

(Read through the entire instruction sheet before you begin. Make sure you have selected the correct length of heating cable.)

**Warnings:**

(This symbol identifies particularly important safety warnings that must be followed. Failure to do so could cause overheating and result in serious fire hazard or electrical shock)

- Failure to handle, improper installation, use, and/or maintenance of electrical heating cable may result in ice dam formation or injury or death from electric shock or fire.
- Do not allow any part of a cable to pass through the inside of any area of a building, including an attic, an exhaust vent, or a chimney. Also no part of the heat-traced downspout may pass through a building.
- Keep the cable at least 30cm/12in away from any extra sources of heat.
- Never alter this heating cable in any way. If made shorter, it will overheat. Once cut, the heating cable cannot be repaired.
- Avoid pulling the heating cable jerking or installing against sharp edges. Don't kink or crush the cable, including walking on it or running over it with equipment.
- Never allow heating cable to touch, cross, or overlap itself at any point.
- Do not cover or insulate any part of the cable.
- The bending radius should larger than 12mm/0.5in. Do not bend the heating cable in along the flat plane. Sharp bends can damage the heating element.
- Do not paint or expose the cable to chemicals such as glue, caulk, or adhesive.
- Do not operate the cable when outdoor temperatures begin to remain above 50°F (10°C)
- Make sure there is a properly grounded electrical receptacle close enough to plug in the cable. If an extension cord is necessary, use only a properly sized, grounded, CSA/UL Certified cord suitable for outdoor service in accordance with state and local codes and per the local authority having jurisdiction.
- Heating cables must be installed in compliance with the National Electric Code and Canadian Electrical Code. Ground fault protection (GFCI) of power supply circuit is required.
- Approvals are based on the use of Britech specified parts only. Any substitute parts or vinyl electrical tapes are not allowed.
- Do not connect power to heating cable while it is coiled.
- Disconnect the roof and gutter heating cable from its power source during installation.
- While energizing the heating system circuit, regardless of the normal operation, installation period or maintenance, always keep the heating section of the heating cable system away from combustible surfaces at least 1in/2.5cm interval.

Caution:

- You may need a professional to install the heating cable on the roof, if you are uncertain about the electrical requirements or there are some special considerations for specific roof materials.
- This product may be installed when there is no ice or snow on the roof.
- If separate areas are being treated, it may be more practical to use separate cables.
- Do not install the BGDC system when the ambient temperature is colder than the minimum installation temperature (0°F/-18°C).
- These instructions must be saved and made available to the owner and transferred to future owners.
- If after reading the following instructions, you still have questions regarding installation or for more information, please contact: Technical Support at 877-335-7790.

A. General Information

This guide provides a basis for designing a roof and gutter snow and ice melting system. It also covers the installation of RGDC heating cables and connections for roof and gutter deicing cables in residential applications. The manual includes information on controls, testing, and periodic maintenance.

How Heating Systems Work**The Problem**

As a result of either exposure to the sun or from heat rising from the building, as melted snow runs into cold gutters and drainpipes, it can refreeze forming layers of ice. These ice dams can result in damaged drains and gutters and can also result in water seeping between shingles. Eventually, water can seep into the building at light fixtures or through the ceiling flowing to places other than below the ice dam's origin. Additionally, icicles can form and become a dangerous potential source of injury and damage.

The Solution

A Therma-Roof BGDC system can help prevent ice dams and icicles by maintaining a continuous path for melt water to drain from the roof. As long as a heated path from the roof to a safe discharge area is maintained, ice dams will not form. The system can be used on roofs and valleys and in downspouts and gutters made from many types of standard roofing materials, including metal, plastic, asphalted and fiberglass shingles.

The Therma-Roof BGDC heating cable is laid in a "zigzag" fashion along the lower edge of the sloping roof. The heater should extend at least 30cm/12in above the level of the outer building wall, or 15cm/6in above the snow fence, whichever is the higher, and extend down into the gutter. This will ensure a continuous run off path for melted water.

The cable should only be operated when the outside temperature is between 15°F and 35°F (-9°C and 2°C). The cable can be operated by using an UL and Canadian Listed or Recognized power ON/OFF switch (better with an indicator light), or an optional UL and Canadian Listed Heat Roof Cable Deicing Control which is a moisture and temperature sensor control that operates the deicing cable only when moisture is present and the temperatures drop below freezing.

Caution: In very cold conditions (below -9°C/15°F), the cable may not generate enough heat in some roof sections to prevent melt water from refreezing.

Therma-Roof BGDC Application

This cable is designed for installed on inclined roofs with noncombustible tab shingles (such as asphalt shingles), metal or plastic gutters, downspouts, and/or valleys so that a clear path is provided for melt water to drain.

If previous ice dam problems have only included ice forming in the gutters and not on the roof, install the cable in the gutters and downspouts only.

The cable does not have to be installed in all of the sections of the roof, but only in the places that have been susceptible to ice dams in the past. However, always install the cable in valleys that are a part of any problem area on the roof.

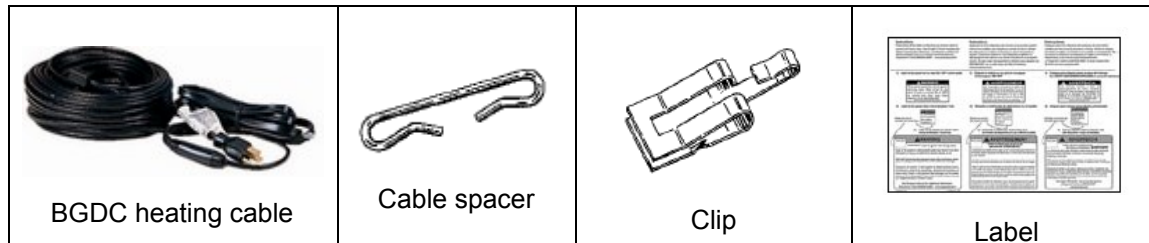
※Usage marking “-WS”----The BGDC system is designed for roof & gutter deicing application. It is intended for use in locations where it may be subject to water and sunlight.



Warnings:

- Do not install this product to remove ice dams that have already formed or to clear the roof of ice and snow.
- Do not use this product on roofs with wooden shingles, rubber roofs or composite (tar and gravel) roofs.
- Do not use this product on wooden gutters or downspouts.
- Do not use this deicing cable for any other purposes, such as to melt snow on sidewalks or to the pipes freezing protection.

Therma -Roof BGDC Kit Material



Tools Required



Receipt & Storage

Receipt

- Compare the materials against the shipping bill and check to verify the proper materials have been received. The heating cable type is printed on its jacket.
- Review design documents and check the received materials against the lists to verify of all needed materials.
- Inspect the heating cable and accessories to ensure there is no in-transit damage.

Storage

- Cables and system components should be stored in a clean, dry area. The storage temperature range is -18°C to 60°C (0°F to 140°F).

Before installation

If heating cable is stiff (due to cold), first uncoil it and then power it with a 120v outlet until it is warm and pliable before unplugging it and applying it to the roof and gutter.

B. Select the proper heating cable

First, several important terms should be defined as below:

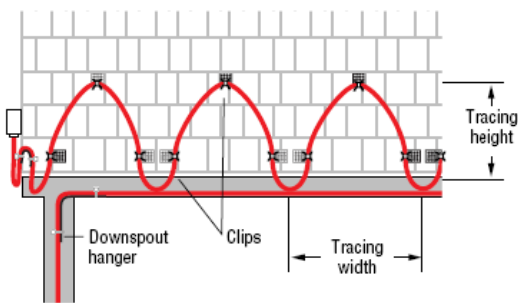


Figure 1.1 Front view of roof with IceStop system.

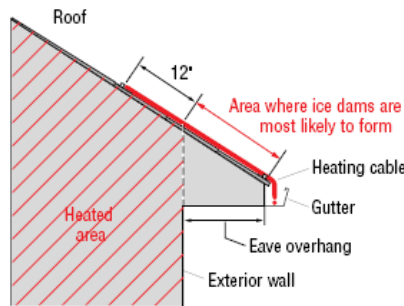
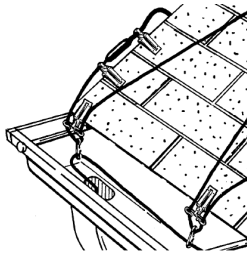


Figure 1.2 Side view of roof with IceStop system.

- An accurate estimate of the cable length you need is very important because you cannot change the cable length by cutting, splicing or altering it in any way.

	Design	Attaching the cable (Use only the clips and spacers provided to attach the cable)
Start Point	If an electrical outlet already exists in an appropriate location near the eave, that will be your starting point. Otherwise, select an appropriate starting point and have an electrical outlet installed.	 <p>First, lay out the cable flat against the roof so it is not twisted or tangled.</p> <p>Second, using the clips, attach the cable to the edge shingles nearest the start point.</p> <p>Using a spacer, arrange the cord to form a drip loop to prevent melt water from tracking along the cord and back into the receptacle.</p> <p>Caution: Lift the shingle just enough to insert clip. Press shingle back down firmly.</p>
Roofline	To maintain a continuous path on the roof for melt water runoff, route the heating cable in a "zigzag" fashion as shown.	A drip loop extends at least 6cm (2.5") from the roof edge to direct melt water into the gutter or to the ground.

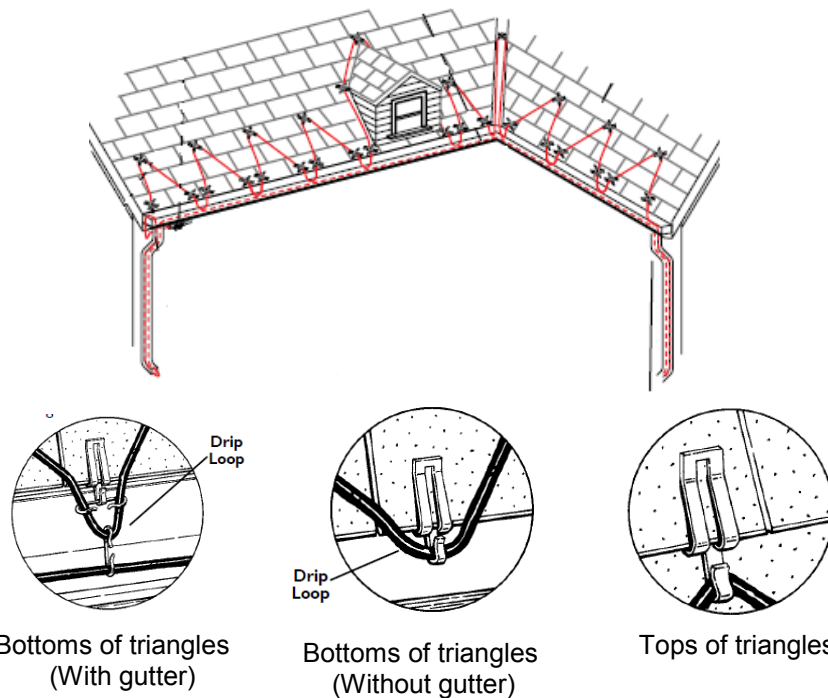
The cable must extend above the overhang into the section of the roof above the heated section of the house. Also in order to make a continuous path for the melted water, extend the heating cable all the way down to the gutter.

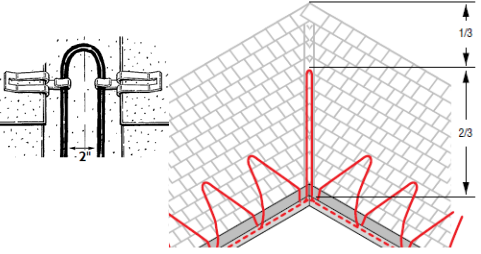
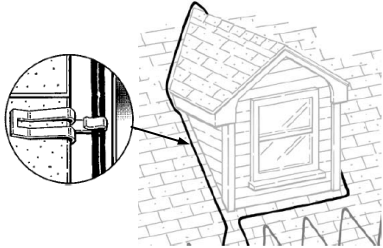
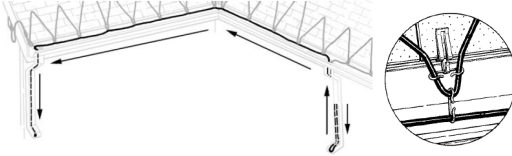
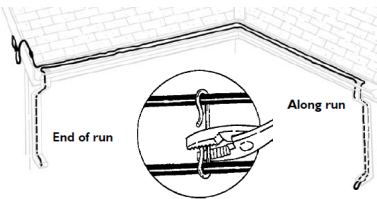
Overhang distance (inch/cm)	Tracing Width (inch/cm)	Tracing Height (inch/cm)	With gutter Multiplier (A)	Without gutter Multiplier (A)
No overhang	15/38	22/56	3.9	3
12/30	15/38	22/56	3.9	3
24/61	15/38	33/84	5.3	4.5
36/91	15/38	44/112	6.8	6
48/122	15/38	55/140	8.2	7.4
60/152	15/38	66/168	9.7	8.9
72/183	15/38	77/196	11.1	10.3

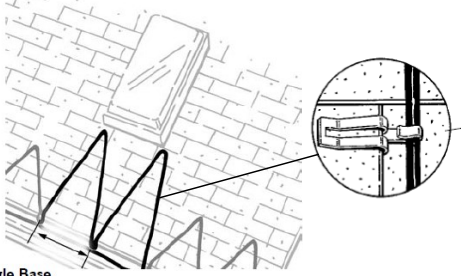
(B): Total length of roof edge

Cable Length required for roofline area: Multiply (A) and (B) to determine the length of heating cable required for roofing.

Caution: There should be a minimum of 2 inches between the bottom of the drip loop and the bottom of the gutter.



<p>Valleys</p>	<p>Lay heating cable up to two-thirds of the length of each valley (a minimum of 91cm/3ft) and return to form a double run of heating cable in the gutter. Extend the cable higher if the heated area of your house below your roof is farther up the valley.</p> <p>(C):Number of valleys (D):Valleys length</p> <p>Cable Length required for valleys: $(C) \times (D) \times (2/3)$</p>	 <p>Attach the heating cable up and down the valley and keep two parallel lines at least 5cm/2in away.</p>
<p>Dormers</p>	<p>For a problem dormer area, the cable should be arranged up and around the dormer.</p> <p>Cable Length required for dormer: Distance around dormer</p>	 <p>Attach the cable with the clips in every 91cm/3ft when the cable is running vertically around a dormer.</p>
<p>Gutter & Downspout</p>	<ol style="list-style-type: none"> 1. The heating cable needs to be installed back along the treated roofline through the gutter. Install the cable down into and back up the inside of any downspouts. If there is a downspout at the end of the roofline, you need only route the cable down the inside of the downspout but not back up. 2. If your icing problems are only in the gutter, cable would be routed only in the gutter and downspouts using a "double run" of cable 	 <p>Fasten the gutter cable to the bottom of each drip loop by use of a spacer. Secure the cable in the gutter, but keep it off the bottom of the gutter to prevent heat loss.</p>
	<ol style="list-style-type: none"> 3. Sometimes in wide gutter (gutter width > 15cm/6in), snow and ice can bridge over a single heating cable creating a runnel that prevents melt water from getting into the gutter and downspouts. To maintain a continuous path for melt water run-off, use two parallel heating cables in the gutter. <p>Cable Length required for gutter: Length of gutter X (1 or 2)</p> <p>Cable Length required for downspouts: Number of downspouts X Length of downspout X 2</p>	 <p>When using two parallel runs of heating cable, separate the two runs of heating cable with a spacer in every 15cm/6in.</p> <p>Route the cable under and over the gutter spike to keep the cable suspended off the bottom of the gutter. Another way to keep the cable suspended off the bottom of the gutter is using clips and spacers to external gutter straps.</p> <p>Determine the total length of cable needed to go down and back up the downspout as accurately as possible. Then install spacers and feed the cable into the downspout. Take care to avoid snagging or cutting the cable on sharp edges when feeding it into the downspout. To assist the cable down into the downspout use a weighted string.</p> <p>Caution: Spacers must be attached to the cable every 15cm/6in so that the cable does not touch itself in the downspout.</p> <p>Caution: Tighten the spacers with pliers. Squeeze gently and use care to avoid pinching, crimping, cutting into the cable. Do not use a hammer to tighten the clips and spacers.</p> <p>Caution: Do not wrap the cable around the downspout or otherwise attempt to attach it to the outside. No cable may be extended out the end of the downspout.</p>

<p>Skylight (Special roof areas)</p>	<p>Installing the heating cable around skylight areas (special roof area) use the "zigzag pattern" approach. The triangle base is also maintained at 38cm/15in. However, the height of the triangles needs to be greater than those along the roofline. Increase the triangle height till it extends to about 15cm/6in into the roof section above the heated portion of the house.</p> <p>Caution: Triangle heights must not exceed 20 feet. For special areas that are more than 20 feet from the roof edge, a commercial grade deicing cable should be installed by a professional installer.</p> <p>Cable Length required for Skylight (Special roof areas): Distance from roof edge to bottom of special roof area X Width of ice dams that form along special roof area X Special Roof Area Multiplier</p> <table border="1" data-bbox="277 674 714 808"> <tr> <th colspan="2">Special Roof Area Multiplier</th> </tr> <tr> <td>for roof without gutter</td> <td>for roof with gutter</td> </tr> <tr> <td>1.6</td> <td>2.6</td> </tr> </table>	Special Roof Area Multiplier		for roof without gutter	for roof with gutter	1.6	2.6	 <p>Triangle Base (15 inches)</p> <p>For triangles that are larger than 91cm/3ft in height, also attach clips every 91cm/3ft up the height of the roof.</p>
Special Roof Area Multiplier								
for roof without gutter	for roof with gutter							
1.6	2.6							
<p>Cable Length required for roofline area +Cable Length required for valleys +Cable Length required for dormer +Cable Length required for gutter +Cable Length required for downspouts + Cable Length required for Skylight (Special roof areas)</p> <hr/> <p>=Total cable Length required</p>								

C. Installation instructions

Pre-Installation Check

- The heating cable should be tested to ensure electrical integrity with at least a 500 Vdc megohmmeter (megger) between the heating cable bus wires and the grounding path (heating cable metallic braid). Minimum resistance should be 20megohms. Readings below 20megohms may mean the electrical insulation has been damaged. Replace the heating cable.
- Ensure that the service voltage available is correct for the heating cable selection. Check cable and components visually for damage.
- Clear all gutters and downspouts of combustible debris such as leaves, pine needles, seeds or windblown trash.
- All sharp edges that may come in contact with the heating cable should be smoothed by either filing or bending them down. Alternately, use a fixing bracket to protect the heating cable from damage by the sharp edge such as, gutter edges, downspout fittings, or screws.

Laying Out the Heating Cable

Please refer to section B “Attaching the cable”

- While the cable is being laid-out on the roof, loose attachment of the clips and spacers is recommended in case adjustments must be made.

Final installation step

- For excess cable, triangles can be made larger or cable loops in valleys can be extended. Alternatively, if a downspout is present at the end of the roofline being treated, cable may be routed back up the downspout to take up excess.
- For slight shortages, triangles can be made smaller on areas of the roof that are less susceptible to ice dams.
- Check the heated portion of the cable has not been moved from its intended position.
- Place the labels on the circuit breaker/fuse panel or on the ON/OFF switch.

Remove the cable

- To remove cable, wait for suitable weather conditions. Then unplug the cable. Open the clips with pliers and remove the cable. Take care when removing cable from a downspout to avoid snagging or cutting the cable on sharp edges.

Electrical Requirements

- This cable must be plugged into a 120 volt A/C outdoor receptacle that is grounded.
- It is better to have an indicator light on the power ON/OFF switch (UL and Canadian Listed or Recognized). The light will be illuminated when your cable is energized. This will allow you to know when the cable is energized and remind you to turning off the cable in warm weather. This will avoid overheating and reduce energy usage.
- To further conserve energy usage, you can use an optional UL and Canadian Listed Britech Heat Roof Cable Deicing Control which is a moisture and temperature sensor control that operates the deicing cable only when moisture is present and the temperature drops below freezing.
- Make sure that the heating cable load you are connecting is within the rating of the control system selected.
- The cable or extension cord should be plugged into a permanently installed outdoor-use receptacle protected from rain, snow, or other elements.
- To ensure the heated portion of the cable is entirely on the roof, the outdoor-use receptacle should be within 183cm/6ft of the starting point. This will help avoid contact with people or equipment that move or damage the cable.
- Ground fault circuit breakers (GFCI) are required on all heater constructions per the National Electric Code. Use circuit breakers that incorporate 30-mA ground-fault circuit protection, or provide equivalent levels of ground-fault protection.
- Two copies of a caution notice indicating the presence of electric de-icing and snow-melting equipment on the premises are packed with this unit. One notice must be posted at the fuse or circuit-breaker panel and the other on or next to the on/off control for the cable unit. Both notices must be clearly visible.



Warnings: Do not use this cable on a circuit whose circuit breaker or fuse is rated at more than 20 amps.

Warnings: Do not modify the plug provided with the cable. If it will not fit the outlet, have a proper outlet installed by a licensed electrician.

Testing

- After the installation but before energizing the circuit, another insulation resistance (megger) test should be repeated. This should draw attention to any damage to the heating cable that may have occurred during installation.
- It is the installer's or electrician's responsibility to perform a series of tests on the heating tracing system at specific points at the start of and during installation of the heating cable.
- Once power is connected, but before putting the system into operation, verify all heating cable testing and documentation have been completed for each heat tracing circuit. This will ensure that the system has been installed per the manufacturer's recommendations.

Maintenance

- During the cable is operating, check to ensure a complete path is available for melt water to get to the ground. There should be no ice buildup above the cables, and icicles should not form at the roof edge.
- Inspect the cable, including the plug at the beginning of every heating season and monthly during operation. Clear all gutters and downspouts of combustible debris such as leaves, pine needles, seeds or windblown trash.
- Remove and dispose of the cable if it shows any evidence of damage or deterioration, including cuts, brittleness, charring, cracking, discolored surfaces, or bare wires.
- Check the heated portion of the cable has not been moved from its intended position.
- Preventive Maintenance: A preventive maintenance program is needed which will encompass both visual and electrical checks of the system. These should be done not only before initial operation of the system, but also on a scheduled basis. The checks should also be done after any maintenance has been performed.
- Turning off or disconnecting the power when the heating season ends. Reconnect before the start of the next heating season.



Warnings: Disconnect the power connection before inspecting.

D. Troubleshooting

Symptom	Problem causes	Correction
Circuit Breaker Trips	Circuit breaker is undersized	Replace the circuit breaker if defective or improperly sized.
	Defective circuit breaker	※Check to see if existing power wire sizing is compatible with larger sized breakers.
	Parts of the electrical circuit be come wet	Use weatherproof receptacle
	Physical damage to the heating cable may be causing a direct short.	Check for where there may have been maintenance work done. Replace damaged heating cable.
	GFCI is undersized	Replace undersized GFCI with 30-mA GFCI.
Low insulation resistance	Nicks or cuts in the heating cable.	Replace the cable with a new one
	Short between the braid and heating cable core or the braid and metal gutters or downspouts.	
Icing problems persist	The cable layout pattern does not prevent ice dams	Observe and record these conditions. Adjust cable pattern when conditions are suitable. ※Rearrange and supply more cable to the needed areas or reduce the cable in an area that is not as susceptible to ice dams
	Lost of power	Check the power supply to the cable



Warnings: Disconnect the power connection before inspecting.

Product Name: _____

Model #: _____ **Watts:** _____ **Volts:** _____

Supplier/Purchased from: _____

APPLICATION: FLOOR WARMING RADIANT HEATING SNOW MELTING ROOF DE-ICING PIPE TRACING OTHER

LOCATION : _____

TEST	Before commencing installation	After installation but before final surface	After final surface installation
Continuity			
Resistance of Cable (OHMS)			
Insulation Resistance (M OHMS)			

Address of Installation: _____

Date of Installation: _____ / _____ / _____ (MM/DD/YY)

Name of Qualified Electrician: _____

Signature of Qualified Electrician: _____

IMPORTANT: The system warranty is not valid without evidence that the system resistance has been tested. Control Card must be completed and given to the property or homeowner upon completion of installation and required testing.

For assistance with your heating cable product please contact Britech by calling 1-877-335-7790 or email info@britech.ca