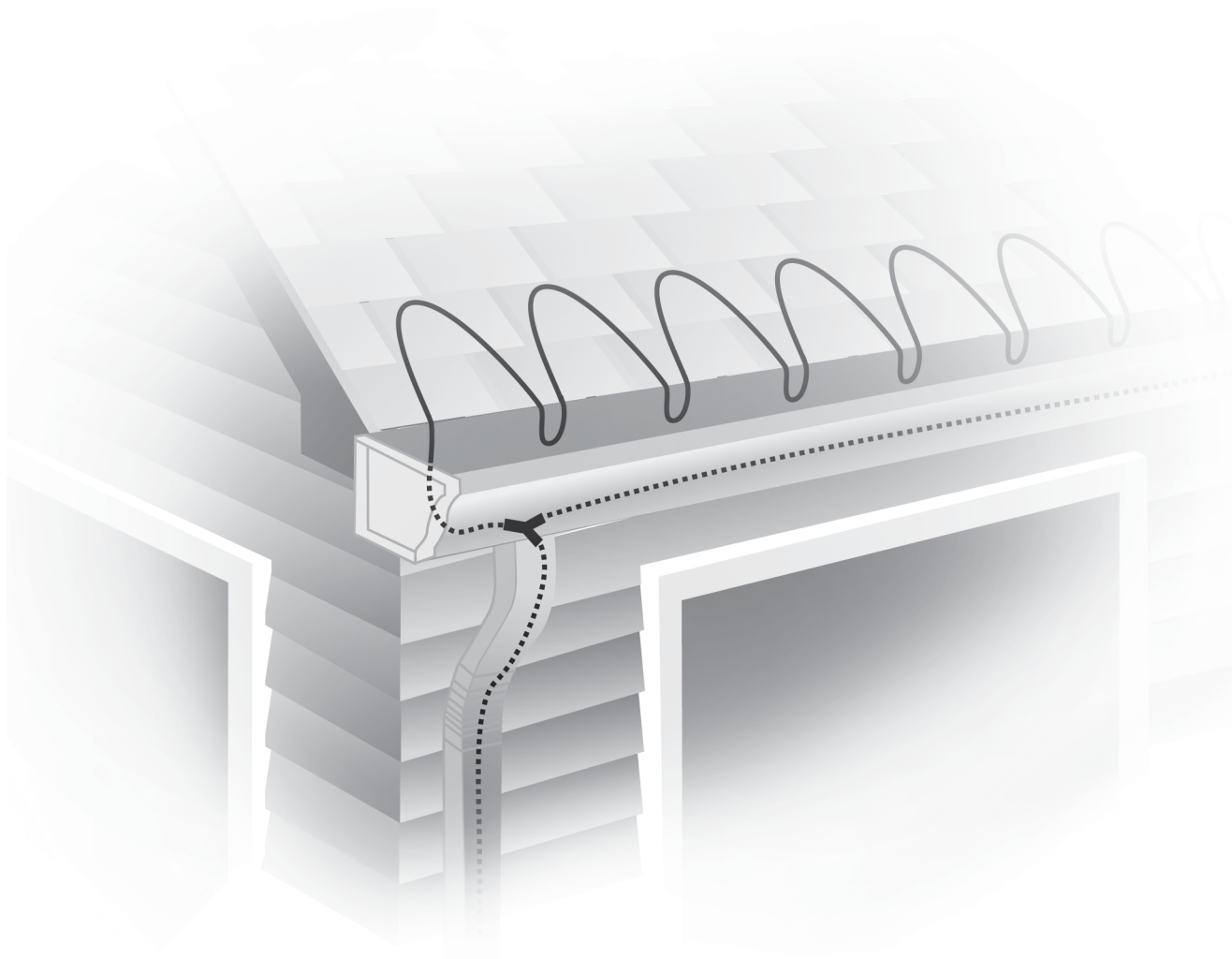


INSTALLATION GUIDE

HEAT TRACE WIRE



INNOVATIVE
ROOF DE-ICING
SYSTEMS

 **engineered**
ROOF DEICING

IMPORTANT

LEGAL NOTICE:

Area laws differ concerning the handling and installation of heat cables, building materials, electrical connections, plumbing etc. Please check and comply with your local laws. Engineered Roof Deicing will not be held responsible for those who do not comply with their local or national laws while installing our products.

NOTE

Because roofs and buildings are all somewhat different, we recommend you use your best judgment when installing our products to attain the best possible results for appearance, safety, and effective operation. Please use all safety precautions when using ladders, tools and when working on rooftops.



WARNING:

This guide does not reflect National Electrical Code, National Fire Protection Association regulations, IEEE standards and/or any other applicable laws or regulations. Engineered Roof Deicing advises you to seek qualified professional installation from a licensed electrician familiar with electrical code and/or other pertinent regulations in your area.

APPLICATION OVERVIEW

The Engineered Roof Deicing Heat Tracing System utilizes a self-regulated heat cable to melt the snow and ice on your roof, and keep ice and snow from building up to dangerous levels. Our self-regulated system reduces costs to homeowners, compared to constant electricity heat cables—meaning big savings over the years. The Engineered Roof Deicing Heat Tracing System is also a valuable investment that can save home and business owners from costly structural damage and personal injuries caused by falling snow and ice.

INNOVATIVE ROOF DE-ICING SYSTEMS

Did you know?

Zig-Zag heat cables aren't the most efficient way to solve the problem of snow load, icicles and ice dams. And in many areas, heat cables alone will not solve these problems. (See page 16)

Engineered Roof Deicing offers heated panels in a variety of widths to fit any roof. T-Panels are available for roofs with eaves up to 18", while the T-Zone system fits roofs with eaves 36" and larger. While these options have a higher up-front cost, they offer significant energy savings over zig-zag heat cables.

ABOUT ENGINEERED ROOF DEICING

Engineered Roof Deicing is a leading innovator of roof de-icing systems. We focus on designing and manufacturing top residential and commercial products. Our passion is helping you come up with the best solution for your individual de-icing needs.

Our high-grade de-icing products include our own revolutionary T-Panel and T-Zone systems that virtually eradicate ice dams. We also provide cost-effective de-icing solutions including our own Engineered Roof Deicing Heat Tracing System.

As a Utah-based company, centered in the snow-capped Mountain West, Engineered Roof Deicing knows cold weather. And, we've created some of the best solutions for eliminating the dangers of ice and snow buildups. We're committed to offering quality installation, knowledgeable customer service and long-term dedication to our customers. And, as a local company serving you, we can really do it.

DETERMINE HEAT CABLE LENGTH

The area required to be heat traced will be determined by the size and shape of the structure. For example an entrance, with an overhang may be susceptible to drifting snow accumulation and require the total area to be heat-traced.

Typically the problem areas of a roof are

- Roof overhangs without gutters
- Roof overhangs with gutters & downspouts
- Gutters & downspouts
- Roof valleys & gutters

GUTTERS & DOWNSPOUTS

In instances where extremely cold temperatures and or severe winds are present it's recommended that the gutter and downspouts include 2 runs of heat cable. Installing 2 runs of heat cable (down and back) in the downspout eliminates the need for a T-Splice and an End Seal.

To calculate the length of heat cable required to trace with 2 runs of 100 ft long gutters and two 15 ft-long downspouts, use the following example: $100 + (2 \times 15) = 130'$ x 2 runs = 260 ft.

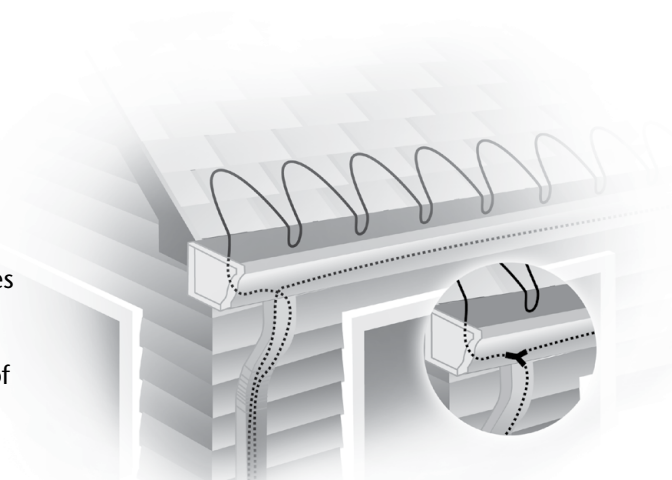


Tip: allow 4' extra cable for terminations and allow sufficient cable to reach your power connection point.

VALLEYS

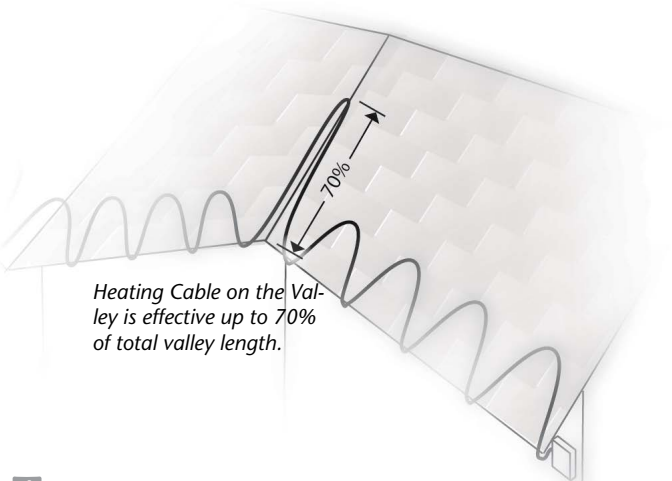
To calculate the amount needed for a valley run, first measure the length of the valley. For complete coverage, 70% of the length is required in a looped-back run.

For example, if your valley is 10 ft long, simply multiply by 0.7 and then multiply by 2 for the loop. $10 \times 0.7 = 7\text{ft}$. $7\text{ft} \times 2 = 14\text{ft}$.



Placing a double-run in the gutter eliminates the need for a T-Splice and provides better protection in extreme environments.

A T-Splice adds more work, but saves cable & wattage requirements.



Heating Cable on the Valley is effective up to 70% of total valley length.

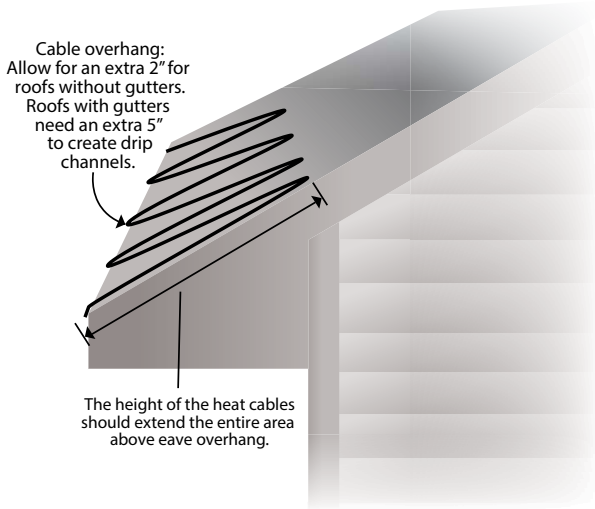
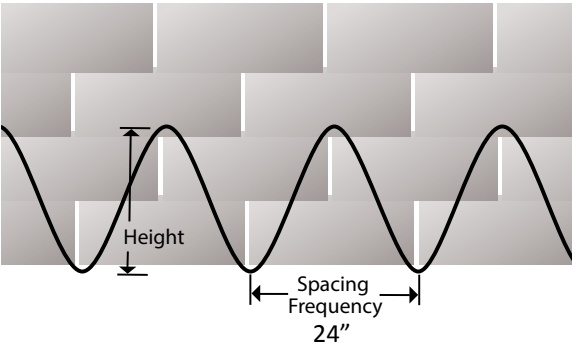
CALCULATING AMOUNT OF CABLE USED IN A ZIG-ZAG CABLE PATTERN:

Zig-zag cable works in areas of light snow-fall. For locations with frequent heavy and extreme snow conditions, T-Panel or T-Zone Panel Systems are recommended (See page 16).

The table below shows the how to determine the length of cable required per foot of roof line. Example: If you have an 24" eave, your multiplying factor is 4.5. For a roof edge of 100', just multiply the two numbers: 100' x 4.5 = 450 feet cable. This does not include length required for the roof edge or gutter.

Multiplying factor to determine amount of cable needed per foot of roof line.

Height Needed To Clear Eave Overhang	Multiplying Factor For 24" Spacing Frequency
6"	x 2.2
12"	x 2.8
18"	x 3.6
24"	x 4.5
30"	x 5.4
36"	x 6.3
42"	x 7.3
48"	x 8.3



POWER CONNECTION KIT

CABLE LENGTH REQUIREMENTS WORKSHEET

Section	Calculation	Sub Total
Gutters	Gutter length feet	ft
Downspouts	(Downspout length x 2') + 4'	ft
Valleys	(Valley Length x 0.7) x 2'	ft
Zig-Zag Roof line	Roof line Length x Multiplying factor	ft
Length to Control Box	Number of Power Connections x 6'	ft
Total		ft

POWER REQUIREMENTS

Try to design the heat tracing system using a worst case start up temperature of 0 F°. If longer circuits are required you may want to choose a higher start up temperature to increase the maximum circuit length allowed for the appropriate breaker size. However, keep in mind that if the heating system starts up at a temperature

lower than that designed for, you may experience breaker tripping.



Tip: Selecting a higher voltage allows you to reduce the breaker size required and in turn allows you to use longer circuit lengths. To determine the maximum circuit length allowable and breaker size required use the table below.

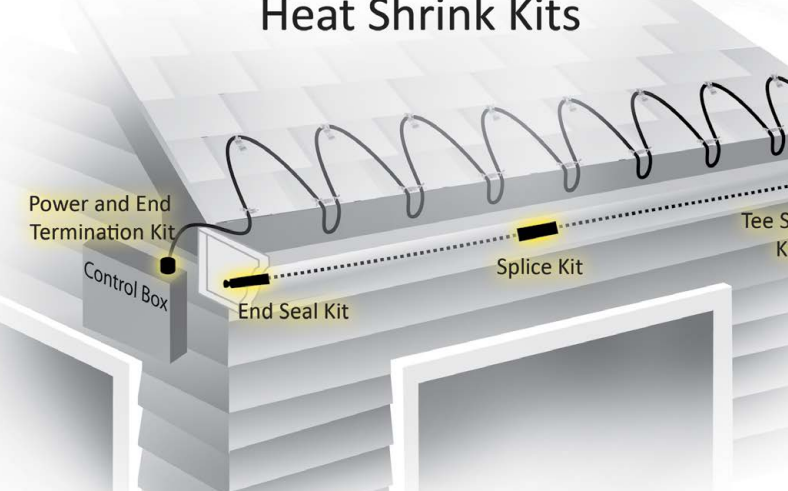
MAXIMUM CONTINUOUS CIRCUIT LENGTH (IN FEET) PER CIRCUIT BREAKER

5 Watt Heat Cable								
Max Length segment lengths in Feet								
Ambient temp at start-up	15 A @120 V	20 A @120 V	30 A @120 V	40 A @120 V	15 A @240 V	20 A @240 V	30 A @240 V	40 A @240 V
50°F (10°C)	200'	231'	231'	231'	395'	463'	463'	463'
0°F (-18°C)	132'	163'	231'	231'	247'	327'	463'	463'
-20°F (-29°C)	113'	136'	217'	231'	213'	327'	429'	463'
-40°F (-40°C)	98'	124'	191'	231'	200'	256'	378'	463'

8 Watt Heat Cable								
Max Length segment lengths in Feet								
Ambient temp at start-up	15 A @120 V	20 A @120 V	30 A @120 V	40 A @120 V	15 A @240 V	20 A @240 V	30 A @240 V	40 A @240 V
50°F (10°C)	132'	172'	183'	183'	258'	342'	363'	363'
0°F (-18°C)	89'	115'	173'	183'	166'	227'	343'	363'
-20°F (-29°C)	77'	102'	153'	182'	151'	204'	302'	363'
-40°F (-40°C)	72'	94'	134'	182'	132'	200'	272'	363'

10 Watt Heat Cable								
Max Length segment lengths in Feet								
Ambient temp at start-up	15 A @120 V	20 A @120 V	30 A @120 V	40 A @120 V	15 A @240 V	20 A @240 V	30 A @240 V	40 A @240 V
50°F (10°C)	106'	133'	154'	155'	207'	268'	310'	365'
0°F (-18°C)	68'	95'	139'	153'	132'	187'	276'	310'
-20°F (-29°C)	60'	79'	119'	153'	126'	162'	240'	310'
-40°F (-40°C)	55'	72'	106'	153'	108'	149'	217'	310'

Heat Shrink Kits



This diagram illustrates the application of heat shrink kits for cable management. A series of black cables are bundled together and run along the top edge of a grey, stepped structure. The cables are secured by a series of black heat shrink sleeves. A dashed line indicates the path of the cables. Labels point to various components: 'Power and End Termination Kit' at the left end, 'Control Box' below it, 'End Seal Kit' at the start of the cable run, 'Splice Kit' in the middle of the run, and 'Tee Splice Kit' at the right end where a cable branches off. The entire setup is shown in a perspective view, with the structure having a series of steps or shelves.



TEE SPLICE KIT

Engineered Roof Deicing's Tee Splice Kit includes: zip ties, cable splices, T-splitter, end seal, and moisture sealant. Used to create a "T" junction in heat cables, as well as terminate one end of the heat seal.

Product code: ETK



END SEAL KIT

Engineered Roof Deicing's End Seal Kit with moisture sealant. This is used to terminate heat cables.

Product code: EES

SNOW/ICE MELTING CONTROLS

To determine the optimum control method you should consider that when the cables are energized (ambient method) and there is no snow/ice present power will be consumed unnecessarily. On the

other hand if you rely on manual control and someone neglects to turn on the system when necessary, the inevitable snow/ice will form thereby defeating the original purpose of the installation.

MANUAL PLUG-IN CONNECTION

The heat cable is switched on/off manually. This method will require supervision to work effectively.



20 AMP 30MA GFCI PLUG KIT

120VAC code: EGFI-120

240VAC code: EGFI-240



10 FOOT PIG-TAIL POWDER CORD W/ MOLDED PLUG

Product code: EPT-10

MOISTURE & SENSOR TEMPERATURE CONTROL

This method ensures that the heat cable is energized only when a combination of moisture and low temperature are present, thereby keeping the roof and gutters free of snow/ice. When either the precipitation ceases, or the temperature rises above freezing, the heating cable is turned off thus conserving energy.

THE CDP-2 SNOW SENSOR CONTROL/DISPLAY PANEL

This optional accessory provides convenient indoor monitoring and control for the DS-2B, DS-8, DS-224 or DS 824 ASE controllers. The remote control is self powered, no AC wiring or batteries required and fits any standard single gang electrical box. Compatible with leviton decora®/hubbell styleline™ cover plates. You choose the cover plate color and material.

Product code: 4214-TT



Heat Cable
Controller with
Integrated
Sensor



THE DS-2B RAIN/SNOW SENSOR CONTROLLER

- Integrated Precipitation Sensor
- 100-120/200-240 VAC Operation

Product code: E-DS-2B

Heat Cable
Controller with
Remote Sensor



THE DS-8 RAIN/SNOW SENSOR CONTROLLER

- Designed for gutter, downspout and roof ice melting
- Remote Precipitation Sensor
- Power/Activation LED
- 100-120/200-240 VAC Operation

Product code: E-DS8-LD

INSTALL GUIDELINES

The effectiveness of heat tracing a roof or gutter is determined not only by the design and layout but also by the quality of installation.

- It is important that the heat cable be in contact with the roof and gutter to ensure proper melting.
- Do not install heat cable under the roofing materials.
- To prevent damage to the cable where snow might slide from the roof, it may be necessary to install a snow fence near the edge of the roof.
- Downspouts to underground sewers should be traced down below the frost line.
- Roof drains should be heat traced 12" down into the heated portion of the building.
- Heat tracing the roof itself is not always necessary. If ice-damming on the roof is not experienced then heat-tracing the gutters and downspouts should be sufficient.
- If gutters are not present then heat cable

installed on the roof must have drip loops extending past the roof edge. We recommend at least 2".

- Roof clips may be secured to surfaces by way of adhesive to avoid the use of nails or screws. We recommend Tamp-Pro Adhesive.
- Junction boxes, whenever possible, should be located under a roof overhang or a similar area to avoid direct exposure to weather and should include drip loops where the cable enters the box.
- On a larger installation when using multiple circuits try to locate all the junction boxes in one area to reduce power feed conduits.
- A complete check list of materials should include: heat cable, power termination, end seal, roof clips, and a controller as required.

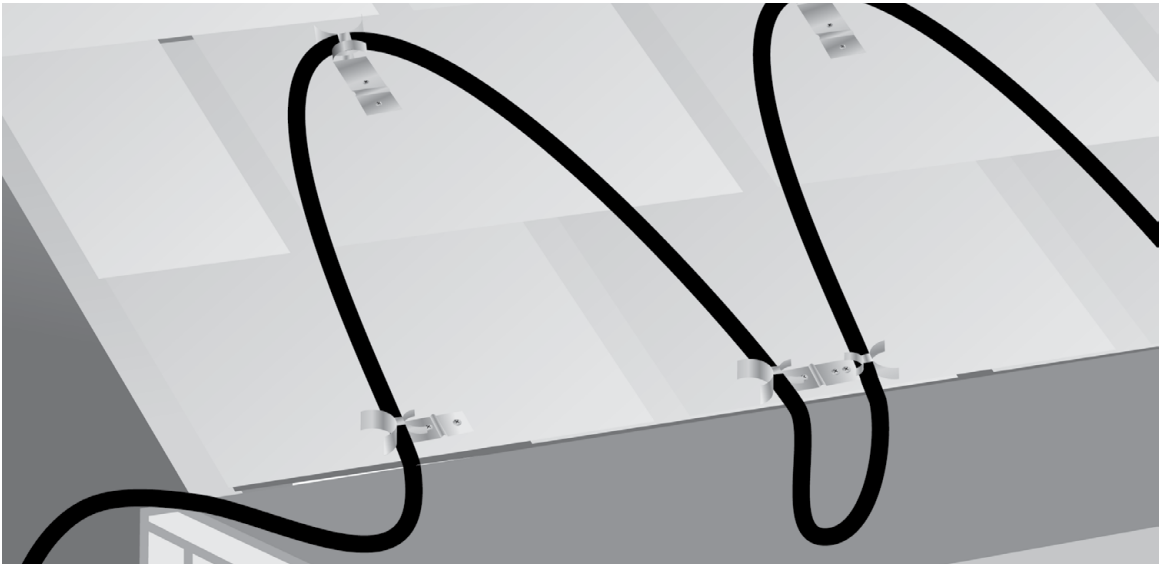


WARNING:

Section 426 of the National Electric Code requires ground-fault protection of equipment.

MATERIALS WORKSHEET

Item	Model #	Unit	QTY
Heat Cable Total Length (in Feet)		ft	
Power Termination Heat Shrink kits (1 per control box)	EPE	ea	
End Seal Heat Shrink Kits	EES	ea	
Splice Heat Shrink Kits	ESP	ea	
Tee Splice Heat Shrink Kits	ETK	ea	
Roof Clips (Typicaly 10 clip-pack per 7 feet of roofline)	ERC	10/bag	
Controller Unit		ea	



INSTALLING ROOF CLIPS

The Roof Cable Clip is used to attach heating cable to most types of roof surfaces. A kit contains 5 double clips, which is typically enough for approximately seven linear feet of roof edge, depending on your spacing frequency.

1. Plan the layout of the roof clips according to your spacing frequency. One double clip is used to secure the heating cable looped at the roof edge (this assures a drainage channel to the gutter). A single clip is used to fasten the cable at the top of the zig-zag layout arrangement. Single clips are made by snapping the double clip in two at the scored indentation.

2. The roof clips can be attached to the roof using adhesive or screws. When using screws, it's recommended to place a dab of weather-proof silicone caulk over the screws (once fastened) to seal the screws holes and prevent leaking caused by the screws.



Tip: Fasten the clips to the roof before installing the heating cables.

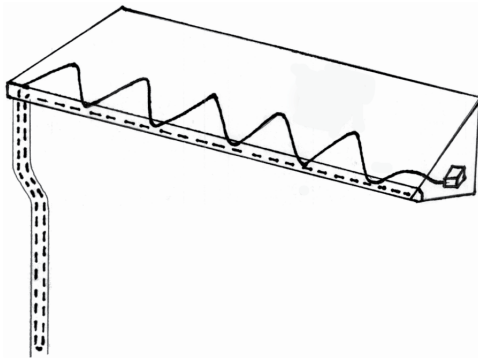
3. After installing the clips on the roof, thread the heating cable around the clips. Use extra clips in any location where the heating cable is susceptible to excess stress or movement.

4. Using pliers, close the clips firmly about the cable, being careful not to crush the cable.

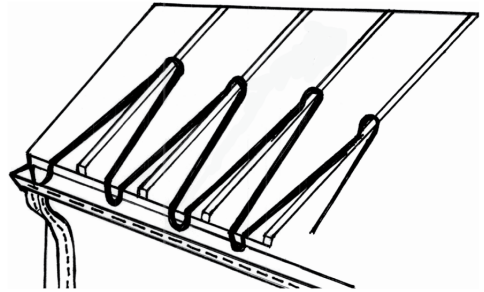
5. The heat tape should be fastened to the roof so that it's touching the roof. This placement better enables the heat tape to melt the snow and ice on the roof.

Tip: Use Aluminum tape to hold cable in place in gutters.

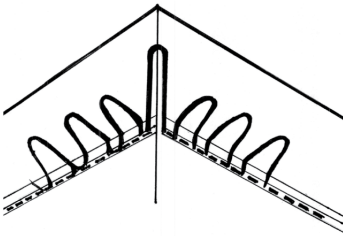




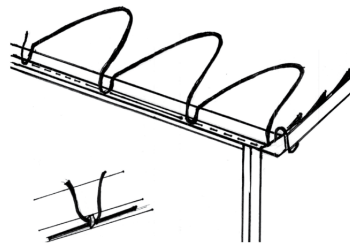
Asphalt Roof



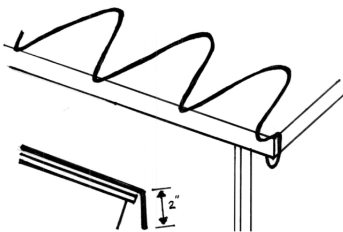
Metal Roof



Heat-tracing a valley, roof edge and gutter.



Heat-tracing a roof edge and gutter.



Installation without gutters



ALONG THE ROOF:

- Your Engineered Roof Deicing Heat Tracing System utilizes a “zig zag” (or repeated “V”-shape) pattern along the roof’s eave.
- This pattern helps melt snow and ice along the eave and keeps snow and ice from building up at your roof’s edge.
- The heat tape is constructed of a flat material, so forming the zig zag is as easy as laying it on the roof.
- The bottom of the zig zag pattern rests inside the gutter. By placing the bottom of the “V” shape in the gutter, the melted snow and ice will better drain into the gutter.



CAUTION: Be sure to use a safety harness/line and/or other essential safety gear when working on your roof. Consult your local safety code(s) and/or regulations and seek expert help.

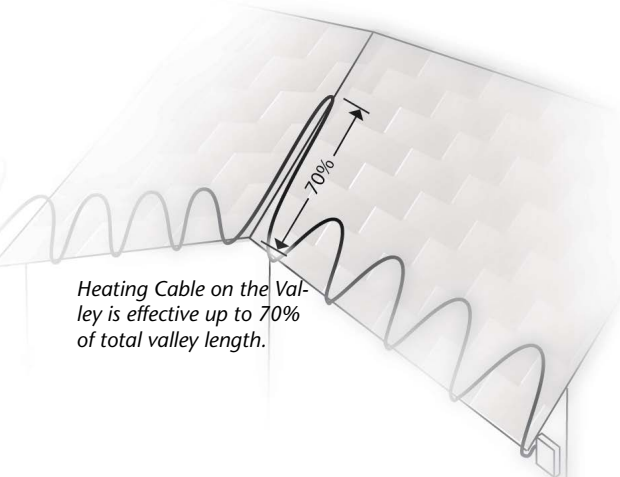
UP THE VALLEY:

- Similarly to the “V” pattern along the eave, you’ll run an inverted (or upside down) “V” up valleys on the roof.
- These valley “V’s” will be much taller than the eave “V’s”. So, the valley “V” will melt snow and ice much higher up the roof where snow and ice collect in the valley.

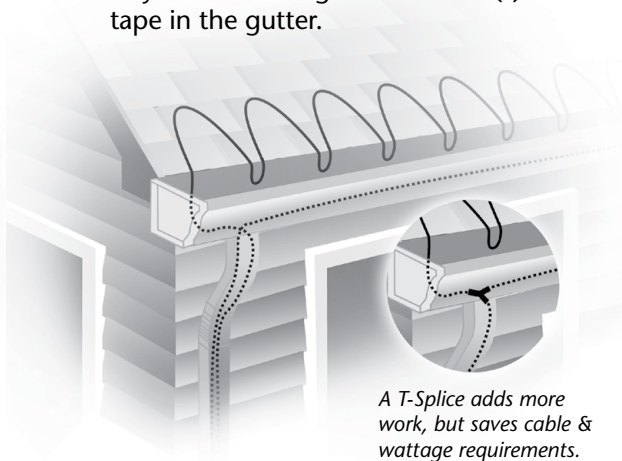


INSIDE & DOWN THE GUTTERS:

- Heat tape is placed inside and down your gutters to keep the melted snow and ice moving freely down and away from your home or business.
- You’ll want the heat tape to exit out the bottom of the gutter downspout(s) at least 3 inches, so the water will flow away from the gutter and ice will not form at the bottom of your downspout.
- The heat tape should be placed at the bottom of the gutter, touching the gutter bottom, to best melt the snow and ice and keep water flowing freely.
- In severe cold conditions, two runs of heat tape can help keep water flowing freely.
- Generally, no clips or fasteners are necessary when running the main line(s) of heat tape in the gutter.



Heating Cable on the Valley is effective up to 70% of total valley length.



A T-Splice adds more work, but saves cable & wattage requirements.

- You may want to secure the heat tape from the roof's eave to the main line(s) of heat tape in the gutter, to better assist the melted snow and ice to drain directly into the gutter.
- Secure the heat tape on the roof's eave to the heat tape in the gutter by fastening the bottom of the zig zag pattern (the bottom of the "V") to the main line(s) of heat tape in the gutter. Be sure to consult labels on zip tie containers and/or other fastener products for heat-resistance before using.

CONNECTING UNDER THE ROOF:

- Since the heat tape is electric, electrical connections need to be made. These connections are best placed under the roof, to protect them from inclement weather conditions.
- When reaching these connections with the heat tape, a "drip loop" or sagging "U"-shape is formed in the heat tape so the melted ice/snow will run down to the bottom of the "U" and then drip to the ground (rather than entering the electrical connection).



CAUTION: Be sure to use a ground fault circuit interrupter (GFCI) that will "trip" (or shut down) your electrical circuit if the electrical comes in contact with water. Always use a licensed and knowledgeable electrician familiar with local electrical and/or other pertinent code(s) and/or regulations.

CUTTING, SPLICING & CAPPING THE ENDS OF HEAT TAPE:

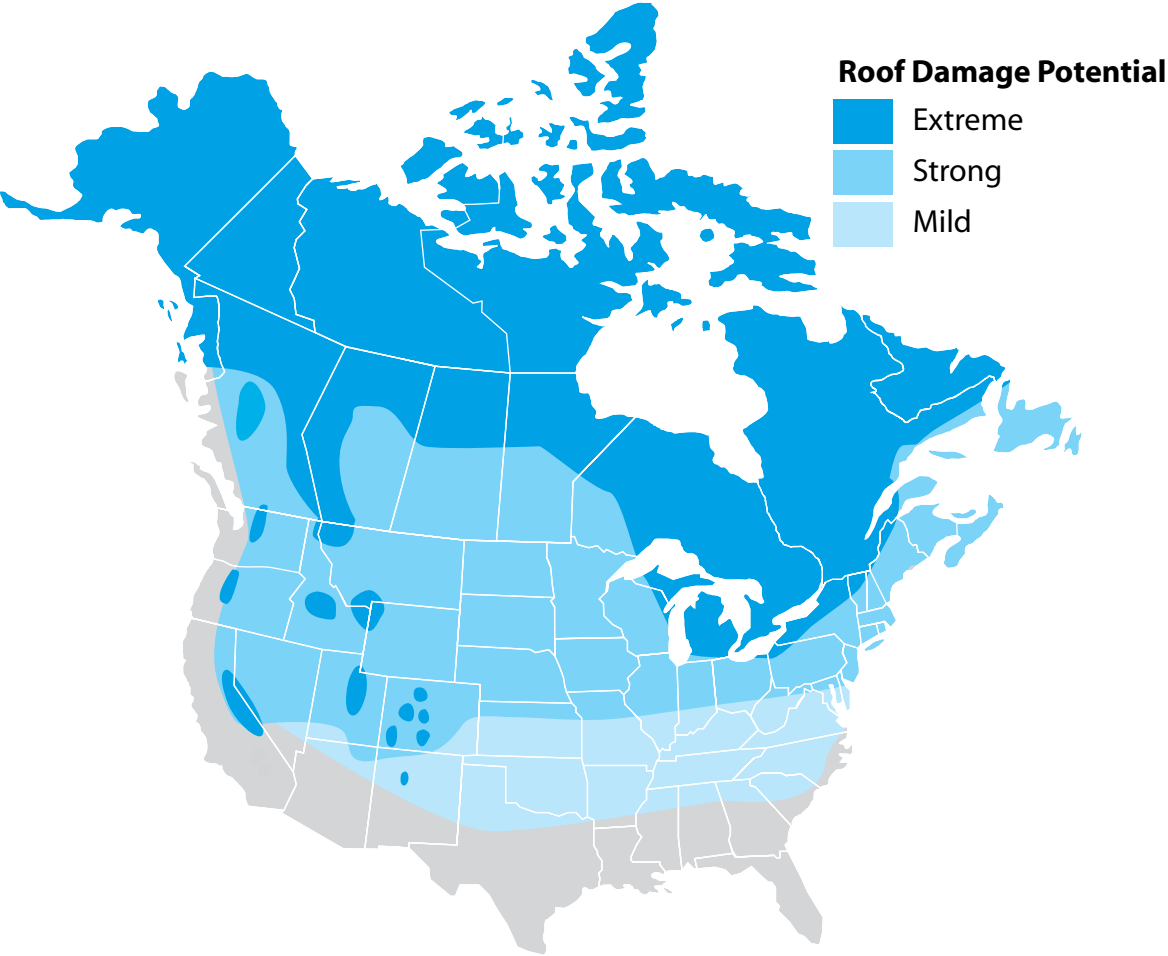
- One primary benefit of Engineered Roof Deicing cut-to-size heat tape is that it can be cut to any length to fit your specific roof. And, the heat tape can be easily spliced to make repairs and/or follow your roof's unique contours.



CAUTION: Never work with live wires. If you are repairing heat tape that has already been in use, be sure to shut off all power connections before attempting to work on the heat cable. Always use a licensed and knowledgeable electrician familiar with local electrical and/or other pertinent code(s) and/or regulations.

- You can run the zig zag pattern along the eave and up the valley with one continuous strand of heat cable. So, little cutting/splicing is necessary.
- The heat cable in the gutter along the eave can also be one (or more) continuous cables. So, few cuts/splices are needed.
- Heat tape can be spliced into a "T." This technique is useful to splice a line of heat tape from the main gutter run to a new line running down a gutter and out the downspout.
- Splices can be concealed in the gutter. However, electrical splices must be well-sealed from exposure to water.
- Be sure to cap the ends of the heat tape well, so the electrical wires are not exposed. You'll likely have cut heat tape to cap at the bottoms of your drain spout gutters.

APPENDIX

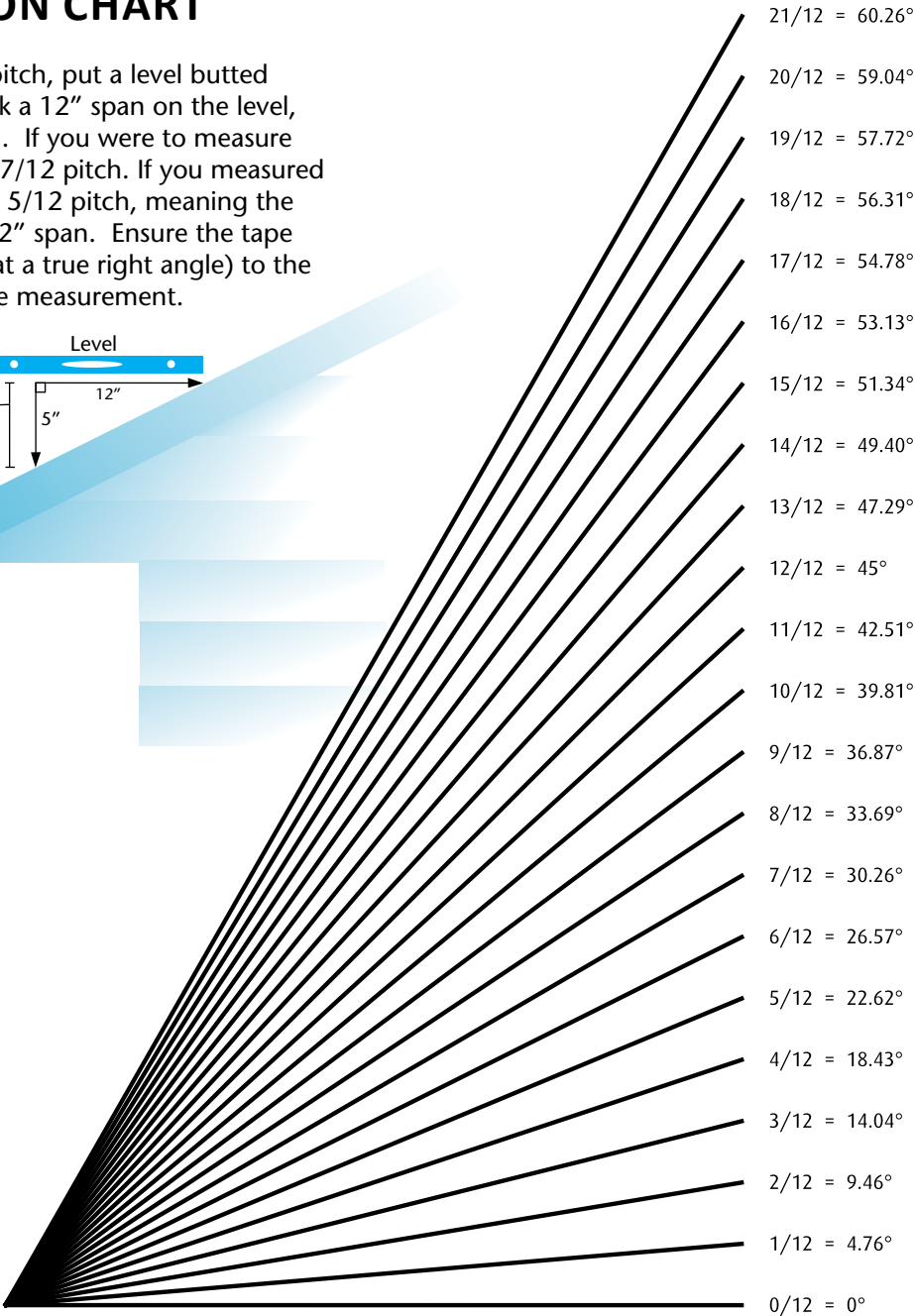
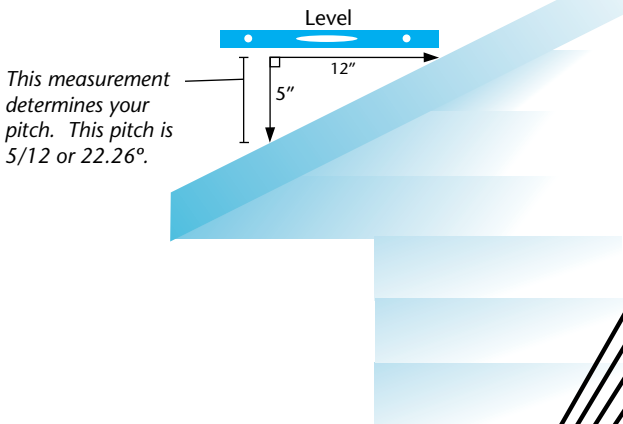


Heat cables are not 100% effective in areas of strong & extreme snow and ice precipitation.

T-Zone & T-Panel Systems from Engineered Roof Deicing remove snow & ice with complete coverage for extreme environments.

ROOF PITCH TO ANGLE CONVERSION CHART

To find your roof's pitch, put a level butted to the roof and mark a 12" span on the level, then measure down. If you were to measure 7" then you have a 7/12 pitch. If you measured 5" down, then it's a 5/12 pitch, meaning the roof drops 5" in a 12" span. Ensure the tape measure is square (at a true right angle) to the level get an accurate measurement.





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