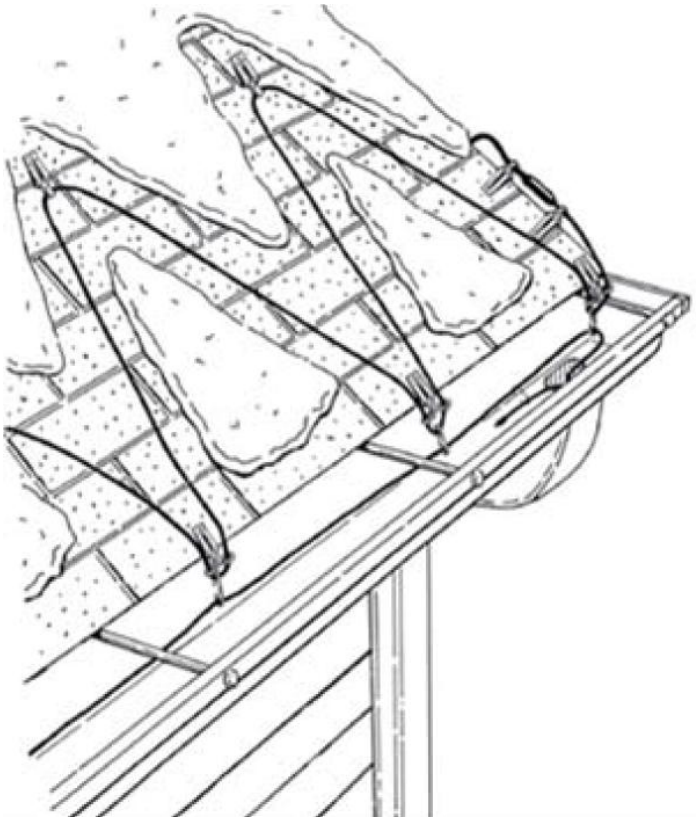
Roof and Gutter Deicing Kit
PLCW Installation Manual



Roof and Gutter Deicing Kit

Contents

1 - IMPORTANT SAFETY INFORTATION

WARNING: *Improper installation, use, operation or maintenance of this product may result in injury or death from electric shock or fire. It may also result in property damage from ice dams. Read and follow the instructions in this manual. If you have questions, contact the manufacturer for assistance. Give this manual to anyone who will be using this cable, including future users/homeowners.*

To reduce the risk of ice dam formation or injury or death from electric shock or fire:

Follow all electrical requirements for using this product.
See *Electrical Requirements* section on pages 4-6 for details. In summary, these requirements include using a 120 volt A/C outdoor receptacle that meets all of the following:

- Is grounded.
- Is ground fault protected.
- Is on a circuit that has an appropriate current (amp) rating.
- Has an on/off switch that has an indicator light (pilot light).
- Is protected from the weather.
- Is within 6 feet of the cable starting point on the roof.

- **Manufacturer recommends that you do not use an extension cord with this cable.**
  - If you are unsure whether your electrical receptacle meets these requirements, contact your local electrical inspector or a licensed electrician.
- **Avoid overheating the cable.** For example:
  - Do not allow the heated portion of an operating cable to touch, cross over or overlap itself or to touch another deicing cable.
  - Do not operate the cable in warm weather (above 50°F / 10°C).
  - Do not install cable where it might be warmed by sources of heat, such as an exhaust vent or chimney.
- **Do not alter or modify the cable in any way.** For example:
  - Do not cut or splice the cable, or paint or expose it to chemicals, such as glue, caulk or adhesive.
- **Keep all combustible materials away from the cable,** such as leaves, pine needles, seeds or windblown trash. Do not attach the cable to a combustible material, such as any wooden parts of the eave.
- **If using gutter guards, ensure that there is at least ½-inch clearance between the gutter guard and cables.**
- **Do not use a cable that is damaged or has deteriorated.**
  - Signs of damage include: cuts, brittleness, charring, cracking, discolored surface, or bare wires. If damaged, dispose of properly.

- **Use this product only as intended and described in this manual.**
- **To prevent creases, ensure that the minimum bending radius is 1 inch.**

2 - PRE-INSTALLATION PLANNING & INFORMATION

A. PURPOSE OF THIS PRODUCT

This deicing cable is designed to prevent ice buildup, known as ice dams, from forming on roofs and in gutters and downspouts. When properly installed and operated, this product creates a path for melted snow or ice (“melt water”) to drain from the roof to the ground. 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 deicing cable for any other purposes, such as to melt snow on sidewalks or to protect pipes from freezing. Manufacturer offers other products designed for these purposes. See your local dealer or contact Manufacturer.

Improved ventilation (cooling) of the space underneath the roof surface, if possible, can also reduce the likelihood of ice dam formation. To avoid ice dams, the entire roof surface should be kept at the same temperature as the outside air. Consult a professional roofer for expert advice on roof venting; refer to *Appendix A* on page 25.

B. WHO SHOULD INSTALL THE CABLE

Although the installation of the cable does not require special skills, you may wish to hire a professional for a variety of reasons. For example, if you are uncertain about any of the *Electrical Requirements* on pages 4-6, or if you are not comfortable working on a ladder or on the roof, you may need to hire a professional, such as a licensed electrician.

C. WHEN TO INSTALL THE CABLE

The deicing cable may be installed when:

There is no ice or snow on the roof

Do not use this cable to melt snow and ice that has already formed on your roof or in your gutters or downspouts, as you would not be able to attach the cable properly with the clips. Additionally, this cable was not designed to melt snow; rather, it simply provides a path for snow or ice that has already melted (meltwater) to flow to the ground.

To solve ice dam problems when snow and ice are on the roof, contact a professional roofer for expert advice.

To prevent future ice dams, you can install the deicing cable once the ice and snow have melted and before the next winter season.

The temperature allows for lifting of the shingle tabs

In general, the temperature should be between 32° and 80°F (0°C and 27°C). Below 32°F (0°C), shingles are brittle and may break off when lifted to install the cable clips. Above 80°F (27°C), shingles may be warm and may tear when lifted to install the cable clips.

D. DETERMINING WHAT AREAS NEED CABLE

In general, the cable should be installed on roof areas where ice dams are likely to form. Depending on the exposure to the sun, prevailing wind direction and roof shape, the susceptible area may be the entire roof edge, or it may be specific areas, such as underneath skylights, in roof valleys or around dormers. Ice dams can be identified at points where snow has melted on an upper roof surface, but the area below is still snow and/or ice covered. Icicles are also a sign of ice dams.

Cable should also be installed in any nearby gutters, downspouts and/or valleys so that a clear path is provided for melt water to drain.

If your previous ice dam problems have only included ice forming in the gutter and there are no ice dam problems on the roof, install the cable in the gutter and downspouts only.

See Planning Your Cable Arrangement on pages 7–13 for details on the proper layout of the cable and *Appendix A* on page 25 for more information about ice dam formation and prevention.

E. CHECKING CABLE LENGTH

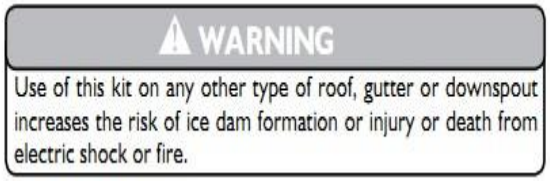
After you have determined what areas need cable (see above), see *Appendix B* on pages 26-29 to check your estimation of the length of cable that you need.

3 - ROOF, GUTTER & DOWNSPOUT REQUIREMENTS

This kit is only designed for use on:

- Inclined roofs. An inclined roof is one where the water is expected to flow off the roof edge.
- Roofs with noncombustible tab shingles (such as asphalt shingles) that meet national building codes.
- Metal or plastic gutters/downspouts.

WARNING: *Use of this kit on any other type of roof, gutter or downspout increases the risk of ice dam formation or injury or death from electric shock or fire.*



Do not use this kit on any other type of roof, gutter and downspout, including:

- Roofs with wooden shingles
- Rubber or rubber membrane roofs
- Composite (tar and gravel) roofs
- Wooden gutters or downspouts
- Flat roofs
- This cable cannot be used on slate, stone, metal and ceramic roofs

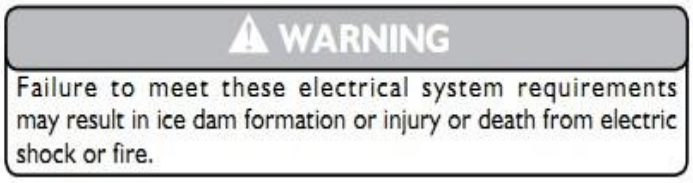
These types of roofs require special consideration. Contact manufacturer for more information.

If you are unsure if your roof, gutters, and downspouts meet these requirements, call a professional roofing contractor.

4 - ELECTRICAL REQUIREMENTS

There are several requirements for the electrical system that supplies power to this deicing cable. Check with your local electrical inspector or a licensed electrician if you are unsure about the requirements listed below or what you may need to do in order to meet all applicable electrical codes and ordinances.

> ⚠ **WARNING:** *Failure to meet these electrical system requirements may result in ice dam formation or injury or death from electric shock or fire.*



This cable must be plugged into a 120 volt A/C outdoor receptacle that:

Is grounded. This cable is equipped with a three-prong plug that has a grounding prong. To reduce the risk of fire and electric shock, this cable must be grounded. To do this, the plug must be plugged into an outlet that is properly installed and grounded in accordance with all local electrical codes and ordinances.

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.

Is ground-fault protected. A ground-fault protected receptacle reduces the risk of fire or electric shock by stopping the flow of electricity (current) when it senses that current is flowing through something other than the cable (for example, a person or downspout).

This unintended current:

- can be caused by a damaged cable,
- may not be large enough to trip a circuit breaker,
- can lead to overheating of the cable, which can result in fire, and
- may result in electrocution due to exposed electrical parts.

One type of ground-fault protection is a ground-fault circuit-interrupter (GFCI). Some, but not all, outdoor receptacles are equipped with a GFCI.

If you are not sure if your receptacle has ground-fault protection, check with your local electrical inspector or a licensed electrician.

Is on a circuit that has an appropriate current (amp) rating. Do not use this cable on a circuit whose circuit breaker or fuse is rated at more than 20 amps. Limiting the circuit to a maximum of 20 amps will reduce the risk of fire and electric shock if the cable becomes damaged.

While a 20 amp circuit is the maximum allowed, you also need to check that the circuit can supply enough current without being overloaded. Overloading a circuit can lead to a tripped breaker or a blown fuse. To avoid overloading the circuit, do not use more than 80 percent of the circuit's rated capacity (for example, do not load a 20 amp circuit more than 16 amps, and do not load a 15 amp circuit above 12 amps).

See Table 1 below for the current needed for your cable length. If you do not have a circuit with an appropriate rating, contact a licensed electrician.

Table I: Current Needed for Manufacturer De-Icing Products

Catalog Number	Current Needed (Amps)
PLCW-100-1	0.83
PLCW-150-1	1.3
PLCW-300-1	2.5
PLCW-400-1	3.3
PLCW-500-1	4.2
PLCW-600-1	5.0
PLCW-800-1	6.7
PLCW-1000-1	8.3
PLCW-1200-1	10.0

Has an on/off switch that has an indicator light (pilot light). The indicator light should be wired to light up when your cable is energized. This will help you minimize energy consumption and make sure that the cable is not energized in warm weather. Turning on the cable in warm weather can cause it to overheat and may increase the risk of fire or electric shock.

Is protected from the weather. The connection between the plug and receptacle must be protected from rain, snow or other elements. You may use either:

- a receptacle in a location that is protected from the elements. (Sometimes an eave can provide adequate protection.)
- a receptacle that has a weatherproof enclosure, similar to that shown below. This type of enclosure is sometimes called an "in-use receptacle cover."

Is within 6 feet of the cable starting point on the roof. [Refer to *Planning Your Cable Arrangement* on pages 7-13.] The power cord of the cable is 6 feet long, and the remainder of the cable is heated.

Choosing a receptacle that is within 6 feet of the start point will make sure that the heated portion of the cable is entirely on the roof. This will also avoid contact by persons or equipment (such as yard tools) that can move or damage the cable.

The use of a properly located receptacle will also eliminate the need for an extension cord. Manufacturer recommends that you do not use an extension cord with this cable. The use of an extension cord with this cable may increase the risk of fire or electric shock.

Remember, there may be different or additional requirements related to local or national codes and ordinances. Check with your local electrical inspector or a licensed electrician if you are unsure about these codes and ordinances.

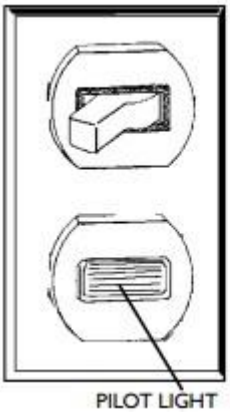


Figure 1A: On/Off switch with indicator (pilot light).

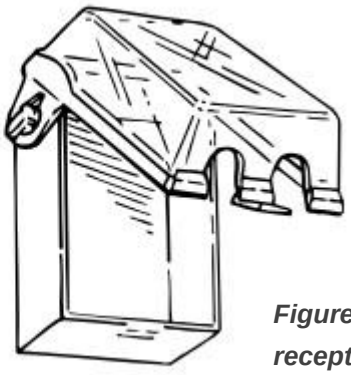


Figure 1B: In-use receptacle cover.

5 - MATERIALS NEEDED FOR INSTALLATION

A. PLCW KIT MATERIALS

This kit contains:

1. Cable
2. Cable spacers
3. Shingle clips

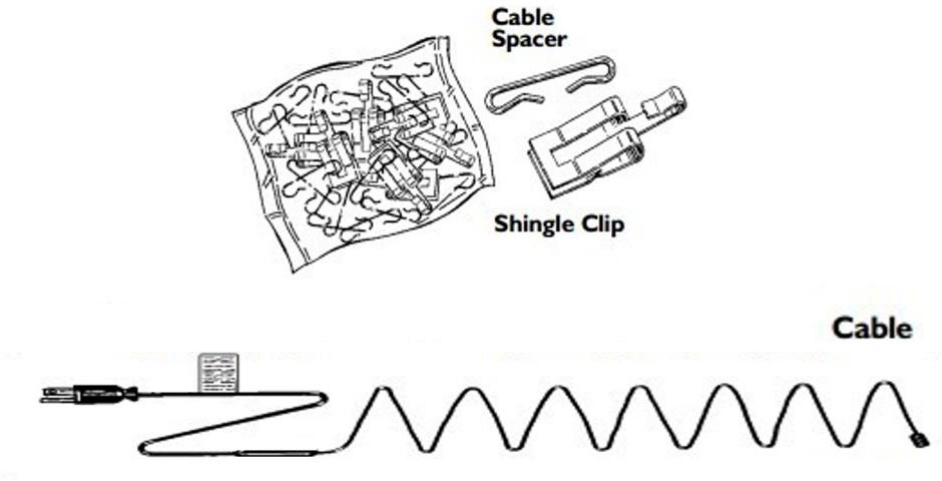


Figure 2: PLCW kit materials

If any components of this kit are missing or damaged, contact Manufacturer for assistance.

B. ADDITIONAL TOOLS & MATERIALS REQUIRED

You will also need the following:

1. **Tape measure** to measure lengths of roof edge, overhang, etc.
2. **Ladder** or other access to roof.
3. **Putty knife** to pry up shingles.
4. **Marking chalk** to mark cable pattern on shingles.
5. **Weighted string** (with string at least as long as the longest downspout), to measure cable needed in downspouts and to pull the cable through downspouts.
6. **File** to remove sharp or jagged edges along gutters and downspouts.

6 - INSTALLING THE CABLE

⚠ **WARNING:** *Failure to handle, arrange and install the cable according to these instructions may result in ice dam formation or injury or death from electric shock or fire.*

A. PLANNING YOUR CABLE ARRANGEMENT

Before laying out and attaching the cable to your roof, it is important to plan how the cable will be arranged.

To prevent ice dams, the cable pattern must be arranged so that it routes meltwater to flow from “warm areas” of the roof through the “cold areas” and down to the ground. A “warm area” of your roof is one where snow and ice on the roof thaws because of heat loss through inadequate roof venting and/or insufficient ceiling insulation. “Cold areas” of your roof are areas where ice typically builds up, such as the roof surfaces above overhangs and in gutters. (See *Appendix A* on page 25 for more information on the warm and cold areas.)

In general, you need to apply the cables in the following areas:

On roof areas, including:

- Along the roofline
- In valleys
- In problem areas, such as skylights and dormers (if applicable)
- In nearby gutters and downspouts

 **WARNING:** *To avoid overheating the cable and increasing the risk of fire or electric shock, do not allow any part of a cable to pass through the inside of any area of a building, including an attic. For example, do not install the cable in a downspout that has a section that passes through a building. In addition, do not install cable where it might be warmed by sources of heat, such as an exhaust vent or chimney. Keep the cable at least 12 inches from these sources of heat.*

This section will also describe how to treat separate areas with multiple cables, and how to handle cable shortage or excess.

Choose a starting point. The cable starting point must not be near any entrance areas, sidewalks, etc. to avoid contact by persons or equipment (such as yard tools) that can move or damage the cable. You may also want to avoid having the cable power cord routed in front of windows or high-visibility areas of your home. For more information on selecting a location for an electrical outlet, see *Electrical Requirements* on pages 4-6.

If an electrical outlet already exists in an appropriate location near the eave, then that defines your starting point. Otherwise, select an appropriate starting point and have an electrical outlet installed. (Refer to *Electrical Requirements* on pages 4-6.)

Plan the pattern for your roof. Methods for arranging the cable pattern for different parts of the roof are provided on the following pages. The cable does not have to be installed in all of these sections – only in the sections that have been susceptible to ice dams in the past (see *Determining What Areas Need Cable* on page 3). You may or may not need to install cable along the roofline or near skylights or dormers. However, always install cable in valleys that are a part of any problem area on your roof.

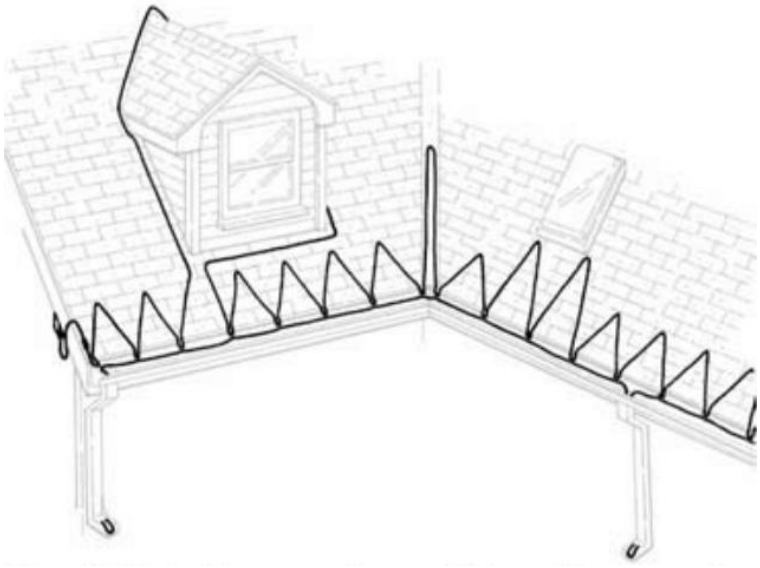


Figure 3: Typical pattern along roofline and in gutters/downspouts.

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 clips. Making a drawing of your roof and your planned pattern on paper may be helpful.

Pattern for the roofline: Cable laid along the roofline is arranged in a triangular pattern (see Figure 4). The cable must extend above the overhang into the warm 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 $5^1/_2$ inch tab shingles). Using Table II, determine the height of each triangle. Using this method, the triangles will extend at least one shingle row ($5^1/_2$ inches) into the warm roof area.

The base of each triangle is always 15 inches wide. If you have nonstandard shingles (not $5^1/_2$ inches wide) contact Manufacturer for assistance.

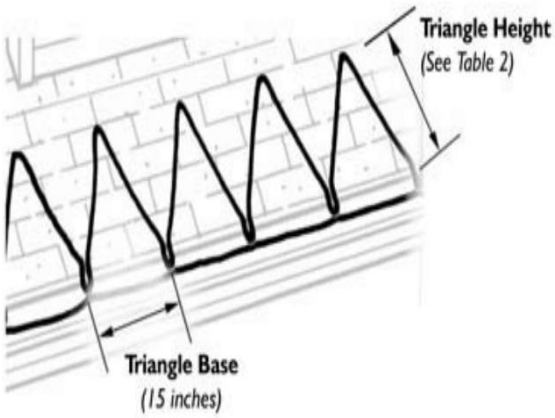


Figure 4: Triangle pattern along roofline.

Pattern for skylights: Problem skylight areas are also treated with the “triangle pattern” approach. However, the height of the triangles may need to be greater than those along the roofline. Increase the triangle height so that it extends to one shingle row ($5^1/_2$ inches) below the skylight. The triangle base is maintained at 15 inches (See Figure 5).

Triangle heights must not exceed 20 feet. The clips provided with the kit are not designed to attach triangles this large. For problem areas that are more than 20 feet from the roof edge, commercial grade deicing cable should be installed by a professional installer, contact Manufacturer for assistance.

Table II: Triangle Heights for Various Overhangs

Overhang *(inches)*	Triangle Height *(Shingle Rows)*
12 or less	3
12 – 18	4
18 – 24	5
24 – 30	6
30 – 36	7
36 – 42	8
42 – 48	9
48 – 54	10
54 – 60	11
60 – 66	12
66 – 72	13

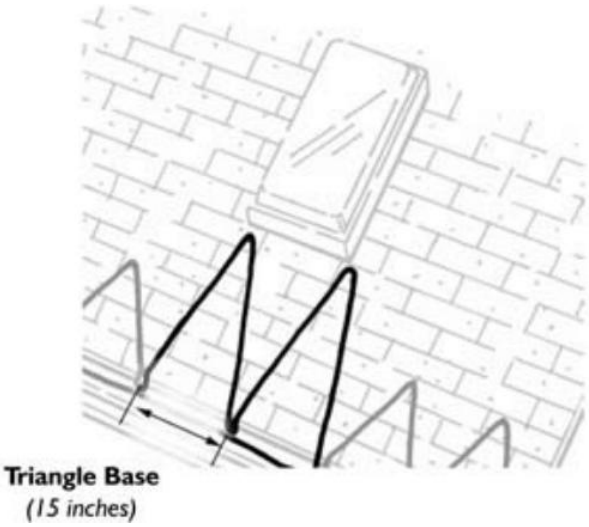


Figure 5: Triangle pattern near skylight.

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 6. Extend the cable higher if the warm area of your roof is higher.

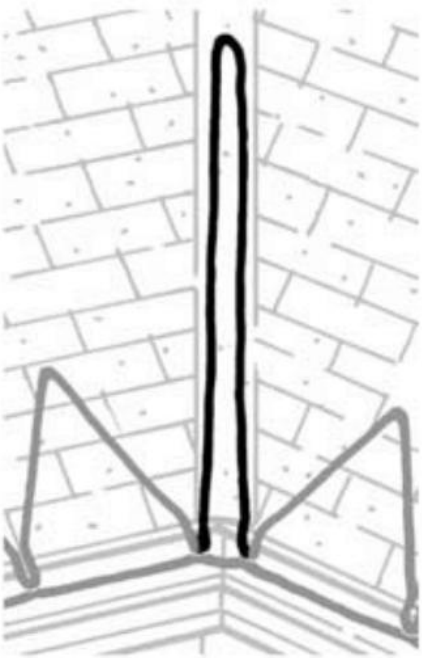


Figure 6: Cable pattern in a valley.

Pattern for dormers: To treat a problem dormer area, the cable should be arranged up and around the dormer as shown in Figure 7.

Figure 7: Cable pattern around a dormer.

Pattern for other special roof areas: Other problem roof areas not previously described may also be treated with deicing cable to prevent ice dam formation. Triangles—similar to those used for the roofline—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 base at 15 inches, but increase the triangle height so it extends at least one shingle row ($5^1/_2$ inches) into the warm roof section.

Triangle heights must not exceed 20 feet. The clips provided with the kit are not designed to attach triangles this large. For problem areas that are more than 20 feet from the roof edge, commercial grade deicing cable should be installed by a professional installer, contact Manufacturer for assistance.

Plan the cable pattern in the gutters and downspouts. For each roof area that has cable, the corresponding gutter (if present) must also have cable. After arranging the cable along the roofline, the cable will need to be installed back along the treated roofline through the gutter. Plan to install the cable down into and back up the inside of any downspouts along the way. If there is a downspout at the end of the roofline, you need only route the cable down the inside of the downspout and back up. However, if there is a shortage of cable, you need only route the cable down the inside of the downspout and not back up. The cable must terminate at the end of the downspout. 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.

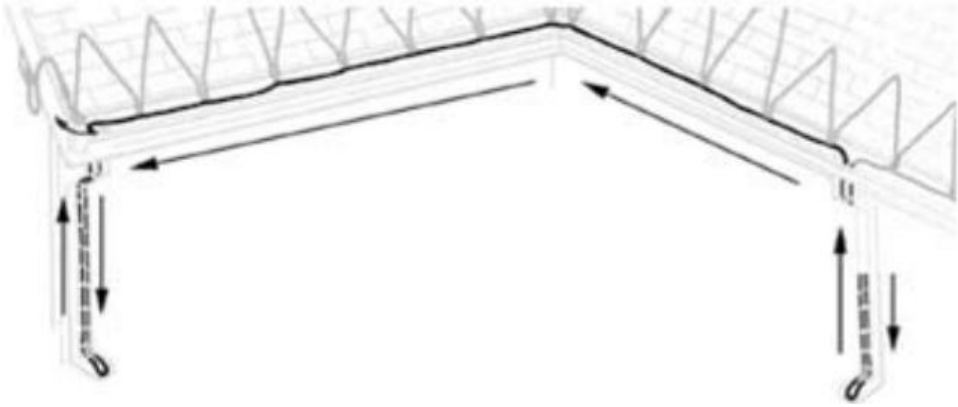


Figure 8: Cable routed back along the roofline in the gutter and downspouts.

If the icing problems are only in the gutter, cable should be routed only in the gutter and downspouts using the recommended “double run” of cable, as shown in Figure 9. This figure shows an alternate “single end of run”.

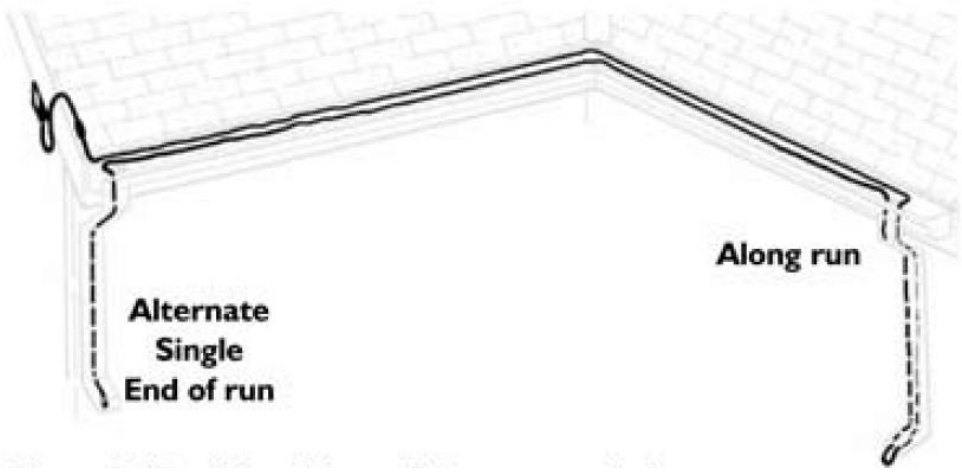


Figure 9: “Double cable run” in gutter and downspouts.

Consider the number of cables. If separate areas are being treated, it may be more practical to use separate cables. When planning your cable arrangement, consider where each cable will be routed given its length.

It is also possible to use one common cable for both areas; the cable can be routed from one area to the next either in the gutter or horizontally attached to the shingles. Do not route the cable over the roof peak, because the clips are not designed for this purpose.

Consider cable shortage or excess. Consider how you will handle any excess or slight shortage of cable. For excess cable, triangles can be made larger (up to 20 feet in height) or cable loops in valleys can be extended. For slight shortages, triangles can be made smaller in areas less sensitive to ice dams. Alternatively, if a downspout is present at the end of the roofline being treated, cable may be routed in a single run down, or as recommended run down and back up. In either scenario the cable must terminate at the end of the downspout. See Figure 22.

> ⚠ **WARNING:** *To reduce the risk of fire, electric shock, or ice dam formation, do not cut, splice or alter the deicing cable in anyway. The cable length cannot be changed.*

B. PROPER HANDLING & CARE OF THE CABLE

> ⚠ **WARNING:** *Improper handling can damage the cable and may result in ice dam formation or injury or death from electric shock or fire.*

Properly handle and care for the cable:

- Do not step on the cable.
- Do not bend cable more sharply than required for use with the clips included with the kit and according to the installation instructions. Sharp bends can damage the heating element.
- Do not allow the heated portion of an operating cable to touch, cross over or overlap itself or to touch another deicing cable.
- Do not cut, splice or alter the deicing cable in anyway.
- Do not cover or insulate any part of the cable.
- Do not paint or expose the cable to chemicals such as glue, caulk or adhesive.

C. TESTING THE CABLE

Although it is not necessary, you may wish to test the cable before installation. To do so, uncoil it completely so it does not touch, cross over or overlap on itself. Do not plug in the cable until it has been completely uncoiled.

Plug cable in, and in approximately 5 minutes, it should feel slightly warm to the touch. Then unplug the cable.

D. PREPARING YOUR ROOF, GUTTERS & DOWNSPOUTS

Follow these steps BEFORE installing the deicing cable:

1. Remove any existing deicing cables, or heating cables, clips and cable spacers in the area where the new cable will be installed. (See *Removing the Cable* on page 17.)
2. Remove any combustible debris from the roof, gutters and down spouts, such as leaves, pine needles, seeds or windblown trash.
3. Look and feel for sharp or jagged edges along gutters and downspouts that could damage the cable. Sharp or jagged edges could include gutter edges, downspout fittings or screws. Remove sharp or jagged edges by either filing or bending them down.

E. ATTACHING THE CABLE

> **WARNING:** *Improper handling can damage the cable and may result in ice dam formation or injury or death from electric shock or fire.*

This section describes how to use the clips and cable spacers to attach the cable to each area of your roof and route it through the gutters and downspouts. Use only the clips and spacers provided to attach the cable. Do not attempt to staple or nail the cable or attach the cable with materials such as glue, caulk or adhesive.

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.

Uncoiling the cable. To attach the cable properly, it must lie flat on the roof. To do this, uncoil the cable so it is not twisted or tangled. If not properly uncoiled, the cable may be hard to clip to your roof.

Attaching the cable at the starting point. Near the outlet, first, attach the cable to the edge of the roof near the outlet using the clips as shown in Figure 10 or 11. Do not plug in the cable at this time.

Then, route your cable as planned on your roof or in your gutter and downspouts. Details on clip and spacer attachment are provided in the following sections.

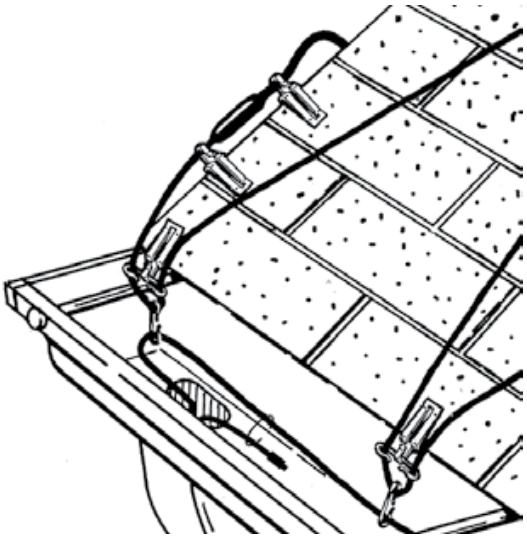


Figure 10: Starting point near roof edge.

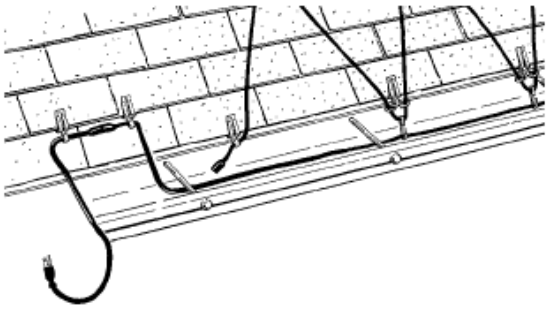


Figure 11. Starting point along gutter edge.

Attaching the cable to your roof with clips and cable spacers. This section describes how to attach the cable to the roof using the clips and spacers.

At tops of triangles along edge of roof

Taking care not to tear the shingle tab, lift it gently and evenly using a putty knife. Lift the shingle just enough to insert clip.

Press shingle back down firmly. Note: Shingles will reseal in hot weather.

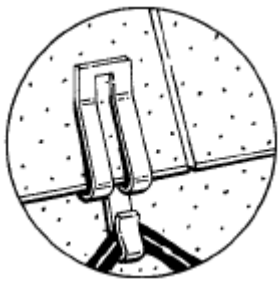


Figure 12: Attaching clips to shingles at top of triangles.

At bottoms of triangles along edge of roof

Form a “drip loop” over roof edge to direct melt water into the gutter or to the ground. There should be a minimum of 2 inches between the bottom of the drip loop and the bottom of the gutter.

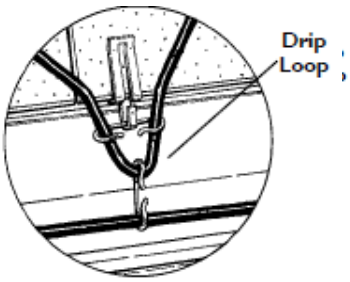


Figure 13. Attaching clips to shingles at edge of roof with gutters

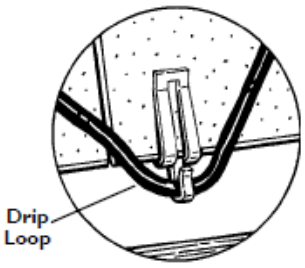


Figure 14: Attaching clips to shingles at edge of roof with gutters.

Along the rise of large triangles

For triangles that are larger than 3 feet in height, also attach clips every 3 feet up the height of the roof.

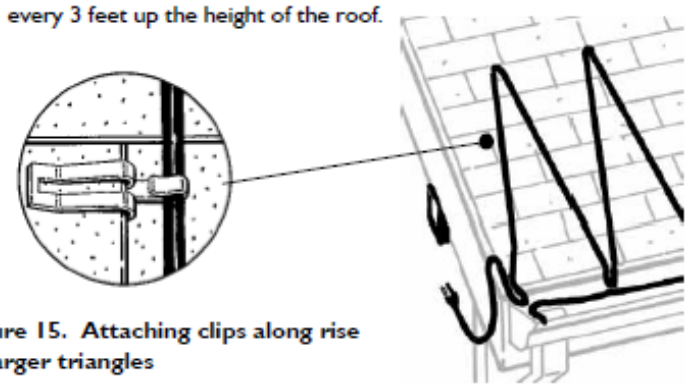


Figure 15. Attaching clips along rise of larger triangles

Around dormers

Figure 16 shows how to use a clip to attach the cable when the cable is running vertically around a dormer. Lift the side edge of the shingle

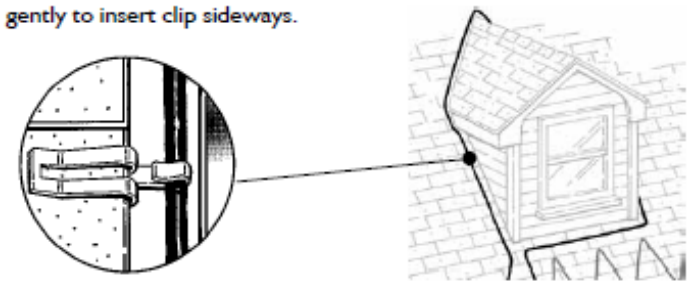


Figure 16. Attaching clips around dormers

Near skylights

Triangles of cable are attached near skylights the same way as shown in Figures 12, 13 and 14. If the skylight is high up the roof (making the triangles larger than 3 feet in height), clips must also be attached every 3 feet up the height of the roof, as shown in Figure 15.

Up and down valleys

Figure 17 shows how to use a clip to attach the cable up and down the valley. Lift the side edge of the shingle gently to insert clip sideways.

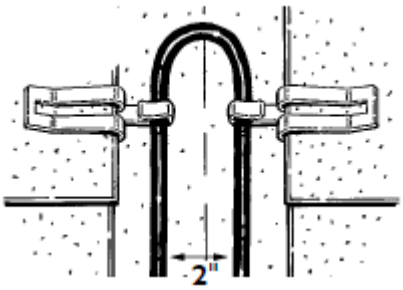


Figure 17: Attaching clips in valleys.

Routing the cable along the gutter using cable spacers. This section describes how to route the cable along the gutter using spacers.

While the cable is being laid in the gutter, the spacers can be tightened with fingers or pliers. If you use pliers, squeeze gently and use care to avoid pinching, crimping, cutting into or otherwise damaging the cable (see Figure 18). Do not use a hammer to tighten the clips and spacers.

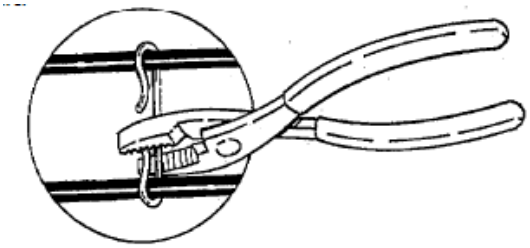


Figure 18: Squeezing spacers with pliers.

Route the cable in the gutter along a treated area of roofline. Using a spacer, fasten the gutter cable to the bottom of each drip loop you have formed. See Figure 19. Keep the cable in the gutter tight and off the bottom of the gutter to prevent heat loss.

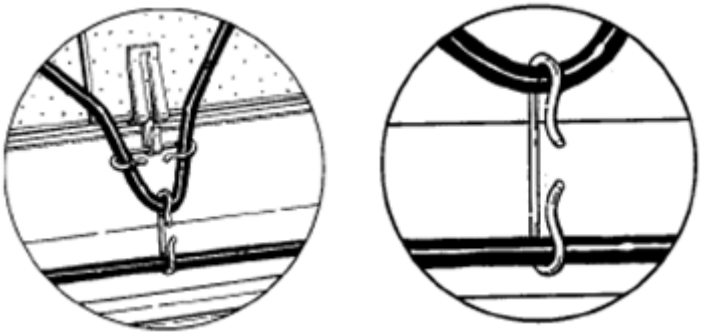


Figure 19: Attaching clips in gutters.

If you are treating only the gutters for ice problems, use a “double-run” of cable in the gutters and downspouts. Figure 20a shows a gutter installed with gutter spikes. Route the cable under and over the gutter spike to keep the cable suspended off of the bottom of the gutter. Spacers should be attached every 12 inches. Figure 20b shows a gutter with external gutter straps. Use the clips and spacers to keep the cable suspended off the bottom of the gutter. Clips should be attached every 3 feet along the roof.

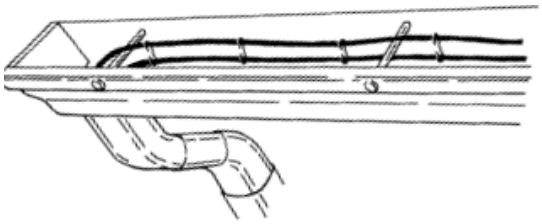


Figure 20a: Double run of cable in gutter-only applications (gutters with gutter-spikes).

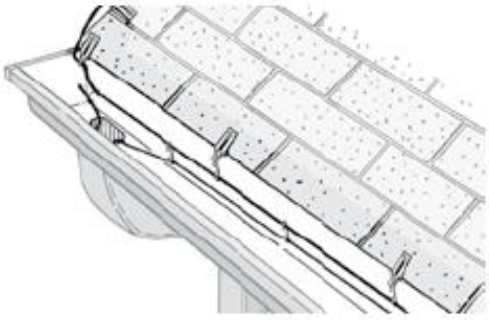


Figure 20b: Double run of cable in gutter-only applications (gutters without gutter spikes).

Routing the cable in downspouts using cable spacers

"Along run" downspouts. For downspouts that are along the run of the roofline 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. No cable may be extended out the end of the downspout. Several different methods for determining the length may be used. One is to tie a small weight (such as a washer) 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.

> ***Note:*** *For accurate results, use a string that does not stretch when the small weight is attached.*

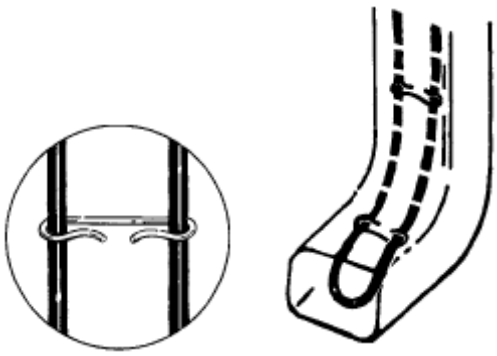


Figure 21: Double cable run in "along run" downspouts.

Alternatively, you could also use a tape measure 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 one 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.

Once you know the length of cable needed, the next step is to install spacers and feed the cable into the downspout. Spacers must be attached to the cable every 6 inches so that the cable does not touch itself in the downspout. You must tighten the spacers before the cable is installed in the downspout. You may do this with your fingers or pliers. If you use pliers, squeeze gently and use care to avoid pinching, crimping, cutting into or otherwise damaging the cable (see Figure 18). Do not hammer to tighten the clips and spacers. Pull the cable into the downspout using a weighted string.

"End of run" downspouts. If a downspout exists at the *end* of the run of the roofline being treated, it is recommended the cable be routed down the inside of the downspout and 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 cable is flush with the end of the downspout and that no cable is extended out the end of the downspout (see Figure 22). 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.

If at this point you find that you have excess cable, triangles on the roof can be made larger (up to 20 feet in height) or cable loops in valleys can be extended.

If you have a shortage of cable (the end of the cable does not reach to the bottom of the downspout), you may reduce the height of the triangles on areas of the roof that are less susceptible to ice dams. It is permissible in this scenario to only have a single run of cable in the end downspout, termination at the end as shown in Figure 22.

⚠ **WARNING:** *To reduce the risk of fire electric shock, or ice dam formation, do not cut splice or alter the deicing cable in anyway. The cable length cannot be changed.*

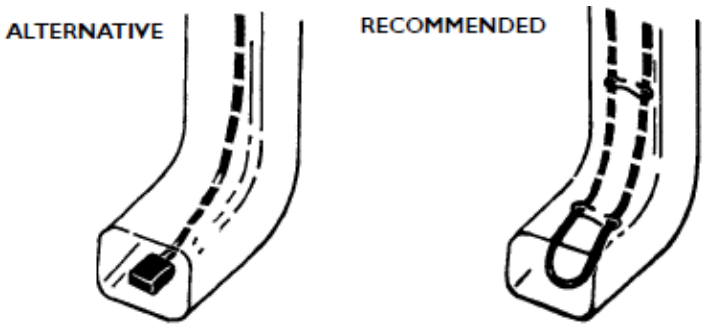


Figure 22. Cable in "end of run" downspouts.

Tighten clips and cable spacers. Tighten clips and spacers on the roof. You may do this with your fingers or with pliers. If you use pliers, squeeze gently and use care to avoid pinching, crimping, cutting into, or otherwise damaging the cable (see Figure 18). Do not use a hammer to tighten the clips and spacers.

F. FINAL INSTALLATION STEPS

Check to be sure the cable has not been moved from its intended position. The heated portion of the cable must be positioned entirely on the roof and must not touch, cross over or overlap itself.

Place the on/off switch label provided so that it is clearly visible to current and future users. The label is provided in two languages. Use the language(s) that are appropriate for you. Pass the labels with other languages onto future users/homeowners.

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. These labels are provided in two languages. Use the language(s) that are appropriate for you. Pass the labels with other languages onto future users/homeowners.

Give the instructions to the user. If you have installed the cable for someone else's use, give this owner's manual to them.

7 - USE & MAINTENANCE OF THE CABLE

In addition to proper installation, correct use of the cable is needed to maintain a path for melted snow or ice to drain all the way to the ground.

> ⚠ **WARNING:** *Failure to use and maintain the cable according to these instructions may result in ice dam formation or injury or death from fire electric shock.*

A. PRE-SEASON CHECKS

At the beginning of the winter season, do the following:

Check for and remove all combustible debris from roof, gutters and downspouts, such as leaves, pine needles, seeds and windblown trash.

Check to be sure the cable has not been moved from its intended position. The heated portion of the cable must be positioned entirely on the roof and must not touch, cross over, or overlap itself.

Without removing it from the roof, visually inspect the entire cable, including the plug. Discontinue use and remove the cable if it shows any evidence of damage or deterioration, including cuts, brittleness, charring, cracking, discolored surfaces, or bare wires. If there appears to be a problem inside a downspout, remove the cable to inspect it. Take care when removing cable from a downspout to avoid snagging or cutting the cable on sharp edges.

If no damage is present, **plug the power cord into the receptacle.** Arrange the cord to form a drip loop using a spacer (see Figure 24). The purpose of the drip loop is to prevent melt water from tracking along the cord and into the receptacle.

Test all ground-fault protection devices (see the instructions provided with the device).

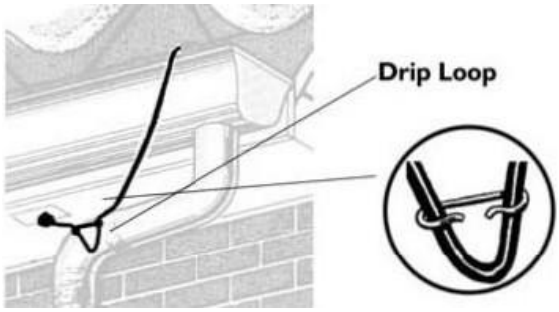


Figure 24: Forming a drip loop near the starting point.

B. TURNING THE CABLE DEICING SYSTEM ON AND OFF

During the winter season, power the cable only when conditions are favorable for ice dams to form. The cable deicing system should only be operated when:

1. **Snow or ice on the roof is melting, or**
2. **The outside temperature is between 15°F and 35°F (-9°C and 2°C).** Below 15°F (-9°C), very little melting will normally occur, and in very cold conditions, the cable may not generate enough heat in some roof sections to prevent melt water from refreezing. This may result in ice dam formation that can cause water to backup under the shingles.

Once turned on, the cable should be shut off when the melt/freeze condition stops, usually above temperatures of 35°F (2°C). The cable should be kept off until the melt/freeze conditions return.

The cable can be operated using: an on/off switch (with an indicator light).

C. CHECKING OPERATION AND CONDITION OF CABLE

During the winter season and when snow or ice on roof is melting**, check to ensure a complete path is available for melt water on the roof to get to the ground**. There should be no ice buildup above the cables, and gutters should not be clogged with ice.

Icicles should not form at the roof edge.

If icing problems persist, the cable pattern may need to be adjusted to better suit melt/freeze conditions of your roof. Observe these conditions and adjust cable pattern (see *Planning Your Cable Arrangement* on pages 7-13) when conditions are suitable. (See *When to Install Cable* on page 2.)

To adjust your cable pattern, first unplug the cable. Then, identify areas where there is extra cable. This may include excess cable you had during the original installation or you may be able to reduce the cable in an area that is not as susceptible to ice dams. Remove the cable by opening the clips and spacers with pliers, as needed, to rearrange and supply more cable to the needed areas.

During operation, **the ground fault protection device may trip** if the cable is damaged or as a result of “nuisance tripping”. One way in which nuisance tripping can occur is if parts of the electrical circuit become wet. This can happen if driving rain or blowing snow enters the electrical receptacle. Use of a weatherproof in-use receptacle may help eliminate this (see page 6).

Before resetting the ground fault protection device and when weather and roof ice conditions allow, unplug and inspect the entire cable for damage. 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. Do not use a damaged cable. If you cannot see damage on the cable, reset the ground fault protection device. If the device trips again and there is no other explanation for it, call a licensed electrician to check the cable and the circuit. A licensed electrician can determine if the cable is damaged or if there is some other problem with your electrical system.

As needed during winter season, **unplug the cable and check for and remove all combustible debris** from roof, gutters and down spouts, such as leaves, pine needles, seeds and windblown trash.

About once a month during winter season, unplug the cable and perform the same checks as outlined in the *Pre-Season Check* section on page 20. Do these checks when weather and roof ice conditions allow.

D. RESETTING CIRCUIT BREAKER/REPLACING BLOWN FUSE

At any time during operation, if the circuit breaker trips or the fuse blows, stop using the cable. Unplug and inspect the entire cable for damage when conditions allow. 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. Do not use a damaged cable. Even if you cannot see damage on the cable, assume it is damaged if you cannot find another cause for the tripped breaker or blown fuse.

E. OFF- SEASON INSTRUCTION

The deicing cable may remain on the roof year-round. However, to avoid overheating the cable and increasing the risk of fire or electric shock, do not operate the cable when outdoor temperatures begin to remain above 50°F (10°C) (i.e., at the end of the winter season). To avoid accidentally turning the cable on, unplug it.

8 - REMOVING THE CABLE

The deicing cable must be removed prior to replacing roof shingles or starting roof repair. Other roof alterations, such as additions of antennae, flag poles, etc. in the area of the cable may require removal of the cable. Cable may also require removal for adjustment. To remove cable, wait for weather conditions to allow. 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.

Inspect the entire cable before replacing it on the roof. If cable is in good condition (no

evidence of cuts, brittleness, charring, cracking, discolored surfaces, bare wires, or other damage), it may be replaced on the roof, according to the instructions.

If a replacement deicing kit is purchased, use only the new clips provided with it. Do not reuse the clips from the previous kit. The new cable may not be designed for use with the old clips. If the old clips are used, the cable may be inadequately secured or may be damaged.

Note that other models of deicing cable may have different methods of removal. Follow the instructions provided with those cables.

9 - LIMITED WARRANTY AND LIABILITY

Manufacturer warrants that if there are any defects in material or workmanship in this product during the **first thirty six (36) months after the date of its purchase**, we will replace the product with an equivalent model, not including any labor or other installation costs.

Our obligation to replace the product as described above is conditioned upon (a) the installation of the product conforms to the specifications set forth in our installation instructions and (b) the product not having been damaged by unrelated mechanical or electrical activities.

Product replacement as described above shall be your sole and exclusive remedy for a breach of this warranty. This limited warranty does not cover any service costs relating to repair or replacement.

We shall not be liable for any incidental, special or consequential damages as a result of any breach of this warranty or otherwise, whether or not caused by negligence. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty is exclusive and makes no other warranties with respect to description or quality of the product. No affirmation of fact or promise made by us, by words or action, shall constitute a warranty. If any model or sample was shown to you, the model or sample was used merely to illustrate the general type and quality of the goods and not to represent that the goods would necessarily be of that type or nature. **No agent, employee or representative of ours has authority to bind us to any affirmation, representation or warranty concerning the goods sold unless such affirmation, representation or warranty is specifically incorporated by written agreement.**

ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE THAT MAY ARISE IN CONNECTION WITH THE SALE OF THIS PRODUCT SHALL BE LIMITED IN DURATION TO THIRTY SIX (36) MONTHS FROM THE DATE OF PURCHASE. WE DISCLAIM ALL OTHER IMPLIED WARRANTIES, UNLESS WE ARE PROHIBITED BY LAW FROM DOING SO, IN WHICH CASE ALL SUCH IMPLIED WARRANTIES SHALL EXPIRE AT THE EARLIEST TIME PERMITTED BY APPLICABLE LAW. Some states do not allow limitations on how long an implied warranty

lasts, so the above limitation may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state or province to province.

To obtain a replacement under this warranty any inoperative product or component must be returned, with proof of purchase, to Manufacturer at the addresses noted herein. Buyer is responsible for all costs incurred in removal and re-installation of product and must pre-pay shipment to factory or point of purchase.

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10 - APPENDIX A: BASIC INFORMATION ABOUT ICE DAM FORMATION AND PREVENTION

A. How Ice Dams Form

Snow and ice on the roof can thaw because of heat loss through the roof due to inadequate roof venting and/or insufficient ceiling insulation. In these cases, the roof surface above heated areas of the building is warm enough to melt the snow, while the roof surface above the overhang is cool enough to refreeze this water as it trickles down the roof. As a result, a layer of ice forms on this cooler, lower roof surface and in gutters.

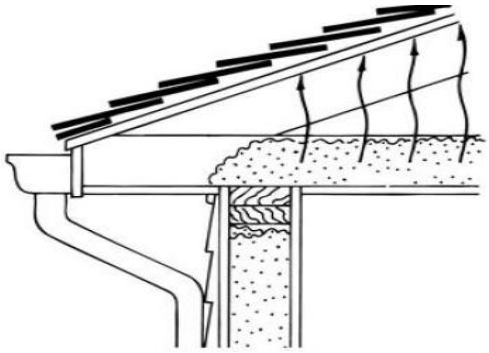

Figure A-1: Heat escaping from the attic creates potential for ice dams to form.

As snow continues to melt, the melt water flows downward and re-freezes at the roof edge. As this happens, ice builds up and eventually forms an ice dam. In addition to having ice dams along the roofline, structures such as skylights and dormers often have poor venting, and ice dams may form in the surrounding areas.

B. Signs of Ice Dams

Ice dams can be identified at points where snow on the upper roof surface has melted, but the roof area further down (eaves) is still snow and/or ice covered. Icicles are also a sign of ice dams.

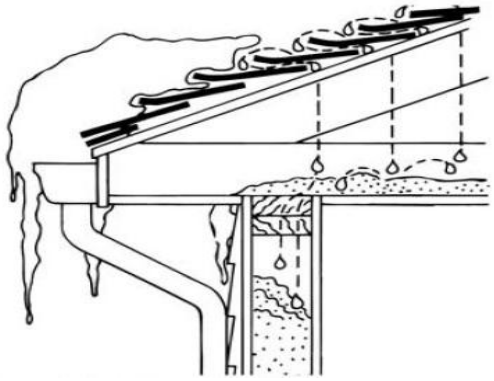

Figure A-2: Ice dam formation and the consequences.

C. Damaging Results

Ice dams prevent water from flowing off the roof. The melt water will instead “pond” at the ice dam, and can result in water seeping between shingles. Water that has seeped under the shingles can leak through roof penetrations, such as nail holes and sheathing seams, and inside the building walls and ceiling. The water can also flow along ceiling beams or wiring. Eventually, water can leak into the building interior at light fixtures or through the ceiling finishing at places other than below the ice dam’s origin. In addition, ice buildup in gutters can put significant stress on the gutter resulting in gutter damage.

D. How to Avoid Ice Dams

To avoid ice dams, the entire roof surface should be kept at about the same temperature as the outside air. The best way to do this is to ventilate the space under the roof. However, this is often costly or impractical. In these cases, deicing cables can provide a reasonable solution to ice dam problems. Placing deicing cable on the roof edge above the overhang and in the gutter and downspouts prevents melt water from refreezing. This allows the melt water to have a clear path to flow to the ground and prevents leaking into your home interior or damage to your gutter system.

11 - APPENDIX B: ESTIMATING THE CABLE LENGTH NEEDED

An accurate estimate of the cable length you need is important because you cannot change the cable length by cutting, splicing or altering it in any way. Doing so may result in fire, electrocution, or ice dam formation. Cable should be installed on roof areas where ice dams form. This can be the entire roof edge or specific areas such as beneath skylights, in valleys or around dormers. Cable should also be installed in any nearby gutters, downspouts and/or valleys.

If you need to apply the cable on a roof with gutter, downspouts, valleys, and/or dormers, follow "*A. For Typical Roof Applications*" below.

If you only need to install the cable in the gutters only, follow "*B. For Problems in the Gutter Only*" on page 27.

If you need to install the cable on a roof with special roof areas such as a roof with skylights, refer to "*C. For Roofs with Special Roof Area Applications*" on page 27.

A. FOR TYPICAL ROOF APPLICATIONS

Step 1 - For each area listed in Table B-I, measure the required dimensions (see Figures B-I and B-II) and calculate the length of cable needed. Add each "area" calculation to determine the total cable length needed.

Table B-1 Cable Length Estimation Formula for Typical Roof Applications

Area	What to measure	How to calculate
Along Roof	Overhang (A) Length along roof (B)	Length of roof (B) X Overhang Multiplier (see Table B-2)
Dormer	Distance around dormer (C)	Number of dormers X Distance around dormer(s) (C)
Valley	Number of valleys (D)	Number of valleys (D) X 6 feet or 1.8 meters
Downspouts	Number of downspouts Length of downspouts (E)	Number of downspouts X Length of downspout (E) X 2

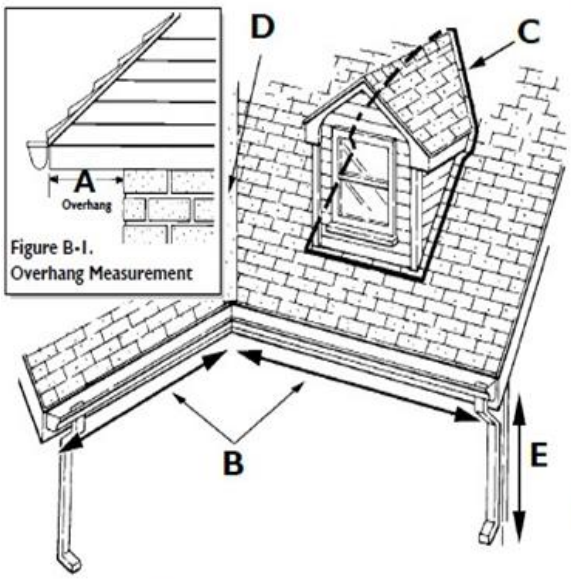

Figure B-1.
Overhang Measurement

Figure B-2. Roof Measurements

Table B-2 Overhang Multiplier

ROOF OVERHANG		Multiplier	Multiplier
Inches	Centimeters	For roof *with* gutter	For roof *without* gutter
less than 12	less than 30	4.0	3.0
12	30	4.0	3.0
24	60	5.3	4.3
36	90	6.8	5.8
48	120	8.1	7.1
60	150	9.6	8.6
72	180	11.2	10.2

Note: For overhangs not listed, estimate multiplier. For example, for an 18" overhang with a gutter, multiplier will be about 4.7.

Step 2 - Use the estimated cable length calculated above to select the proper de-icing cable from Table B-III. In general, choose the longer cable if the length you need is between the sizes offered. If the difference is small (less than 5 feet or so), the shorter cable can be used. You cannot change the cable length by cutting, splicing or altering it in any way.

If ice dams are occurring on roof areas that are significant distance apart, you may want to use a separate cable for each location, rather than choosing one large cable. Also, if roof areas are large, separate cables for the roof area and gutter should be used.

Table B-III: Manufacturer Deicing Kits

Catalog Number	Length	
	Feet	Meters
PLCW-100-1	20	6
PLCW-150-1	30	9
PLCW-300-1	60	18
PLCW-400-1	80	24
PLCW-500-1	100	31
PLCW-600-1	120	37
PLCW-800-1	160	49
PLCW-1000-1	200	61
PLCW-1200-1	240	73

B. FOR PROBLEMS IN THE GUTTER ONLY

If ice dams are occurring in gutters only, measure the required dimensions (see Figure B-2) and calculate the length of cable needed for each area listed in Table B-IV. Add each “area” calculation to determine the total cable length needed.

Table B-IV: Cable Needed for Gutter Only Ice Problems

Area	How to Calculate
Gutter	Length of gutter (B) x 2
Downspouts	Number of downspouts X Length of downspout (E) x 2

C. FOR ROOFS WITH SPECIAL ROOF AREA APPLICATIONS

Step 1 - For each area listed in Table B-V, measure the required dimensions (see Figure B-1 and B-2 on page 26, and Figure B-3 on page 28) and calculate the length of cable needed. Add each “area” calculation to determine the total cable length needed.

Table B-V: Cable Length Estimation Formula for a Roof with Special Roof Areas

Area	What to Measure	How to Calculate
Along roof	Overhang (A) length along roof (B)*	Length of roof (B) x overhang multiplier (see Table B-II)
Dormer	Distance around dormer (C)	Number of dormers x distance around dormers
Valley	Number of valleys (D)	Number of valleys (D) x 6 feet (1.8 meters)
Downspouts	Number of downspouts Length of downspouts from roof to ground (E)	Number of downspouts x length of downspout (E) x 2
Special roof areas (such as skylights)	Distance from roof edge to bottom of special roof area (F). Width of ice dams that form along special roof area (G)	Distance from roof edge to bottom of special roof area (F) x Width of ice dams that form along special roof area (G) x special roof area multiplier (see Table B-VI).

*** Note:** *Do not include the width of special areas (G) in this measurement.*

Step 2 - Use the estimated cable length calculated above to select the proper de-icing cable from Table B-III on page 27. In general, choose the longer cable if the length you need is between the sizes offered. If the difference is small (less than 5 feet or so), the shorter cable can be used. You cannot change the cable length by cutting, splicing or altering it in any way.

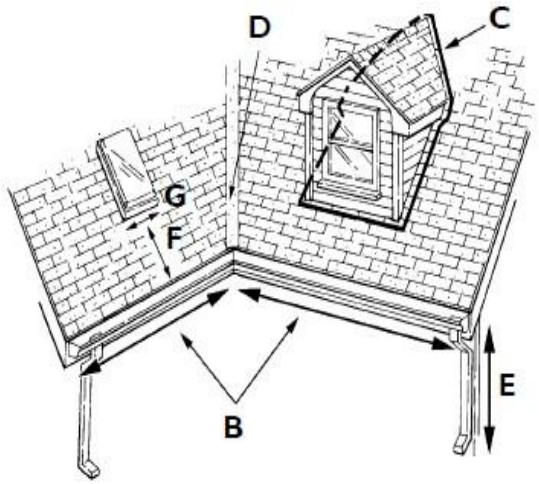

Figure B-3. Roof Measurements

If ice dams are occurring on roof areas that area significant distance apart, you may want to use a separate cable for each location, rather than choosing one large cable. Also, if roof areas are large, separate cables for the roof area and gutter should be used.

Table B-VI: Special Roof Area Multiplier

Multiplier	Multiplier
For roof with gutter	For roof without gutter
2.6	1.6

D. EXAMPLE #1 – EXAMPLE OF TYPICAL ESTIMATION

Consider a roof section (See Figure B-2 on page 26) that you want to treat that has:

- 32 feet of roof
- an overhang of 12 inches with a gutter
- 1 dormer (30 feet around)
- 1 valley
- 2 downspouts (each 10 feet long)

From Table B-II, the multiplier for a roof with a gutter and an overhang of 12 inches is 4.
Using Table B-I, the cable length needed = (32 x 4) + (1 x 30) + (1 x 6) + (2 x 10 x 2) = 204
Using Table B-III, you would select the PLCW-1000-1 (200 feet of cable). You would select the smaller cable because the difference between the cable length and your calculation is less than 5 feet.

E. EXAMPLE #2 – EXAMPLE OF SPECIAL ROOF AREA ESTIMATION

This example shows how to estimate the cable length needed for a limited problem roof area – a skylight (see Figure B-3 on page 28). For this roof, you would like to treat only the problem area underneath the skylight.

This roof section has:

- 1 downspout (l0 feet long)
- 1 skylight (the distance from the bottom of the skylight to the roof edge is 12.5 feet, and the width of the ice dams that form beneath the skylight is about 6 feet)
- 1 gutter

From Table B-VI, the special roof area multiplier for a roof with a gutter is 2.6.
Using Table B-V, the cable length needed = (1 x 10 x 2) + (12.5 x 6 x 2.6) = 215
From Table B-III, you would select the ADKS-1200 (240 feet of cable) to ensure complete coverage.

> **Note:** *If you are only treating one special roof area and the problem area is a significant distance from the downspout, you may wish to add extra cable to your estimation to account for the cable in the gutter.*