



# SNOW MELTING HEAT CABLE AND MATS

## **Installation Guide**





## GENERAL INFORMATION

The following instructions are designed to assist in installing and operating an electric radiant heat snow melting system.



**PLEASE READ THIS MANUAL BEFORE INSTALLING THE HEATING CABLES/MATS**

Please read this manual in its entirety to ensure that you are familiar with the recommended installation methods for this product. The manufacturer's warranty does not cover failures resulting from improper installation.

### INSTALLATION PERSONNEL

Electricians and installers should thoroughly review this manual prior to installing and operating the radiant heat system. Other system equipment such as aerial and pavement-mount snow sensors and the control unit will include additional instructions.

#### **IMPORTANT:**

Please coordinate and disseminate the information in this installation manual with **all** individuals who will be involved in the preparation and installation of this snowmelt system.

**It is important that this equipment is installed only by a licensed and qualified electrician and in accordance with local laws, codes, regulations, and NEC guidelines.**

## TERMS CONCERNING SAFETY

The terms WARNING, CAUTION and NOTE are used in these instructions to highlight particular dangers and/or to provide additional information on aspects that may not be readily apparent.

**NOTE:** Provides additional technical information on topics/methods that may not be very obvious, even to qualified personnel.

**CAUTION:** Indicates that property/equipment damage can occur if proper precautions are not taken.

**WARNING:** Indicates that severe personal injury, death, and/or substantial property damage can occur if proper precautions are not taken.

**ATTENTION:** To avoid possible injury to personnel or damage to the heat cable or other snowmelt system equipment, WARNING and CAUTION notes must be strictly followed. Modifying this product, substituting non-factory parts or using installation procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment and may void existing warranties.

# Contents

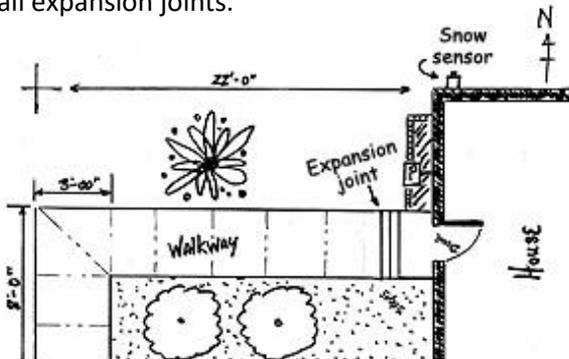
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# Pre-Installation Preparations

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1. Prepare a diagram of the work area or work site. (A sample worksheet is available on page 53.)
2. Note all of the areas to be heated.
3. Identify the size and location of drains, planters or any features within your project that cannot be heated.
4. Take accurate measurements. This is crucial for proper installation.
5. Determine what type of snow sensor will be used (aerial, aerial w/remote head, or in-ground sensor).
6. Note the preferred location of the snow sensor. Avoid areas that could cause false or no triggering of the controller (i.e. under an eave or a tree). Refer to the installation instructions provided by the snow sensor manufacturer.
7. Identify J-box locations to provide power connections to your heating cables or mats.
8. Determine the primary power source, voltage, and maximum current available at this site.
9. Indicate the intended embedment material.
  - a. Concrete
  - b. Asphalt
  - c. Pavers with sand
  - d. Pavers with mortar
10. Estimate degree and direction of slope, if applicable.
11. Show all expansion joints.



*Sample layout drawing.*



## Before Installing the System

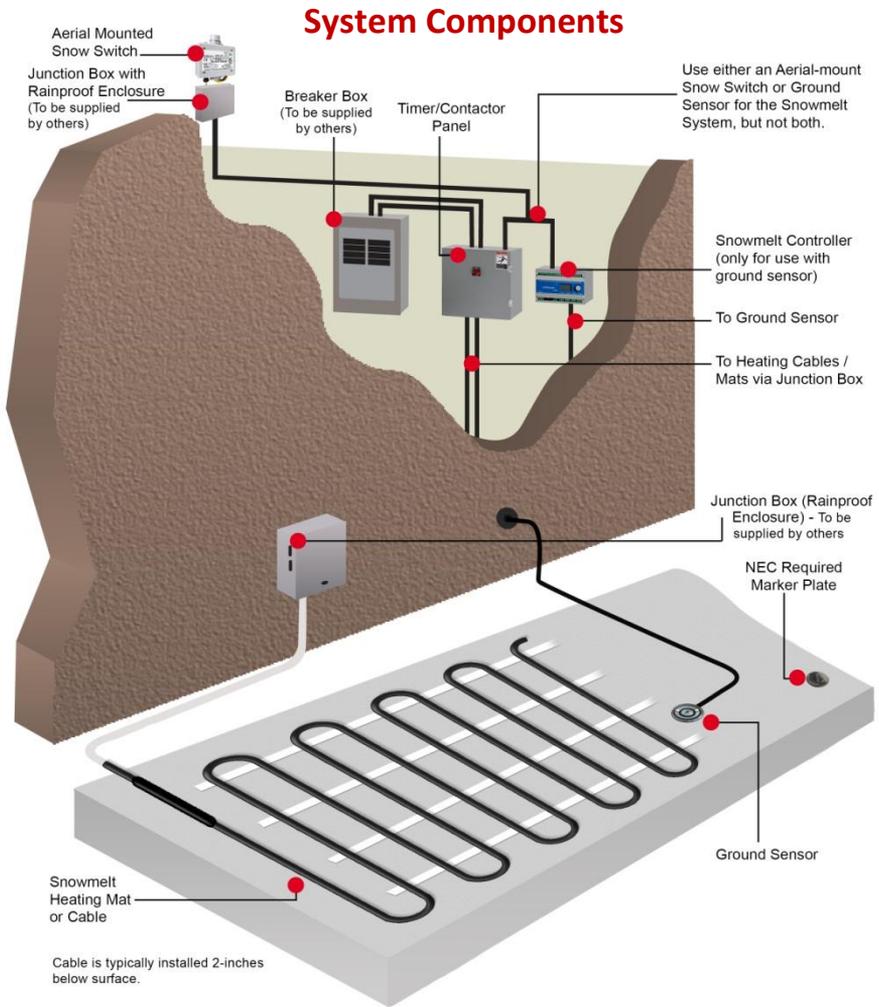
1. **Heating cables/mats must not cross, touch or overlap at any point.** This will cause the heating cable to overheat and burn out. These failures are not covered by the manufacturer's warranty.
2. **The heating cable (or heat cable in mats) must not be cut or altered under any circumstances.** Doing so will destroy your product and void the warranty on the cable. The cold lead can be cut and extended to suit the installation as well as the ribbon/tape holding the cable in mat form. Use the appropriate feeder wire gauge compensated for voltage drop when extending the cold lead.
3. Do not subject the splice (cold lead/heating cable) to excessive strain. Do not flex the splice. Do not allow the splice to be immersed in water prior to embedment. Bag the end of the cable until it is installed in a weatherproof J-box.
4. Take precautions to avoid damaging the heating cable during installation. Avoid striking the cable with sharp metal tools such as trowels, rakes and shovels.
5. Avoid walking or placing heavy objects on the heat cable. Do not roll a loaded wheelbarrow over the cable/mat without first protecting it.
6. Do not install heating cable/mat below 10°F (contact Technical Support if the heating cable must be embedded at a colder temperature).
7. The minimum bending diameter of the heating cable shall not be less than 6-8 times (about 2-inches) the diameter. Bending the heat cable beyond this limit may cause non-warrantable damage. The minimum spacing between heating cables is 2-inches.
8. Check the voltage and the wattage on the white tag attached to the heating cables to verify it matches your order. A qualified electrician should be contracted to install and connect the snowmelt system.

9. As part of Step 6 in the *Inspecting Heat Cables and Mat* section, the insulation resistance should be measured with a Megger®. The measurement should be more than 200 megohms at 500VDC when measured with a Megger.



10. Heating cables/mats should be embedded as soon as possible once they have been laid out. The heating cable splice should not be allowed to sit in standing water. The heating system should be covered (protected) if the embedment process is delayed. The heating cable/mat splice must be in the embedment. (Do not pull the splice into conduit.)
11. Keep the power cable/mat(s) conduit separate from the sensor cable conduit.
12. Allow sufficient drying or curing period of the embedment before powering your snowmelt system for the first time. (E.g., Concrete requires a minimum of 30 days to cure.)

# Radiant Heat System Components



*Overview of snow melting system components.*

## Inspecting Heat Cable and Mats

The heating cables/mats should be inspected prior to installation.

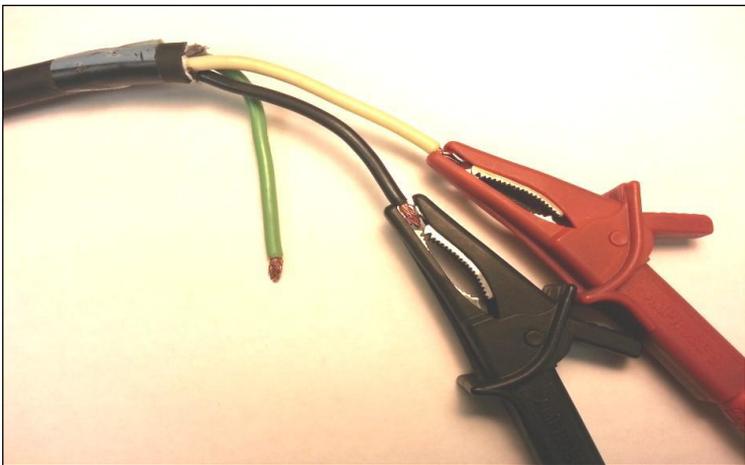
- Check the white tag on the cable/mat for the voltage and wattage.

Wellspring Manufacturing		CSF <sup>®</sup> c US		
<b>Snow Melting Cable</b> Series Type for Embedded Heating File No. xxxxxx				
Part #	:	SC23754500		
Cable Length	:	375 ft		
Total Watts	:	2,500 W		
Rated Voltage	:	240 V		
Nominal Resistance	:	23.1 Ohms		
Amperage	:	10.4 Amps		
Usage Marking	:	WS,X		
Serial Number	:	##-#####		
Spacing (inches)		2"	3"	4"
Coverage Size (sq. ft.)		63	94	125
Watts per sq. ft.		72	48	36
<b>Do not cut the heating cable</b>				

- Verify that it matches your order details (on quote).
  - Please use the following procedures to check the heating cable/mat resistance and the insulation resistance of the heating cables. **DO NOT SKIP THIS STEP.**
1. Check the element resistance of each of the heating cables/mats that will be used for this project. For this procedure you will need a digital or analog multimeter (a volt ohm meter). Most meters will have a resistance scale. Set the meter to the appropriate resistance scale for the measurement to be made.



2. Each heating cable or mat should be checked individually by measuring for resistance between the BLACK and the RED (or WHITE) heating element in the cable. The meter should display a very low ohms reading on the display. Check this reading against the tag on the cable to verify that it matches this value.



3. When checking the element resistance of each cable, the meter should be set to the lowest possible OHMS setting (1X) that is above the cable resistance on the tag.

**NOTE:** Before taking the insulation measurement in an asphalt application, the asphalt must be cooled to the ambient temperature, otherwise false readings will occur.



4. When using a Megger, check between the BLACK and the GREEN, and the RED/WHITE and the GREEN only! Contact your sales rep or tech support if a cable measures  $< 200 \text{ M}\Omega$  @ 500VDC.



**NOTE:** If the readings taken are different than the numbers on the white tag on the cable, stop the installation immediately and contact support (801.948.7577).

Ohms ( ) =  $\frac{\text{Voltage}}{\text{Current}}$

240V  
23.8A = 10.08 ohms

-5% to +10% variance is acceptable.



- Write down the reading for each cable/mat on the warranty card (see page 54). Resistance readings should be verified in the box, after layout and after embedment. Completed warranty cards are required for the extended warranty.

### WARRANTY CARD

Name:	<input style="width: 95%;" type="text"/>		
Address:	<input style="width: 95%;" type="text"/>		
Zip/Postal Code:	<input style="width: 20%;" type="text"/>	State / Province:	<input style="width: 50%;" type="text"/>
Phone:	<input style="width: 20%;" type="text"/>	Order number:	<input style="width: 50%;" type="text"/>

PLEASE OBSERVE:

To qualify for the manufacturer warranty, the following fields must be filled in and the warranty card submitted within 14 days of installation. (Please submit a warranty card for each cable/mat.)

Name of Installer:	Telephone Number:	Date of Install:
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
Name of Electrician:	Telephone Number:	Date:
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>

PRODUCT INFO

Serial Number:	Nominal ohm value from cable tag:	Resistance value between conductor 1 and 2:
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
Date of Purchase:	Ohm value - before installing:	Resistance and megg value conductor 1 to cable ground braid:
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
Size (ft. or sq. ft.):	Ohm value - after installing:	Resistance and megg value conductor 2 to cable ground braid:
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
Total watts:	Ohm value - after embedment:	Floor covering / Top layer:
<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input type="checkbox"/> Concrete <input type="checkbox"/> Asphalt
Cable tag voltage:      Applied voltage:	Ohm value - after top layer:	<input type="checkbox"/> Paver / Tile <input type="checkbox"/> Other
<input style="width: 20%;" type="text"/> <input style="width: 20%;" type="text"/>	<input style="width: 95%;" type="text"/>	

- Check insulation resistance with a Megger® (insulation tester) to verify that the cable has not been damaged. The cable should read 200 meg ohms or higher (208-277V), 400 meg ohms or higher (480-600V). Infinity is the ideal reading.

# Installation Basics

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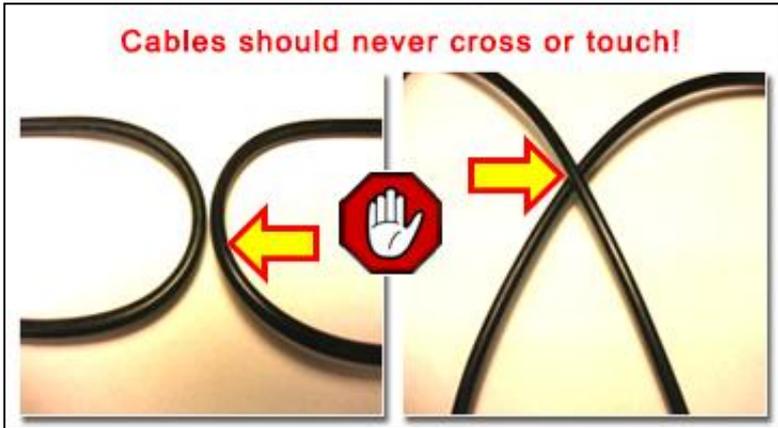
This section covers the basics of installing heating cables and mats. Please refer to the section that covers your specific embedment material (concrete, asphalt, pavers) for detailed installation information. Proper installation of the heating cables or mats will provide reliable, trouble-free operation.

**WARNING: For your safety, all electrical connections must be completed by a qualified electrician.**



- A. **Never cut or alter the heating element/cable.** Heat cable is listed as an appliance and cannot be shortened to make it fit in a particular area. Excessive cable (or cable in the mat) can be consumed by decreasing the OC (on-center) spacing or by routing the cable around the perimeter – keeping within the heated area. Minimum spacing is 2-inches, center-to-center.

**NOTE: All of the heating cable must be embedded.**



- B. Heat cables must never touch, cross or overlap or the cable will burn out in that section because of excessive heat. Minimum spacing is 2-inches (center-to-center) between the heat cables.



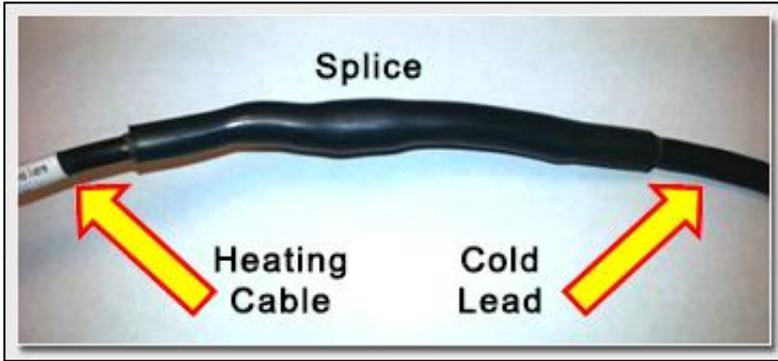
- C. Heating cable/mats should **never** cross or pass through an expansion joint. Special precautions should be made if the heating cable is to be placed under a control joint. (Tooled or cut joints are not to exceed 1¼-inches in depth.) The heat cable must be at least ¾ to 1-inch from the bottom of the control joint.



- D. Great care should be used when working around the heating cables or mats. Shovels, trowels, rakes and other sharp tools can damage the cable. Avoid unnecessary walking on cable.



- E. The heating cable or mat should never sit in standing water, and should be embedded as soon as possible. The ends of the cable and cold lead should be bagged or protected from water infiltration until connected in a waterproof J-box.



- F. All of the heating cable / mat must be embedded, including the splice **and** 6-inches of the cold lead. The splice should not be subjected to excessive strain or bending.

## Mat Fitting

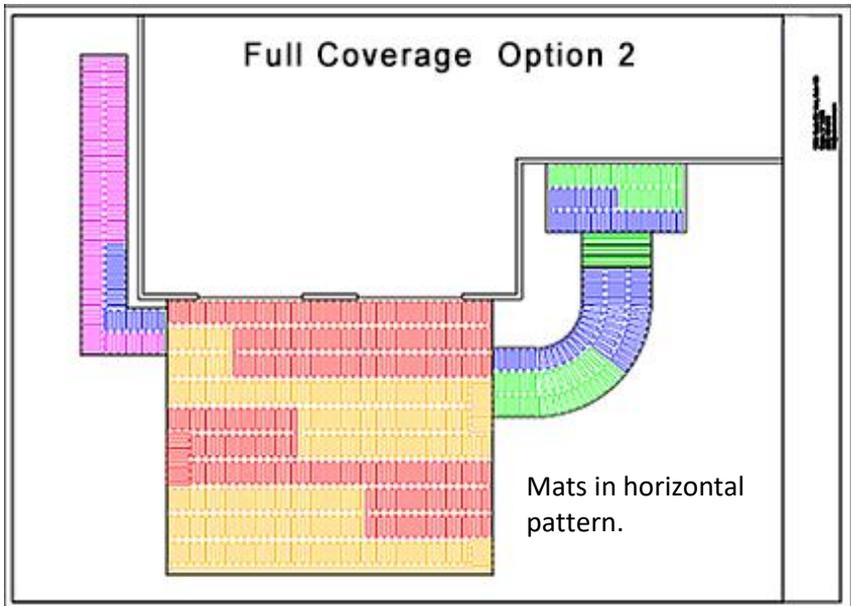
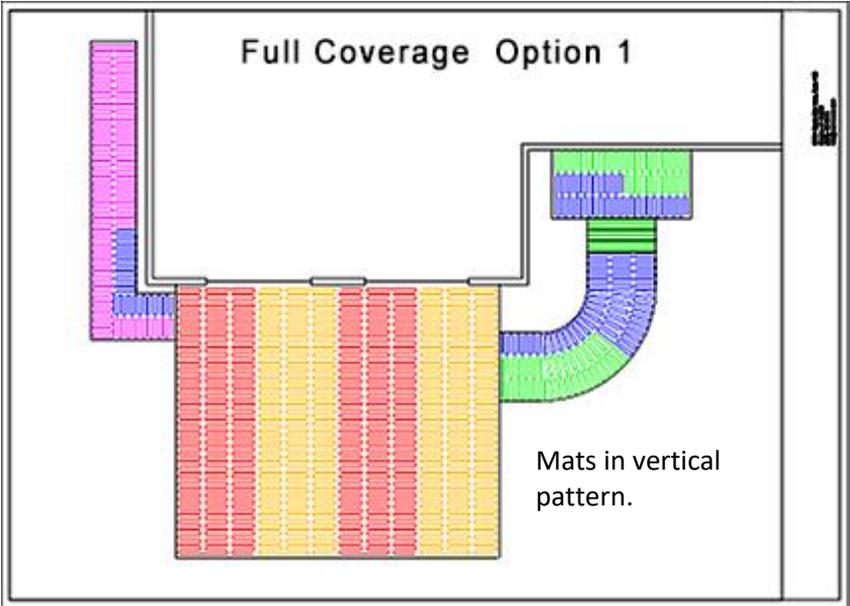
Heating cables pre-spaced in mats are a convenient option, and are generally easy to install. There are many different ways the mats/cables can be installed. The tape in the mats can be cut so the mats can be fitted to wide variety of areas.

**NOTE:** *Remember, only cut the tape that is holding the heat cable; not the heat cable itself.*

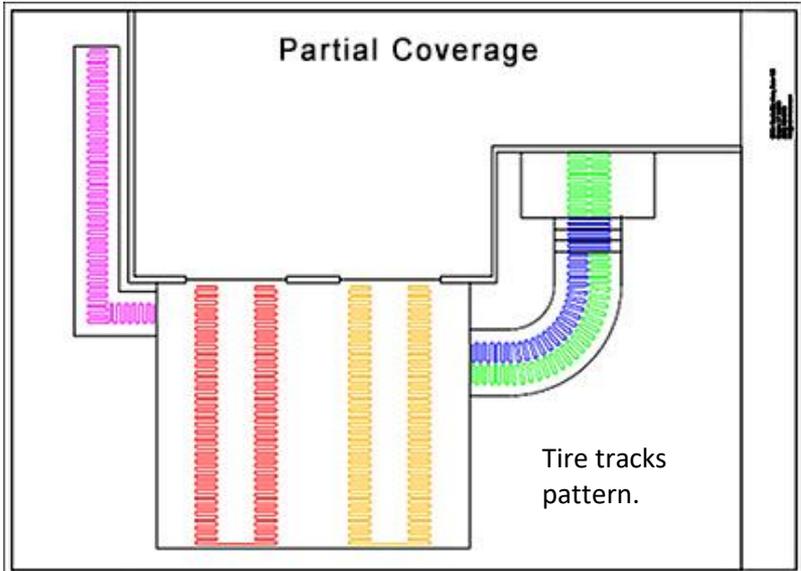
For information on creating turns with mats by cutting the tape backing, refer to page 20.

## Layouts

The same area can have mats installed horizontally or vertically.



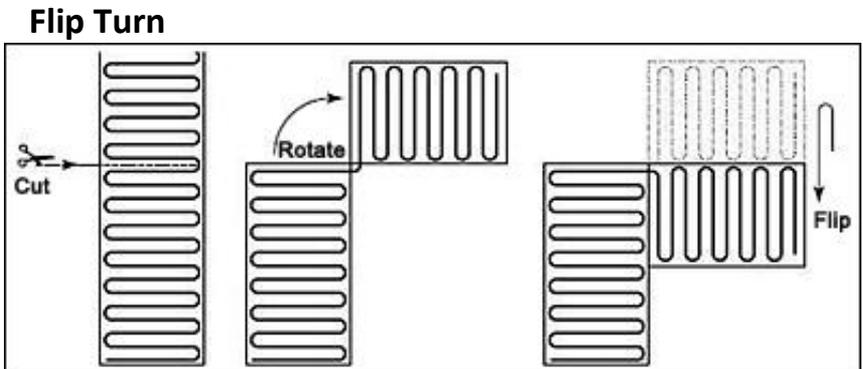
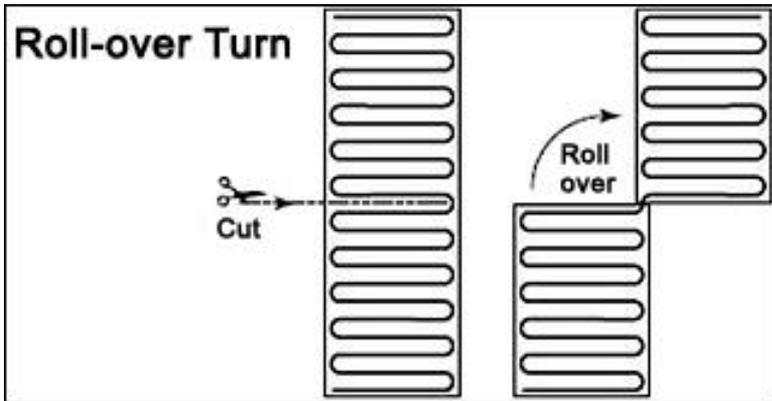
The same area can be heated with a tire track pattern.



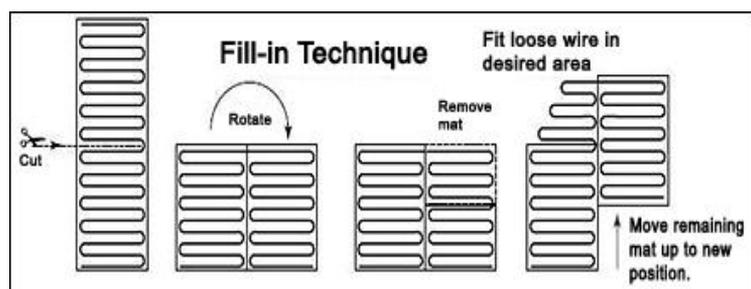
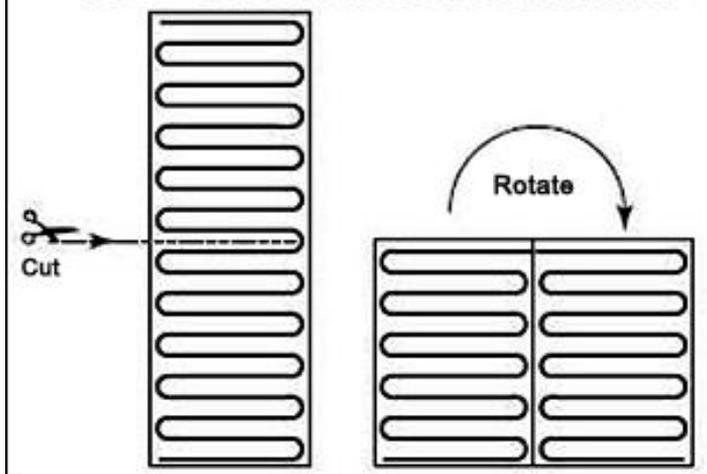
## Types of Turns

There are a few types of turns and techniques that can be used when installing the heating mats.

**CAUTION:** When making turns, only cut the white binding tape. **Do not cut the heating cable.** Cutting the heat cable will cause the system to not function and will void the warranty. If a heating cable is cut or damaged, cease installation and contact the manufacturer or place of purchase immediately. Do not energize damaged or cut heating element.



## 180° or Back-to-Back Turn



**CAUTION:** Be careful to not kink or sharply bend the heating cable. A recommended minimum bend diameter of 2 inches, center-to-center (6-8 times the diameter of the cable) should be maintained.

## Adjusting the Length of your Heating Cable or Mat to fit your Project

If you have extra heating cable or matting, then please utilize the following techniques to use all the material.

**CAUTION: NEVER CUT THE HEATING CABLE. This will destroy the heating cable/mat and void your warranty.**

1. Tighten the spacing between the cable runs on a mat.
  - a. Fold the tape/ribbon and secure it together, closing up the spacing in the mat. (Minimum spacing is 2-inches center to center spacing.)
  - b. Attach the heating cable to the rebar/remesh/metal screen material using plastic ties closing up the spacing. (Minimum spacing is 2-inches center to center spacing.)
2. Route extra cable around the perimeter of the project, making sure all heat cable will be in the embedment material. Maintain a minimum spacing of 2-inches center-to-center between all heating cables or mats and 1-inch from the edge of the embedment or any area or object that is not to be heated.
3. Do not route the extra heating cable outside the embedment area. All heating cable/mats MUST be embedded. Heating cable cannot touch, cross, or overlap other heating elements.

## General Snowmelt System Information and Tips

Snowmelt systems must be protected by a Class B Ground Fault Equipment Protection circuit breaker (GFEP). **Do not use GFCI or Class A circuit breakers.**

Snowmelt systems should **NOT** be activated above 50°F (ambient) temperature.

Circuit breakers should be deactivated during the spring and summer months to prevent unintended activation of the snowmelt system.

All heating cables or mats should be checked for continuity and resistance prior to being embedded.

Do not install heating cables or mats if the ambient temperature is below 10°F.

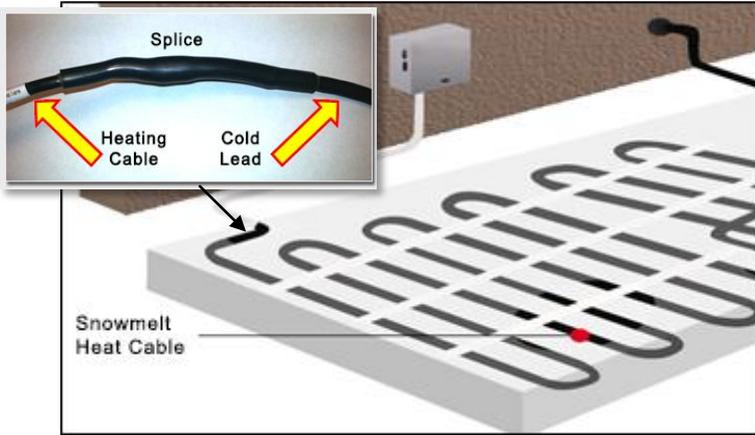
**NOTE:** *An automatic activation device is highly recommended.*



**NOTE:** *Before taking the insulation measurement in asphalt applications, the asphalt must be cooled to the ambient temperature, otherwise false readings will occur.*

## Installation Steps (for ALL Applications)

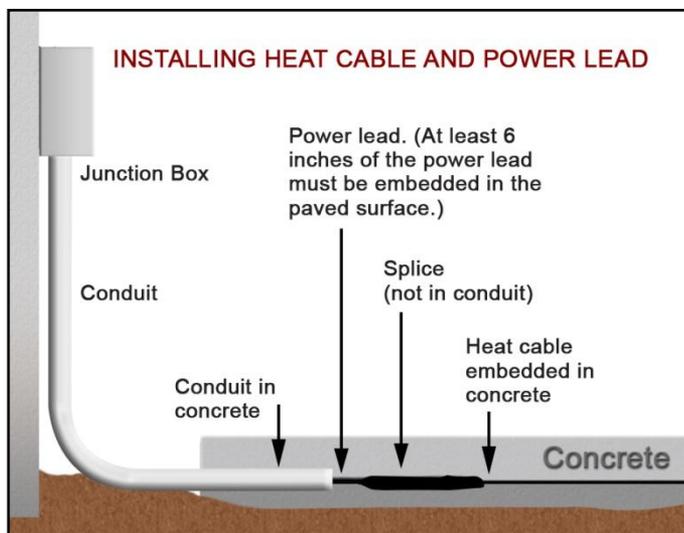
1. Begin installation as close as possible to the electrical source. The heating cable must not be cut or shortened. The splice between the cold lead and the heating cable must be completely embedded.



2. If the contactor panel is more than 15-feet away from heating cables/mats, plan where the junction boxes (for connecting the heating cable to the contactor panel) will be mounted. Follow local code and the NEC for conduit sizes.
3. The cold lead on the heat cable and mats is not rated for direct burial in earth and must be run through a conduit. (The first 6-inches of the cold lead and splice must be embedded in the heated surface.)
4. Run a conduit from the in-ground J-box (i.e., Quazite by Hubbell or Christy Box by Christy) into the heated surface to within 6-inches of the cable/mat splice.
5. Rise up into the heated surface from the minimum required conduit depth for your area (Follow NEC and local codes).
6. Multiple cold leads may be in the same conduit, but the conduit must be sized for the circular square inches of the wire and de-rated for current, per code.

7. Use a separate conduit for the ground sensor (if applicable). **Do not run the ground sensor in a power conduit.** The cup for the sensor MUST be installed BEFORE the pour. The sensor cup must be installed between two runs of heating cable located in the area it is to control. For detailed installation instructions, refer to the documentation provided in the packaging of your ground-mount snow sensor.
8. Route all cold leads in a conduit from the pour to the power connection box (J-box). The entire splice and 6-inches of cold lead must be embedded. The cold lead is NOT rated for direct burial.

**NOTE:** *Great care should be used when working around the heating cables and mats to ensure that they are not damaged by shovels, rakes, trowels or other sharp tools.*



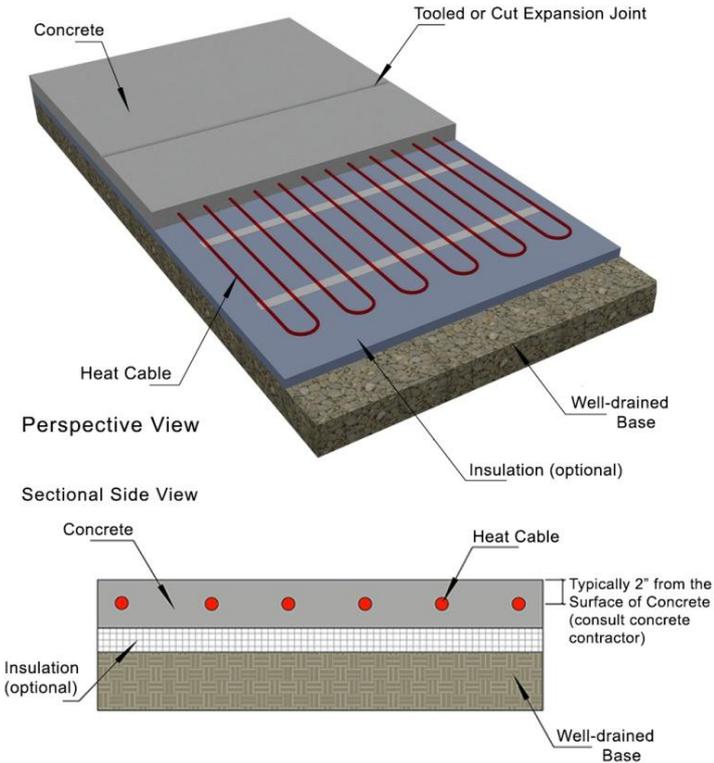
9. Pull the cold lead of the cable through conduit pipes into the junction box. Do not use excessive force to pull the cold leads, otherwise damage to the hot/cold splice may occur.
10. Ensure that all sharp stones and debris are removed from the heating area.

**If you are installing under concrete (page 26), pavers (page 36), or in asphalt (page 44), refer to the corresponding section to continue your installation at this point.**

# Installing Heat Cable and Mats

## Concrete Installation Basics

### Heat Cable in Concrete



System Diagram: *Heat cable in concrete.*

**DO NOT cover a heating cable or mat that may be damaged.**

**NOTE:** Remember to check the element resistance and the insulation resistance of the heating cable/mat at the recommended intervals:

- In the box: Write the values on the warranty card.
- After being laid out: Write the values on the warranty card.
- After being covered: Write the values on the warranty card.
- Record readings in manual (see page 54).



*Pavement mount snow sensor*

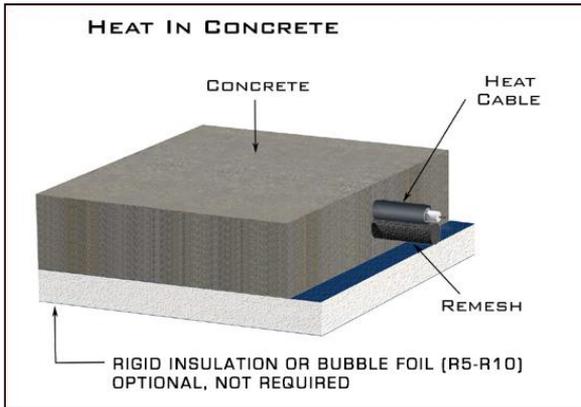
**NOTE:** *If a pavement mounted snow sensor is being used, the rough-in must be completed before pouring the concrete. (For detailed sensor installation instructions, refer to the installation documentation provided in the packaging of your ground-mount snow sensor.)*

## Installation in Concrete

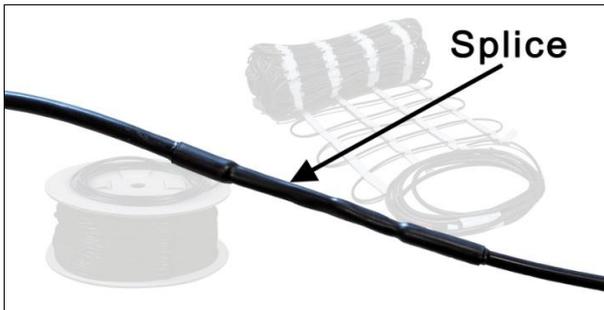
First, complete Steps 1-10 on pages 24-25.



11. (Continued from Step 10 on page 25.) Insulation may improve efficiency (check local codes if required in your area). Make sure that the heating cable is NOT pressed into the insulating materials if used.



12. Do not flex or strain the cable splice by pulling on the cable. The entire splice must be embedded in the concrete. **The splice must not be pulled through the conduit.**



13. Lay the cables/mats according to the plan and fasten them to the remesh or rebar (using plastic zip-lock ties) so that they do not move during the concrete pouring.

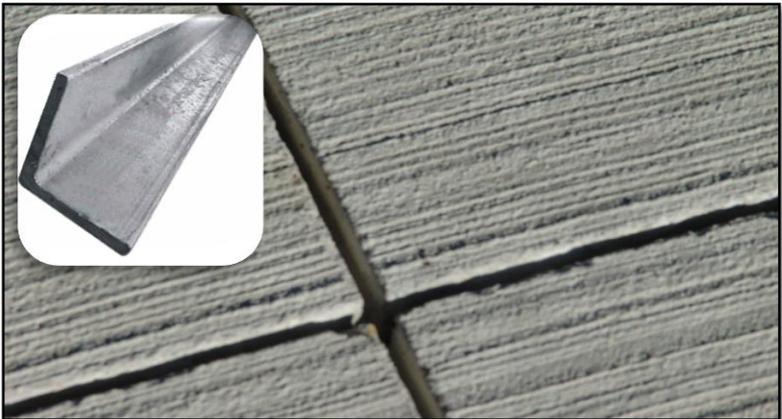
**NOTE:** Heating cable must be fastened to the remesh at regular intervals to keep it from floating to the surface.

14. **NEVER RUN HEATING CABLE OR MATS THRU AN EXPANSION JOINT.** All heating cable and mats should be isolated to a single pour area.



15. Control joints are allowable under the following conditions:

- The joint is tooled or cut NO deeper than 1¼-inches.
- The cable must be ¾ to 1-inch below the bottom of the joint.
- For added protection, a 6-inch piece of ¼-inch angle iron may be used to shield the cable any place where a control joint will pass over it. The heating cable is tightly strapped to the angle iron with plastic zip ties.
- If angle iron is used, mark the forms where the angle irons are located to accurately place the control joints.



16. Roll out the heating cable or mat. Heating cable or mats should be installed away from the perimeter a minimum of half the spacing. For example, cable installed with 4-inch center-to-center spacing should be at least 2-inches from the perimeter.

**Maintain proper spacing:** Heating cable/mats should be spaced at no less than 2-inches center-to-center and no more than 4-inches center-to-center. This also applies to adjacent heating mats.



*Rolling out the heating mat prior to the concrete pour.*

**NOTE:** You can alter the direction of the mat by cutting the binding tape and repositioning the mat. **Be careful to not cut the heating cable.** Fasten the heating cable to the wire mesh to keep all parts of it at the correct depth.



**NOTE:** Refer to page 20 for information on types of turns.



17. Secure the heating cable/mat to the wire mesh or grid using plastic zip ties. Make sure that the cable/mats and the wire mesh are secure so that they will not move or shift when the concrete is being poured.



18. The heating cable will need to be positioned 2-inches from the surface of the concrete. Use wire remesh and Mesh-Ups or concrete dobies/chairs to position the heating cable within 2-inches of the surface. **The heating cable/mat should never rest on the ground.**





**IMPORTANT NOTE:** *If you are installing an in-ground snow sensor, it is important that you refer to the installation instructions provided in the packaging of your sensor prior to pouring the concrete. **The sensor cup must be installed before the concrete pour.***

## Pouring Concrete

1. Pour the concrete over the heating cable/mats. Take care to not damage the heating cable. A typical slab is 4-inches thick. Follow your concrete contractor's installation methods and follow all building codes. The heating cable is to be within 2-inches of the finished surface.
2. Great care should be used when working around the heating cables and mats to ensure that they are not damaged by shovels, rakes, trowls or other sharp tools. If possible, avoid walking on the cable. Any damaged cable or mat should be immediately evaluated and repaired (or replaced). Concrete should be carefully poured to ensure that the heating cables or wire mesh do not move. Do not install the heating cables or mats if ambient temperature is below 10°F.

3. There must NOT be any heating cable or mat protruding from the surface of the concrete after the pour. Ensure that there are no air pockets in the concrete. **The concrete must be completely cured prior to activation.**

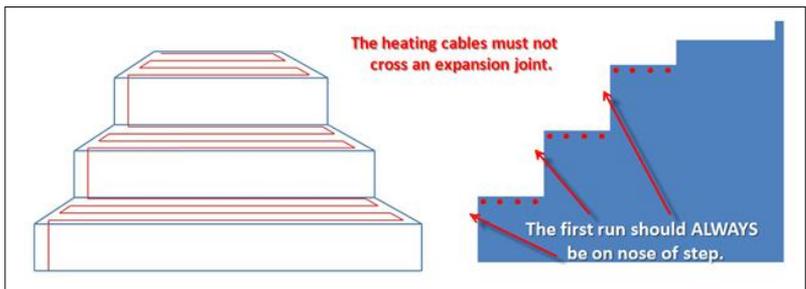


4. Tamp the pavement marker into the concrete between the heating cables/mats before the concrete starts to set. National Electric Code requires a marker be placed to indicate that heating cables are embedded in the concrete.



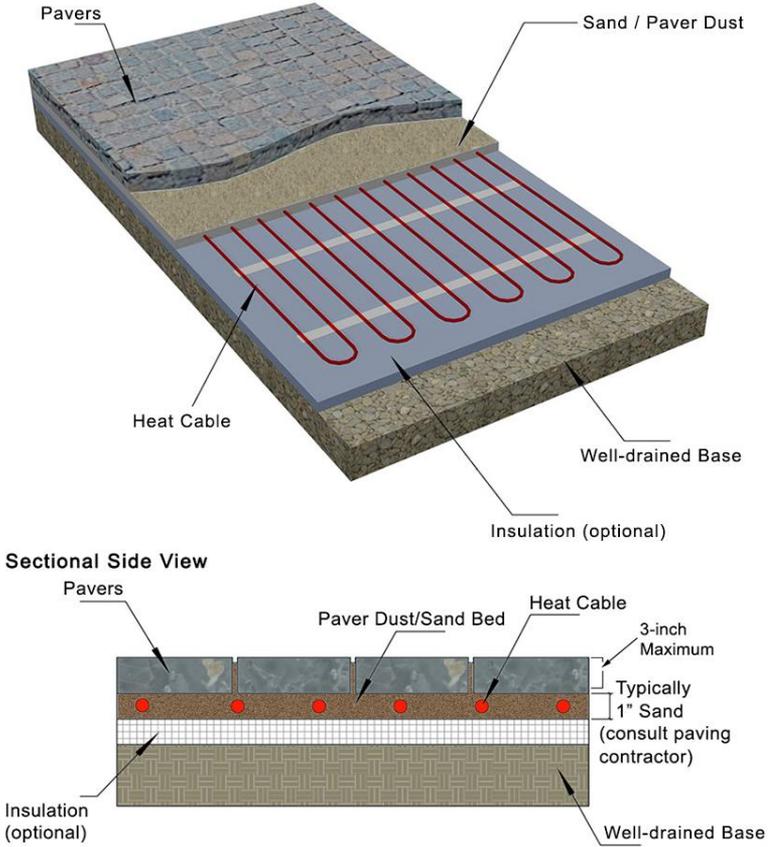
## Installing Heat Cable in Stairs

1. Only use heating cable off the spool (rather than mats) on steps.
2. Use a minimum of four runs of cable per step.
3. The first run should always be as close to the nose of the step as possible.
4. The heating cable must not cross an expansion joint.
5. Insulation will be required for suspended stair cases.



# Installation Under Pavers

## Heat Cable in Sand Under Pavers



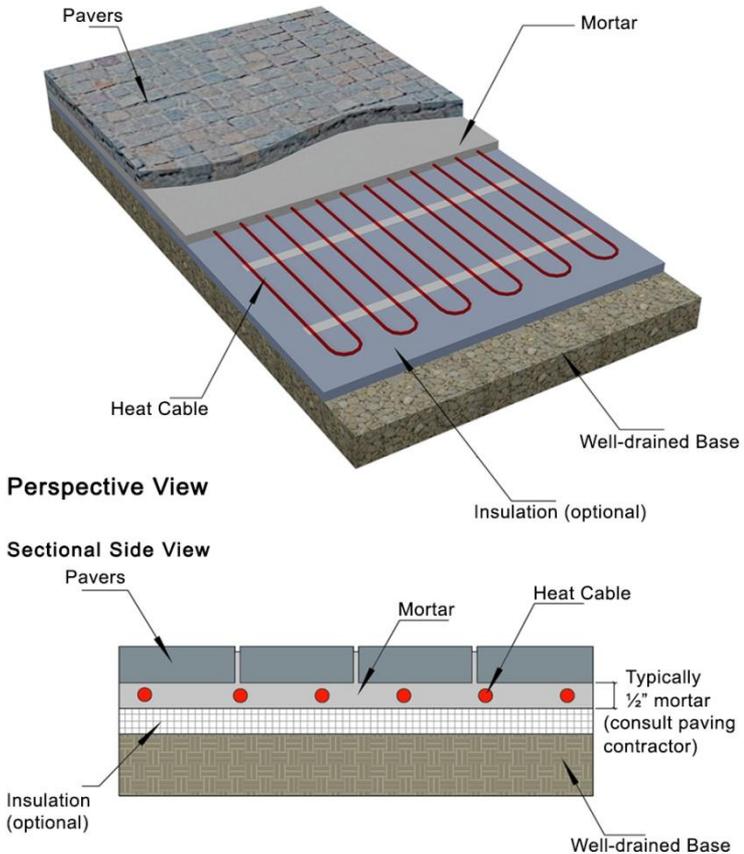
System Diagram: *Heat cable under pavers with sand.*

**DO NOT cover a heating cable or mat that may be damaged.**

**NOTE:** Remember to check the element resistance and the insulation resistance of the heating cable/mat at the recommended intervals:

- In the box: Write the values on the warranty card.
- After being laid out: Write the values on the warranty card.
- After being covered: Write the values on the warranty card.
- Record readings in manual (see page 54).

## Heat Cable Under Stone Pavers with Mortar



**System Diagram: Heat cable under pavers with mortar.**

**DO NOT cover a heating cable or mat that may be damaged.**

**NOTE:** Remember to check the element resistance and the insulation resistance of the heating cable/mat at the recommended intervals:

- In the box: Write the value on the warranty card.
- After being laid out: Write the value on the warranty card.
- After being covered: Write the value on the warranty card.
- Record in manual (see page 54).

## Installation Steps for Pavers

### First, complete Steps 1-10 on pages 24-25.

11. (Continued from Step 10 on page 25.) Follow the paver/block manufacturer installation instructions for the paver sand/stone dust or mortar depth. The heating cable must be encased completely (no air gaps). The heating cable needs to be ½-inch from the bottom of the paver after compaction. (The heat cable should not be visible.)
12. One option to secure the cable is to lay down a piece of thin wire mesh that fits the area.



13. Roll out the heating cable or mat and secure it to the wire mesh or grid using plastic zip ties. Make sure that the heating cable does not cross or touch. (Avoid walking on the heat cable.)
14. The wire mesh should be secured to the ground (with landscaping staples or pins) so it will not move during the embedment process.

**NOTE:** See page 43 for alternative securing method using mortar.



15. Heating cables or mats should be installed a minimum of one half of the cable spacing from the perimeter. (For example, for 3-inch spacing, the cable should be at least 1½ inches from the perimeter.)

16. **Maintain a proper distance.** Heating cables should be spaced at no less than 2-inches center-to-center and no more than 4-inches center-to-center. This also applies to adjacent heating mats.
17. Lay down a second layer of mortar/paver sand or stone dust and compact it down to ½-inch. The embedment material should be tamped down around the cables to ensure that the cables are fully embedded. This will ensure the cables are protected and the heat is pulled from them in an efficient manner.

**NOTE:** *Make certain that there is ½-inch of compacted paver sand or stone dust on top of the heating cables or mats. Cables/mats must be completely encased with no air gaps.*



*Paver sand being applied over snow melting mats.*

**NOTE:** *Install pavers according to the paver manufacturer's installation instructions.*



*Example of insufficient sand on top of cables.*



*Example of proper compacted depth on cables.*

18. Lay down the paver blocks as per manufacturer instructions. Pavers should be carefully placed on top of the mortar/stone dust. If a paver is dropped on the cable or mat, the cable should be inspected and tested before proceeding with the rest of the installation.
19. Remember to check the element resistance and the insulation resistance of the heating cable/mat, in the box, when installed in the work area and after embedment. Write these on the warranty card (page 54).

20. Damaged cables must be replaced prior to embedment, or if necessary, repaired after embedment.
21. Route all cold leads in a conduit from the pour to the power connection box (J-box). The splice and 6-inches of cold lead must be embedded. The cold lead is not rated to be buried in earth or ground.
22. Use a separate conduit for the in-ground sensor (if applicable). **Do not run it in a power conduit.** Be sure to account for the ground sensor conduit before putting stone dust/sand or mortar down.
23. Install the in-ground sensor cup (if applicable).

**NOTE:** *Please consult the installation instructions included with the packaging of your snow sensor for detailed installation information.*



24. Layout and secure all heating cables and mats. Adjust the placement of the mats or heating cables to ensure even coverage.
25. **NEVER CUT THE HEAT CABLE.** If there is any excess cable after laying everything out, the heat cable spacing can be tightened to 2-inches center-to-center minimum in order to utilize all of the cable.
26. The in-ground sensor or sensor cup should be level with the top of the finished paver.
27. The National Electric Code requires a marker be placed to indicate that heating cables are embedded under the pavers.

**NOTE:** *An automatic activation device is highly recommended.*

## **ALTERNATIVE METHOD - For Mortar Applications Over Concrete**

**Replaces Steps 12-14:** Follow block/paver manufacturer installation instructions for the mortar base depth (minimum ½-inch). The heating cable must be completely encased (no air gaps).

### **Securing the Heat Cable**

The heating cable can be secured using strapping designed for cable installation (This can be purchased through a radiant heat dealer.)

1. The cable is secured by straps that are usually placed every 4-5 feet. Select enough strapping to secure the cable to the ground. (One box contains 25 feet of strap, enough to prepare about 50 square feet of space.)
2. Measure the spacing dimension from the edge of the heated area and strike a chalk line along the edge and about every 4 feet in between.
3. Roll out the strapping along the chalk line and cut to length.
4. Set the metal cable strap along the chalk line and screw or nail it down to the prepared installation surface. (Use galvanized flat head screws.) Make sure the strapping lays flat, nail or screw it to the surface every 6 to 10 inches.
5. Install remaining strap along this chalk line using the methods previously described.
6. Weave the cable back and forth across the area at the desired spacing (no less than 2" and no more than 4"). After this is completed, press down all the tabs to secure the cable.

### **MATS ONLY:**

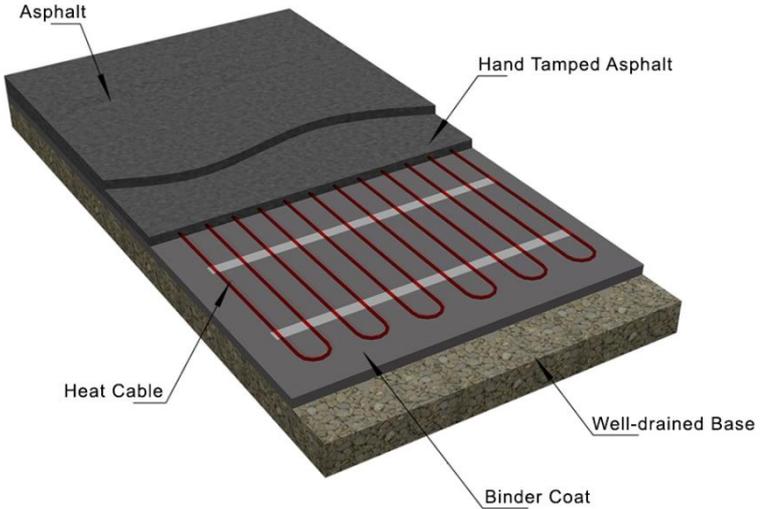
Use a powder actuator gun/fastening system (i.e., Ramset® nail gun) to secure the matting or tape. Place a nail with Fender washer in every run of the white tape. **Do not nail directly on or through the heat cables. Avoid hitting the cable with the nail gun.**

**NOTE:** *Return to Installation Step 15 on page 39 to continue installation.*

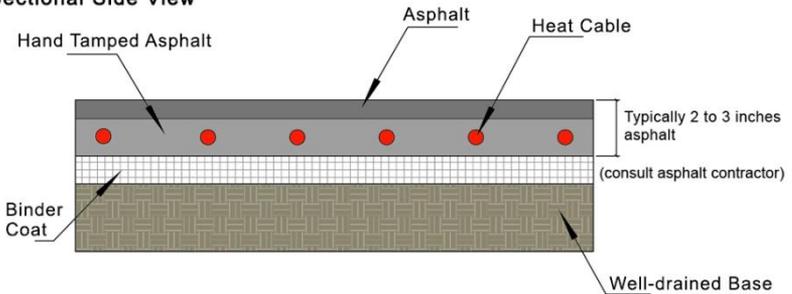
# Installation in Asphalt

## Heat Cable Under Asphalt

### Perspective View



### Sectional Side View



### System Diagram: *Heat cable in asphalt.*

**NOTE:** Remember to check the element resistance and the insulation resistance of the heating cable/mat at the recommended intervals:

- A. In the box: Write the value on the warranty card.
- B. After being laid out: Write the value on the warranty card.
- C. After being covered: Write the value on the warranty card.
- D. Record resistance in the manual (see page 54).

## General Guidelines for Installing in Asphalt

### First, complete Steps 1-10 on pages 24-25.

11. (*Continued from Step 10 on page 25.*) Do not use a track application machine on asphalt that contains snowmelt heating cable/mats. If the finish course must be laid by a mechanical asphalt spreader, the machine must be a pneumatic tire version. The machine must straddle the tire tracks (if used) for longer inclined driveways.
12. Rubber tire applicators are ok as long as the asphalt temperature is below the maximum temperatures listed below (depending on the cable purchased).
13. Heating cables/mats are normally covered by 2 inches of asphalt.
14. There are three methods of installation of mats or heating cables.
  - a. **Method 1.** The asphalt can be poured directly onto the heating cables/mats provided that asphalt specific heating cables / mats have been purchased. These cables/mats are RED in color and can resist 464°F (240°C) for a short period of time (less than 10 minutes).
  - b. **Method 2.** Asphalt is applied, over a layer of concrete that is at least ¾-inch thick (22 mm) which is used to cover the top of the cables to protect them from the heat of the asphalt. Allow the asphalt to cool to a temperature of 266 to 284°F (130 to 140°C) before it is applied.
  - c. **Method 3.** If using a BLACK cable, wait until the asphalt cools to 220°F (80°C). Hand shovel the asphalt over the cables and hand tamp the surface making sure the cables are fully embedded in the asphalt. Finish the asphalt using normal asphalt application methods.

**NOTE:** *Do not use a track machine.*

15. Ensure that the cable and cold lead cable connections (splice joint) are completely encapsulated by the asphalt. Allow asphalt to cool to a temperature of approx 212°F (100°C) before laying it over the splice joint.

16. The ground sensor mounting cup and conduit should be installed while the rough in work is under way in the pour area.
17. Install electrical conduit rated for asphalt temperatures and rise up into the area where sensor is to be mounted.
18. The pavement mounted snow switch (if used) must be placed in such a way that its stainless steel surface is horizontal with the finished asphalt surface.
19. Mount and level the mounting cup over the conduit.
20. Hand shovel the asphalt around the cup to lock it in place.
21. The conduit must be sealed at the end so the asphalt cannot enter.
22. NEVER INSTALL THE PAVEMENT MOUNTED SNOW SENSOR PRIOR TO ASPHALT APPLICATION.
23. The cold leads must be protected by a suitable conduit pipe (rated for asphalt temperature) and its ends sealed so that asphalt does not enter the conduit.
24. A buffer of 2 to 6 inches of asphalt should surround the heated area. This allows for adjustment of the paving surface edges without damaging the heating cable.

## Heating Cable Limitations

1. Do not dump large quantities of hot asphalt on the mats or heating cables. The temperature at the base of the pile may damage the heating cables.
2. Once the heating cables and conduits are in place, the final top coat of asphalt may be applied. At least 2-inches of material must cover the heating cable. The material should be spread evenly around the heating cable with shovels and rakes. The sharp blade ends of shovels should be blunted. The top coat should be spread manually to avoid use of heavy machinery. After completion of the top coat of asphalt, it may be compacted by the steamroller. Ensure that no air pockets exist in the asphalt as this can result in damage to the heating cables.

3. Asphalt should be manually placed on the heating cables.
4. During the process of installing heat cable in asphalt, it is the responsibility of the installer to continually check the heating cable with a megaohm meter to ensure they have not been damaged during the installation.
5. Do not stop or rock the compacting roller when rolling on a grade. (The heating cable may stretch and break.)
6. It is important that the heating cable/mat be laid in such a way that the asphalt spreader will run perpendicular to the runs of heating cable to prevent straining or damaging the heating cables.

## Asphalt Installation Steps

1. Apply a first course of asphalt over the gravel base. The heating cable will be laid out on this layer. Follow the asphalt contractor's methods and procedures. Allow the asphalt to set up enough to work with.
2. Clean the area where the heating cables or mats will be laid. This area should be void of sharp objects, rocks, etc.
3. Begin installation as close as possible to the electrical supply.
4. The heating cable must not be cut or shortened or strained at the power lead/heating cable splice.
5. Roll out the heating cables or mats and secure them to the asphalt base course with nails and fender washers - through the tape backing of the mat. (A pneumatic gun such as a Ramset® will facilitate this work.)
6. Avoid walking on the heat cables.
7. Make sure the heating cable/mats are secured to the base course so they will not move during the embedment process. *(An alternate attachment method is to place a 14-16-gauge wire mesh down and then attach the heat cable to it with zip ties.)*
8. Heating cables or mats should be a **minimum** of 2 inches and a maximum of 6 inches from the perimeter of the embedment area.



Nail & fender washer

9. **Maintain proper cable spacing.** Heating cables should be spaced at no less than 2-inches center-to-center and no more than 4-inches center-to-center. This also applies to the cable in adjacent heating mats.
10. Remember to check the element resistance and the insulation resistance of the heating cable/mat, in the box, when installed in the pour area, and after embedment. Write the results on the warranty card. (See page 54.)
11. Damaged cables must be replaced prior to embedment.
12. Route all cold leads in a conduit from the pour to the power connection box. The cold lead is not rated for direct burial in the ground.
13. Use a separate conduit for the in-ground sensor (if applicable).  
**Do not run the ground sensor in a power conduit!**
14. Install the in-ground sensor cup (if applicable) BEFORE the pour. (Please consult the installation instructions provided in the packaging of your snow sensor for detailed installation information.)
15. Layout and secure all heating cables and mats. Adjust the placement of the heating cables to ensure even coverage.
16. Hand shovel the asphalt over the heating cables and hand tamp. Allow the area to cool.

**CAUTION:** If using BLACK cables, asphalt should be allowed to cool to 220°F before it is applied to the heating cables or damage may occur.

17. **NEVER CUT THE HEATING CABLE.** Heat cable spacing can be tightened (up to 2-inches center-to-center) to fit the allotted area. Maintain the minimum spacing requirement.
18. **Never use a track paver on the cables.** (A rubber tire machine is ok.)
19. Heating cables should be within 2 to 3-inches of the surface.
20. **NO heating cable or mat should be protruding from the surface or sides of the asphalt.**



*Hand shovel the asphalt onto the heating cables.*

21. Tamp the pavement marker in to the finished asphalt surface before it starts to cool and set up. National Electric Code requires a marker be placed to indicate that heating cables are embedded in the asphalt.
22. The asphalt can be compacted using a roller with a maximum weight of 1 ton. The roller should be used in direction perpendicular to that of the cable. This helps avoid stress or stretching of the cable in the hot asphalt. Also, **do not stop, start, or rock the compacting roller directly on the heating cables.**

**NOTE:** *An automatic activation device is highly recommended.*



*Maximum roller weight is 1 ton.*

# Snow Sensors and Wiring Diagrams

## Aerial Mount Snow Sensors

For information on how to install an aerial-mount snow sensor, refer to the documentation included in the packaging of your sensor.



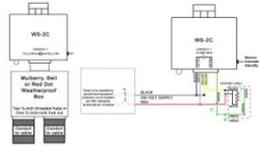
## Pavement Mount Snow Sensors

For wiring information, refer to the wiring diagrams that are provided in the packaging with your pavement-mount snow sensor.



## Wiring Diagrams

For wiring information, refer to the wiring diagrams that are provided in the packaging with your controller panel and snow sensor.

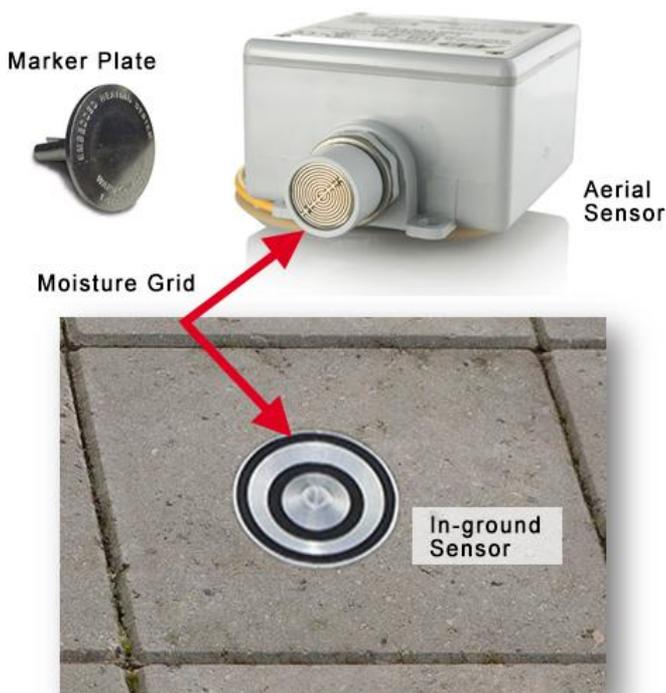


**NOTE:** System specific electrical diagrams are available from the Technical Support department. Phone: **801.948.7577**.

# System Maintenance

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1. The moisture grid on the sensor should be cleaned once a year by applying a drop of detergent soap and gently scrubbing it with a non-metallic scrubby pad.
2. Inspect the moisture grid on the aerial sensor for signs of corrosion. Replace the moisture grid if corrosion is excessive.
3. If there is a contactor panel (or panels) installed, shut off the breakers and open the panel door. Inspect the inside of the unit, checking for any evidence of overheating or discoloration of the connecting wires. Have the panel serviced by a qualified electrician if you suspect that the panel has overheated.



# Contacting Technical Support

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Prior to contacting the Technical Support Team, please collect the following data:

1. Quote or order number from system purchase.
2. Date of purchase and installation.
3. Type of embedment (concrete, asphalt, pavers).
4. Detailed description of the failure.
5. Name and phone number of installer and electrician.
6. Note the ambient temperature and current snow accumulation.
7. Serial number from contactor panel or sensor.

**It is highly recommended to shutdown the snowmelt system at the breakers if you are experiencing equipment failure.**

Please provide pictures that will clearly illustrate the purpose of your call.

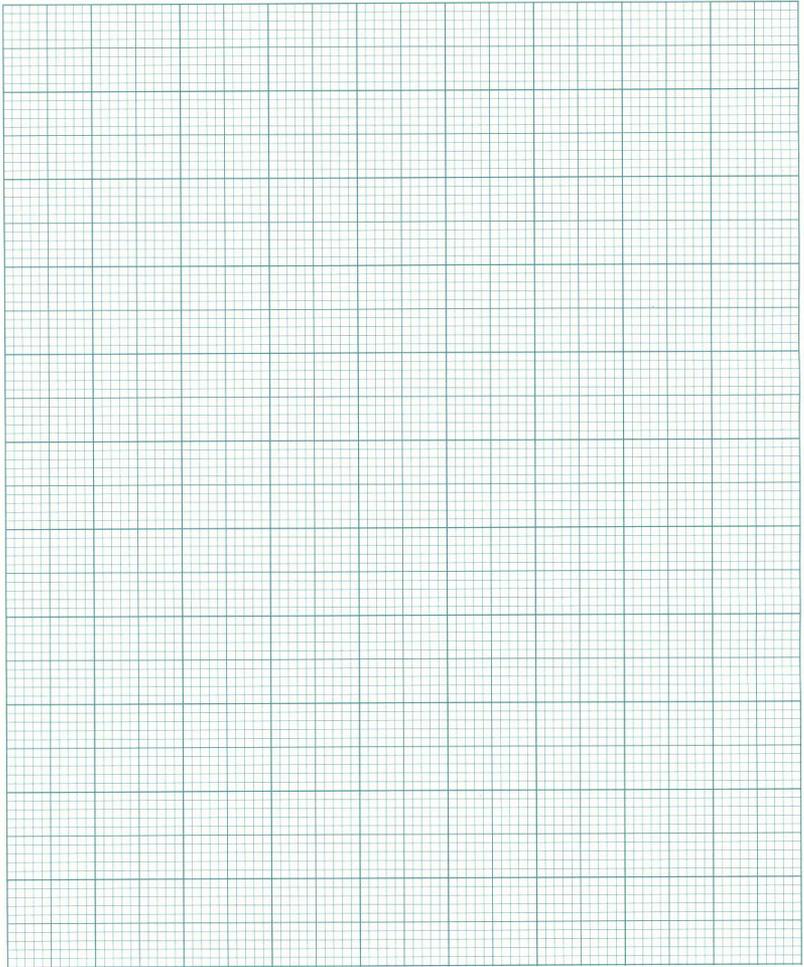
- Take a picture of your in-ground sensor(s) or aerial sensor.
- Take a picture of the other snowmelt equipment.

Component, control and equipment warranties vary in requirements, details and length. Please see the warranty information for the respective items for details.

For additional information, call **801.948.7577**.

# Worksheet

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# Warranty Card

Record cable resistance values in the “Product Info” section of the Warranty Card:

**WARRANTY CARD**

Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Zip/Postal Code: \_\_\_\_\_ State / Province: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Order number: \_\_\_\_\_

**PLEASE OBSERVE:**  
 To qualify for the manufacturer warranty, the following fields must be filled in and the warranty card submitted within 14 days of installation. (Please submit a warranty card for each cable/mat.)

Name of Installer: \_\_\_\_\_ Telephone Number: \_\_\_\_\_ Date of Install: \_\_\_\_\_  
 Name of Electrician: \_\_\_\_\_ Telephone Number: \_\_\_\_\_ Date: \_\_\_\_\_

**PRODUCT INFO**

Serial Number: _____	Nominal ohm value from cable tag: _____	Resistance value between conductor 1 and 2: _____
Date of Purchase: _____	Ohm value - before installing: _____	Resistance and megg value conductor 1 to cable ground braid: _____
Size (ft. or sq. ft.): _____	Ohm value - after installing: _____	Resistance and megg value conductor 2 to cable ground braid: _____
Total watts: _____	Ohm value - after embedment: _____	Floor covering / Top layer: <input type="checkbox"/> Concrete <input type="checkbox"/> Asphalt <input type="checkbox"/> Paver / Tile <input type="checkbox"/> Other
Cable tag voltage: _____ Applied voltage: _____	Ohm value - after top layer: _____	



Serial Number: _____	Nominal ohm value from cable tag: _____	Resistance value between conductor 1 and 2: _____
Date of Purchase: _____	Ohm value - before installing: _____	Resistance and megg value conductor 1 to cable ground braid: _____
Size (feet or square feet): _____	Ohm value - after installing: _____	Resistance and megg value conductor 2 to cable ground braid: _____
Total watts: _____	Ohm value - after embedment: _____	Floor covering / Top layer: <input type="checkbox"/> Concrete <input type="checkbox"/> Asphalt <input type="checkbox"/> Paver / Tile <input type="checkbox"/> Other
Cable tag voltage: _____ Applied voltage: _____	Ohm value - after top layer: _____	

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Size (feet or square feet): _____	Ohm value - after installing: _____	Resistance and megg value conductor 2 to cable ground braid: _____
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Size (feet or square feet): _____	Ohm value - after installing: _____	Resistance and megg value conductor 2 to cable ground braid: _____
Total watts: _____	Ohm value - after embedment: _____	Floor covering / Top layer: <input type="checkbox"/> Concrete <input type="checkbox"/> Asphalt <input type="checkbox"/> Paver / Tile <input type="checkbox"/> Other
Cable tag voltage: _____ Applied voltage: _____	Ohm value - after top layer: _____	

# Manufacturer's Limited Warranty

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For a period of ten (10) years from the date of purchase on electrical mats and cables and for a period of two (2) years on thermostats, sensors and controls (collectively "Product"), Manufacturer warrants to the original purchaser that the Product is free from defects in materials and workmanship under normal use and maintenance, provided the Product is installed in accordance with the accompanying installation manual, any special written design or installation guidelines for a particular project, the National Electrical Code (NEC) or the Canadian Electrical Code (CEC), and all applicable local building and electrical codes. The limited warranty is valid only if all measurements have been taken and recorded and the warranty certificate has been properly completed and mailed. Warranty is for Product only and does not cover any other equipment.

Under this Limited Warranty if the Product is determined by Manufacturer to be defective in materials and workmanship, has not been damaged as a result of abuse, misapplication, misuse, modification, neglect, alteration or improper installation, operation, maintenance, repair or testing, the Manufacturer will repair Product or supply replacement Product or refund the purchase price of the Product on Product covered by this Limited Warranty whichever Manufacturer may elect at its sole discretion.

This limited warranty does not cover, and Manufacturer shall in no event be liable for:

1. Any direct, indirect, incidental or consequential damages, including inconvenience, loss of time, loss of or damage to or loss of use of facilities or other property, loss of revenue, loss of anticipated profits or loss of income.
2. Any labor or materials required to repair or replace the Product.
3. Any labor or materials required to remove, repair or replace covering materials.
4. Any freight or delivery costs related to the Product, or any related covering or electrical products.

Manufacturer assumes no responsibility under this warranty for any damage to the Product caused by any persons; including any trades people or owners or visitors to the job site or damage caused as a result of pre or post-installation work. Owing to differences in surfaces, applications, environment, climate and installation practices, Manufacturer makes no representation that application containing the products will be free from snow and/or ice.

**MANUFACTURER DISCLAIMS ANY WARRANTY NOT PROVIDED HEREIN, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. MANUFACTURER FURTHER DISCLAIMS ANY RESPONSIBILITY FOR SPECIAL, INDIRECT, SECONDARY, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING FROM OWNERSHIP OR USE OF THIS PRODUCT, INCLUDING INCONVENIENCE OR LOSS OF USE.**

THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE FACE OF THIS DOCUMENT. NO AGENT OR REPRESENTATIVE OF MANUFACTURER HAS ANY AUTHORITY TO EXTEND OR MODIFY THIS WARRANTY UNLESS SUCH EXTENSION OR MODIFICATION IS MADE IN WRITING BY A CORPORATE OFFICER.

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights, which vary from state to state.

Incoming materials should be inventoried and a resistance reading taken immediately for completeness and for possible shipping damage. Any visible damages or shortages must be noted prior to accepting the material. Any discrepancy concerning type or quantity of material shipped or Ohms measurements must be brought to the attention of Manufacturer or Manufacturer authorized agent within 15 days of the shipping date entered on the packing slip for the order.

### **How to Claim this Warranty**

In order to receive the remedy set forth above, you must contact the manufacturer or manufacturer's authorized representative during the warranty period and include sufficient details relating to the nature of the defect, the installation, the history of operation, and any repairs that may have been made, including:

1. Provide Resistance readings taken by installer, Ohms measurement: within four hours before installing Product, after installing Product, and after covering is installed over Product.
2. Provide proof that Product was installed in accordance with the installation manual, any special written design or installation guidelines, the National Electrical Code (NEC) or the Canadian Electrical Code (CEC), and all applicable local building and electrical codes.
3. Provide dated proof of purchase.

### **Warranty Registration**

Mail: PO Box 1268  
Riverton, UT 84065  
Phone: 801.948.7566