

Residential



ADVANCED PROTECTION

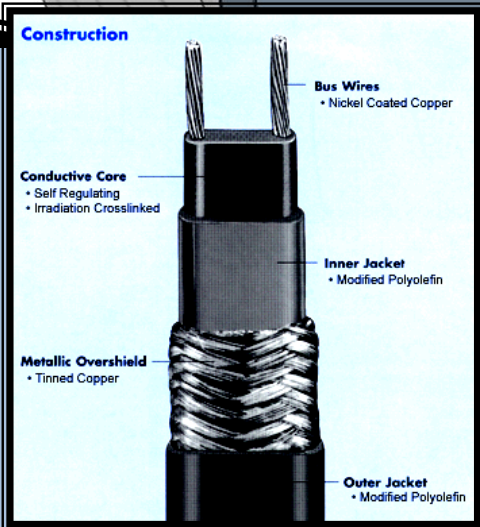
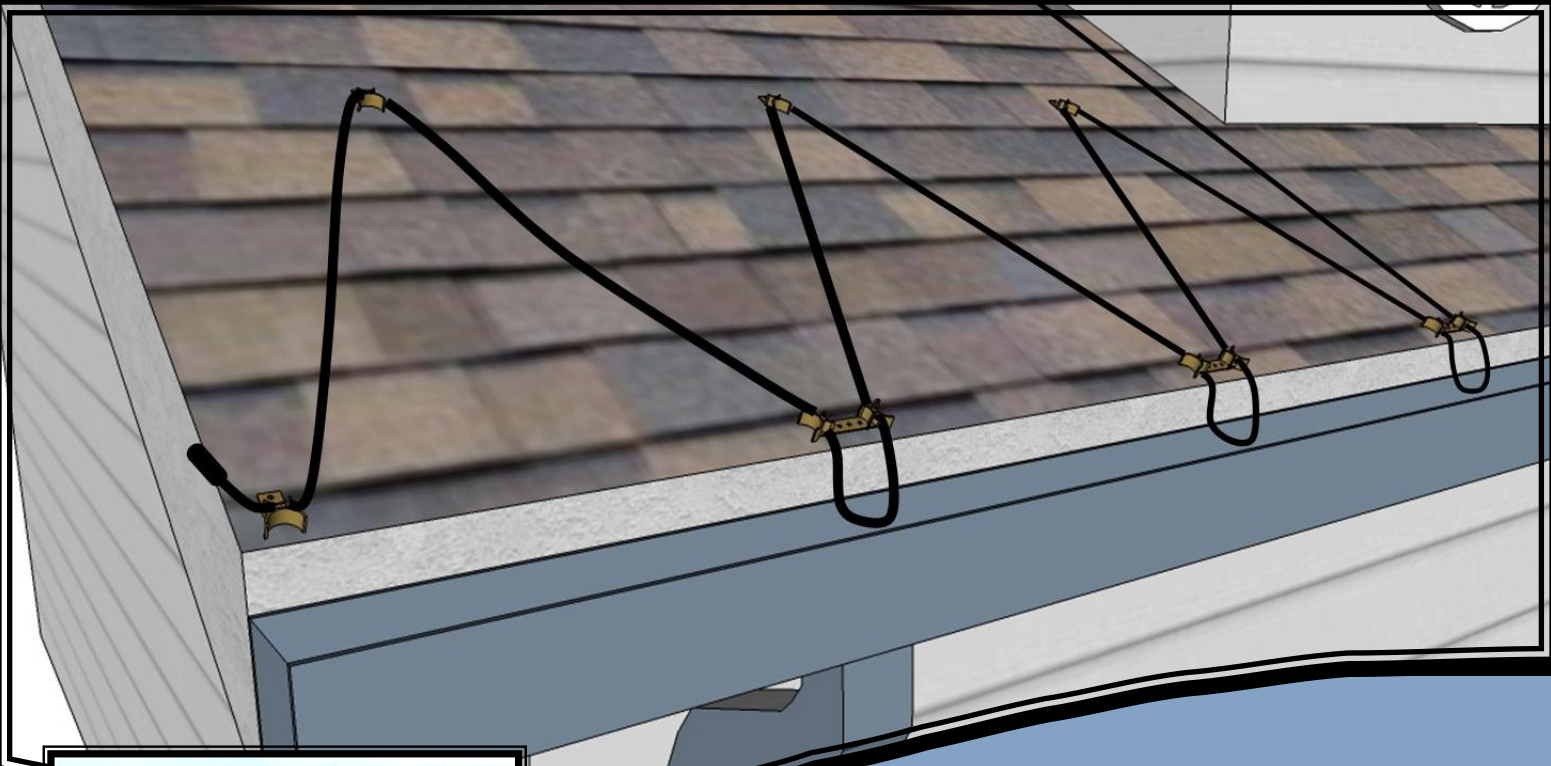
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EXTREME CLIMATES

Commercial

Industrial

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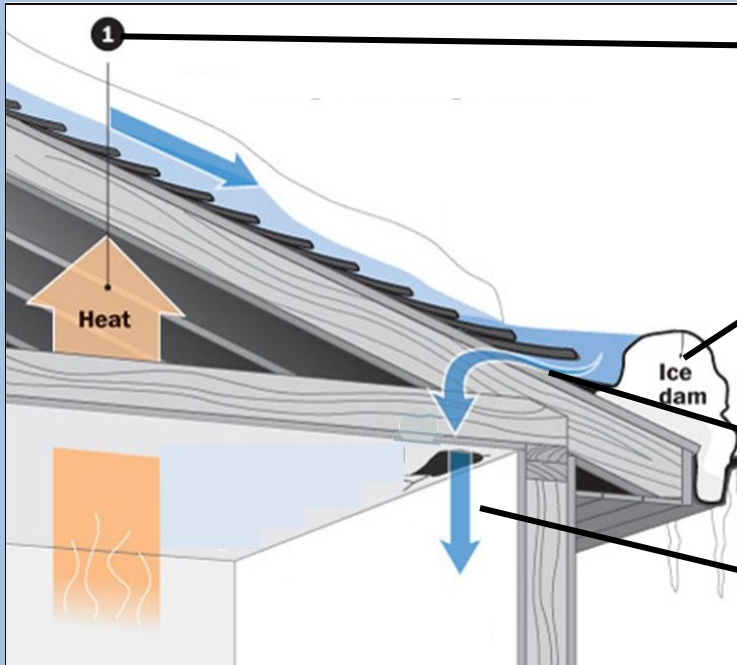


ROOF AND GUTTER DE-ICING CABLE

Design and Installation Guide

What are Ice Dams?

How Ice Dams are formed



- 1 Rising heat from the house melts the blanket of snow and ice on the roof from the bottom up, sending water trickling down the roof.
- 2 When water arrives at the cold eaves, it refreezes and forms a dam, preventing drainage.
- 3 Water is trapped behind the dam and backs up under the shingles.
- 4 The melted water can leak into the house through the windows or ceiling

Snowmelt Principles and Application:

Electrical Heat Trace Cable is intended to provide drain paths for the melted or flowing water to be carried away from the roof, gutters, and down spouts. This system is not intended to provide a snow free surface.

Roofs in General

Sun and building heat combine to melt accumulated snow at the roof/snow interface. Snow is porous and allows water to flow. Ice is not porous and will trap water. Water will flow as long as the roof surface stays above freezing. When the water runs to the roof edge it freezes, starting an "ice dam" that continues to grow and trap more water, leading to leakage problems. The objective of a snowmelt system is to ensure the water is drained off and not allowed to freeze at the roof edge forming a dam.

Gutter Damage from Ice

The water that enters into your rain gutters can freeze and build up an enormous amount of weight many times causing water to leak into soffits and entering into the building. Most rain gutters are not built to hold excessive weight from ice and excessive ice may cause a safety and structure damage potential.

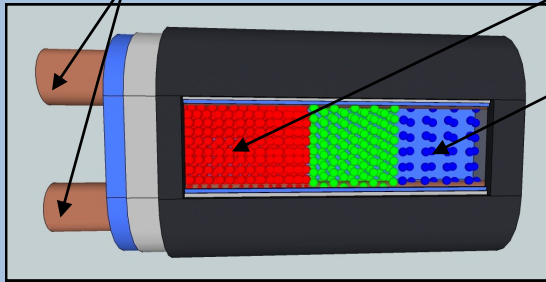
Icicles can form which can become dangerous and damaging to the property.



The Solution = Create heated pathways for melted water to flow.

Self-Regulating Heat Cable

When energized, the current flows through the 2 bus wires



As the temperature cools. The output of the cable increases.

As the temperature goes up the output of the cable goes down.

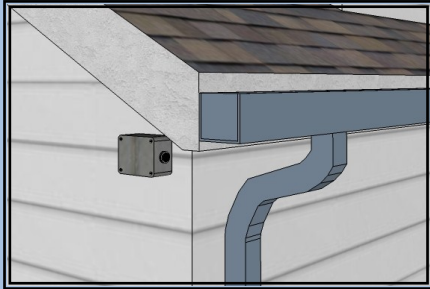
The benefits to a Self-Regulating Cable

- Simple to Install
- Reliable and a longer design life
- Can be overlapped
- Can be cut to length on site
- Saves energy
- Will not overheat roofing materials or ruin plastic or vinyl rain gutters

Design Solutions

Shake or Shingle Roof	Use the Serpentine method discussed on "Page 6". Be sure that the heating cable extends all the way into the gutters, meeting the run in the gutter to form a continuous path. Generally, use one run of heating cable in the gutter. If there are no gutters, use the serpentine method and our heated drip edge or hang loops off roof edge.
Standing Seam Metal Roof (Steel, Aluminum, Copper, Cor10, Etc.)	Use snow fence to prevent snow sliding. Use one run for each section, from gutter 2'-3' up roof. Use an appropriate amount of heater cable in the gutter. Attach with RCK-1 roof clips with GE Gray RTV-167 or attach with S-5 Mini clips as shown on "Page 7".
Standing Seam Metal Roof which continues down fascia.	These must be designed on an individual basis.
Metal Roofs Over Air	Plywood or insulation should be added under the eave. Use a run of heater cable in the gutter.
Membrane Roof (PVC, TPO, EPDM, Etc.)	Use belt loop approach (Attach with adhesive). Refer to "Page 8" for design options
Standard 4"-6" Gutters	Use 1 run of heat trace cable in gutter. As described on "Page 3"
Downspout ending in a drain	The heating cable should extend into the heated area or below the frost line. Use 2 runs of heater cable. "Page 4"
Downspout ending above ground.	Use two runs if down spout serves a large roof area. One run will work with a small water flow. Leave drip loop below down spout at bottom. NOTE: If the downspout ends near the ground. The water will freeze on the ground, and build up around the down spout, eventually blocking the opening.
Wide Gutters 6"-12"	Use 2 runs of heating cable separated by RCK-1 Clip. No attachment of cable needed. Larger gutters would require multiple cables depending on the overall size. Contact HTS For more design help for larger gutters.
Valleys	Trace 2/3 the way up each valley with a double run of heater cable (loop up and back once). The heating cable must extend into the gutter or over the roof edge forming a drip loop. Refer to "Page 5"
Snow Load Reduction	Not Recommended. Must be designed as a snow melting system @ 20-30Wft ² .

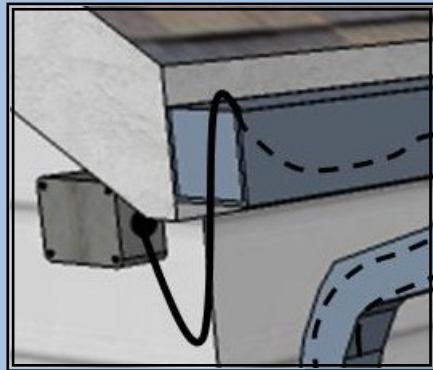
Gutter Cable Installation



Step 1

Identify the power source and power requirements for the cable. Consult a qualified electrician for all electrical aspects.

Account for a drip loop from the power source and lay the cable in the bottom of the gutter.

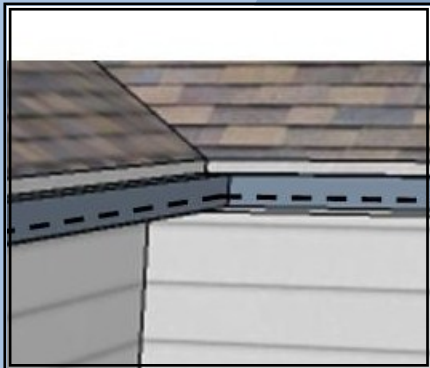


Step 2

Standard rain gutters only require 1 pass of heat cable to effectively control ice problems.

Rain gutters 6" or larger should hold 2 passes of cable to effectively control ice problems.

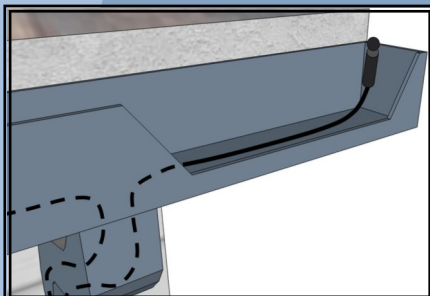
NOTE: Before installing your cable, See "Downspouts" section for more information about designing your full system properly.



Step 3

Protect the outer jacket from all sharp edges in corners and downspout outlets.

The cable has an extruded polyolefin jacket that is capable of being surrounded by flowing ice water. The cable is able to lay against the bottom surface of the gutter without attaching firmly with clamps.

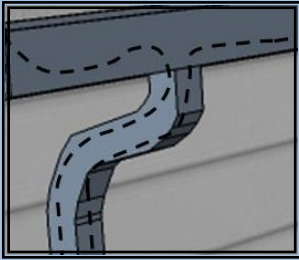


Step 4

Any "End Sealed" and "Spliced" cable pieces should be elevated out of the flowing path of water to better protect the cable from possible moisture penetration.

Downspout Cable Installation

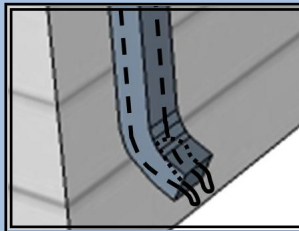
Recommend Method: 2 Passes of cable



Step 1

Measure out the needed amount of cable for the downspout and bend a loop at the measurement where the cable will emerge from the bottom of the downspout. Insert the loop through the downspout until the desired length is met.

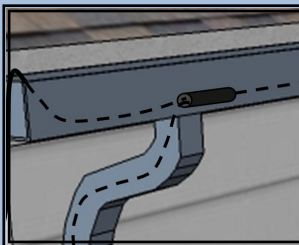
Hint: An electricians “fish tape” can make this process easier. To avoid sharp screws on metal downspouts. It is easier to disassemble and reassemble downspout after cable installation.



Step 2

Once the cable loop has emerged from the bottom of the downspout. If the loop is longer than 3”, fold all cable back into the downspout to ensure the cable is not exposed to possible damage at high traffic or questionable circumstantial areas.

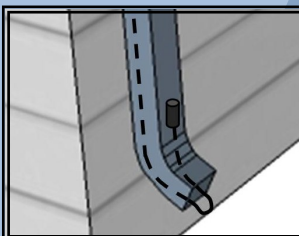
Optional Method: Splice or “Tee” Kit



Step 1

A “Tee” kit installed in a downspout will avoid the 2nd pass of cable. Typically on longer downspouts.

One pass of cable may not be sufficient to keep a sufficient pathway for the discharged water. This design option is at the discretion of the installer.



Step 2

The end seal should extend approximately 6”-12” past the discharge point of the gutter.

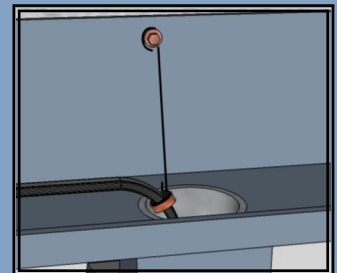
Fold the end sealed cable back and insert it back up through the downspout to protect the seal from direct water penetration.

Downspout footages may differ in that there may be one or two cable passes. National Electrical Code has no requirements, but good practice requires downspout terminations to be at the top of the downspout and supported above the water level. This is shown in the last diagram on the opposite page. The **recommended method** requires two heater cable passes in each downspout.

NOTE: Fewer components reduces potential problems, but circuit length considerations may dictate single cable passes. Heat Trace Specialists offers “Tee” kits for these applications.

Downspout Hanger Kit

Each cable should have an RDK-1 Downspout Hanger to support the cable in the downspout.

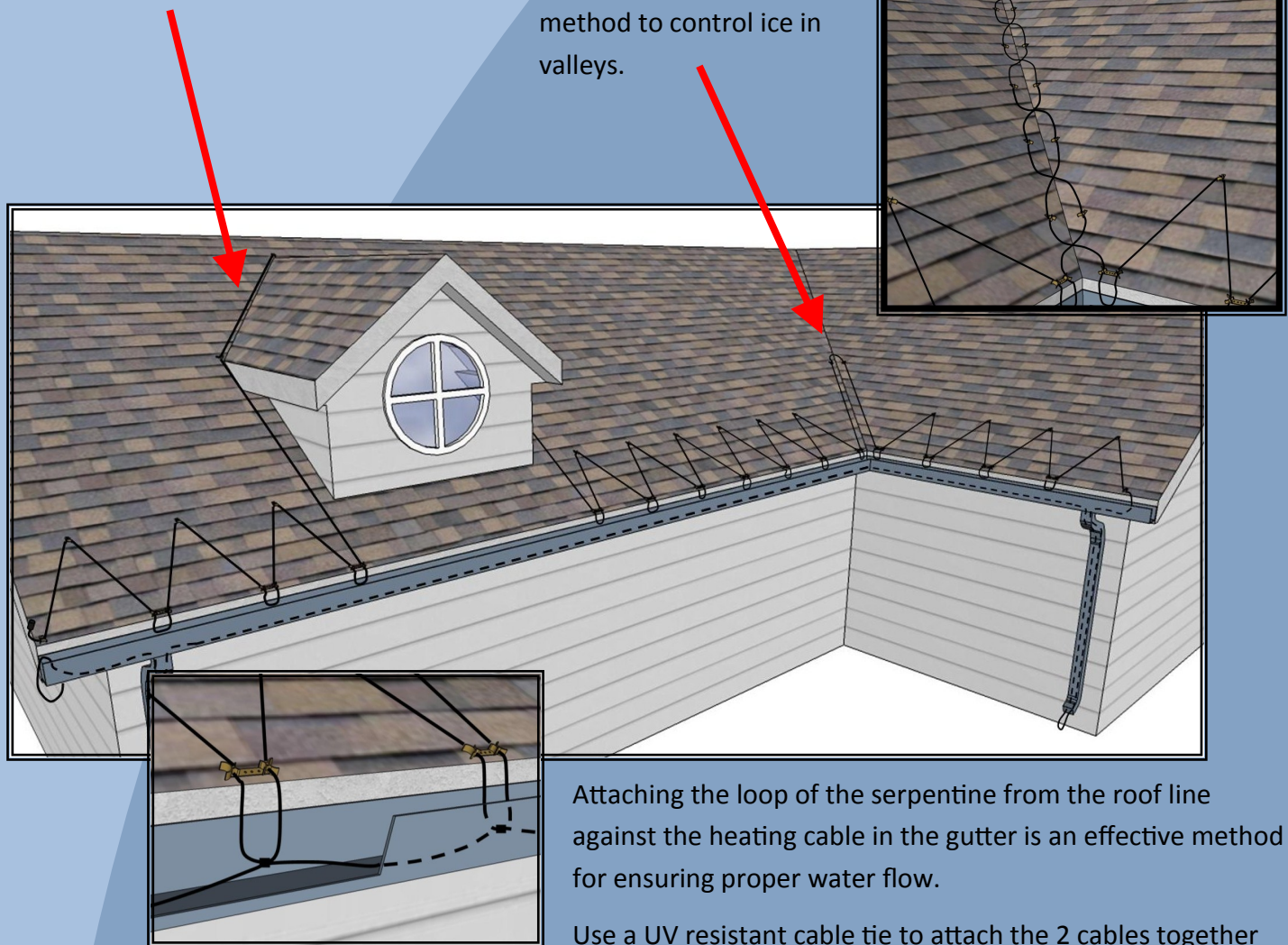


Serpentine Roof Design

Dormers that do not receive the heating cable in front should outline the outer edge of the roofline to better accommodate snow that can cause damage to the valley and the sidewall of the dormer.

Valleys: Heating cable should extend up the valley a minimum of $\frac{2}{3}$ of the overall distance. The cable can be installed in two different methods:

1. Run the cable up one side of the valley and crossing the valley and proceeding down the opposite side of the valley. As shown in picture.
2. The figure 8 configuration as shown in the smaller picture below. Is another effective method to control ice in valleys.



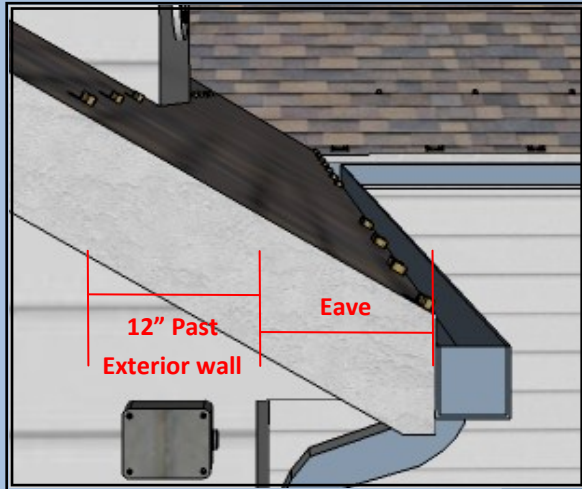
Attaching the loop of the serpentine from the roof line against the heating cable in the gutter is an effective method for ensuring proper water flow.

Use a UV resistant cable tie to attach the 2 cables together

Roof Valleys:

Usually a straight pass of heater cable extends up and back down each side of the “V” formed at the valley bottom. Typically, the cable extends $\frac{2}{3}$ the distance up the valley. **Example**— A 10’ long valley would extend up the valley approximately 7’ and back down the opposite side by 7’ which equals to 14’ of needed cable.

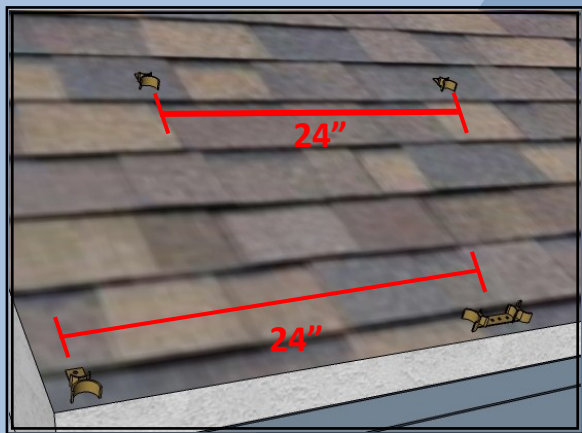
Serpentine Roof Design



Step 1

Measure your eave and add 12" to the dimension to figure out the "Danger Zone" for ice dams.

Refer to the "Design Guide" page of this document to give you the proper multiplier for the quantity of cable you should factor into your system.

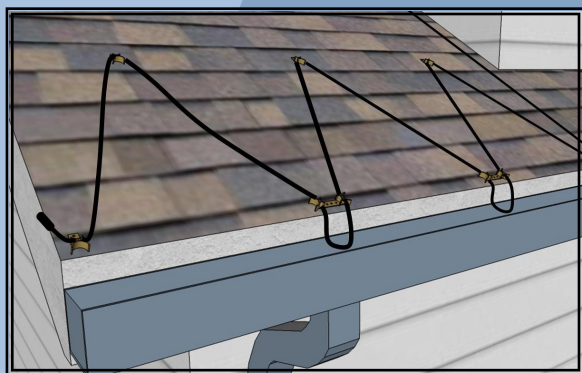


Step 2

Plan on 24" intervals between each peak of the serpentine cable.

The RCK-1 Clip is able to be divided into 2 parts if desired. Simply bend the clip in the middle at the notch and the clip will break evenly into two parts.

When installing the clips, attach as recommended and seal all penetrations.



Step 3

Install the cable according to the proper design by inserting the cable into the RCK-1 clips. Once the cable is inserted, clamp the tab on the clip over the cable to hold the cable in place.

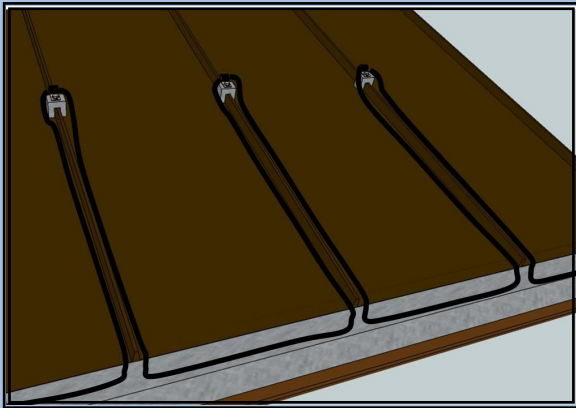
Roof Edges and Eaves:

When placing heater cables on a roof, the installer is laying out a series of triangles along the eave edge. Generally, the legs of the triangle meet the eave edge at Two-foot intervals. The height of the triangle, from the eave edge to the apex, is the eave overhang distance plus one foot. **Example-** An eave with a two-foot overhang will have a heater cable triangle two feet wide and will extend vertically for three feet.

Use the multiplier on the Roof and Gutter Data Sheet on "Page 9" to calculate the footage of required heat cable.

Metal Roof Design

Step 1

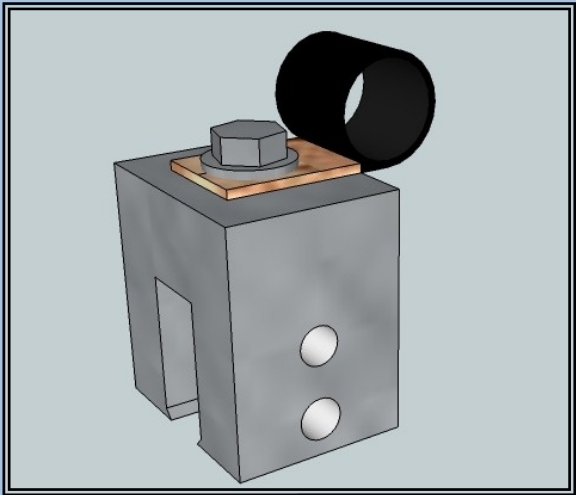


Metal roofs need to be configured differently than a standard asphalt shingle roof.

We recommend running the cable parallel to the rib and crossing over the rib and continuing on the other side and returning the cable back to the drip edge or gutter.

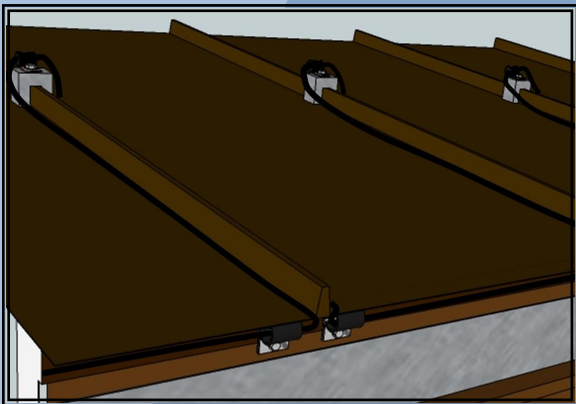
Crossing the cavity of the panel is not recommended, with sliding ice a prevalent problem with metal roofing, ice will damage the cable if you cross the cavity of the panel.

Step 2



We recommend using our Standing Seam cable clip that will effectively hold the heating cable to your standing seam rib roof with no penetrations.

Step 3

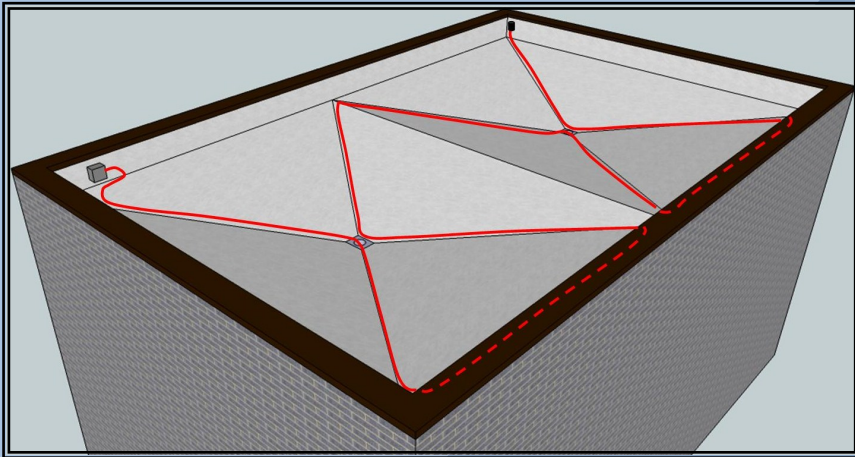


Using our Belt Clips to hold the wire below the roofing panel is a simple solution to avoiding loose fitting cables that can be a possible problem when ice slides down the metal roof cavity.

NOTE: An electric heat trace system will not prevent snow from sliding off a roof. Accumulated snow can move down the roof just like a glacier. For metal roofs, this can become a virtual avalanche sweeping any heat trace system with it. Adding snow fences on the roof to prevent snow movement can solve this problem and save a potential disaster.

Flat Roof Design

Flat Roof with Center Drains



Flat roof with center drains should have all valleys and drains traced.

A minimum of one run of cable needs to trace down into the drain until the heated portion of the building or until it is safe from possible freezing.

Before laying out a cable diagram. Estimate the needed amount of heat cable according to your available power and specifications. Consult with the specified cable specifications for available circuit lengths.

Flat Roof with Perimeter Scupper Drains



Flat roof with perimeter drains should be sufficiently traced in all valleys and discharge boxes.

The heat cable should safely leave the discharge box or scupper at the drip edge portion.

Before laying out a cable diagram. Estimate the needed amount of heat cable according to your available power and specifications. Consult with the specified cable specifications for available circuit lengths.

NOTE: Adhere Belt Loop Clips to the surface of the liner where needed. Use an appropriate adhesive that adheres metal to the chosen type of roof membrane. Be sure to not use puncture type fasteners on this application.

Roof and Gutter Data Sheet

Cable Length Calculation: Eave Overhang: _____ (Depth) Voltage Available: _____

Roof: X X 1.111 =
 Roof Length Ft of cable (Table 1)

Valleys: X X 2.15 =
 Number of Length of Each

Roof: X 1.1111 =
 Roof Length

Down Spouts: X X 2.15 =
 Quantity of Length

Downspout Hangers use 1 or 2 per gutter, depending on passes of cable. 1 pass = 1 hanger 2 passes = 2 hangers. Total Cable Length

Roof Clips: X 1.5 =
 Roof Length Total Clips Needed

Table 1

Eave Overhang	Cable length per foot of roof edge	Loop length Metal
1'	2.25	**
2'	3.25	**
3'	4.25	**
4'	5.25	**

240 VAC cable

Part No.	208 Volt	277 Volt
2806-2	0.86	1.16

120 VAC Breaker Size VS Max Circuit length (FT)

Energized	20 Amp	30 Amp	40 Amp
2806-1 @ 40°F	200	250	250
2806-1 @ 0°F	130	190	250
2806-1 @ -20°F	115	170	225

240 VAC Breaker Size VS Max Circuit length (FT)

Energized	20 Amp	30 Amp	40 Amp
2806-2 @ 40°F	260	450	450
2806-2 @ 0°F	230	340	450
2806-2 @ -20°F	190	285	385

* For valleys, measure length X 2.15, cable goes up valley in figure eights. Clips go on the top and each side of the figure 8 (Top Diagram on "Page 5")



* 1.111 or 2.15 Service factor to accommodate drip loops, terminations & measurement variations

** Consult HTS for Details



YouTube Video Tutorials

For added help on installing Heat Tape.

We have several videos online that will show you how to work with Self-Regulating heat cable for “Tee” connections, Splices, End Seals, and standard Hardwire connections.

Click on the links below to be directed to our individual YouTube videos



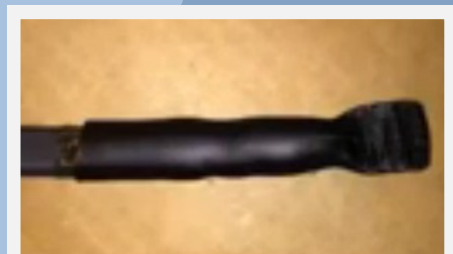
DTEK-1 Tee Connection

[Tee Kit Tutorial](#)



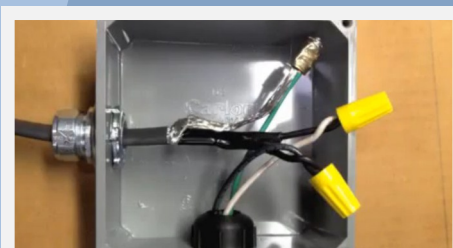
DSK-1 Splice Connection

[Splice Kit Tutorial](#)



DES-1 End Seal Connection

[End Seal Tutorial](#)



DPEST-1 Hardwire Power Connection

[Hardwire Tutorial](#)