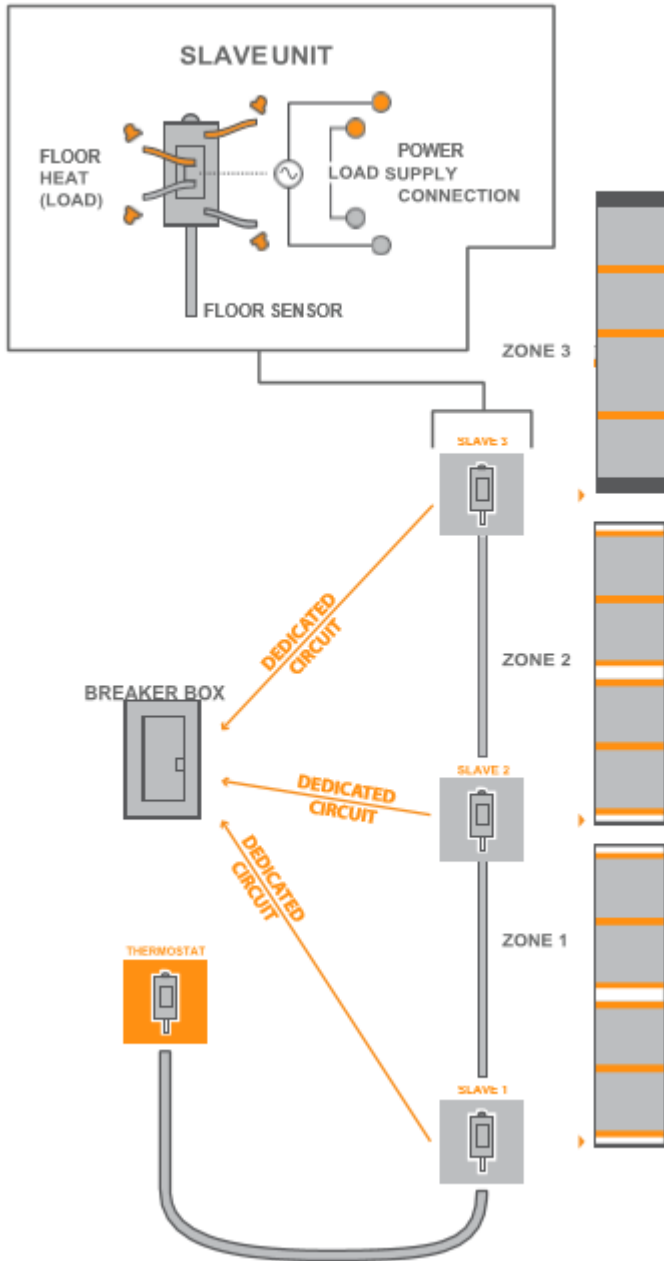


# 240 VOLT CONFIGURATIONS

## MULTI-SHEET SET UP



# MULTIPLE ZONES



# TROUBLESHOOTING

PROBLEM	POSSIBLE SOLUTION
System does not turn on	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check that circuit breaker is on</li> <li><input type="checkbox"/> Check that thermostat is turned on.</li> <li><input type="checkbox"/> Make sure that the GFCI on the circuit breaker is not tripped on either the thermostat or the Sheet.</li> <li><input type="checkbox"/> Check wiring at thermostat.</li> </ul>
Can't feel any heat	<ul style="list-style-type: none"> <li><input type="checkbox"/> Confirm that the floor sensor is on and that the temperature is not set too low (thermostat installation guide).</li> <li><input type="checkbox"/> Check the temperature set point on thermostat.</li> <li><input type="checkbox"/> Make sure the thermostat is set for ambient air and floor temperature.</li> </ul>
GFCI tripping on thermostat	<ul style="list-style-type: none"> <li><input type="checkbox"/> Tripping is often caused by moisture.</li> <li><input type="checkbox"/> Double check OHMs readings making sure there are no loose connections.</li> <li><input type="checkbox"/> Call customer support 1.855.558.5200</li> </ul>
Heat works, but then shuts off	<ul style="list-style-type: none"> <li><input type="checkbox"/> Check the thermostat floor sensor setting.</li> <li><input type="checkbox"/> Make sure the thermostat is set on both floor and ambient settings.</li> <li><input type="checkbox"/> Make sure the floor sensor is in an appropriate location.</li> </ul>
Floor keeps heating after it should stop	<ul style="list-style-type: none"> <li><input type="checkbox"/> Thermostat “bypassed” or switch on. The control has the proper wire connections per diagram on back, but your multi-meter shows full line voltage on the “load side” of the control when you believe it should not</li> <li><input type="checkbox"/> be sending power to the floor. If it is a programmable control, there may be an error in programming. (Check installation guide).</li> <li><input type="checkbox"/> There may be a problem with the floor temperature sensor itself, or it may not be in the proper location.</li> </ul>

**PLEASE NOTE: THIS IS A TROUBLESHOOTING DOCUMENT. IF YOU ARE NOT QUALIFIED TO DO ELECTRICAL WORK, WE RECOMMEND HIRING A QUALIFIED, LICENSED ELECTRICIAN. ANY TROUBLESHOOTING WORK SHOULD BE DONE WITH THE POWER REMOVED FROM THE CIRCUIT UNLESS OTHERWISE INDICATED. IF YOUR PROBLEM CAN'T BE RESOLVED WITH THESE TIPS, CALL CARBONIC HEAT FLOORS AT (855)558.5200. THESE TIPS ARE PROVIDED TO ASSIST WITH TROUBLESHOOTING THE FLOOR WARMING SYSTEM. RESULTS ARE NEVER GUARANTEED. CARBONIC HEAT LLC DOES NOT ASSUME ANY LIABILITY OR RESPONSIBILITY FOR DAMAGE OR INJURY THAT MAY OCCUR FROM USING THESE TIPS. REFER TO THE INSTALLATION GUIDE OR OTHER APPROPRIATE INSTRUCTIONS AND WARNINGS REGARDING INSTALLATION, USE, AND MAINTENANCE.**

# CARBONIC HEAT FLOORS WARRANTY

## PRODUCT WARRANTY

Carbonic Heat LLC extends warranty protection for the product for any residential customer who has installed the heating system in a residential property owned by that customer, for one (1) year after the products or system has been installed.

During the first year of ownership, Carbonic Heat LLC warrants that Carbonic Heat LLC will bear costs associated with the replacement of the defective or non-conforming product, up to a maximum value of the purchase price of the product. If such customer sells or transfers the property in which the product is installed, the warranty is canceled.

Proof of Purchase is required.

Carbonic Heat Floors offers an extended warranty on our Carbonic Heat Floor Film systems.

By performing a few simple tests and then registering them online or by mail, you can increase the warranty to 5 years of assembly repair, labor, & materials coverage to your existing warranty!

Remember, only Carbonic Heat Floors system products purchased through an authorized dealer and installed by an authorized independent installer are eligible for any manufacturer warranty coverage.

- Test 1 Heating film installed, and Ohms Resistance tests are performed and meet the required installation calculations. Test all circuits to ensure that connections are made properly. The tests must be noted in the panel or Thermostat J-box – Required
- Test 2 Power supply requirements are met – Required
- Test 3 Edge Seal Tape installation performed properly and bonded to film with low temperature heat gun to insure waterproofing – Required
- Test 4 Floor Temperature Sensor installed to specifications required in the installation guide and calibrated to temperature with the thermostat – Required
- Test 5 After installation of floor covering allow the floor heat to rise at a slow pace as to not adversely affect the flooring and floor covering. For Tile installation please allow the thin set to cure for 28 days prior to heating the floor. Rapid heat curing may result in damage to the bonding of the thin set to the Carbonic Heat floor heating system as well as the bond to the tile.

To maximize your warranty coverage, perform all required & recommended tests listed above and receive assembly repair, labor, & materials coverage for the first 5 years from date of purchase. A multimeter will be needed at installation to perform ohms tests. A heat gun will be required to warm up the edge seal tape to ensure proper bonding and waterproofing of the heat film and electrical connections.

You are required to register your warranty & test results by mail or online at [carbonicwarmfloors.com/register](http://carbonicwarmfloors.com/register) warranty to be eligible for your coverage.

Carbonic Heat Floors urges customers to take full advantage of this warranty. This means following our testing instructions to perform all four tests and registering them with Carbonic Heat Floors by mail or online.

If your Carbonic Heat Floor heating system stops performing, having followed Carbonic Heat Floor's recommendation, you will not be held liable for expenses related to the repair of the floor heating assembly including labor & materials. Here, "assembly" refers to all floor heating materials (e.g. matting and wiring harnesses, edge Seal tape), non-reusable flooring surfaces (i.e. tile or stone), and the appropriate setting and grouting materials.

Testing of the installation of the Carbonic Heat Floor heating system and registration of tests are required within 30 days of initial installation of the heating system in order to apply for your warranty. Neglecting to do so will result in the coverage of the affected heating film only in the event of failure of the heating system.

Neglecting to register this installation will result in that the customer will be liable for any labor, materials, and/or repair costs associated with taking the failed heating system out and installing a new one.

We've put together the following chart so you can more easily understand your warranty options:

Test 1: Ohms test result number at initial install:

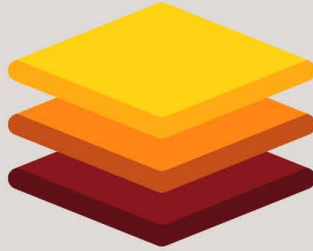
Test 2: Amp draw at load/initial startup of the product. (must be below 15 amps per circuit)

Test 3: Edge seal tape to be installed properly and warmed to ensure proper seal from water intrusion and connection protection.

Test4: Temperature Sensor located on the heat mat and taped into proper placement:

**OPERATING THE SYSTEM WITHOUT A FLOOR COVERING IN PLACE WILL VOID  
THE WARRANTY OF THE PRODUCT.**





# CARBONIC HEAT TECHNOLOGIES<sup>®</sup>

**ELECTRIC RADIANT FLOOR HEATING FIRM**

## **CONTACT INFORMATION**

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