

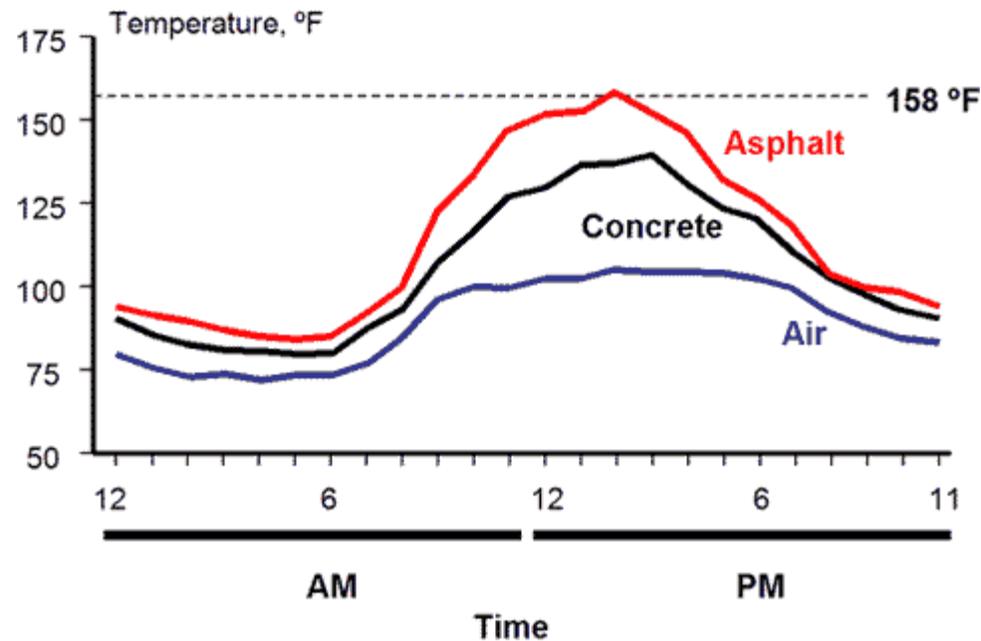
Snow and Ice on your Roof/Gutter

A description of why ice forms on the eaves and gutters of roof systems.

We live in a climate that is conducive to varying weather, especially in winter. It can be 10 degrees one day and 60 the next. We can have snow one day and a few days later rain. Why does snow melt on a roof when temperatures are below freezing? Why does ice collect at the eaves and gutter even though the snow is melting on the roof surface? The following slides attempt to answer these questions and will explain the following:

1. **The makeup of roof material and its color**
2. **Sun direction**
3. **Varying temperature between attic space and the freeze line**
4. **Freeze thaw line and why ice forms here**
5. **Leaf guard**
6. **What is done to thwart possible damage**
7. **Concerns**
8. **What to do?**

Most people understand the main component in shingle roofing is asphalt. Asphalt will reach much higher temperatures than the outside air temperature. This holds true when the weather is cold. Even with snow on a roof, which reflects most sunlight, some energy reaches the roof surface and heats it. This causes the snow to melt when temperatures are below freezing. The color of the roof also has an influence. Dark colored roofs will see more snow melt in below freezing temperatures than light colors. These are the two most influential reasons you see snow melting on a roof even when outside air temperatures are below freezing.



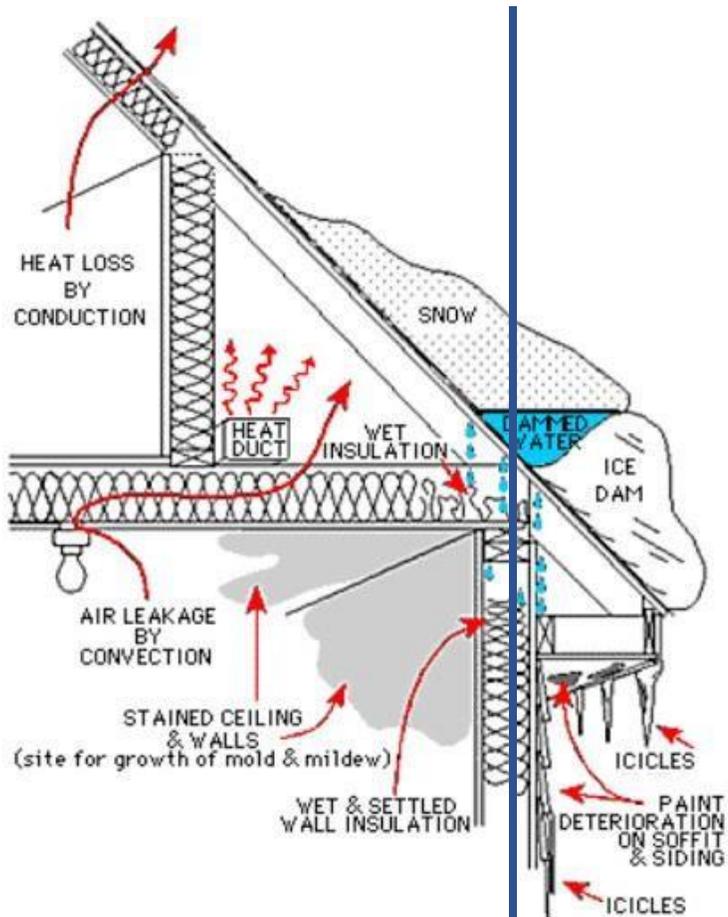
Why does one side of my roof melt more than others? Why does my neighbor's roof have no melt while mine is melting? Why does my neighbor have no ice cycles, but I have many? The main answer to these questions is the sun's direction. In winter, we know the sun is up for a much shorter period and is lower in the horizon. Where the sun hits a roof surface in summer is much different than winter. Areas that see direct sun will melt much more quickly than those that do not. Why this causes ice to form at the eaves will be covered later.



This is a temperature reading from an attic vs. outside air temperature in the morning on a cloudy day. You can see that the difference is almost 7 degrees. Why does this happen? Even a well insulated attic, such as this one, will have air escape into it from the living space below. Most attic spaces will see a wider disparity in temperature ranges because they are not as well insulated. Even in this case, the outside air temp is below freezing, and the attic is above freezing. The underside of the roofing is warmed and causes snow to melt.



Below is a vertical line at the freeze line of a roof. Area to the left of the line sees higher temperatures due to the instances shown in the previous slides. So why does ice form to the right of the line? The answer is quite simple. This entire area is surrounded by outside air temperature. The roof surface to the left of the line is warmer allowing snow to melt. The water hits the freeze line where the temperature remains below freezing and the water turns back to ice. The melt from above continues and the ice builds until all snow from above is gone. It takes outside air temperatures above freezing for the ice and snow to melt from the eave. Areas with small sections of gutter, such as in the photo to the right, will fill with ice more quickly. As you can see, the effects can be staggering. Picture two bathtubs; one small and one large. Plug the drains and begin adding water. The smaller tub will overflow before the larger one.



Leaf guard is just that; a system to prevent leaves from entering the gutter. Most leaf guards are a solid surface with perforations to allow water to flow into the gutter. The perforations must be small enough to keep debris out, but allow water in. These perforations freeze over quickly. Therefore, homes with leaf guard will see ice cycles more quickly than others. You may also see water coming over edges and off the sides of gutters where it normally wouldn't when the perforations are open.



What are the dangers of ice dams and ice? Some may remember an event just over a decade ago in our area that we call “snowmageddon.” Conditions allowed massive snow dams to form well above the normal freeze/thaw line. Homeowners saw roof leaks, gutters ripped off, and in some cases I saw entire soffit systems torn down by ice. This was a freak occurrence by mother nature where many variables had to align to make it possible. Ice dams are normal and typically remain within the freeze line area. This area is protected by the ice guard underneath.

Ice cycles themselves can be dangerous if they get large enough to fall on someone or something. The best solution is to install heat cables.



What is done to protect the home and stop ice from forming at the edge of the roof? Ice guard is applied at the eaves and valleys where ice and snow collect. Ice guard is installed up to a point that reaches above the freeze line. This protects the home from ice dams. Heat cables can also be installed that melt snow and ice away at the eave and gutters to give melting water from above an avenue to travel rather than being blocked. They do not eliminate all ice or snow, but they do help.



As a contractor, we install material per manufacturer guidelines including their recommendation for ice guard. However, this does not prevent ice from forming. Ice and snow are an inevitable part of where we live. The best solution for an individual who has concerns are heat cables. While they do not eliminate all ice, they slow down the process that can lead to dramatic ice formations. The cables we recommend are heavy duty. They are also self regulating which means they pull more electricity as temperatures drop and less when the temperature rises. People like this feature because they can be left on all winter. The associated fastening clips we use, are much more effective than others on the market. Most homes require 100-150 feet, and some require multiple cables. These heat cables come with a two-year warranty. Any necessary electrical outlet hook up must be done by a certified electrician.

