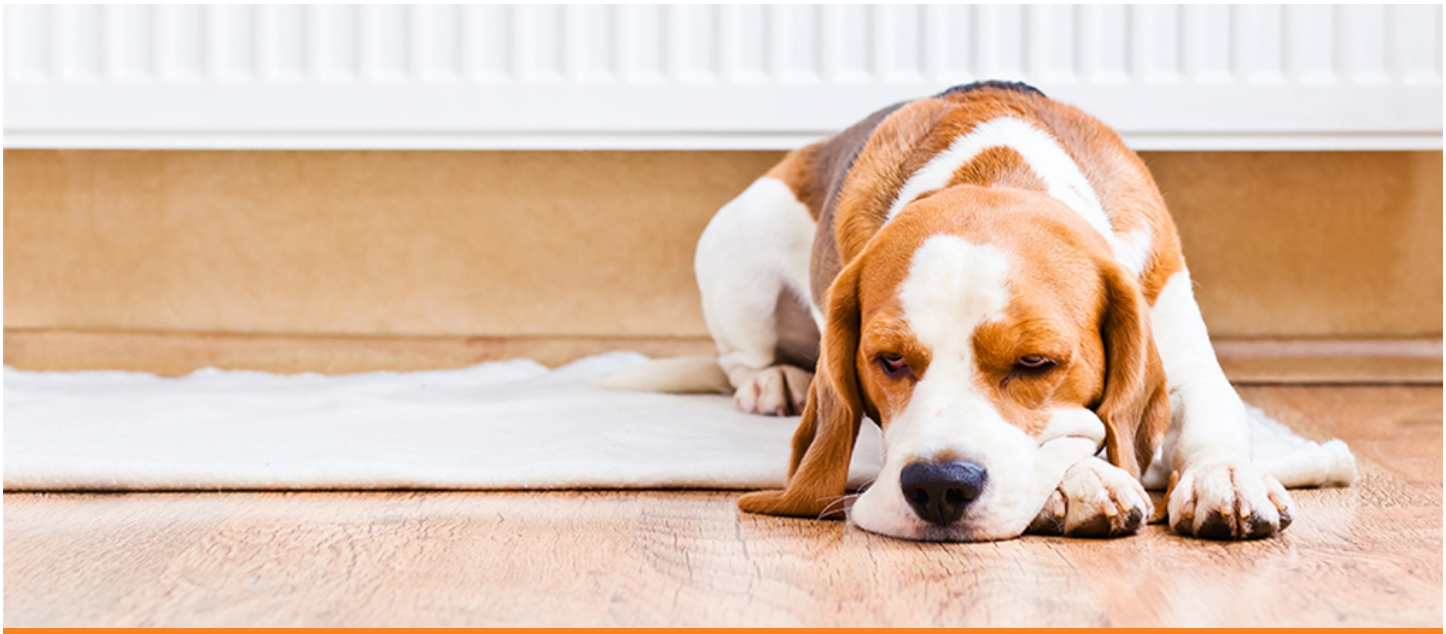
Installation Manual

Summerstep™ Electric Radiant Floor Heating Systems



•Efficient Patented Technology •1/16" Thickness •Quick Turnaround Custom •Lifetime Warranty
•Training & Support •Made in the USA

www.summerstep.com (801) 456-6000

The Summerstep Advantage

At Summerstep™, we work hard to bring you the best electric radiant-heating products. Our goal is to make it easy for our customers to enjoy the warmth, comfort, and luxury of radiant floor heating. Our electric floor-heating systems are the most technologically advanced in the market—incorporating graphite technology to offer efficient and even heat distribution. Our systems are also among the thinnest and easiest to install.

We are so confident in our products that we offer an industry leading, limited lifetime warranty, so you can enjoy your warm floors without any worries.

This installation manual covers all of the general information you will need to install your Summerstep™ Floor Heating System. It is specifically designed to cover the process of installing under tile or stone-floor coverings. For specific information on how to install this system under carpet, vinyl, laminate, or wood floors, see the construction details chart (Fig. 6.1), or visit our website for further information.

Overview

Summerstep™ electric radiant floor heating systems can be installed under carpet, tile, stone, engineered-wood or laminate floor coverings to provide unparalleled warmth and comfort. Different systems are available for different AC single phase voltages from 120VAC through 240VAC. Summerstep offers standard product lines and the extremely popular Quick-Turn-Customs (QTCs). QTCs are guaranteed to ship within 10 business days after receipt of all necessary design information.

Summerstep floor heating systems are not compatible with nail-down floor coverings. The systems are for **INDOOR USE ONLY** and not rated for wet locations. Summerstep heating mats are to be installed above the subfloor; they are not approved for use between the joists below the subfloor surface, nor are they to be installed under or in decorative concrete.

Summerstep mats are not recommended for use on wood subfloors over an uncontrolled, damp crawl space. Moisture levels in crawl spaces below Summerstep floor heating mats need to be controlled. Relatively low moisture levels must be maintained to avoid the possibility of long term subfloor problems. Do not install Summerstep radiant floor heating systems on floors over damp spaces.

When Summerstep electric radiant floor heating mats are installed below carpet, the heating mats must be completely isolated from the carpet and pad by a layer of mortar, 1/8” to 1/4” thick, consisting of either thin set or Portland cement-based floor leveler.

The Summerstep standard product line of radiant floor heating mats are nominally 10 watts per square foot, and they conform to the latest US safety guidelines for electric floor heating appliances, **UL Subject 1683**. These new guidelines are based on the thermal resistance (R-Value) of your chosen floor coverings. Low R-Value materials transfer heat more easily than those with High R-Values.

When installed, your Summerstep electric radiant floor heating mat will be thermally insulated by whatever is placed below it (your subfloor) and above it (your flooring). High R-Value floor coverings make the heating mat run at higher temperatures; Low R-Value floor coverings allow lower mat temperatures for the same radiant heating effect. Summerstep mats are approved for applications where the subfloor does not exceed R 21 and the floor covering system does not exceed R 3.0 (more on this in the “Thermal Resistance Calculations” section).

DANGER!

Failure to adhere to the following installation instructions can result in danger to life and property, including ELECTRICAL SHOCK, INJURY, and/or FIRE. Guard against these dangers by following all instructions and guidelines.

Installation Support Available at: (801) 456-6000

Contents

1. Order Details

The first step when installing Summerstep radiant floor heating is to check your order and documentation. When you receive your Summerstep delivery verify that the contents of your order contain everything that is needed.

Checking Your Order & Documentation

Check and verify the contents of your order for all necessary materials and documentation. Make certain you have the following:

1. **Products**
    a. Heating mat(s) as specified on quotation and Installation Plan
    b. Control Device(s)
    c. Sensor, Relay Contactor, Power Modules, etc.—if required.

2. **Documentation**
    a. Packing Slip
    b. This installation manual
    c. Warranty Card/Resistance Log
    d. Wiring schematic for control device
    e. Custom Installation Plan – Mat Layout
    f. Caution Labels

Make sure to check the items you received against the packing list and quotation to ensure proper mat sizes and thermostat type(s).

-Important-

Check again to verify that your installation plan has the correct dimensions. Your order consists of the exact materials required to complete your specific project. If the measurements of your space have changed, it will affect the material quantities and sizes. Once the mat(s) have been secured to the subfloor, they cannot be returned. If there have been any changes in the measurements of your space, or you have any questions, please call Summerstep at:

(801) 456-6000.

2. Before Installation

Before you start installing Summerstep radiant floor heating, it's important to be aware of what tools you'll need and what tools you should avoid using.

Tools & Materials

Before installing Summerstep flooring, you need to have the proper tools. Here is a list of the tools and materials you may need:

- ☐ Digital Ohm Meter (multi-meter)
- ☐ Measuring Tape and Marker
- ☐ Electrical Housing Boxes/Switch Plates
- ☐ Electrical Conduit
- ☐ Plastic Trowel
- ☐ Plastic Lath
- ☐ Thin set and/or Floor Leveler
- ☐ VCT Adhesive
- ☐ Cardboard scraps to protect the mat(s) during installation

Preparing the Subfloor

Before installation, subfloors must be prepared in accordance with appropriate specifications. Tile and hardwood associations, along with local building officials, can offer excellent guidelines for sub-floor preparation.

Make sure to clean and smooth the floor surface prior to installing the heating mats. Remove features or debris that may puncture or scratch the heating mat. You should also countersink and completely cover all fasteners in the subfloor that might contact the heating mat. Cover the fasteners and smooth the subfloor with non-electrically-conductive fillers (i.e., wood, putty, or thin set).

Fig. 2.1

Summerstep™ Resistance Log					www.summerstep.com
Summerstep™ Order No.	Input number here				
Mat Model No.	SS16034610				
Mat Serial No.					
Factory Ship Date	September 26, 2014				
Tag Part Number / Revision	SSxxx6034610xxx0.2xxxxxCSTN0D / Rev. A				
Electrical Specifications	50/60 Hz. SINGLE Phase				
AC Voltage Rating	120 VAC				
Current Rating	12 Amps RMS				
Wattage Rating	1440 Watts				
Nominal Electrical Resistance	10 Ohms (Ω)				
Allowable Electrical Resistance Range	9.5 Ohms (Ω) minimum to 11.1 Ohms (Ω) maximum				
IMPORTANT WARNING ON ELECTRICAL RESISTANCE	DO NOT INSTALL IF BELOW 9.5 Ohms (Ω)				
Maximum Thermal Resistance Below Mat	R 21	Calculated Value =			
Maximum Thermal Resistance Above Mat	R 3.0	Calculated Value =			
CAUTION	Verify Thermal Resistance Values Below and Above Heating Mat(s) Before Installation.				
Arrival Date					
Finish Date					
Job					
Room					
Mat No.					
Floor Covering Type					
	Resistance Ohms, Ω				
When	Black to White	Green to Black	Green to White	Technician	Date
Unpacked					
Glued down					
After leveler					
Before floor covering installation					
After floor covering installation					
Before applying power					
Licensed Electrician Name / State / Lic. No.			/	/	
Fill out this sheet and leave YELLOW copy with owner as part of their specification/service manual on their electrically heated floors.					
The WHITE sheet must be returned to Summerstep™ to activate the warranty.					

Test the Mat(s)

Summerstep heating mats must be visually inspected and electrically tested before, during, and after installation (See Section 3 for further details). During the inspection, you also need to fill you the Summerstep Resistance Log (see Fig. 2.1). A copy of this form must then be returned to Summerstep to validate the warranty and to ensure that the mats are undamaged. If your visual inspection or electrical-resistance tests do not pass the requirements at any point of the installation process, please contact Summerstep Customer Care at:

(801) 456-6000 or email **customercare@summerstep.com**.

Caring for the Mat(s)

Summerstep recommends that the mats remain rolled in the shipping container until it is time to install them. Exercise caution during the installation process; take care not to fold, crease, drop, or drag items on the unprotected mats. You should also minimize traffic on the mats until they are protected by building materials.

Use ONLY plastic trowels when troweling on Summerstep mats. Metal trowels have sharp corners that may damage the mat. If using lath, use only plastic lath with Summerstep mats. Metal lath is notorious for its sharp edges and can easily inflict damage. Never use power tools or sharp tools to clean grout lines as this could damage the mat and will void the warranty. Cardboard scraps can be used to cover and help protect the floor heating system during installation.

Dry Fit the Mat(s)

Before you begin the installation, dry fit the mat(s) to ensure proper sizing and to determine the proper placement. Make sure to route all non-heating leads (wires) around the heated areas; the non-heating leads cannot cross the heating mats because of possible damage to their electrical insulation. Once you have determined the proper layout, mark the location of the mat(s) and wires on the subfloor.

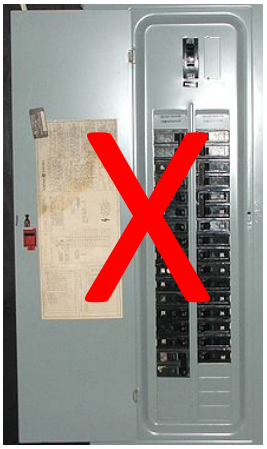
3. Visual Inspection & Resistance Testing

Remember, Summerstep heating mats must be visually inspected and electrically tested before, during, and after installation. Additionally, the Summerstep Resistance Log needs to be filled out and a copy returned to Summerstep to validate the warranty.

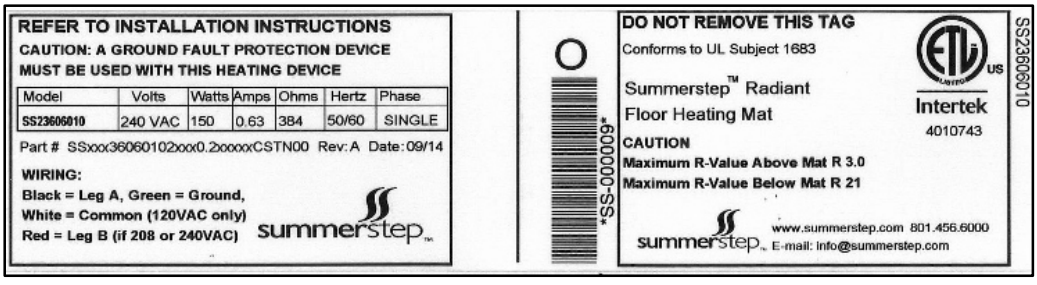
Visual Inspection

When visually checking the heating system, look for any signs of damage, wear, or scratching that might have occurred during shipping and/or installation. If any portion of the system appears damaged, stop the installation and contact Summerstep Customer Care immediately.

Electrical Resistance Testing



1. Make sure that the product is disconnected from the power source.
2. Inspect the lead wires for signs of damage. Do not use the product if it has damaged lead wires. If the lead wires are not damaged, please continue.
3. Set the digital multimeter to measure resistance/ohms (Ω). If using an ohmmeter, set it to a low resistance range, usually the 200 ohm setting.
4. Place one multimeter clip on the white wire (if 120VAC) or red wire (if 208 or 240VAC) and the other on the black wire.
5. Confirm the reading on the multimeter/ohmmeter is within +10% / -5% of the factory resistance listed on the white tag that is attached to the cold lead of every heating mat (see example below). The white tag contains important information including thermal resistance values allowable below and above the particular mat, the color code for the wiring, serial number, model number, voltage, watts, amps, ohms (electrical resistance at 72 °F), manufacture date, and any revision.



6. Record the resistance test readings in the table on the Summerstep Resistance Log included with every mat.
7. Set the ohmmeter to its highest resistance measuring range, MΩ and connect the ohmmeter from the ground (green wire) to each of the other lead wires separately. There should be a high electrical resistance from the

ground (green) wire to either of the lead wires. Both of these readings should be greater than 240,000 ohms (240kΩ). The higher the better - a low reading indicates that the product was damaged.

8. Record these resistance test readings on the Summerstep Resistance Log (see example below).

9. Electrical resistance testing is to be performed multiple times during the installation process. The installation process should be stopped if any readings are out of the ranges specified on the resistance log. Damage may have occurred if the readings are out of range. Inspect the panel for damage sites and contact Summerstep for possible remedies. DO NOT continue the installation until the nonconformance is resolved.

Summerstep Resistance Log

Summerstep™ Resistance Log				www.summerstep.com	
Summerstep™ Order No.	Input number here				
Mat Model No.	**SS16034610**				
Mat Serial No.					
Factory Ship Date	September 26, 2014				
Tag Part Number / Revision	SSxxx60346101xxx0.2xxxxxCSTN00 / Rev. A				
Electrical Specifications	50/60 Hz. SINGLE Phase				
AC Voltage Rating	120 VAC				
Current Rating	12 Amps RMS				
Wattage Rating	1440 Watts				
Nominal Electrical Resistance	10 Ohms (Ω)				
Allowable Electrical Resistance Range	9.5 Ohms (Ω) minimum to 11.1 Ohms (Ω) maximum				
IMPORTANT WARNING ON ELECTRICAL RESISTANCE	**DO NOT INSTALL IF BELOW 9.5 Ohms (Ω)**				
Maximum Thermal Resistance Below Mat	R 21	Calculated Value =			
Maximum Thermal Resistance Above Mat	R 3.0	Calculated Value =			
CAUTION	**Verify Thermal Resistance Values Below and Above Heating Mat(s) Before Installation.**				
Arrival Date					
Finish Date					
Job					
Room					
Mat No.					
Floor Covering Type					
	Resistance Ohms, Ω				
When	Black to White	Green to Black	Green to White	Technician	Date
Unpacked					
Glued down					
After leveler					
Before floor covering installation					
After floor covering installation					
Before applying power					
Licensed Electrician Name / State / Lic. No.	/ /				
Fill out this sheet and leave YELLOW copy with owner as part of their specification/service manual on their electrically heated floors.					
The WHITE sheet must be returned to Summerstep™ to activate the warranty.					

4. Installation

The actual installation methods and materials will depend largely on your specific floor covering and the thermal resistance calculations from the previous section. Once both of these variables are known, proceed to the following table for installation details and methods.

Where to Begin

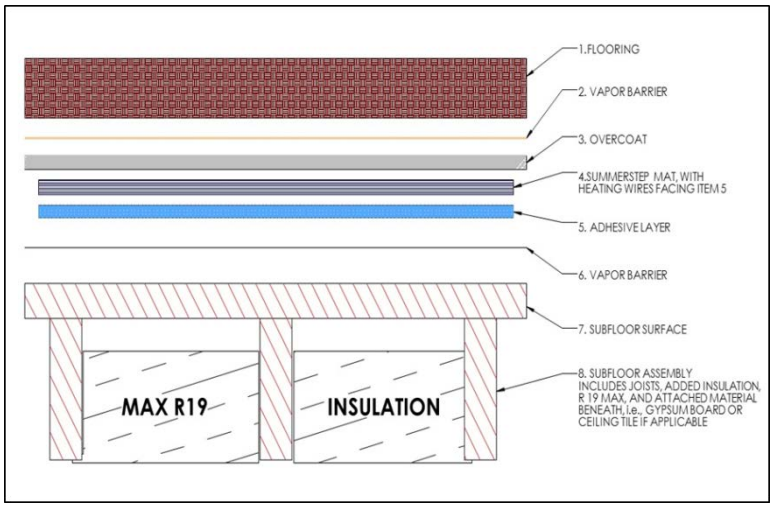
First off, determine your choice of floor covering and find the corresponding column in Fig. 4.1. All installations will start at the bottom of the table at the subfloor (Fig. 4.1) and continue to progress up the chart to the floor covering. For example, an installation on a concrete/cement subfloor has the option of installing insulation but requires a vapor barrier. Above this, there is an option between a VCT adhesive or modified thin set to secure the mat(s) to the previous layers and so on up the chart.

Fig 4.1

<table>
<tr><td>Item Description</td><td>Item No.</td><td>Carpet and Pad or Other Flooring types used with rugs or pads</td><td>Tile and Grout</td><td>Laminate or Engineered Wood, glue down</td><td>Floating type Laminate or Engineered Wood</td></tr>
<tr><td>Flooring</td><td>1</td><td>Carpet and Pad, glue down padding (no nails or staples), stretch or glue down carpet.</td><td>Tile plus thin-set. Use modified thin set with admix if Overcoat, Item 3, is omitted.</td><td>Laminate or Engineered Wood.</td><td>Laminate or Engineered Wood.</td></tr>
<tr><td>Vapor Barrier</td><td>2</td><td colspan="4">Usually N/A. Include ONLY if required by flooring manufacturer.</td></tr>
<tr><td rowspan="3">Overcoat
USE ONLY PLASTIC TROWELS</td><td rowspan="3">3</td><td>Required.</td><td>Optional.</td><td>Required.</td><td rowspan="3">Omit overcoat.</td></tr>
<tr><td colspan="3">Consisting of either floor leveler with admix or modified thin set with admix. Thickness range 1/8" to 1/4" (3.2mm to 6.4mm). Overcoat MUST cover all heated and unheated areas of the subfloor.</td></tr>
<tr><td colspan="3">Alternative overcoat for use with wood subfloors: Plastic lath can be stapled down at select locations and then coated with modified thin set (1/4" thick maximum). In such cases, Item 5, Adhesive layer, can be omitted.</td></tr>
<tr><td>Summerstep™ Mat</td><td>4</td><td colspan="4">Summerstep™ Mat</td></tr>
<tr><td rowspan="2">Adhesive Layer</td><td rowspan="2">5</td><td colspan="3">Required unless using the alternative overcoat with plastic lath as Item 3.</td><td rowspan="2">Omit adhesive. Use approved underlayment instead.</td></tr>
<tr><td colspan="3">Either VCT adhesive or modified thin set with admix. Thickness less than 1/8" (3.2mm).</td></tr>
<tr><td>Vapor Barrier</td><td>6</td><td colspan="4">Required by Summerstep when installed on slab subfloors, with a perm value less than or equal to one.
Usually N/A on wood subfloors but include if required by flooring manufacturer.</td></tr>
<tr><td>Subfloor Surface</td><td>7</td><td colspan="4">Wood or concrete. May use firmly adhered cork insulation
for improved system performance on concrete subfloors.</td></tr>
<tr><td>Subfloor</td><td>8</td><td colspan="4">Wood or concrete.</td></tr>
</table>

Please use this table to determine the proper installation methods & materials for your specific installation.

Fig 7.2

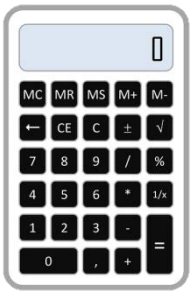


Installation Details Based on your Choice of Floor Covering

Example Application: A main floor master bathroom is to be tiled. Radiant floor heating is desired. The following represents the steps you'd need to take in such a scenario. Please review section 7 if you are unfamiliar with calculating R-values.

Step 1.

Calculate the thermal resistance below the heating mat: the surface is 3/4" of plywood plus 3/4" of particle board; R-value = 1.2 x 0.75 + 1.3 x 0.75 = R 1.9 for the subfloor surface. No vapor barriers are required, so none will be used in this application. In this case there is R 11 insulation below the subfloor and between the joists, plus a layer of 5/8" thick sheet rock/gypsum board that forms the ceiling in the room below. The total resistance is 1.9 + 11 + 0.9 x 5/8 = R 13.5 below the heating mat. This is less than R 21 so Summerstep radiant floor heating systems may be used.



Step 2.

Calculate the thermal resistance above the heating mat: the 1/2" thick tile and approximately 1/8" thick layer of thin set offer a thermal resistance of 0.9 x 1/2 + 0.2 x 1/8 = R 0.5. No vapor barrier is required by the tile manufacturer so none will be used in this application. The overcoat chosen is the alternative version that allows selective stapling down of the heating mat and the plastic lath. The thermal resistance would be basically that of the (less than or equal to) 1/4" thick layer of thin set; 0.2 x 1/4 = R 0.1 for the overcoat. The total resistance above the mat is the sum, thus 0.5 + 0.1 = R 0.6.

Step 3.

Supplemental floor coverings: it is agreed among the users that they will NOT use throw rugs in this room; at most a towel on the floor outside of the shower. The thermal resistance of the towel is estimated as 3.6 x 1/8 = R 0.5. So most of the floor will have R 0.6 thermal resistance while the portion covered with the towel will be 0.6 + 0.5 = R 1.1. The area of the heating mat below the towel will run warmer than the rest of the mat but since the thermal resistance is less than R 3.0, it will be fine.

Step 4.

Sketch the room's floor area (as shown in Fig. 8.1). Using the spacing and design guidelines (specified in Section 8 of this document) determine the maximum possible heated area. As shown in the aforementioned sketch, the heated area is at least 2" away from the walls, the vanity, the front of the toilet, and the tub/shower. There is another heat source, the baseboard heater, so that spacing needs to be at least 8". The heated area does not extend beyond this room, it does not extend under the wall, tub, or vanity, and it was not extended into the nook where there will be a free-standing cabinet.

Step 5.

Determine a location for the thermostat: one is indicated in the example sketch. It is on an inside wall in a spot where the sun will not shine directly on it. Also, you should consider how easy it will be to run a new, dedicated power-supply line to the thermostat location. Decide whether your application is better suited for 120VAC, 208VAC, or 240VAC. Summerstep floor heating mats MUST be connected to a ground fault circuit interrupter (GFCI) protected circuit. Either the new, dedicated breaker needs to be GFCI capable, or else the control thermostat must have that functionality. All Summerstep supplied thermostats are GFCI equipped.

Step 6.

Choose the appropriate mats from the Summerstep standard product listing (Fig. 8.2) or contact Summerstep to order a custom mat. Two week turnaround, from receipt of order to ship date, is normal for the Summerstep custom department. For this example application, a standard 30" x 84" (2.5 x 7 foot) mat may be used. The leg extending to the doorway will not be heated. A Quick-Turn-Custom (QTC) mat, made for the maximum heated area, could be ordered instead as an entire system, or just the section that the standard mats will not heat.

5. Installation Tips

*First time installers should contact Summerstep Customer Care at **(801) 456-6000** or visit our website to view instructional videos. Heed the General, Thermal and Electrical Safety Guidelines listed below.*

Details to Consider

- Plan carefully where the thermostat will be located. Summerstep heating mats ship standard with three, 15-foot-long, 14AWG, stranded-wire, non-heating leads (connection wires). Please refer to the electrical schematic or white cord tag for wiring color codes.

- A dedicated 15A breaker is required for each thermostat; do not exceed a maximum of 12A on any given thermostat. The non-heating leads MUST be routed through an approved, protective conduit along and within the wall. Please recall that the non-heating leads cannot be run over the heated area on the way to the thermostat.

- Install and wire the thermostat according to its instruction set and all applicable national and local codes. A floor temperature sensor can be used with most thermostats. Place it between 1.5 and 2.0 inches (38-51 mm) in from the edge of the Summerstep mat it will be controlling. It can be placed above the mat (making allowance in the floor covering for its thickness) or below the mat (with a recess in the subfloor surface for the sensor and its wire).

- If floor temperature sensor replacement would be difficult, it may be worth considering placing a second, spare sensor at this time.

- Do not exceed a thermostat setting of 86 °F (30 °C) for the ambient temperature. Do not exceed 104 °F (40 °C) for the floor temperature setting. Use care when selecting your thermostat so that its limits do not allow a user to exceed these maximum settings.

- Summerstep radiant floor heating mats come from the factory with the heater installed on one side. That surface is placed TOWARD the subfloor surface. (Please refer to figures 5.2 & 5.3 below) The other surface faces up and is marked with lines indicating where it is safe to drive staples if using the alternative overcoat technique on a wood subfloor surface.

- It is suggested that you plan to run the plastic lath perpendicular to these lines thereby having safe fastening points about every six inches along the edge of the lath. EXERCISE CAUTION WHEN STAPLING. ACCURATE LOCATION OF THE STAPLES IS REQUIRED. Misplaced staples, those that are not entirely within one inch (25 mm) of a line or one inch of the outside edge of the mat, may damage the heater and the mat. In the event of a misplaced staple, stop immediately, perform a round of resistance checks, and then contact Summerstep for assistance. Replace any damaged mat(s).

- Summerstep radiant floor heating systems are quite thin. The thickest part of the system is always the non-heating leads and where they attach to the heater. If that thickness is an issue in your installation, please consider carving the subfloor surface to allow clearance. The far end of the heater would be the next thickest spot. Another pocket in the subfloor surface may be desirable (See Fig 5.1 for thicknesses).

Fig 5.1

Thickness			
inch	mm	Feature	Location
0.23	5.8	at leads/heater connection	mat
0.16	4.1	at leads	mat
0.14	3.6	at far end of heater	mat
0.07	1.8	at a typical heater corner	mat
0.02	0.5	the rest of the mat	mat
		Thermostat Related	
0.20	5.1	thin floor temperature sensor	sensor
0.23	5.8	fat floor temperature sensor	sensor
0.13	3.3	sensor lead wire diameter	sensor

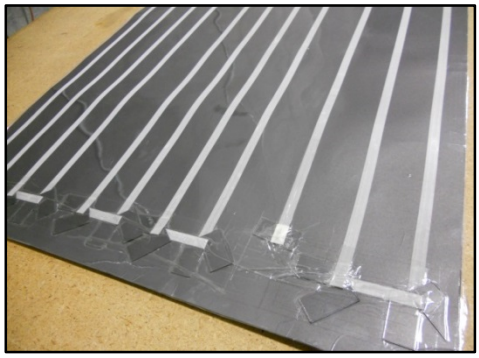
- Follow the instructions provided with any adhesives (vinyl composite tile adhesive or thin set) used in the installation. It is recommended that all adhesives and overcoats be allowed to completely cure per their manufacturer's instructions before applying power to the heating mats.

- Plastic trowels are required when trowelling on Summerstep heating mats. Use of metal trowels may result in damage to the mats.

- Wood subfloors over damp crawl spaces can spell trouble. The Summerstep mats may allow for moisture accumulation within the wood. Moisture control in crawl spaces should be implemented to avoid possible long term damage to the subfloor.

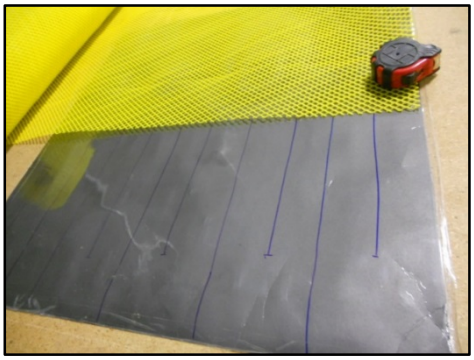
- Summerstep requires the use of a vapor barrier in the case of installation on slab subfloors. The perm value must be 1 (one) or less. Install the barrier between the slab and the heating mat(s) as shown in Fig.4.1.

Fig 5.2



Heater side faces subfloor when installed.

Fig 5.3



Top side marked for permissible stable locations & lath running perpendicular to the marked staple lines.

6. Important Guidelines

The following lists of guidelines are provided to help make the installation process of Summerstep heating systems much more effective and hassle free. These guidelines are divided into three areas of concern: General Guidelines, Thermal Guidelines, and Electrical Guidelines.

General Guidelines

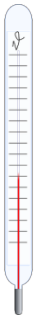
DANGER: Guard against the risk of electric shock, fire, and bodily injury during the installation of this equipment.

- The installation of this heating product must be in accordance with all instructions in this manual, with local regulations, and with applicable agency standards.

- This equipment must be installed only by qualified personnel who are familiar with the construction and operation of the system and the risks involved.

- The ambient air temperature must be above 65 ˚F (18 ˚C) when the Summerstep radiant floor heating system is installed.

65° F

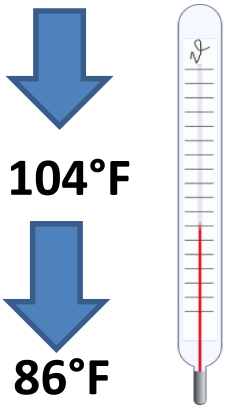


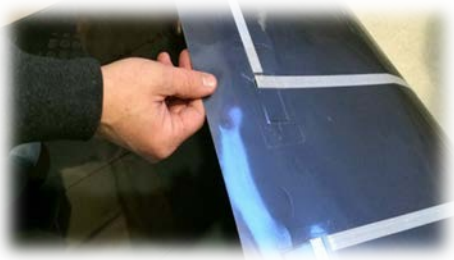
- Do not install or store Summerstep mats at ambient air temperatures above 120 ˚F (49 ˚C).

- Your adhesives, mortars, or floor covering systems may further restrict the ambient temperature range; please see the manufacturers' instructions if more information is needed.
- Subfloors must be prepared in accordance with appropriate specifications. Tile and hardwood associations, along with local building officials, can offer excellent guidelines for subfloor preparation.

- Clean and smooth the floor surface prior to installing the heating mats. Remove features or debris that may puncture or scratch the heating mat.
- Countersink and completely cover all fasteners in the subfloor that might contact the heating mat. Cover the fasteners and smooth the subfloor with non-electrically-conductive fillers (i.e., wood, putty, or thin set). Similarly, provide electrical insulation between any other features of the subfloor that might be electrically conductive—for example, a junction box in the floor.
- Summerstep™ mats are best stored and shipped as received, rolled with heater wires facing out in an 8 x 8" box. Minimum bend radius of 3" (a 6" diameter) should be observed when handling the mats. Do not fold or crease the mats. Summerstep™ recommends that the mats remain rolled in the shipping container until it is time to install them.

- Minimize traffic on the mats until they are protected by building materials.
- Inspect the mats for damage and perform electrical measurements as required by these instructions before installing floor coverings. Remove and replace damaged mats before they are covered or concealed.
- Summerstep mats are not recommended for use on wood subfloors over an uncontrolled, damp crawl space. Moisture levels in crawl spaces below Summerstep floor heating mats need to be controlled. Relatively low moisture levels must be maintained to avoid the possibility of long term subfloor problems.
- Do not install Summerstep radiant floor heating systems on floors over other damp spaces.





Thermal Guidelines

- Do not exceed a thermostat setting of 86°F (30°C) for the ambient temperature. Do not exceed 104°F (40°C) for the floor temperature setting.
- Do not install any Summerstep mats on subfloors that exceed an insulation value of R 21 under the mats. Summerstep mats can be used with insulation values up to R 3.0 above the heating mats (most carpet systems OR other coverings incorporating chair mats or area or throw rugs).

DANGER: Avoid practices that can result in localized overheating of the radiant floor heating mats. FIRE, INJURY and/or ELECTRICAL SHOCK may result from overheating.

- Thermal insulation values above and below the heating mats must be known, and the limits must be observed to avoid possible overheating issues.

- Maintain a minimum of 8" (203 mm) spacing from other heat sources (i.e., heat vents, hot water pipes, baseboard heaters, stoves, fire places, and the like). All these must be at least 8" away from any Summerstep heating mat

- Summerstep floor heating systems cannot be installed under any walls, base boards, counters, toilets, tubs, or any other feature that increases the thermal resistance above the mat.

- Mats cannot be overlapped, crossed, cut, shortened or modified. They can abut each other at seams. For example, if two mats are required to cover the heated area, while they cannot overlap each other, they can be installed side-by-side, without a gap between them.

- When planning mat layouts, do not extend a mat out of the heated area controlled by the thermostat. For example, do not extend out into the hallway or heat closets or areas of the room that can be closed off from the thermostat.

- Tall partitions or furniture can also restrict airflow, resulting in locally elevated temperatures, which could potentially lead to overheating.

- Do not install Summerstep floor heating mats over cabinets whose clearance from the ceiling is less than the minimum horizontal dimension of the cabinet to the nearest cabinet edge that is open to the room or area.

- Do not run mats under, on, in, or over walls or ceilings.

- Heating wires are placed on the mats at the factory. Do not pull them up or change the heater layout in anyway.

- **If installing mats under carpet, the mats must be completely isolated from the carpet and padding by a 1/8-1/4" thick layer of mortar** (thin set or Portland cement based floor leveler).

When planning a heated floor under carpeting, efficiency and comfort can be significantly affected by your choice of carpet padding. Typically, urethane based pads are very good thermal insulators which makes them MUCH LESS DESIRABLE than rubber based paddings in heated floor applications. Please carefully consider your choice of carpet and padding.

Electrical Guidelines

DANGER: Guard against the risk of electrical shock during installation and use.

- **Electrical connections MUST be made by a licensed electrician.**

- Summerstep mats MUST be connected to a dedicated electrical circuit with a maximum circuit breaker rating of 15 amps. Do not exceed a current load of more than 12 amps on any set of Summerstep heating mats connected to one dedicated circuit.

- Do not connect the mats to a power source until they are completely installed and covered with building materials.

- Do not connect to a power source of higher voltage than that specified for the Summerstep mats being installed.

- Each room or area must be controlled by its own thermostat/control. If the thermostat does not have a built-in Class A GFCI (ground fault circuit interrupter, 5 mA trip, "personnel" protection) then the circuit breaker supplying power to the system MUST be so equipped. All Summerstep™ thermostats come equipped with a built-in Class A GFCI so they may be used with standard circuit breakers.

- Ground Fault Protective Devices must meet the applicable requirements of CAN/CSA-C22.2 No. 144, No. 144.1, and/or NFPA 70 National Electric Code (NEC).

- Perform electrical resistance testing on each mat as specified on the Summerstep Resistance Log supplied with each mat. Do not apply power if any of the resistance readings are out of specification. Contact Summerstep before proceeding with the installation if there is any damage to the mats, as damaged components must be replaced. For heater resistance measurements, an ohmmeter capable of reading from 6 to about 2300 Ohms +/-1% will be needed. For electrical insulation resistance measurements, from heater to ground, mega-ohm capabilities will be required.

- Mats have electrical resistance heating wires on one surface (as show in the image below). That surface is to be placed facing the subfloor. The surface without the electrical resistance wires on it is to be placed facing up, facing the floor covering surface. This configuration places the ground plane between the electrically live heating wires and the human occupied space.

- Exercise caution when stapling plastic lath through the heating mat into the wood subfloor surface as in the alternative overcoat method (fig. 4.1). **ACCURATE PLACEMENT OF FASTENERS IS REQUIRED**. If the entire fastener is not within an inch (25 mm) of the line or the edge of the mat, damage to the heater may have occurred, and the fastener may now be electrically live. If this happens, stop immediately, make resistance measurements, and contact Summerstep™ for assistance.

- Route all non-heating leads (wires) around the heated areas; the non-heating leads cannot cross the heating mats, due to possible damage to their electrical insulation.

- To prevent damage to the free, non-heating leads (wires), they must be installed in an approved conduit within the baseboard and wall.

- Apply the supplied label (reference right side of Fig. 6.1 below) to the electrical panel beside the dedicated circuit breaker to indicate that it is supplying power to Summerstep mat(s).

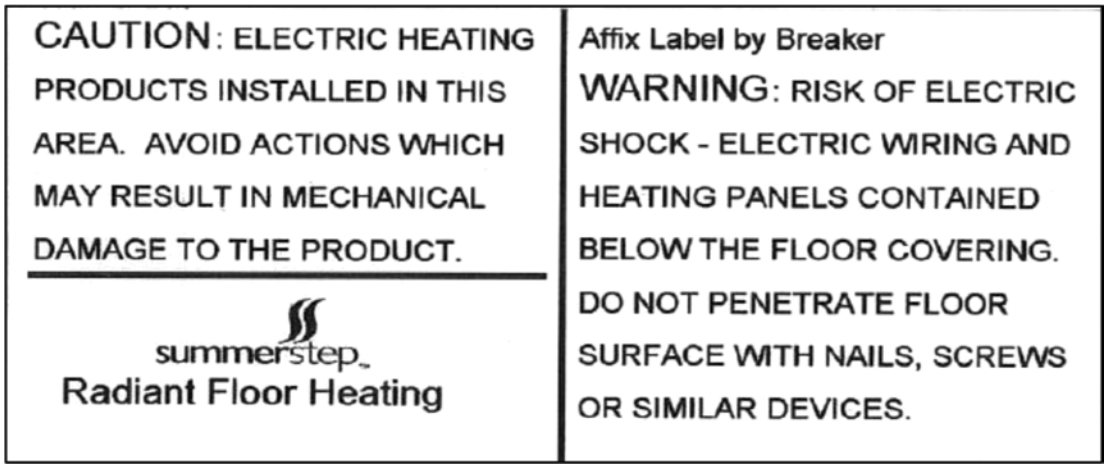
- Affix the supplied "Concealed Area Warning" label (reference left side of Fig. 6.1 below) to adjacent points of access to concealed areas in which installed heating products are accessible.

- Affix the supplied "Radiant Floor Heating" sticker (reference left side bottom of Fig. 6.1 below) to the room control for the floor heating system.

This page shows the supplied electrical labels. (Fig. 6.1)

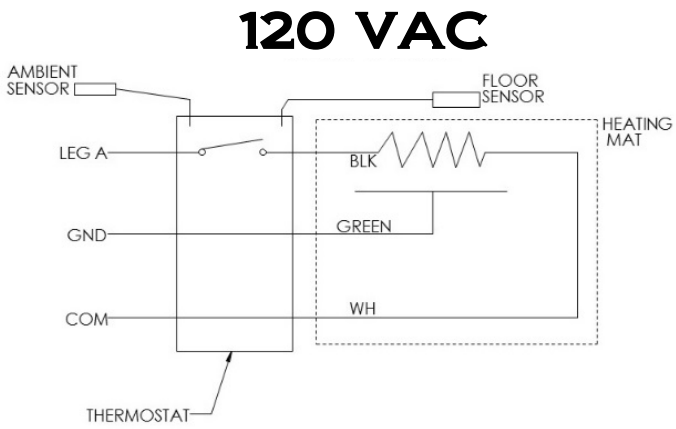
This page shows the electrical schematics for the Summerstep floor heating systems. (Fig. 6.2)

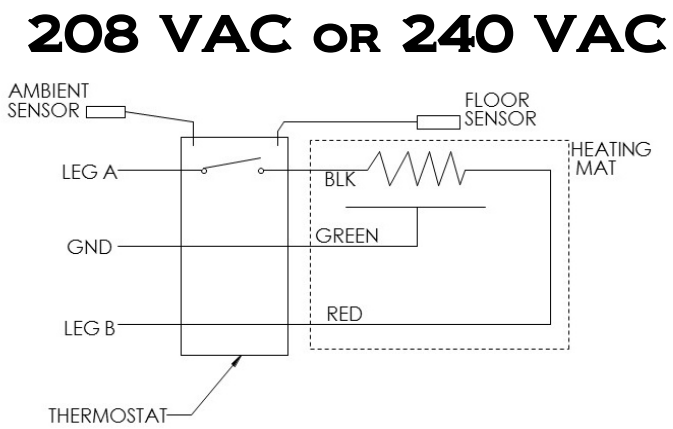
Fig. 6.1



Apply supplied labels to dedicated circuit breaker, points of access to concealed areas, and to the room control for the heating system.

Fig. 6.2





Systems – 120, 208 & 240 VAC

7. Thermal Resistance Calculations

This section of the manual offers many helpful examples of thermal resistance calculating scenarios that you can use to become familiar with the process.

Example 1.
Tile flooring consisting of 1/4" of thin set with plastic lath plus 1/8" of thin set plus 1/4" thick tiles which are all placed over the heating mat. R_total = (0.2 x ¼) + (0.2 x 1/8) + (0.9 x ¼) = R 0.3 R-Value. This is a low thermal resistance versus R 3.0, the max allowable above the heating mat, so the system will be very efficient.

Example 2.
Same as Example 1 but you plan to use ½" thick throw rugs in the room. **This changes things dramatically.** The throw rug has an R-Value of about R 1.6 all by itself. Adding that to the R 0.3 of the tile flooring totals to R 1.9; the heating mat under the throw rug will run hotter than the rest of the floor but it is still less than the maximum allowable thermal resistance above the mat, R 3.0.

DANGER: Failure to follow the thermal resistance guidelines can result in danger to life and property including ELECTRICAL SHOCK, INJURY, and/or FIRE. Guard against this danger by following the thermal resistance guidelines.

WARNING: If the use of throw rugs, area rugs, chair mats, etc. is planned, calculate the new R-Value, and if it exceeds R 3.0, do not use Summerstep™ electric radiant floor heating products.

Example 3.
Engineered wood will be used, and it will be floating (opposed to glued down). In this case, the Summerstep radiant floor heating mat would be placed between the underlayment and the engineered wood, so only the wood's R-Value will be used. For 3/8" thick Engineered Wood, R 0.38 is about right. (Remember, verify this fact with the manufacturer of YOUR flooring.)

NOTE: All Summerstep mats are approved for use on subfloors with R-Values up to and including R 21.

WARNING: Do not install Summerstep radiant floor heating products on floors exceeding R 21 BELOW the mat(s).

WARNING: Do not place futons, beanbag chairs, couches, coffee tables or similar furniture with closed-bottoms on ANY heated floors. Placing closed-bottom furniture on top of the heated area may exceed the recommended R-Values for floor coverings resulting in elevated temperatures and the risk of DAMAGE, INJURY, ELECTRICAL SHOCK and/or FIRE.

This page offers a helpful chart with representative R-Values for common materials. (Fig. 7.1)

Fig 7.1

Material	R-Value per Inch (ft*ft*°F*h/Btu)	Typical Thickness, inches	Typical R-Value
Ceramic Tile	0.9	1/4"	0.23
Thin Set Mortar	0.2	1/8"	0.03
Floor Leveler	0.3	1/4"	0.08
Vinyl Sheet/Tile	1.6	1/8"	0.20
Cork	2.3	3/8"	0.86
Linoleum	1.6	1/8"	0.20
Stone	0.8-1	(Thinner is better for radiant heating.)	
Marble	0.5	1/2"	0.25
Brick or Limestone	1.0	1/2"	0.50
Carpet	2.2-4.4	(Thinner is better for radiant heating.)	
Office Glue Down	2.4	3/8"	0.90
Plush Acrylic	3.2	1/2"	1.60
Carpet Wool	4.3	1/2"	2.15
Carpet Pad	1.25-4.4	(Thinner is better for radiant heating.)	
Solid Rubber	1.3	3/8"	0.49
Bonded Urethane	4.3	3/8"	1.61
Wood Flooring			
Engineered Wood	1.0	3/8"	0.38
Eng. Wood Pad	1.6	1/4"	0.40
Elm, Oak, Walnut	0.9	3/4"	0.68
Ash, Maple	1.0	3/4"	0.75
OSB (oriented strand board)	1.4	1/2"	0.70
Plywood	1.2	3/4"	0.90
Particle Board	1.3	1/2"	0.65
Gypsum Board (drywall)	0.9	5/8"	0.56
Towel, Cotton	3.6	1/8"	0.45
These values are representative, please verify actual values with the manufacturer.			

Representative R-Values are given above. It is important that you verify with the manufacturers of your flooring components what the ACTUAL R-Values should be in your application.

8. Product Selection

System Sketch & Electrical Planning

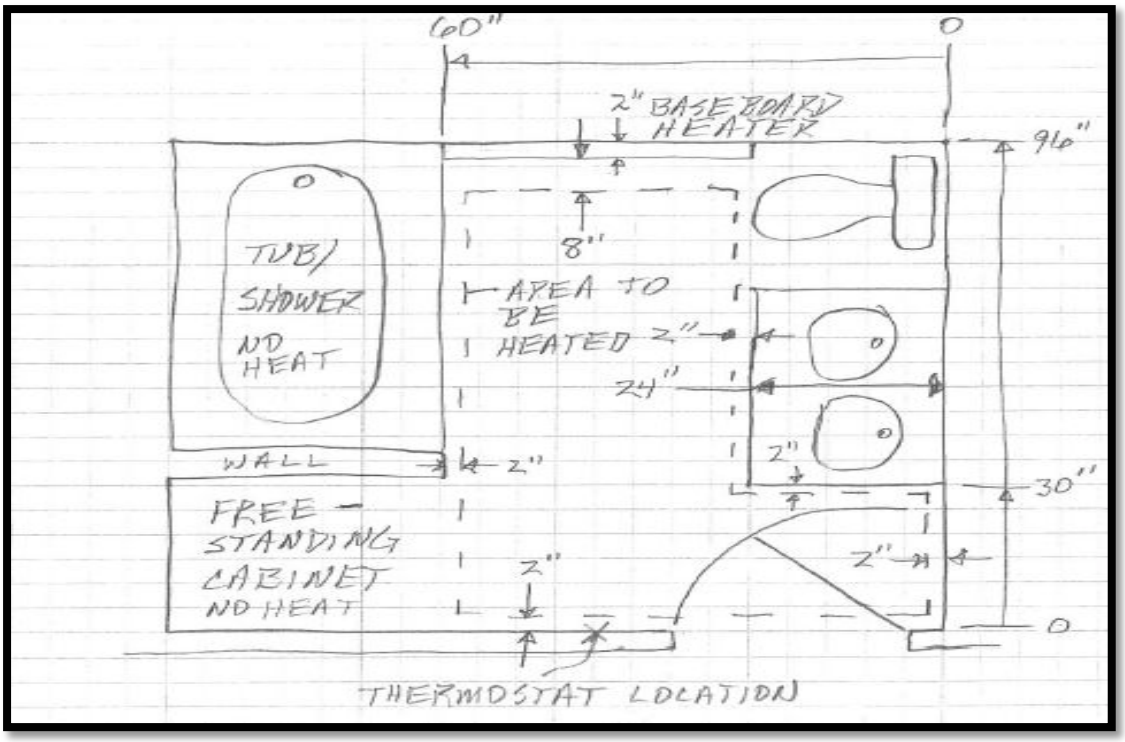
After you've made certain you have all the tools and materials you need, the next step is to create an image of the room's floor area.

- Sketch a drawing of the space to be heated like the example in Fig. 8.1.
- Determine the location of the thermostat.
- Using the spacing and design guidelines (specified earlier in this document), determine the maximum possible heated area.
- Choose the correct, standard floor heating mats listed in Fig. 8.2 or order custom mats as needed.

OR

Submit drawings to Summerstep. We will choose the appropriate mats from our standard product listing, or we can design custom mats to cover an odd-shaped room. The usual turnaround for custom orders is two weeks from receipt of order to ship date. See Fig 8.2 for standard size information.

Fig. 8.1



Example floor plan sketch with measurements, fixtures, and thermostat location clearly marked.

This page offers a chart with Summerstep's standard sizes. (Fig. 8.2)

Fig. 8.2

Length	Width	Wattage	$/Hour	120 VAC		208 VAC		240 VAC	
Feet	Inches	Watts	$0.11/kWh	PN	Amps	PN	Amps	PN	Amps
3	30	73	0.008	SS13003610	0.6	SS73003610	0.4	SS23003610	0.3
4	30	99	0.011	SS13004810	0.8	SS73004810	0.5	SS23004810	0.4
5	30	124	0.014	SS13006010	1.0	SS73006010	0.6	SS23006010	0.5
6	30	150	0.017	SS13007210	1.3	SS73007210	0.7	SS23007210	0.6
7	30	175	0.019	SS13008410	1.5	SS73008410	0.8	SS23008410	0.7
8	30	200	0.022	SS13009610	1.7	SS73009610	1.0	SS23009610	0.8
9	30	225	0.025	SS13010810	1.9	SS73010810	1.1	SS23010810	0.9
10	30	250	0.028	SS13012010	2.1	SS73012010	1.2	SS23012010	1.0
12	30	300	0.033	SS13014410	2.5	SS73014410	1.4	SS23014410	1.3
14	30	350	0.039	SS13016810	2.9	SS73016810	1.7	SS23016810	1.5
16	30	400	0.044	SS13019210	3.3	SS73019210	1.9	SS23019210	1.7
18	30	450	0.050	SS13021610	3.8	SS73021610	2.2	SS23021610	1.9
20	30	500	0.055	SS13024010	4.2	SS73024010	2.4	SS23024010	2.1
Length	Width	Wattage	$/Hour	120 VAC		208 VAC		240 VAC	
Feet	Inches	Watts	$0.11/kWh	PN	Amps	PN	Amps	PN	Amps
3	60	150	0.017	SS16003610	1.3	SS76003610	0.7	SS26003610	0.6
4	60	200	0.022	SS16004810	1.7	SS76004810	1.0	SS26004810	0.8
5	60	250	0.028	SS16006010	2.1	SS76006010	1.2	SS26006010	1.0
6	60	300	0.033	SS16007210	2.5	SS76007210	1.4	SS26007210	1.3
7	60	350	0.039	SS16008410	2.9	SS76008410	1.7	SS26008410	1.5
8	60	400	0.044	SS16009610	3.3	SS76009610	1.9	SS26009610	1.7
9	60	450	0.050	SS16010810	3.8	SS76010810	2.2	SS26010810	1.9
10	60	500	0.055	SS16012010	4.2	SS76012010	2.4	SS26012010	2.1
12	60	600	0.066	SS16014410	5.0	SS76014410	2.9	SS26014410	2.5
14	60	700	0.077	SS16016810	5.8	SS76016810	3.4	SS26016810	2.9
16	60	800	0.088	SS16019210	6.7	SS76019210	3.8	SS26019210	3.3
18	60	900	0.099	SS16021610	7.5	SS76021610	4.3	SS26021610	3.8
20	60	1000	0.110	SS16024010	8.3	SS76024010	4.8	SS26024010	4.2
Need a different length? Example: 19' could be a combination of a 9' and a 10' or 16' + 3', etc.									

SUMMERSTEP™ SYSTEM WARRANTY REGISTRATION

Thank you for purchasing your new Summerstep™ floor warming system. To register your system, simply complete, detach and mail this warranty card within 30 days of date of purchase. For your convenience you may also fax this card to **(801) 386-9044** or email to **warranty@summerstep.com**.

HOMEOWNER INFORMATION		
Name:		
Address:		
City:	State:	ZIP Code:
Phone:	Email:	

INSTALLER INFORMATION			Check here if homeowner installed ☐
Installer Name:			
Company Name:			
Address:			
City:	State:	ZIP Code:	
Phone:	Email:		
Fax:			

HEATING SYSTEM INFORMATION			
Install Date:	Room:	Installed Under: ☐Tile ☐Stone ☐Laminate ☐Wood ☐Other_____	
Imbedded In:	Subfloor Material:	Insulation Material:	Total Mats Installed:

	Mat 1	Mat 2	Mat 3	Mat 4	Mat 5	Mat 6
Mat Size/Model #						
Serial #						
Factory Measured Resistance (On Tag)						
Resistance Test Ohms Reading (Before Installation)						
Resistance Test Ohms Reading (During Installation/Before Floor Covering)						
Resistance Test Ohms Reading (After Installation)						

VISUAL INSPECTION		
Inspected by:	Date:	Signature:

SUMMERSTEP™ SYSTEM WARRANTY REGISTRATION

GreenHeat Flooring, LLC, dba Summerstep (hereafter "Manufacturer") makes no warranties express or implied, on products manufactured or distributed by it except the warranty against defect in material and workmanship as set forth herein. Subject to the limits set forth below, Manufacturer warrants to the original purchaser (hereafter the "purchaser") of Summerstep heating systems and products (hereafter "products") installed in the purchaser's residence, business or other improvements (hereafter the "improvements") that the products are free from defects in material and workmanship under normal and proper use and servicing. The warranty shall commence on the date of installation (hereafter "Start Date") of the product in the improvements by an installer that is familiar with the construction and operation of the Summerstep system and that has been approved in writing by Manufacturer (hereafter a "Manufacturer-approved installer") and remains effective as long as the original purchaser owns the improvements. In addition, if the original purchaser sells the improvements before ten (10) years have elapsed after the Start Date, Manufacturer will extend full coverage under this warranty to any new owner(s) of the improvements who purchase the improvements before the tenth (10th) anniversary of the Start Date. If any product parts are found to be defective in manufacture, Manufacturer's sole obligation under its warranty shall be, at its option, either (1) to issue a credit for the purchase price of the part, or (2) to repair or replace any article or part thereof, which is proved to be other than as warranted. For this warranty to be valid: (1) a copy of the warranty card must be delivered to Manufacturer within thirty (30) days of the Start Date (and any new purchaser buying the improvements before the tenth (10th) anniversary of the Start Date must also give Manufacturer written notice of the warranty transfer within thirty (30) days after purchasing the improvements); and (2) Manufacturer-approved installers must install the products in the improvements. Manufacturer shall not be responsible for any loss or damage that may arise due to:

- Non-compliance with usage of the product heating system and accessories as recommended by Manufacturer.
- Heater failure due to damage caused during installation of the Summerstep system or flooring installation, unless damage is caused directly by an employee of Manufacturer or a Manufacturer-approved installer.
- Improper installation of the floor covering. All floor covering must be installed in conformance with the floor covering manufacturer's instructions and shall conform to all applicable trade practices, local codes and Manufacturer's specifications.
- Usage of inadequate or non-specified materials with the Manufacturer's products.
- Any and all defects, deficiencies, or failures resulting from improper handling of the product (e.g., cuts made to the heater, or the lead wires).
- Any acts of nature or damage by causality, accident or the elements, including, but not limited to, damage as a result of floods, fires, winds, lightning, accidents, corrosive atmospheres or other conditions.
- Tampering with the Manufacturer product heating system (e.g., removing, altering or overloading the circuit breakers or over-current protectors).

For the warranty to be valid, the procedures set forth in this paragraph must be followed. Claims for defective product(s) must be reported to Manufacturer within thirty (30) days from the date the product is determined to be defective. Upon request, and subsequent authorization granted by Manufacturer, authorized returns must be sent within sixty (60) days from having received the authorization. Buyer shall send authorized returns to Manufacturer with a dated sales receipt. A Manufacturer-issued returned material authorization ("RMA") number authorizing a product return must be acquired prior to sending any return. If Manufacturer determines that the product (or a part thereof) was properly installed and then failed during normal use, as a result of a manufacturing defect, then Manufacturer will repair or replace the defective part of the product, or issue a credit or refund of the purchase price of the defective part of the product, at its sole discretion, as described above. Manufacturer shall not be responsible for any defect in products that are created after the products are shipped from Manufacturer, including purchaser's method of handling or storage of the products or modifications to or adaptations of the products made by purchaser or others. No employee, agent or representative of Manufacturer has authority to modify the provisions of this warranty or to make any representation or warranty concerning the products.

Under no circumstances will Manufacturer be liable for labor or other charges related to the installation and use of the products. This warranty does not cover labor or removal or reinstallation of the product and is null and void if: (1) any product is installed improperly or in an improper environment, overloaded, misused, abused or altered in any manner; and (2) if the floor covering over the heater(s) is damaged, lifted, replaced, repaired or covered with subsequent layers.

If Manufacturer is required by this warranty to inspect or repair products and it is determined that the defects were caused by any exclusions referenced above, then purchaser will reimburse Manufacturer for all work at Manufacturer's inspection and repair rates then in effect.

THE WARRANTIES STATED HEREIN ARE EXCLUSIVE OF ALL OTHER WARRANTIES, WRITTEN OR ORAL, STATUTORY OR EXPRESS OR IMPLIED, RELATED TO THE PRODUCTS OR THEIR USE OR FAILURE, INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OF A PATENT, TRADEMARK OR OTHER INTELLECTUAL PROPERTY RIGHT, NONE OF WHICH SHALL APPLY TO MANUFACTURER'S PRODUCTS HEREUNDER OR THEIR USE OR FAILURE AND ALL OF WHICH ARE DISCLAIMED BY MANUFACTURER. THIS WARRANTY EXCLUDES, AND MANUFACTURER SHALL NOT BE LIABLE FOR, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES THAT ARE CAUSED BY, THAT RELATE TO OR THAT ARISE OUT OF THE PRODUCTS OR THEIR USE OR FAILURE, EVEN IF MANUFACTURER IS ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Products that are replaced by Manufacturer in accordance with the foregoing shall become the property of Manufacturer and at Manufacturer's written request shall be returned to Manufacturer by purchaser f.o.b. point of shipment. If no such request is made, then purchaser shall be responsible to discard the replaced products. Manufacturer's maximum liability under this warranty is limited to the replacement or repair or the original purchase price of the defective product (or part thereof). If a product is returned to Manufacturer and Manufacturer finds that no defect exists or that the user misused the product, then Manufacturer will inform the purchaser. If the purchaser chooses to have Manufacturer repair the defective part of the product (if possible), then the purchaser shall pay Manufacturer for reasonable labor and shipping charges.

Limitation of Liability: MANUFACTURER SHALL NOT BE LIABLE FOR ANY LOSS, CLAIM, EXPENSE OR DAMAGE CAUSED BY, CONTRIBUTED TO OR ARISING OUT OF THE ACTS OR OMISSIONS OF PURCHASER OR THIRD PARTIES, WHETHER NEGLIGENT OR OTHERWISE. IN NO EVENT SHALL MANUFACTURER'S LIABILITY FOR ANY CAUSE OF ACTION WHATSOEVER THAT RELATES TO THE PRODUCTS EXCEED THE COST OF THE PRODUCT GIVING RISE TO THE CLAIM, WHETHER BASED IN CONTRACT, WARRANTY, INDEMNITY OR TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHERWISE. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR OTHER SUCH INDIRECT DAMAGES (INCLUDING, WITH-OUT LIMITATION, LOSS OF REVENUES, PROFITS OR OPPORTUNITIES OR DAMAGE TO OTHER GOODS OR IMPROVEMENTS, INCLUDING, BUT NOT LIMITED TO, FLOORING), WHETHER ARISING OUT OF OR AS A RESULT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE.