



**cab**le series

# Electric Floor Heating Cable Systems



## INSTALLATION MANUAL

This installation manual includes factory guidelines for installing King Electric floor heating systems. These guidelines must be followed to ensure warranty coverage. Contact King Electric for any questions regarding proper installation of the heating cable.

***IMPORTANT: Save these instructions!***





www.king-electric.com

# Electric Floor Heating Cable Systems

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# General information

Electric floor heating is a simple, economical way to warm any floor providing years of lasting comfort whether it is used as supplemental or the primary heating source. This installation manual provides guidelines, safety warnings and describes the elements of properly installing the King Electric floor heating system which are:

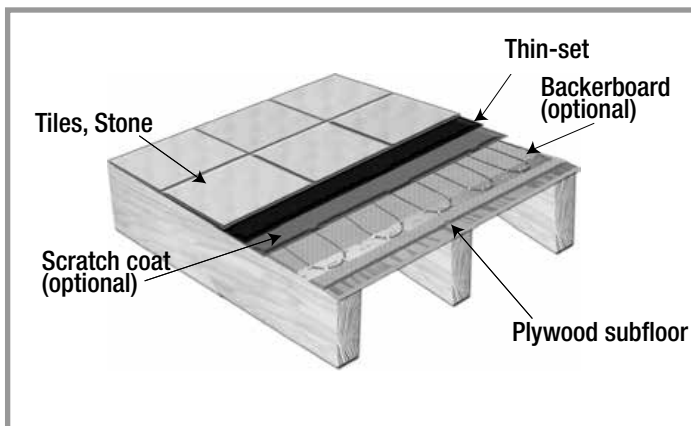
1. How to design the proper layout for the room.
2. How to select the right product for the application.
3. How to properly install the system.

This installation manual DOES NOT provide detailed information regarding thermostat installation. It is important to thoroughly review the thermostat installation manual included with the thermostat. For additional information regarding any aspect of the King Electric floor heating system, please contact us at:

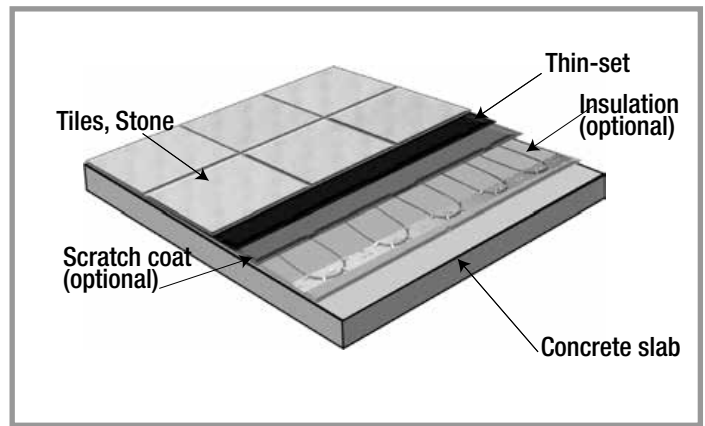
**King Electrical Manufacturing Co..**  
**9131 10th Ave South**  
**Seattle, WA 98108**

**1-800-603-5464**  
**www.king-electric.com**

## Typical Installations



**Directly on plywood**  
Standard spacing = 3 inches



**Directly on concrete**  
Insulated slab spacing = 3 inches  
Un-insulated slab spacing = 2 inches

# Important Safeguards and Warnings

READ AND FOLLOW THE WARNINGS AND INSTALLATION INSTRUCTIONS PROVIDED IN THIS MANUAL. FAILURE TO DO SO COULD RESULT IN ANY OF THE FOLLOWING: CABLE FAILURE, IMPROPER SYSTEM OPERATION, PROPERTY DAMAGE, BODILY INJURY OR DEATH. THE WARRANTY IS INVALID IF THE WARNINGS AND SPECIFIC INSTRUCTIONS ARE NOT FOLLOWED.



## **WARNING: ELECTRIC SHOCK AND FIRE HAZARD!**

1. The instruction manual follows North American standard building construction conventions.
2. An electrical inspector may be required before, during and after the installation. It is recommended to contact your local building department BEFORE beginning the installation.
3. DO NOT energize the cable before installation as it will cause overheating or damage to the cable.
4. Connect cables to rated voltage only. Be sure to size for conductors properly to carry the rated amperage.
5. This product is approved for indoor use only. Minimum installation temperature is 40 F .
6. Use only copper supply wires. Be sure to size for conductors properly to carry the rated amperage.
7. DO NOT cut the blue heating cable or attempt to alter the length in any way. The black cold lead can be shortened, but only at the end of the cable where the power leads are exposed. DO NOT cut at the splice between the cold lead (black wire) and the heating wire. (blue wire)
8. DO NOT install heating cable under any type of floor that requires nailing.
9. Ground fault protection (GFCI) is required when installed in wet environments such as a bathroom. Consult the local electrical and building authority to determine and additional requirements in your area.
10. If the GFCI trips during normal conditions and cannot be reset, consult an electrician for service. NEVER attempt to bypass or disable the GFCI system.
11. When installing cable in shower areas, the cable must be installed under the waterproofing membrane to keep the cables dry.
12. DO NOT drill, nail or cut into any floors that have heating cable installed underneath. This could result in contact with live electrical wires causing electrical shock.
13. DO NOT use staples, nails or similar fasteners directly on the cable. Use only factory the factory strapping system to attach cable. The use of any other fastening method will void the warranty.
14. Use a smooth plastic trowel only. NEVER bang or drop a tool on the cable. Care should be taken not to nick or gouge cable.
15. DO NOT install the heating cable under a cabinet or other built-in. This will cause the cable to overheat.
16. DO NOT install the heating cable (blue wire) inside a wall. Only the cold lead can go into a wall stud.
17. DO NOT extend the heating cable beyond the room or area that it originates.
18. DO NOT attempt to repair damaged cable without a factory splice kit.
19. DO NOT overlap heating cables. Dangerous overheating will occur.
20. DO NOT allow the cold lead or thermostat sensor to cross or overlap the heating cable.
21. All cables must be completely embedded into a cement based mortar including the cold lead, cold lead splice, heating cable, heating cable tail splice and thermostat sensor with the wire lead.
22. DO NOT bend the cable at sharp right angles. Always maintain a minimum 1" radius.
23. Maintain at least a minimum of 2" between heating cables.
24. Test and record the cable resistance at least 4 times during installation.
25. After installation of the cable, the installer must inspect and remove damaged or defective cables before they are covered or concealed.
26. The installer should mark the appropriate circuit breaker reference label indicating which branch circuit supplies the circuits to those electric space heating cables.
27. These products are to be installed in accordance with ANSI/NFPA 70, National Electrical Code (NEC) and CAN/CSA-C22.1, Canadian Electrical Code, Part I (CEC).
28. Only UL Listed conduit, fittings, and/or other components are to be used.
29. Products are listed for installations with a maximum thermal resistance value of R-1 for floor covering that can be placed on top of your product

# STEP 1: Inspecting and testing the cable and floor sensor

**1.1** Take the cable out of the box and inspect it for any physical damage.

**1.2** Test the insulation and the resistance of the cable and record data in the CABLE TESTING LOG listed on page 6 of this manual. This is test #1.

**1.3** The cable and sensor must be tested and recorded a minimum of 4 times during the installation for the warranty to be valid.

## **1.4** Insulation Test:

This test ensures that the insulation jacket of the cable is not damaged. A low value on the meter indicates the cable has been damaged and must be replaced. Follow the following steps:

- A. Set the multi-meter to read ohms.
- B. Connect the ground wire (braided un-insulated wire) to the black test lead of the multi-meter and the red test lead to both the black and white wires of the cold lead.
- C. The meter should read “OPEN” or “OL”. If you get a different reading, the cable is damaged, contact King Electric for support.
- D. Record the readings on the cable tag and in the cable test log.



**Insulation Test**

## **1.5** Resistance test:

This test measures the resistance of the cable which verifies the continuity (no breaks) and that the cable has the proper wattage rating.

- A. Set the multi-meter to read ohms.
- B. Connect the meter leads to the black and white cold lead wires, DO NOT connect the ground wire.
- C. Compare the resistance reading to the value specified in the product selection table, it should read  $\pm 10\%$ . If the reading is different, contact King Electrical for support.
- D. Record the readings on the cable tag and in the cable test log.



**Resistance Test**

# STEP 1: Inspecting and testing the cable and floor sensor. (continued)

## 1.6 FLOOR SENSOR TEST:

This test measures the resistance of the floor sensor to verify the integrity of the component.

- A. Set the multi-meter to read ohms.
- B. Connect the multi-meter leads to the floor sensor wires.
- C. The meter should read between 8-25k ohms depending on the ambient temperature when taking the test. If test results are not between 8-25k contact King Electrical for support.
- D. Record the readings on the cable tag and in the cable test log.

### Typical sensor values:

|                    |       |                    |
|--------------------|-------|--------------------|
| <b>55F° (13C°)</b> | _____ | <b>17,000 ohms</b> |
| <b>65F° (18C°)</b> | _____ | <b>13,000 ohms</b> |
| <b>75F° (24C°)</b> | _____ | <b>10,000 ohms</b> |
| <b>85F° (20C°)</b> | _____ | <b>8,000 ohms</b>  |



**Floor Sensor Test**

## CABLE TEST LOG

| Tests must be recorded for warranty              | Resistance<br>(± 10%) | Insulation<br>Test |
|--|-----------------------|--------------------|
| Model:   |                       |                    |
| Volts:   |                       |                    |
| Factory QC Test                                  |                       |                    |
| TEST 1. Before installation                      |                       |                    |
| TEST 2. After installation, but before embedding |                       |                    |
| TEST 3. After embedding                          |                       |                    |
| TEST 4. After floor tile                         |                       |                    |

## STEP 2: Layout planning and product selection

King Electric heating cable is used to warm interior floors. It is not to be used for exterior applications such as snow melting or roof and gutter applications. It is not to be used in walls or ceilings. Follow these steps in planning the installation:

**2.1** Draw the room dimensions on a piece of grid paper.

**2.2** Draw in any fixed obstructions such as a shower, bath tub, vanity or counter. The cable is not to be installed under these type of items. In addition, DO NOT run cables into closets or confined areas where heat could build-up.

**2.3** Mark the locations of any toilets, heating vents or any other heating appliance. Note on the drawing that the heating cable must be installed at a minimum distance of:

A. 6" from the center of the toilet drain.

B. 8" from heating vents or any other heating appliance.

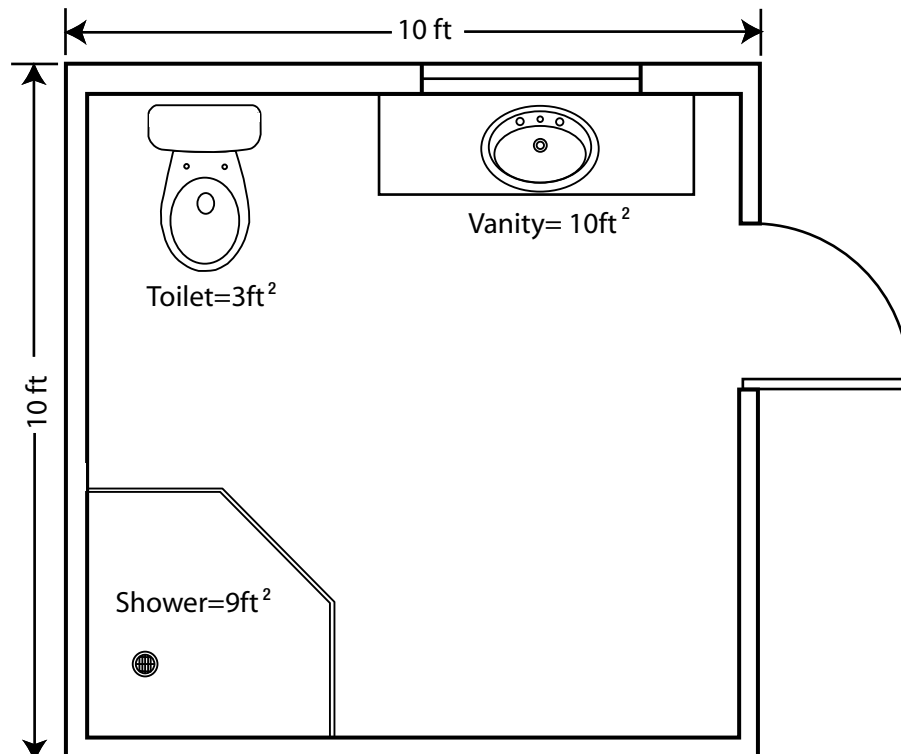
**2.4** Determine the heated area of the floor by subtracting the permanent fixtures. For example: Figure 1.5 the room is 10ft x 10ft equaling 100 square feet. (ft<sup>2</sup>). The area of each permanent fixture is as follows:

A. Vanity = 10ft<sup>2</sup>

B. Toilet = 3ft<sup>2</sup>

C. Shower = 9ft<sup>2</sup>

D. Total heated area: 100ft<sup>2</sup> - 22ft<sup>2</sup> = 78 ft<sup>2</sup>



## STEP 2: Layout planning and product selection (continued)

- 2.5** Border allowance: Heating cable should be installed between 1” and 6” from the perimeter walls, but not more than 1.5” from a kick space vanity, shower, bathtub, counter or doorway. It is not necessary to heat the floor all the way to the wall as it is not typical that people will stand that close to the walls. In addition, the heat will radiate out an additional 2” from where the cable is embedded.
- 2.6** In most cases simply select the cable kit that is 5% but no more than 10% less than the total square footage of the area to be heated as calculated in the previous step. For example: if the square footage after deduction the fixed obstacles equals 74 ft<sup>2</sup>, then the closest cable kit is 70 ft<sup>2</sup> which is 5.4% less allowing for an unheated border. The next size down is 60 ft<sup>2</sup> which is too small and would not be enough cable to properly heat the room.
- 2.7** Selecting the cable spacing:
- A. 3” is the standard spacing and recommended for most flooring heating applications.
  - B. 2” spacing is used for high heat loss applications such as a non-insulated concrete basement floor or bathroom with a large exterior wall.
  - C. 4” spacing is used in low heat loss applications such as in warmer climates where there is a modest temperature rise of less than 15 F is all that is needed.
- 2.8** Select either 120 or 240 volt cable depending on the power supply available. DO NOT mix voltages on the same system when more than one cable is used to cover a room.

| 120V<br>Model | Length |       | Heated area spacing (ft <sup>2</sup> ) |     |     | Watts | Amps | Ohms  | Fast Set<br>Strapping |
|---------------|--------|-------|--|-----|-----|-------|------|-------|-----------------------|
|               | ft     | m     | 2”                                     | 3”  | 4”  |       |      |       |                       |
| FC12120       | 40     | 12.2  | 5                                      | 10  | 15  | 120   | 1.0  | 120.0 | 20 ft.                |
| FC12180       | 60     | 18.3  | 10                                     | 15  | 20  | 180   | 1.5  | 80.0  | 20 ft.                |
| FC12240       | 80     | 24.4  | 15                                     | 20  | 25  | 240   | 2.0  | 60.0  | 20 ft.                |
| FC12300       | 100    | 30.5  | 18                                     | 25  | 35  | 300   | 2.5  | 48.0  | 20 ft.                |
| FC12360       | 120    | 36.6  | 20                                     | 30  | 40  | 360   | 3.0  | 40.0  | 40 ft.                |
| FC12480       | 160    | 48.8  | 25                                     | 40  | 55  | 480   | 4.0  | 30.0  | 40 ft.                |
| FC12600       | 200    | 61.0  | 35                                     | 50  | 65  | 600   | 5.0  | 24.0  | 40 ft.                |
| FC12720       | 240    | 73.2  | 40                                     | 60  | 80  | 720   | 6.0  | 20.0  | 60 ft.                |
| FC12840       | 280    | 85.3  | 45                                     | 70  | 95  | 840   | 7.0  | 17.1  | 60 ft.                |
| FC12960       | 320    | 97.5  | 55                                     | 80  | 105 | 960   | 8.0  | 15.0  | 60 ft.                |
| FC121080      | 360    | 109.7 | 60                                     | 90  | 120 | 1080  | 9.0  | 13.3  | 80 ft.                |
| FC121200      | 400    | 121.9 | 65                                     | 100 | 135 | 1200  | 10.0 | 12.0  | 80 ft.                |



## STEP 2: Layout planning and product selection (continued)

### 240 Volt selection table

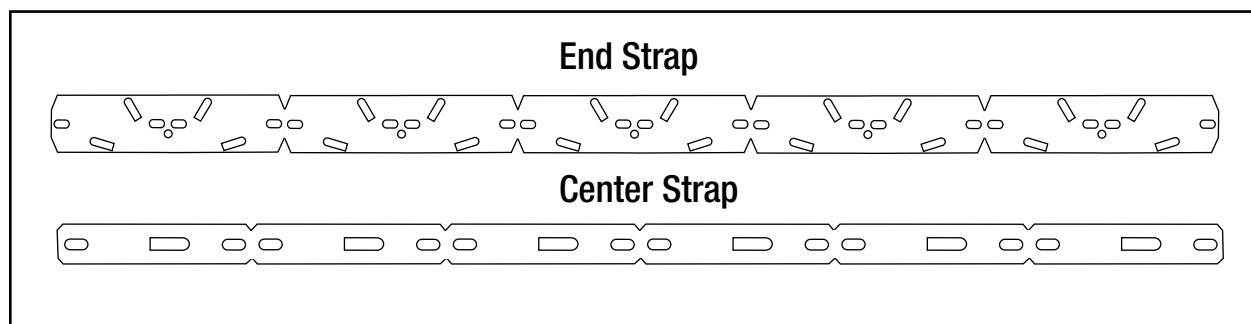
| 240V*<br>Model | Length |       | Heated area spacing (ft <sup>2</sup> ) |     |     |       |      | Fast Set<br>Strapping |         |
|----------------|--------|-------|--|-----|-----|-------|------|-----------------------|---------|
|                | ft.    | m     | 2"                                     | 3"  | 4"  | Watts | Amps |                       | Ohms    |
| FC24240        | 80     | 24.4  | 15                                     | 20  | 25  | 240   | 1.0  | 240.0                 | 20 ft.  |
| FC24360        | 120    | 36.6  | 20                                     | 30  | 40  | 360   | 1.5  | 160.0                 | 40 ft.  |
| FC24480        | 160    | 48.8  | 25                                     | 40  | 55  | 480   | 2.0  | 120.0                 | 40 ft.  |
| FC24600        | 200    | 61.0  | 35                                     | 50  | 65  | 600   | 2.5  | 96.0                  | 40 ft.  |
| FC24720        | 240    | 73.2  | 40                                     | 60  | 80  | 720   | 3.0  | 80.0                  | 60 ft.  |
| FC24840        | 280    | 85.3  | 45                                     | 70  | 95  | 840   | 3.5  | 68.6                  | 60 ft.  |
| FC24960        | 320    | 97.5  | 55                                     | 80  | 105 | 960   | 4.0  | 60.0                  | 60 ft.  |
| FC241080       | 360    | 109.7 | 60                                     | 90  | 120 | 1080  | 4.5  | 53.3                  | 80 ft.  |
| FC241200       | 400    | 121.9 | 65                                     | 100 | 135 | 1200  | 5.0  | 48.0                  | 80 ft.  |
| FC241320       | 440    | 134.1 | 75                                     | 110 | 145 | 1320  | 5.5  | 43.6                  | 80 ft.  |
| FC241440       | 480    | 146.3 | 80                                     | 120 | 160 | 1440  | 6.0  | 40.0                  | 100 ft. |
| FC241680       | 560    | 170.7 | 95                                     | 140 | 190 | 1680  | 7.0  | 34.3                  | 100 ft. |
| FC 241920      | 640    | 195.1 | 105                                    | 160 | 210 | 1920  | 8.0  | 30.0                  | 100 ft. |
| FC 242160      | 720    | 219.5 | 120                                    | 180 | 240 | 2160  | 9.0  | 26.7                  | 120 ft. |
| FC 242400      | 800    | 243.8 | 135                                    | 200 | 265 | 2400  | 10.0 | 24.0                  | 120 ft. |
| FC 242880      | 960    | 292.6 | 160                                    | 240 | 320 | 2880  | 12.0 | 20.0                  | 120 ft. |

\* 240 volt cables are approved for 208 volt, but will produce 25% less wattage.

NOTE: Strapping is sold separately, and is not included with cable.

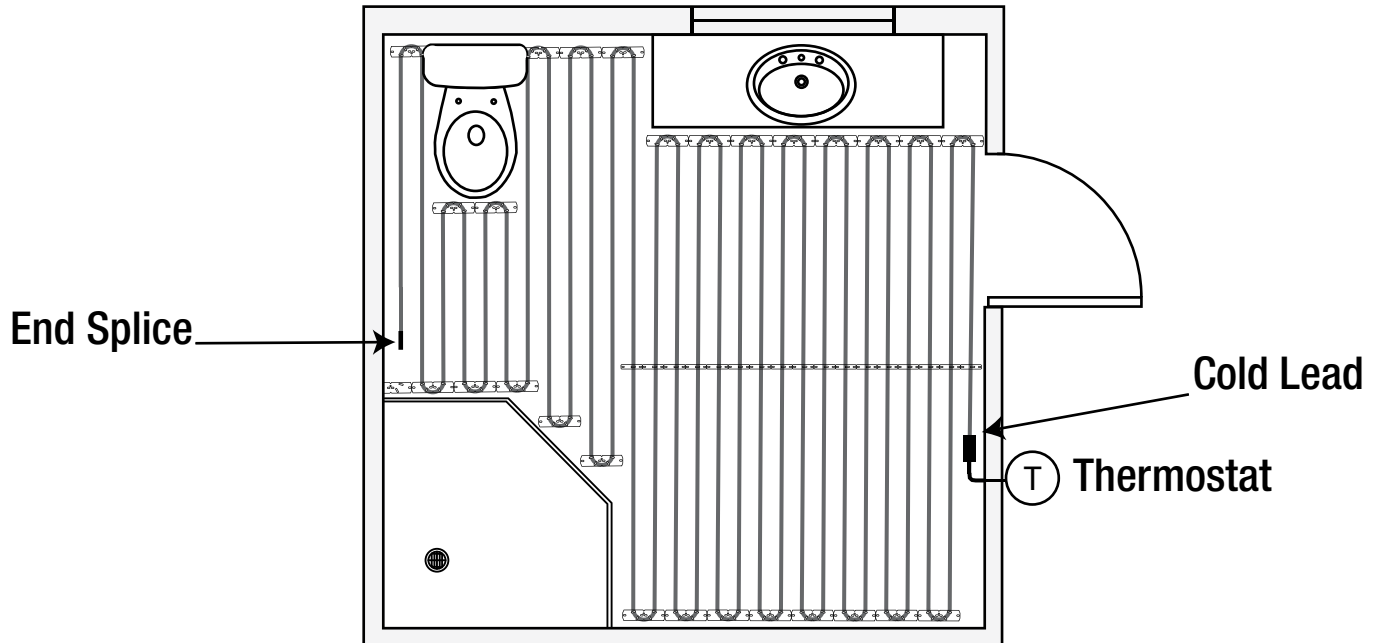
## STEP 3: Thermostat location and strapping layout

**2.9** Draw in the locations of the strapping guides, making sure to identify both the center straps and the end straps in your drawing. The end straps are used to turn the cable 180 degrees while the center straps are used to hold the cable when the end straps are more than 48 inches apart.

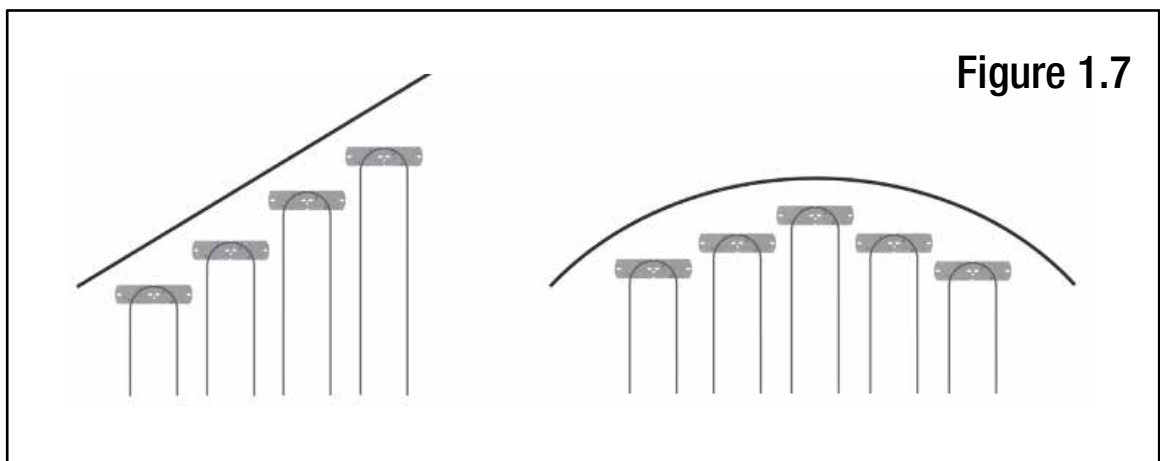


### STEP 3: Thermostat location and strapping layout (continued)

- 3.2** Mark the location of the thermostat on the drawing. This is where the cold lead will drop from the wall box and become the starting point for the heating cable as well as where the floor sensor will be installed.



- 3.2** For walls or obstructions with angles or curves, the strapping can be cut into smaller sections and installed as demonstrated in figure 1.7



## STEP 3: Thermostat location and strapping layout (continued)

- 3.4** Determine the direction of the cable runs. It is recommended that the cable run parallel to the wall that the thermostat is mounted. Center straps are required when the distance between end straps is more than 48 inches. Center straps should be 3 to 4 feet apart.
- 3.5** On average, a 5 to 10% deduction in heated area will create a 2-4" border. To determine the exact distance to mount the strapping from the wall, take the actual room square footage less the selected cable kit less to determine the unheated border. Then take the unheated border and divide it by the perimeter. Now multiply by 12 for the number of inches to mount the cable straps away from the wall.
- A.  $10\text{ft} \times 10\text{ft} = 100 \text{ft}^2$
  - B.  $4\text{ft} \times 10\text{ft} = 40 \text{ft}$  perimeter
  - C. Cable kit selected  $90 \text{ft}^2$
  - D.  $100\text{ft}^2 - 90 \text{ft}^2 = 10\text{ft}^2$  unheated border
  - E.  $10\text{ft}^2 / 40\text{ft} = .25\text{ft}$
  - F.  $.25\text{ft} \times 12\text{in}/\text{ft} = 3"$  from the wall
- 3.6** It is difficult to predict exactly where the heating cable will end, thus it is important to have a buffer zone. A buffer zone is an area where heating is not essential and if unheated will go unnoticed. This area is also used for any excess cable where a higher heated density will also be un-noticed.

### Materials required

- |   |  |
|---|--|
| 1. King floor heating cable                           | 14. Broom                              |
| 2. King floor strapping (sold separately)             | 15. Felt tip marker                    |
| 3. King GFCI thermostat                               | 16. Electrician tools                  |
| 4. King temperature sensor (included with thermostat) | 17. Electric drill                     |
| 5. King instant alert monitor, model FCS11            | 18. Plastic trowel                     |
| 6. Electrical box and cable clamps                    | 19. Hammer                             |
| 7. Wood chisel or router                              | 20. Hot glue gun                       |
| 8. Multimeter or megometer                            |  |
| 9. Electrical wire connectors and cable fasteners     | For installation on concrete slab add: |
| 10. Nail plate (included with cable kit)              | 21. Double backed tape                 |
| 11. Duct tape   |  |
| 12. Stapler   |  |
| 12. Protective glasses                                |  |
| 13. Tape measure                                      |  |

## STEP 4: Electrical rough-in (New construction)



### Mount Electrical Box

- 4.1** Determine the proper location and height (typically 60") for the junction box. The cold lead and the floor sensor lead wires should be in the same stud cavity as the electrical junction box. Install the junction box for the thermostat and run the power supply wires into the box.



### Drill Horizontal Hole

- 4.2** Drill a 3/4" hole 1-1/2" deep horizontally into the sill plate for the cable routing. Drill the hole as close to the bottom of sill plate as possible. Chisel out the bottom of the sill so that the cold lead wire will not create a high spot in the floor when the thin-set is applied.



### Drill Vertical Hole

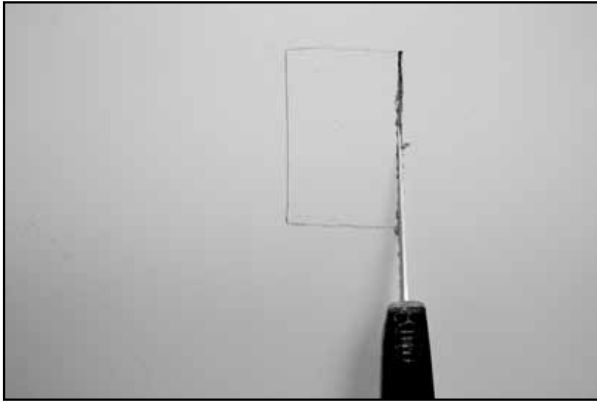
- 4.3** Drill a 3/4" hole vertically into the sill plate 1-1/2" deep. If installing a floor sensor, drill a second set of holes 4" away in the same stud cavity.
- 4.4** Clear the cable routing holes of debris and install in the same stud cavity.



### Install Nail Plate

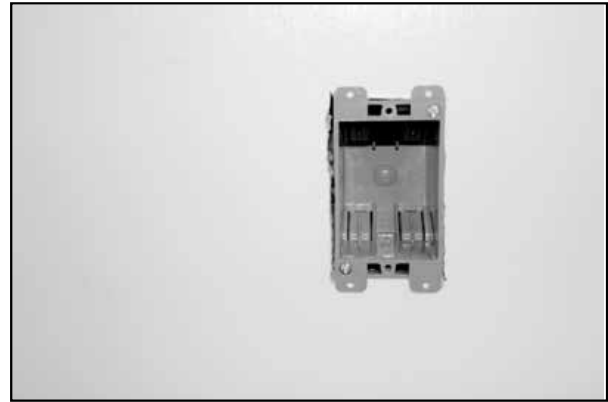
- 4.5** It is recommended to thread a pull string as the cable installation will be done after the drywall is in place. Run a second pull string if a floor sensor is being installed. Otherwise the wires can be fished through the wall with an electrician's fish tape after the drywall is installed.

## STEP 4R: Electrical rough-in (For remodel)



**Cut Hole for remodel J-box**

**4.1R** Determine the proper location and height (typically 60") for the junction box. The cold lead and the floor sensor lead wires should be in the same stud cavity as the electrical junction box.



**Install remodel J-box**

**4.2R** Install a remodel type electrical junction box for the thermostat and run the supply power into the box.



**Chisel channel**

**4.3R** Remove base moldings as needed where the cable routing holes need to be drilled.

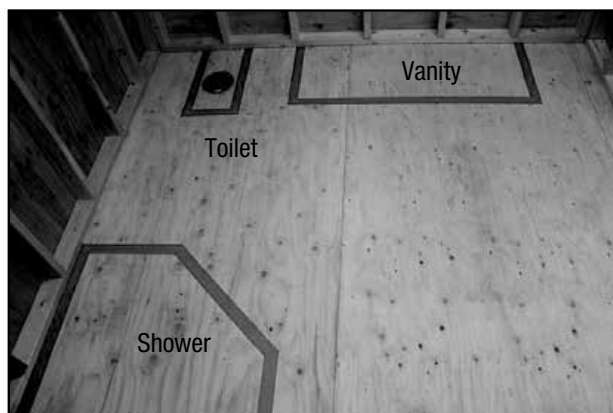
**4.4R** Chisel out a 1-1/2" by 1-1/2" channel into the sill plate 1-1/2" deep. If installing a floor sensor, chisel a second relief 4" away in the same stud cavity.



**Install Nail Plate**

**4.5R** Install a nail plate to protect the wires.

## STEP 5: Transfer layout to floor and plan cable routing



### Plan routing of cable.

- 5.1** Use tape to mark the fixed objects in the room the cable needs to avoid, such as a vanity, shower or bathtub. These areas will remain unheated.
- 5.2** Plan the cable routing around the fixed objects. It is best to plan the cable runs parallel to the longest wall in the room. Be sure to have a plan for the end of the cable, including an overflow area to place any excess cable. The cable **MUST NOT** be cut.



### Install end strapping

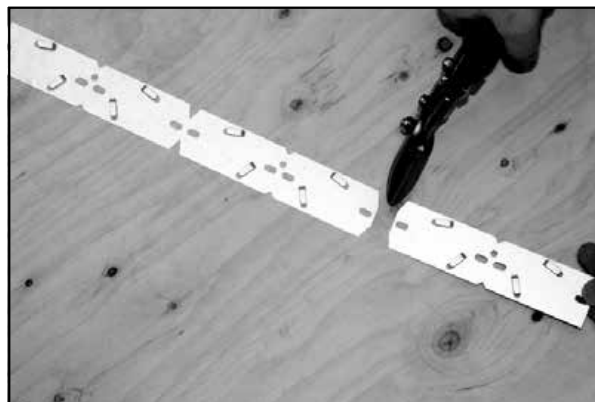
- 6.2** Heating cable should be mounted 1-1/2" from a kick space, shower or bathtub and between 1-6" from walls.
- 6.3** Start mounting the end strapping at the predetermined distance from the wall on one side of the room, then offset the end strapping by 3" on the opposite side of the wall. This will allow for proper alignment of the cable spacing. Tip: use of a chalk line will assist in proper alignment of the end and center strapping.



## STEP 6: Installing the metal strapping

- 6.1** Each strapping kit includes a combination of end and center strapping. End strapping is used around the border while the narrow center strapping is used to install between the end strapping when greater than 4 feet apart.

**Note:** The strapping and heating cable are designed as a complete system. using any other strapping or mounting system will void the warranty.



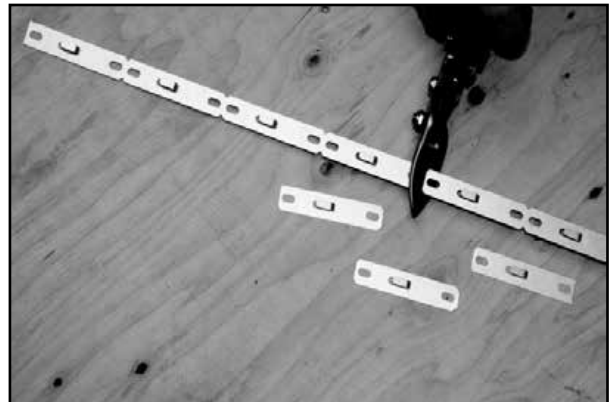
### Cut strapping to fit

- 6.4** Strapping is designed to be cut into smaller sections by using guides located every 6". Cut the strapping into smaller segments to fit the cable layout scheme.
- 6.5** On wood subfloors, the strapping should be fastened with 3/8" staples every 6" using the gap between the pre-punched holes to center the staple gun. The strapping can also be mounted using nails with .25" head or #10 screws. Fasteners are required at the end of ends of each individual piece of strapping to keep it secure.

## STEP 6: Installing the metal strapping (continued)



**Installation in angled areas**



**Center strapping**

**6.6** For angled areas such as a corner shower, cut 6" pieces of end strapping then mount each piece in a staggered fashion as shown.

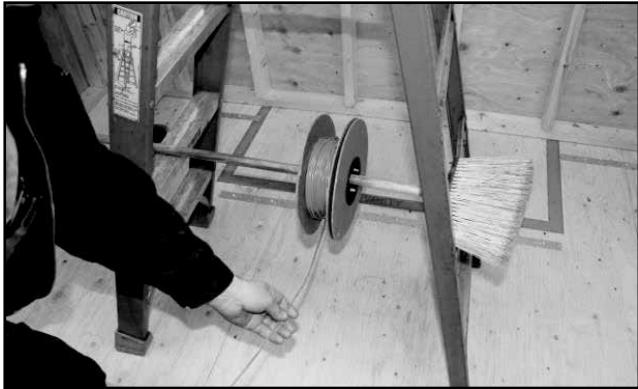
**6.7** When end strapping is greater than 4ft apart, then the center strapping must be installed to secure the cable. Snap a chalk line between the end strapping using the diamonds punched in the strapping to align the centers.



**Fasten Strapping**

**6.8** For installation on concrete surfaces the metal strapping may be attached using double side tape, hot glue or concrete anchors.

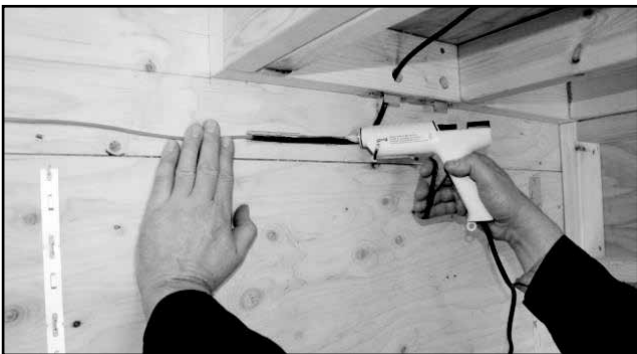
## STEP 7: Installing the cold lead



### Uncoil Wire

**7.1** It is important to properly uncoil the cable to prevent twisting and pig tailing. Insert a rod into the spool hub and let the spool unreel as shown. Unreel the power leads of the cable up to the factory splice and feed it up the wall into the thermostat junction box. The factory splice **MUST BE** mounted on the floor and **MUST NOT** be installed in the wall.

**7.2** Due to the large diameter of the cold lead splice, a .25" deep channel must be cut into the floor to avoid interference with the finished floor. For a wood floor Use a router or wood chisel. For a concrete floor, use An appropriate masonry chisel or power hammer. Remove any debris to avoid damage to the cable.



### Hot Glue Splice

**7.4** Secure any loose (blue) heating cable between the start of the run and the location where the cable is first laced through the strapping. Use the single hole straps provided.



### Chisel .25" Groove

**7.3** Secure the cold lead splice into the chiseled channel with hot glue. **DO NOT USE SCREWS OR STAPLES TO SECURE THE COLD LEAD.**

#### IMPORTANT:

**THE COLD LEAD SPLICE MUST BE FULLY EMBEDDED IN THE MORTAR.** In addition, the cold lead splice **Must not be bent.** No portion of the cold lead should Enter into a wall or drop through a subfloor.

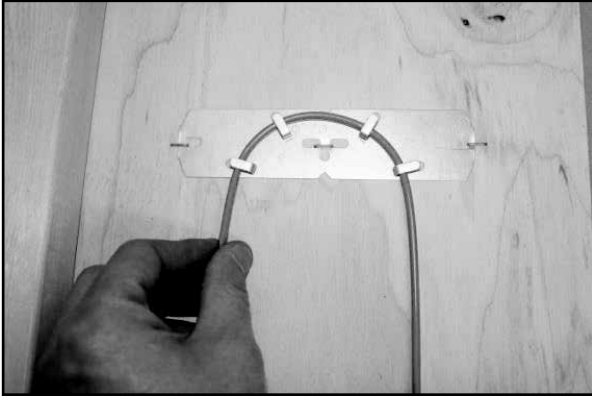


### Install Cable Monitor

**7.5** Install the cable monitor and leave it connected throughout the entire installation process until the tile has set. If the cable monitor sounds an alarm, stop and check the cable for damage. The cable is only to be repaired with a factory splice kit.



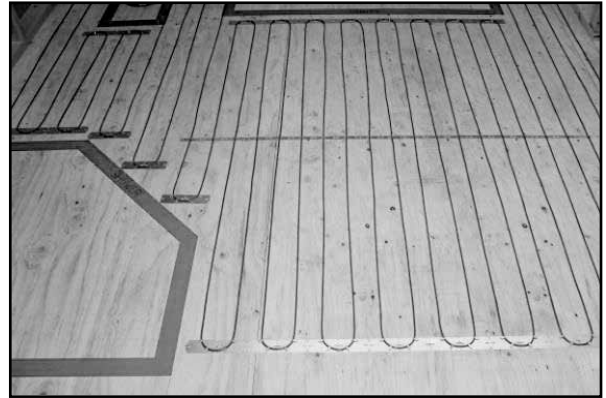
## STEP 8: Lacing the cable through the strapping



### Lace around end straps

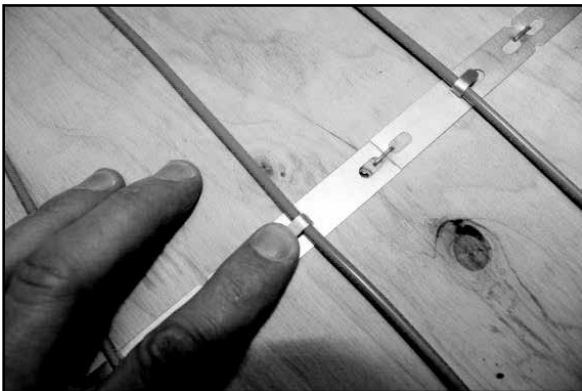
**8.1** Begin at the cold lead splice by running the blue heating cable into the first end strap. Pull the cable around the end strap keeping light tension on the cable while seating it under as well as all the way into the tabs. The tabs are designed in a semicircle creating a 180 degree turn while maintaining the proper 1" bend radius.

**8.2** Lace the heating cable back and forth while maintaining light tension. Lace across the area desired spacing, DO NOT space cable closer than 2". DO NOT pull the cable too tight. It is only necessary to create enough tension to keep the cable from lifting up when applying thin set.



### Weave cable back and forth

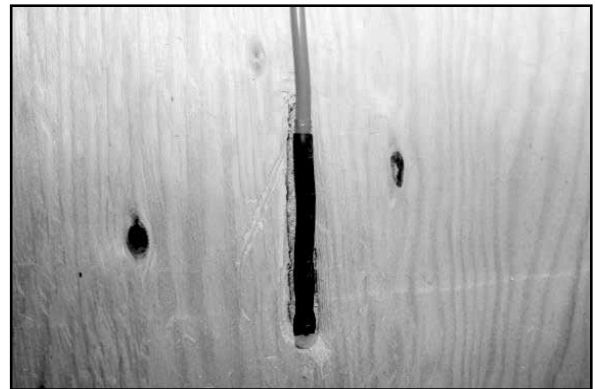
**8.3** Once the area is completed, lightly press down the center straps and one hole straps to secure the cable. DO NOT use a tool, push lightly by hand. It is not Necessary to clamp the cable firmly, apply just enough pressure to keep the cable from coming up when applying the thin set. It is not necessary to push down the end straps as the tension on the cable will be hold under the tabs in the semicircle.



### Push down center strap tabs

**8.4** At the end of the run use the one hole strapping pieces, cut from the center strapping to secure the cable. ALWAYS maintain a minimum distance of 2" spacing.

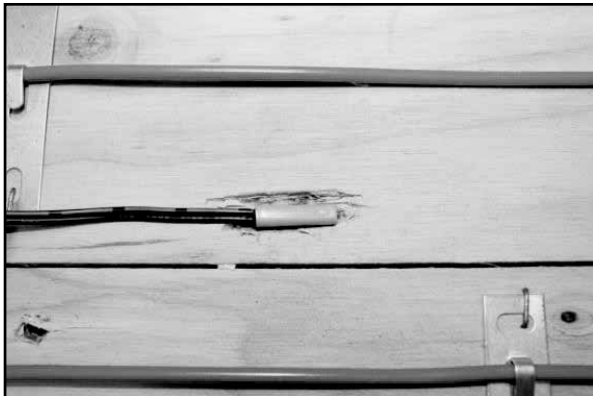
**IMPORTANT:** NEVER LAY ONE CABLE OVER THE TOP OF ANOTHER.  
NEVER STAPLE OVER A CABLE, AND ONLY USE STRAPPING TAB TO HOLD DOWN THE CABLE.



### Chisel groove for end splice and secure

**8.5** The tail splice is slightly larger in diameter than the heating cable and must be recessed into the subfloor. Make a .25" channel into the subfloor and secure the tail splice into the channel and secure with hot glue.

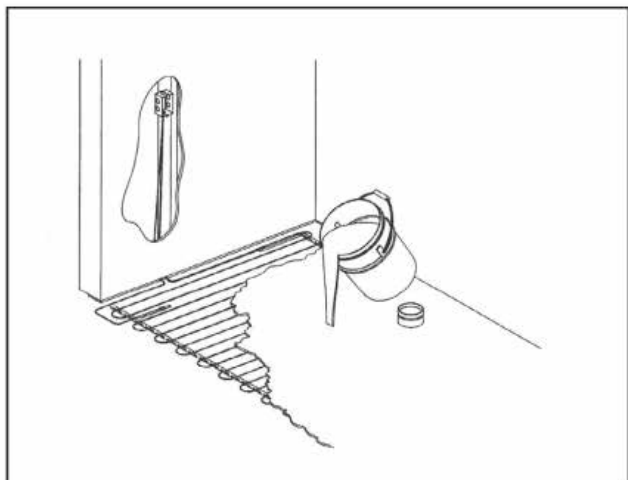
## STEP 9: Install the floor sensor



### Position floor sensor halfway between the heating cables

- 9.1** The floor sensor must be positioned exactly halfway between two heating cables to accurately read the floor temperature. Place the sensor bulb at least 12" into the heated area. Mark the spot on the floor where the sensor bulb will be located.
- 9.2** To make sure the sensor bulb will not create a high spot in the floor, chisel a .25" channel into the floor and lay the sensor bulb into the channel. Apply hot glue to secure the bulb into place.

## STEP 10: Apply scratch coat



### Scratch coat application



### Test cable before embedding

- 9.3** Use a fish tape or pull string to pull the sensor wire to the electrical box, but not in the box.

**IMPORTANT TEST 2:** Test the cable resistance, cable insulation and floor sensor now that the cable is installed on the floor. Record the readings on the cable label and the data table on page 6.

- 10.1** Apply a scratch coat of thin-set or self-leveling mortar uniformly over the entire floor area. Make sure the heating cables are completely embedded. Follow the compound manufacturer's instructions.
- 10.2** Use a plastic straight edge trowel and cover the entire areas that don't have cable to maintain uniform height.
- 10.3** Apply the mortar in the same direction of the cable runs to minimize lateral movement.

**IMPORTANT TEST 3: TEST THE CABLE RESISTANCE, CABLE INSULATION AND FLOOR SENSOR RESISTANCE TO BE SURE NO DAMAGE OCCURRED DURING THE THIN-SET APPLICATION. RECORD THE READINGS ON THE CABLE LABEL AND IN THE DATA LOG ON PAGE 6.**



# Trouble Shooting Guide

| Symptom                                     | Probable Cause  | Solution  |
|---|---|---|
| Cable test resistance measurement is wrong. | Meter is out of calibration or inaccurate.  | Try another meter.  |
|   | Test measurement indicates open or short circuit.   | Cable is most likely damaged and must be replaced.  |
|   | Measurement is slightly out of specified range.   | Room temperature can effect reading, retake the at room temperature between 65F-75F.  |
|   | The ohmmeter could be set to the wrong scale.   | The typical scale is 200 ohms, unless the cable label is rated for more than 200 ohms.  |
| Floor does not heat up.                     | The cable is damaged  | Measure the resistance, if it reads open or short then it must be repaired. Find the damage cable and have it repaired by a qualified installer using a factory repair kit. |
|   | GFCI is tripped   | Reset GFCI control on the thermostat or circuit breaker. If GFCI continues to trip  |
|   | No voltage  | Check circuit beaker, if it is on then test for voltage at the line side of thermostat.   |
|   | Thermostat is not turned on.  | Refer to thermostat manual for operating instructions   |
|   | Incorrect supply voltage.   | A 240V cable supplied with 120V power will not generate sufficient heat. Measure supply voltage with a volt meter.  |
|   | Multiple cables wired in series.  | Multiple cables must be wired in parallel.  |
| Floor heat does not turn off.               | Wiring is incorrect. The control is bypassed.   | Refer to the thermostat instructions for proper wiring.   |
|   | Defective thermostat or floor sensor.   | Replace thermostat and/or floor sensor.   |
| Control is not working properly.            | Check for proper supply voltage, check program, check floor sensor, check for loose connections . | Refer to the thermostat instructions for proper wiring. Replace thermostat if found to be defective.  |
| GFCI false trips                            | More than one GFCI on circuit.  | Verify that there is only one GFCI on circuit.  |
|   | Electric motor or ballast is sharing the circuit.   | The floor heat must be on a dedicated circuit, run a new circuit.   |

King Electrical Mfg. Company will repair or replace, without charge to the original owner, any heating cable found to be defective or malfunctioning within the 20 year warranty. In Case of Product Failure: Contact King Electrical Mfg. Co. at 800.603.5464. The owner will be required to provide, within the designated warranty period, the following information: model number, date of purchase, and a complete description of the problem encountered with product. Upon receipt of the aforementioned, the company will reply to the owner within a period not to exceed fifteen (15) working days, and will provide the action to be taken by owner. Terms: This warranty requires the owner or his agent install the equipment in accordance with the National Electrical Code, any other applicable heating or electrical codes and the manufacturer's installation instructions. It further requires that reasonable and necessary maintenance be performed on the unit. Failure of proper maintenance by owner will void the warranty in its entirety. The company is not liable for any actions it deems to be abuse or misuse of the product. The customer shall be responsible for all costs incurred in the removal or reinstallation of products, including, but not limited to, labor costs, and shipping costs incurred to return products to King Manufacturing. At their discretion, King Manufacturing will decide to either repair or replace the product, with no charge to the owner, with return freight paid by King. The Company shall not be liable for consequential damages arising with respect to the product, whether based upon negligence, tort, strict liability or contract. No other written or oral warranty applies, nor any warranties by Representatives, Dealers, Employees of King or any other person. King Manufacturing can be contacted by phone at 206.762.0400, fax 206.763.7738 or website [www.king?electric.com](http://www.king?electric.com). The company's minimum liability shall not in any case exceed the list price for the product claimed to be defective.