



**ThermoSoft**<sup>®</sup>  
INTERNATIONAL CORPORATION

Installation Guide

# NeverFreeze<sup>®</sup> Self-Regulating (PTC) Heating Cable



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## DESCRIPTION

ThermoSoft NeverFreeze® cables are intended for use on all types of roofs, including rubber, metal, clay and asphalt shingles.

The cables are available in custom length plug-in kits or in various spool lengths and terminated on-site. The plugin kits are provided with a factory sealed power connection with 30-inch power cord and plug and a factory sealed end termination.

CONSTRUCTION OF THERMOFOFT NEVERFREEZE® CABLES	
Service Voltage	110-120V, 220-277V
Normal cable width (in/mm)	0.42 (10.6)
Normal cable thickness (in/mm)	0.23 (5.8)
Cable Bus Wire Gauge (AWG)	16
Cold Lead Length (in/mm)	35 (900)
Min. Circuit Breaker Size (Amps)	15
Max. Exposure Temperature	185°F (85°C)

## SIZING

ThermoSoft NeverFreeze® cables are available in 120 or 240 Volts.

Both voltage options come in foot lengths, from 1 to 500 feet. Combine different sizes to heat total area if needed.

## INSPECTION

1. Open package and visually check for breaks or nicks in the cable jacket. File claim with carrier if any damage is found.
2. Never energize the cable when it's coiled or on a reel. Test only when it is laid out straight.
3. (Skip for preconnected plug-in kit) - After removing the cable from the carton or wrapping, check the insulation resistance of the unit from buss wires to braid with a 2500VDC megger to assure the cables have not been damaged during shipping and handling.

**ELECTRIC SHOCK HAZARD. Verify insulation resistance is 20 megohms or greater before installing. Contact ThermoSoft if cable is less than 20 megohm.**

## WARNING

**ELECTRIC SHOCK HAZARD.** Disconnect all power before installing or servicing heating cable and accessories. A qualified person must perform installation and service of heating cable and accessories. Heating cable must be effectively grounded in accordance with the National Electrical Code. Failure to comply can result in personal injury or property damage.

## DESIGN

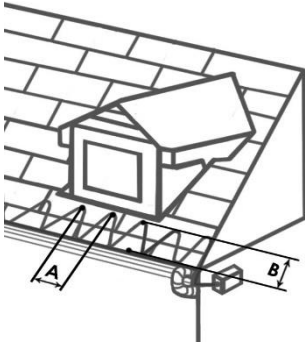
1. Obtain the following roof information: roof edge length, roof overhang, total gutter length, total downspout length and breaker rating.

Step 1 - Record Measurements		
A	Roof Overhang:	
B	Roof Length:	
C	Gutter Length:	
D	Downspout Length:	
E	Number of Downspouts:	
F	Distance Around Dormer:	
G	Number of Dormers:	
H	Number of Valleys:	
I	Breaker Rating:	

2. Calculate the amount of cable required.

TABLE 1: REQUIRED CABLE			
Roof Overhang	A	B	Spacing Factor
	Heating Width	Heating Height	
12 in	24 in	18 in	2
24 in	24 in	30 in	3
36 in	24 in	42 in	4

\*Regardless of overhang, these are standard measurements.



3. Calculate the number of circuits required.

Step 2 - Determine Spacing Factor		
J	Determine Your Roof's Spacing Factor Found in Table 1 (Left)	

Step 3 - Complete Calculations		
K	Multiply Roof's Spacing Factor (J) by Roof Length (B)	
L	Multiply Number of Dormers (G) by Distance Around Each Dormer (F)	
M	Multiply Number of Valleys (H) by 6 ft (1.8 m)	
N	Multiply Number of Downspouts (E) by Downspout Length (D) by 2	

Step 4 - Find Total Cable Length Needed		
O	Add Figure from C (Gutter Length), K (Roof Calculation), and N (Downspout Calculation)	

Step 5 - Circuit Calculations		
P	Determine the Maximum Heater Length for Your Breaker Rating Found in Table 3 (Below)	
Q	Divide Total Cable Length (O) by Maximum Heater Length Above (P)	

## Maximum Allowable Circuit Lengths per Breaker Rating for 5W/Ft. Heating Cable

**TABLE 2: THERMO SOFT NEVERFREEZE®**

	120V		
	15A	20A	30A
Start Up @ 0°F	140 ft	190 ft	270 ft
Start Up @ -20°F	125 ft	165 ft	250 ft
	240V		
	15A	20A	30A
Start Up @ 0°F	285 ft	380 ft	540 ft
Start Up @ -20°F	250 ft	330 ft	500 ft

4. Branch-Circuit Sizing: The ampacity of the branch circuit conductor and the rating or setting of overcurrent devices shall not be less than 125% of the ampere load of the cable or units.

### BEFORE INSTALLATION

**1. The minimum installation temperature is 32°F (0°C).**

**2. Locating the heating cable on the roof.**

A. Loop the heating cable on the overhang area of the roof. The overhang area is the portion of the roof which extends beyond the building's outside wall. The heating cable loop should extend into the gutter to maintain a drainage path. It should also extend to a point 6 inches above the line where the wall joins the roof. The spacing of the loops should be at 2-foot intervals. The minimum bending radius is six times the minor diameter.

B. For flat roofs, the heating cable can be spaced as appropriate for creating drainage paths.

C. Secure the heating cable to the roof using ThermoSoft NeverFreeze® roof clip kits for specified roof and gutter product. ThermoSoft NeverFreeze® recommends using two clips to form the loop that extends over the gutter edge and one clip to form the loop at the top of the overhang. For flat roofs, secure the heating cable to the roof with a clip at 3-foot intervals. See clip instruction sheet for details.

D. It is recommended that a barrier (snow birds) or snow fence be mounted on the roof above the heating cable. This prevents damage to the heating cable system due to ice slides. If desired, the heating

cable can be attached to the barrier with the ThermoSoft NeverFreeze® roof clips.

**3. Locating the heating cable in gutters and downspouts.**

A. Run the heating cable in and along the gutter. It is not necessary to attach the heating cable to the gutter bottom.

B. When running the heating cable into, or out of the gutter, use a ThermoSoft NeverFreeze® roof clip to prevent abrasion of the cable

C. In downspouts, the heating cable must extend below the freezing level.

D. The heating cable can be looped in the downspout if it is convenient to do so, such as when a downspout is not at the end of a run. Note: Tee splices are not permitted and void agency approvals.

E. Use a ThermoSoft NeverFreeze® downspout hanger to protect the heating cable from damage caused by sharp gutter edges and to provide strain relief.

F. Protect any heating cable which protrudes past the lower opening of the downspout.

#### **4. Installing the installation accessories.**

A. Install all end seals and splices prior to making power connections.

B. Use only ThermoSoft NeverFreeze® Installation Accessories. Refer to the appropriate product literature for the correct accessory catalog numbers for Power Connection Kit, Roof Clip Kit, Splice Kit and Hanger Kit.

C. If these kits are not used, or if their instructions are not followed, then the installation will not comply with UL.

D. Use only UL Listed weather-proof junction boxes for power connection.

#### **5. Start-up requirements.**

A. The power connection kit contains two caution labels that must be visibly located. One must be at the circuit breaker panel, the other on or next to the ON/OFF control for the cable unit.

B. Prior to energizing the system, make sure the heating cable is free of mechanical damage (nicks, cuts, etc.) and thermal damage (solder, overheating, etc.). Visually check all power connections, splices and end seals.

C. (Skip for preconnected plug-in kit) - Perform 2500 VDC meggar check.

The meggar check is performed at the power connection end of the cable between buss wire and the grounding braid this test is skipped for all 120V plug-in kits. The minimum acceptable reading is 20 megohms. If the installation fails the meggar test, check end seals, splice connections and cable sheath for physical damage or areas where the grounding braid has come in contact with the buss wires or conductive core.

If physical damage cannot be found and end seals or splices are not the cause, then the complete circuit should be removed and replaced with new roof and gutter heating cable.

### **SERVICE**

1. Prior to the winter season, make sure gutters and downspouts are free of leaves and other debris.
2. (Skip for preconnected plug-in kit) - ThermoSoft recommends checking the insulation resistance of the heating cable sheath with a 2500 VDC meggar. This reading is taken at the power connection end of the cable between a buss wire and the grounding braid. The minimum acceptable reading is 20 megohms. The value should be recorded.
3. The installation should be checked every Fall. The following checks should be done.
  - A. (Skip for preconnected plug-in kit) - Meggar test (see #2 above for procedure).
  - B. Inspect heating cable and connections for signs of damage.
  - C. If physical damage is found, replace the damaged sections.
  - D. If the installation fails the meggar test and physical damage cannot be found, then the complete circuit should be removed and replaced with new roof and gutter heating cable.
4. Prior to repairs performed on roof, heating cable must be removed to prevent damage to cable. Cable must not be exposed to chemical sealants that may be applied to roof surface and must be stored away from area while sealants cure. Upon replacement of cable, inspect for signs of physical damage to cable and connections. Replace any damaged sections and connections.

### **CONTROLLING YOUR ROOF & GUTTER CABLE**

The hardwired ThermoSoft NeverFreeze® Roof & Gutter De-Icing Cable works most effectively with an automatic thermostat and sensing device. The sensor monitors for moisture and temperature to energize the cable at the required temperature.

When using ThermoSoft NeverFreeze® Plug-In Kits from ThermoSoft NeverFreeze®, no control device is necessary. Simply plug into an outdoor rated outlet supplied by a GFCI breaker of the appropriate voltage.

## **ELECTRICAL PROVISIONS FOR THE SYSTEM**

The electrical connections to the De-Icing Cables shall be in accordance with the National Electrical Code (in the USA) or Canadian Electrical Code (in Canada).

## INSTALLING YOUR ROOF & GUTTER HEATING CABLE

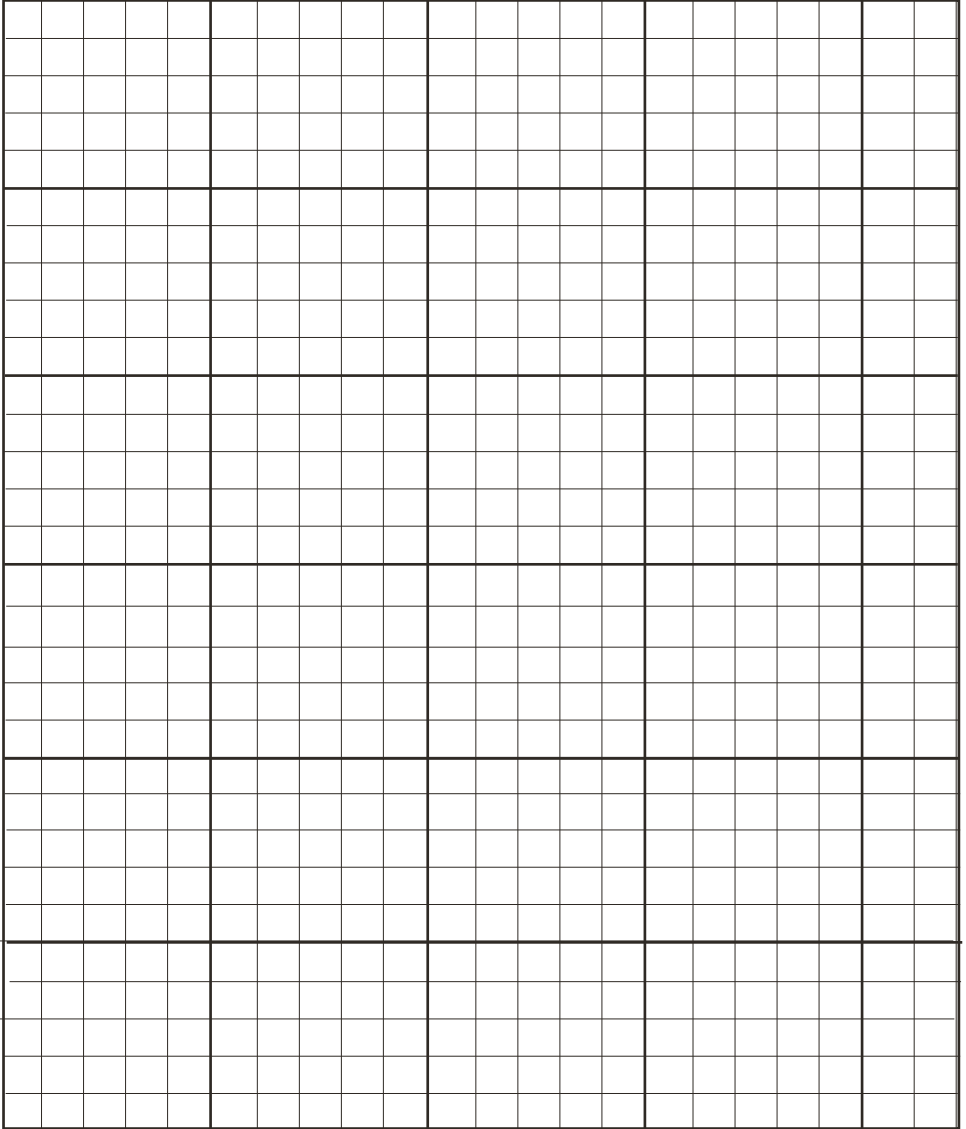
**Choose a starting point** - Select the starting point of your system by locating the desired placement of the outdoor electrical outlet or the junction box routing to the controller. Make sure to use caution and avoid high traffic areas, restrict general access to the cable and stay away from windows, doors and other obtrusions.

**Plan the pattern on your roof** - There are multiple methods for applying the cable to the roof and gutters as further described in this manual. We recommend you plan a written route for the cable to ensure the most efficient path and installation method for the heating cable.

Note that the heating cable is specifically intended for problem areas and does not need to be installed on all areas of the roof. In some instances, on high-pitched roofs (over 40-degree slope) and on roofs with minimal overhang, no cable on the actual roof line may be required. However, always ensure to create a path for the ice to melt from the roof to the ground, placing cable on the roof, in the gutters and in the downspouts as necessary. Extend the cable about 1' out of the bottom of the downspout (surface) or about 1' below the frost line. As a reference, the frost line in cold areas is typically 20" to 30" deep.

## PLANNING YOUR LAYOUT

Draw a plan showing the layout and location of the snow melting cables below and keep it for future reference.



**ThermoSoft NeverFreeze®'s 24/7 Toll Free Technical Number: 1-800-308-8057**



## INSTALLATION INSTRUCTIONS FOR THE ROOF & GUTTER DE-ICING CABLE

**TIP:** If you will be working directly on the roof during the installation, you may want to mark the cable pattern with chalk before attaching the cable. If working from a ladder, you will probably want to lay out the pattern as you attach the cable with the ThermoSoft NeverFreeze®-ROOF-CLIPS (NF-RC10, NF-RC25, NF-RC50). Making a drawing of your roof and your planned pattern on paper is recommended.

**Pattern for the roof line:** The cable laid along the roof line is arranged in a triangular pattern (see Figure 2). The cable **MUST** extend above the overhang into the heated section of the roof. To determine the height of the triangles, measure the depth of the overhang. The triangle heights are measured by the number of shingle rows from the roof edge (based on the standard 5½ inch tab shingles). The triangles should extend at least one shingle row (5½ inches) into the warm roof area.

**Pattern for the sky lights:** Problem sky light areas are also treated with the “triangle pattern” approach. However, the height of the triangles may need to be greater than those along the roof line. Increase the triangle height so that it extends to one shingle row (5½ inches) below the sky light. The triangle base is maintained at 15 inches (see Figure 3).

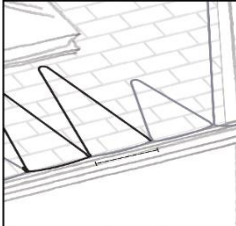


FIGURE 3: Triangle pattern near sky light

**Pattern for valleys:** If a valley exists in a problem area of your roof, you must route cable up and back down the valley a minimum of 3 feet, as shown in Figure 4. Extend the cable higher if the warm area of your roof is higher.

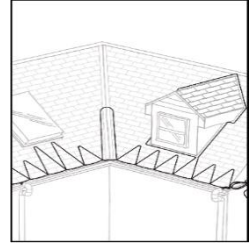


FIGURE 1: Typical pattern along roof line and in gutters/downspouts.

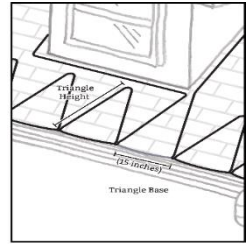


FIGURE 2: Triangle pattern along the roof line.

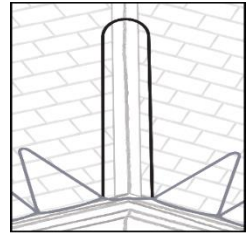


FIGURE 4: Cable pattern in a valley

**Pattern for dormers:** To treat a problem dormer area, the cable should be arranged up and around the dormer as shown in Figure 5.

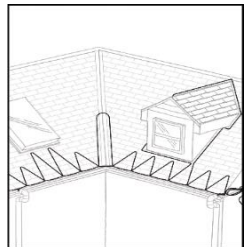


FIGURE 1: Typical pattern along roof line and in gutters/downspouts.

## INSTALLATION INSTRUCTIONS FOR THE ROOF & GUTTER DE-ICING CABLE (cont'd)

Pattern for other special roof areas - Other problem roof areas not previously described may also be treated with the de-icing cable to prevent ice dam formation. Triangles - similar to those used for the roof line can also be used to treat these special areas. In treating these special problem areas, the height of the triangles may be greater than those used at the roof edge. Keep the triangle based at 15 inches but increase the triangle height so it extends at least one shingle row (5½ inches) into the warm roof section.

### ROUTING OF CABLES IN DOWNSPOUTS

“Along run” downspouts - For downspouts that are along the run of the roof line being treated, the cable must be routed down and back up the inside of the downspout. Do NOT wrap the cable around the downspout or otherwise attempt to attach it to the outside. Remember: to avoid overheating the cable and increasing the risk of fire or electric shock, no part of the downspout may pass through a building.

You must first determine the total length of cable needed to go down and back up the downspout. It is important to measure as accurately as possible because the cable must be flush with the end of the downspout. Several methods for determining the length may be used. One is to tie a small weight to a string and lower it into the downspout. Once the string passes through the bottom of the downspout, mark the string as needed to record the length of the downspout. You will need twice this length of cable.

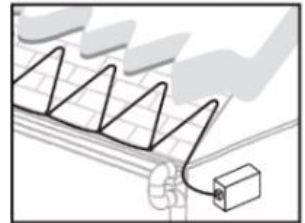
Alternatively, you could also use a tape to measure each section of the downspout. To calculate the total cable needed, add the measurements in each section and multiply by 2.

Lastly, if it is not possible to use either of these above methods, you may use the cable itself to estimate the length of cable needed in the downspout. However, to avoid snagging or cutting the cable on sharp edges, take care when pulling the cable into and removing it from the downspout. Inspect the cable for damage and do NOT use a cable that has been damaged.

“End of run” downspouts - If a downspout exists at the end of the run of the roof line being treated, the cable must be routed down the inside of the downspout. There is no need to route it back up. Do NOT wrap the cable around the downspout or attempt to attach it to the outside.

Pull cable into downspouts using weighted string. Be sure the run of the cable is flush with the end of the downspout and that no cable is extended out at the end of the downspout. NO part of the downspout may pass through a building.

If at this point you find that you have an excess of cable, you may route the cable back up the downspout to take up this excess. Alternatively, triangles on the roof can be made larger (up to 5 feet in length) or cable loops in valleys can be extended. If needed, ThermoSoft NeverFreeze® cable can be terminated on-site where desired, using the ThermoSoft NeverFreeze®-END-SEAL-KIT (NF-ESK). If you have a shortage of cable (the end of the cable does NOT reach to the bottom of the downspout), you may to reduce the height of the triangles on areas of the roof that are less susceptible to ice dams.



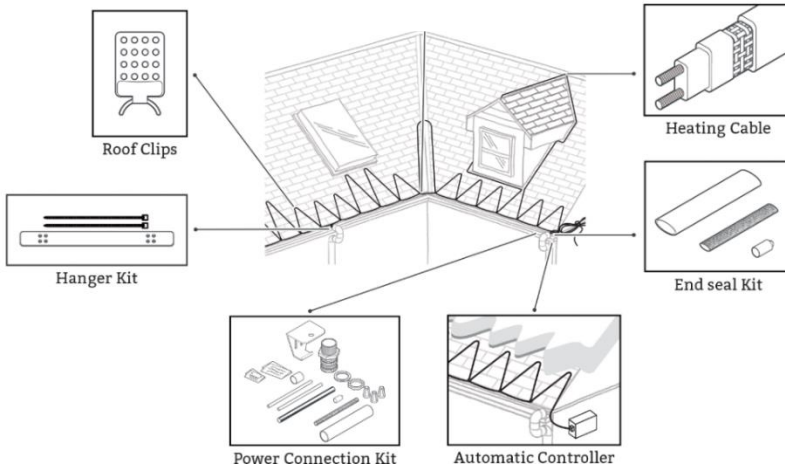
When transferring from gutter to downspout, in-line or at end-of-run, always use a ThermoSoft NeverFreeze®-HANGER BRACKET (NF-HB) to prevent the cable from chafing against the sharp sheet metal edges of the gutter. Refer to the specific instructions to apply such clip.

The above instructions assume ‘residential’ type gutters and spouts between 4” and 6” wide. For roof draining larger applications that may require above normal melting. Consider double or triple cable runs. Though cables should be kept spaced apart to ensure efficiency.

### FINAL INSTALLATION STEP

Check to be sure that the cable has NOT been removed from its intended position. The heated portion of the cable MUST be positioned entirely on the roof. Place the labels for the Circuit Breaker / Fuse Panel near the appropriate circuit breaker / fuse so that they are clearly visible to current and future users.

## LIST OF ACCESSORIES



Code	Description
THERMOFOFT NEVERFREEZE® -HANGER BRACKET (NF-HB)	Downspout Hanger for Self-Regulating Cable and Roof/Gutter heaters.
THERMOFOFT NEVERFREEZE®-POWER-CONNECTION-KIT (NF-PCK)	Hardwire Power Connection Kit for Self-Regulating Cable. Includes 2 warning labels. Also includes 1 END-SEAL-KIT.
THERMOFOFT NEVERFREEZE®-PLUG-IN POWER-CONNECTION-KIT (NF-GPPCK)	120V Plug-in, GFCI power connection kit for Self-Regulating Cable. Includes 2 warning labels. Also includes 1 END-SEAL-KIT.
THERMOFOFT NEVERFREEZE® -END-SEAL-KIT (NF-ESK)	End Seal Kit for Self-Regulating Cable.
ROOF-CLIPS (NF-RC10, NF-RC25, NF-RC50)	Roof Clips. Sold 10, 25, or 50/pkg.

## **WARRANTY - ROOF & GUTTER DE-ICING CABLES**

ThermoSoft NeverFreeze® provides a 3-Year Warranty (from date of purchase) for the Snow Melting Cables for the material and workmanship under normal operating conditions.

In case of defective material, ThermoSoft NeverFreeze®'s obligation will be limited to the repair or supply of new material, free of charge to the customer.

The Warranty does NOT cover installations made by unqualified personal or faults caused by incorrect design by others; misuse; damage caused by others; damage in transit; incorrect installation and any other subsequent damage that may occur. Cost related to repair/replacement will be fully chargeable to the customer if the damage is due to any of the above reasons.

ThermoSoft NeverFreeze® is under no circumstances liable for consequential damages or losses including without limitations the loss or profit arising from any cause whatsoever. The guarantee is a material warranty only and does NOT cover field labor. A qualified electrician MUST connect the heating system.

The Warranty is void if there is any payment default and if data is not filled in correctly.

### **EXCLUSIONS**

ThermoSoft International Corporation shall in no event be liable for incidental or consequential damages, including but not limited to extra utility expenses or damages to property. This Warranty is null and void if:

- 1) The covering over the heater(s) is damaged, lifted, replaced, drilled into or repaired.
- 2) The heater fails due to damage caused during installation, unless damage is caused directly by an employee of ThermoSoft. It is therefore essential to check that the heater is working (as specified in the installation manual) prior and during installation.
- 3) Damage as a result of floods, fires, winds, lightning, accidents, corrosive atmosphere or other conditions beyond the control of ThermoSoft International Corporation.
- 4) Use of components or accessories is not compatible with ThermoSoft NeverFreeze® heaters.
- 5) ThermoSoft NeverFreeze® products are installed outside the United States.
- 6) Parts not supplied or designated by ThermoSoft International Corporation.
- 7) Damage or repair required as a result of any improper use, maintenance, operation or servicing.
- 8) Failure to start due to interruption and/or inadequate electrical service.
- 9) Any damage caused by frozen or broken pipes in the event of equipment failure.
- 10) Changes in the appearance of the product that does not affect its performance.
- 11) The owner, or his/her designated representative, attempts to repair the product without receiving prior authorization from ThermoSoft NeverFreeze®. Upon notification of a repair problem, ThermoSoft International Corporation will issue an Authorization to Proceed under the terms of this Warranty. If ThermoSoft NeverFreeze® is required to inspect or repair any defects caused by any exclusions referenced above, all work will be fully chargeable at ThermoSoft NeverFreeze®'s inspection and repair rates then in effect.

THERMOSOFT INTERNATIONAL CORPORATION DISCLAIMS ANY WARRANTY NOT PROVIDED HEREIN, INCLUDED ANY IMPLIED WARRANTY OF THE MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. THERMOSOFT INTERNATIONAL CORPORATION 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 THAT EXTEND BEYOND THE FACE OF THIS DOCUMENT. NO AGENT OR REPRESENTATIVE OF THERMOSOFT INTERNATIONAL CORPORATION HAS ANY AUTHORITY TO EXTEND OR MODIFY THIS WARRANTY UNLESS SUCH EXTENSION OR MODIFICATION IS MADE IN WRITING BY A CORPORATE OFFICER.

DUE TO DIFFERENCES IN BUILDING AND INSULATION, CLIMATE AND COVERINGS, THERMOSOFT INTERNATIONAL CORPORATION MAKES NO REPRESENTATION THAT THE TEMPERATURE WILL ACHIEVE ANY PARTICULAR TEMPERATURE OR TEMPERATURE RISE. UL STANDARD LISTING REQUIREMENTS LIMIT THE HEAT OUTPUT OF THERMOSOFT NEVERFREEZE® HEATING, AS SUCH, USERS MAY OR MAY NOT BE SATISFIED WITH THE WARMTH THAT IS PRODUCED. THERMOSOFT DOES WARRANT THAT ALL HEATERS WILL PRODUCE THE RATED WATT OUTPUT LISTED ON THE HEATER THERMOSOFT NEVERFREEZE®, WHEN OPERATED AT THE RATED VOLTAGE.

## **TERMS AND CONDITIONS**

### **Shipping Discrepancies:**

Incoming materials should be inventoried 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, must be brought to the attention of your ThermoSoft NeverFreeze® retailer within 15 days of the shipping date entered on the packing slip for the order.

### **Miscellaneous:**

The terms of this Limited Warranty are exclusive and supersede any other warranty or terms and conditions relating to the subject matter whether included in a purchase order for this product or in any other document or statement.

## **ThermoSoft Offices in North America:**

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