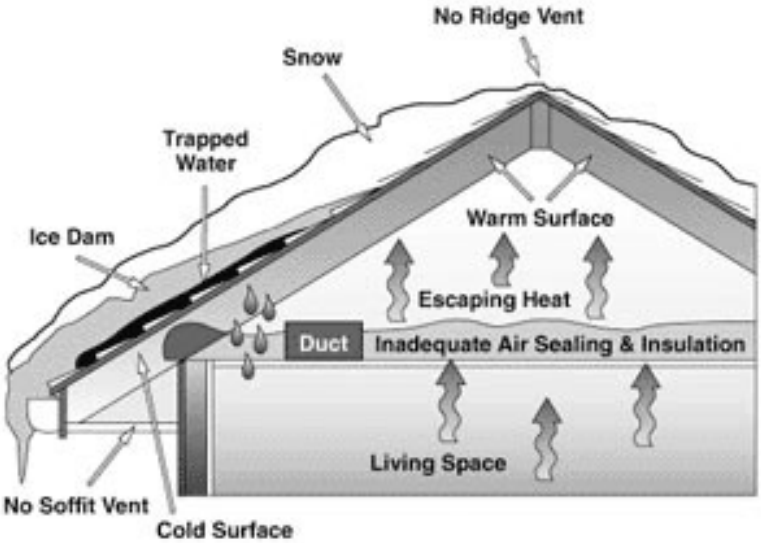
Ice Damming – or, "Why Is It Raining in My Kitchen?"

If you had icicles hanging from your gutters or actual water leakage into your house during heavy snows, you may have a house prone to ice damming. Ice damming happens when snow on the roof melts and the water freezes when it hits the cold gutters. The ice builds up above the gutters, pushes into the attic, and then melts. The melt water drips into the living space. This water damages ceilings, walls, floors, and insulation, and could cause thousands of dollars of interior damage. One winter in the late 1980s, we experienced ice damming and suffered considerable damage inside our home. Although it was covered by insurance, it was a heartbreaking experience which we never want to repeat. And, in today's insurance climate, a substantial claim for ice damming could lead to increased premiums at best, or a cancelled policy at worst.

You can search "ice dam" on the internet and get loads of information. One of the better articles is www.doityourself.com/stry/icedam. While www.heatercap.com is in the business of selling heated gutter covers that they claim will help solve the ice damming problem, its web site has some basic information on ice damming. Also, in February 2010, local gutter contractor Chris Pauly produced a series of short videos on ice damming. Visit www.youtube.com and search for "guttermansvcs"

Here is a picture of how ice damming works with roofs with traditional soffits/overhangs. Most of this article addresses this common roof structure. Other roof types, such as those over cathedral/vaulted ceilings or Mansard/Dutch Colonial roofs may need different treatments.



Ice damming occurs when the outside temperature is below freezing (32 degrees F) for a long spell (two days or more) and the temperature of the roof surface is warm enough to melt snow. The increased roof temperature is usually caused by a warm attic, although bright sunlight can heat it up, too. This causes the snow to melt and then refreeze when the warm water hits the cold gutter. The ice in the gutter builds up, pushes under the shingles or plywood roof sheathing, melts, and the water seeps into the attic. From the attic, the water seeps through the ceiling and inside the exterior wall.

Water leaking through siding weep holes freezes when it hits cold air.

Stains from water leakage through siding weep holes

Signs that you have a classic ice damming problem include water coming inside the house; “rain” between the main window and the storm window; wet mushy drywall on ceilings or exterior walls; ruined paint on the drywall; water leaking through ceiling light fixtures, exhaust fans, and heating vents; ice piled high above the gutters; a dripping sound coming from the attic; and icicles on the exterior siding. Icicles hanging from the gutter may be just a sign that the snow is melting and not indicate ice damming. But, keep your eye on them anyway.

Sometimes ice damming occurs on only one side of the house. This could be due to differences in the construction of the building, as well as the roof’s orientation to the sun and wind, tree shading, and even the color of the shingles. Don’t be fooled by lack of ice damming on one side of the house; it could just as well happen there the next time ice damming conditions exist.

A “perfect storm” for ice damming is a heavy snow followed by a long cold spell. And, even though these conditions occur in the Washington, D.C. area only once a decade or so, it pays to be prepared.

Your goal is to keep the bottom layer of snow on the roof as cold as possible to keep it from melting. You do this by keeping the attic as cold as possible.

What to Do Before the Big Snow

If it is forecast that a snowfall is expected that could leave 7+ inches of snow on your roof, and you believe that your house is susceptible to ice damming, do the following before it begins to snow:

- Manually turn on any rooftop or gable vent fans (gable vents are at the ends of the house, just under the peak of the roof) to suck warm air out of the attic. See #2.

- Make some ice melt sausages and place them on the roof. Also, sprinkle ice melt in the gutters that are prone to ice damming. See below.

- Purchase a snow rake before the snow begins to fall - if you think you can reach the snow with a 15 foot long snow rake.

- Make sure your gutters are clear of leaves and debris, which hinter the flow of water and promote ice damming.

- Purchase some "ice dam melt socks" – see below.

Emergency Measures to Stop Ice Damming In Its Tracks

First, some cautions:

> Never use a blowtorch or flame of any type to melt ice. You could burn down the house! And, coming from someone who has tried, torches don't work! You could try a hair dryer, though - if you have a week or so free time.
>
> Never use a chain saw to cut through the ice! Yeah, I know there's a video on YouTube showing just that. But working on an icy roof and using a chain saw are dangerous activities on their own – but together? It's a good way to destroy the roof itself and cost you an arm or worse.
>
> Be careful when you work with or walk on snow or ice covered roof shingles. Cold shingles are very brittle and can split if you mess with them when cold. If you do walk on the roof to remove snow or strike a shingle with your shovel, you could easily crack the shingles which could lead to even more roof leaks.

1. Get the snow off your roof. If you have a one story house, use a "roof rake" to scrape off as much snow as you can. See www.roofrake.com If the snow is still fluffy and you are venturesome and can climb onto the roof without serious danger, use an electric leaf blower

to blow snow off the roof. Some roofers will remove snow for you – for lots of money, as you can imagine and, as noted above, with the risk of damaging your shingles. Check www.Craigslist.com, as independent operators spring up during storms. Get the snow off at least the bottom six feet of the roof. If you have ridge vent along the peak of the roof, try to clear that off so that warm attic air can vent. Once the snow and ice have melted and it has warmed up a bit, check the roof for broken shingles.

2. If possible, manually turn on any rooftop or gable vent fans (gable vents are at the ends of the house, just under the peak of the roof) to suck warm air out of the attic. However, these fans are primarily designed for summer attic cooling and are controlled by a thermostat that triggers at around 110 degrees. If you're handy, you could open the control box of the fan and bypass the thermostat, thus turning on the fan. Turn off the power at the circuit panel before doing this, of course. However, if the rooftop fan is already covered by 10 or more inches of snow, the fan may not be able to blow off the snow. So, try to remember to get the fan running when there are only a few inches of snow on the roof.

3. Don't have an attic fan? Get a 20' box fan from a hardware store or K-Mart/Walmart and place it in the attic, directly in front of one of the gable vents. Orient the fan to blow warm attic air outside. Better yet, use two box fans, one at each gable vent. One fan should blow warm air out and the other should suck cold air in. This creates a cool breeze through the attic that should blow out quite a bit of the warm air.

4. Use a screwdriver to poke holes in the ceiling where water is ponding or dripping. It's better to drain the water through the ceiling into a bucket than wiping down walls and suffering damaged paint and wallpaper.

5. Don't use the fireplace. The heated chimney warms the attic and roof.

6. Lower the temperature in the portion of the house directly below the attic where ice damming is occurring, by one or more of the following:

> Turn on ceiling fans to move the warm air away from the ceilings which are directly under the affected attic/roof.
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> Open the windows to cool down the rooms below the affected attic/roof.
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> Turn the thermostat down to 45 degrees and move in with the in-laws until the cold spell ends. Turn off the master water valve in the basement, open faucets to drain water, and open cabinet doors under sinks to circulate air around water pipes. This should keep your pipes from freezing.
>
> Shut off furnace heat to ducts that run through the attic. Hickory Farms Colonials were built with poorly insulated attic heating ducts. When the furnace runs, heat

escaping from the ducts raises the attic temperature, which heats the roof, which melts the snow. If you can shut off the heat to the attic ducts, you can cool down the roof. If you have the original duct configuration in the basement furnace, turn the butterfly valve (which is connected to the "damper") for the ducts leading to the attic to the "off" position (there is one run of ducts that heats the basement and first floor and a second run of ducts that goes into the attic and heats the second story). To be in the off position, the lever should point to the left or right, not up or down. It will get chilly, though. Note: Closing the upstairs heat registers is not the same thing as closing off the ducts at the furnace. If you only close the registers, warm air will continue to push into the attic ducts, although a bit more slowly.

7. Some homes with cathedral or vaulted ceilings are also prone to ice damming. Unless they were properly constructed (and we know our homes were frequently not), there is likely little or no dead air space between the inside ceiling and the roof since the space between ceiling and roof is probably filled with fiberglass insulation. Since the insulation is likely in direct contact with the roof, it will readily conduct heat from the inside of the house to the roof, melting snow which then refreezes and causes ice damming. The only emergency solutions for cathedral ceiling arrangements that come to mind are to turn the thermostat down to 45-50 degrees or so, and get snow off the roof or tear off the gutter.

8. Fill the leg of a pair of panty hose with an ice melt product such as Blizzard Wizard (a blend of conventional rock salt encapsulated with liquid magnesium chloride and an agriculturally derived corrosion inhibitor). Snow and ice melt ingredients, in order of preference are: magnesium chloride, potassium chloride, calcium chloride, and rock salt (sodium chloride). The first two chemicals don't damage plants and lawns. The last two can damage plants, so you may have to make a choice – your plants or your home. Lay the panty hose sausage onto the bottom of the roof so it crosses the ice dam and overhangs the gutter by a few inches; in other words, the long sausage-like panty hose tube should be vertical. Use a long-handled garden rake or hoe to push the pantyhose into position. Or, tie a rope on the end of the sausage and use it to flip it onto the roof. Try to put one every five feet or so. The chemical will melt through the snow and ice in just a few hours and create a channel for water to flow down into the gutters or off the roof. See http://ice-dam-roof.com/ If you want to be really prepared, buy specially made "ice dam melt socks" made by Pennington Equipment Company for about $1 each.

9. If you can reach the iced over gutters, pour blue windshield washer fluid just above the ice dam to promote melting.

10. Clear the snow around your downspouts so that water from melting ice and snow, when it finally comes, doesn't clog them.

11. Get a long hose and connect it to the drain valve of your hot water heater. Turn on the valve. Spray hot water on gutters and downspouts. It takes quite a while to melt the ice, but it may slow down the ice damming until the weather warms up. You should be literally above the gutter level when spraying. Never spray water from a distance, such as from the ground onto a two story roof; by the time the water hits the roof, it will have cooled considerably and may just make more ice. Also, never point the hose up the roof as the pressurized water will just push under the shingles and work its way into the attic. Finally, you should start with the downspout and work along the gutters away from the downspout. This allows the melted ice water to drain down the downspout, rather than building up more ice on the gutter and roof. This is a cold, wet, messy and potentially harmful project, but I have seen it work twice.

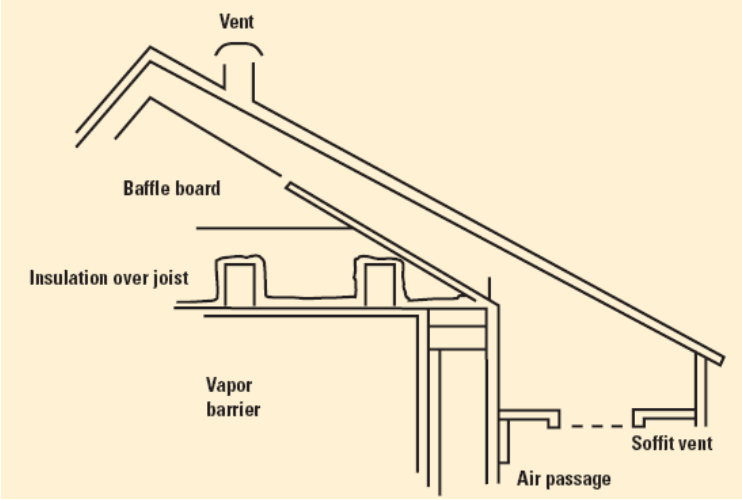
12. Keep kitchen and bathroom exhaust fan use to a minimum, as they may dump warm air into the attic.

13. Hire a contractor to tear off your gutter. A Paul Bunyan type wood axe or sledgehammer work very nicely. The ice damming will cease in a very short period of time. However, when the gutter falls to the ground, it may take some shingles along with it, and they will need to be replaced as soon as possible. Insurance may pay for new gutters as well as the fee you'll pay to have this done. Check www.Craigslist.com, as independent operators will spring up during storms.

Once warm weather returns, consider long term approaches to preventing further ice damming. You may not necessarily need to do all of these tips, but a few could certainly help.

14. Keep your gutters and downspouts clear. Gutters that are clogged with leaves and debris will fill up with ice more quickly than clean gutters.

15. Insulate, insulate, insulate. Insulation will keep heat in the house and out of the attic. When they were constructed, our homes had only about 3-4" of loose fill insulation blown into the attic. This has an insulation value of R-13, whereas R-30 or more is now standard in our region. You can install 8" *unfaced* insulation bats right on top of the loose fill. Note that as much as 10% of the energy loss in an attic is through the wood trusses. If you just lay the insulation between the trusses, the area covered by wood will not be insulated. So, if you do use roll insulation or bats, consider installing it perpendicular to the trusses.) It is critical that the attic insulation does not touch the underside of the roof, especially near the soffit. The insulation should be exposed to only air so that any heat conducted through the insulation will go into the air, not the roof. The warm air can then be sucked out of the attic before it warms the plywood roof sheathing. You can purchase plastic insulation chutes that are stapled to the underside of the roof sheathing - near the soffit area - to keep the insulation from touching the roof sheathing itself. Be sure to cover any heating ducts in the attic with insulation to slow down escaping heat. These insulation tips will keep your living area cooler during the summer, too.



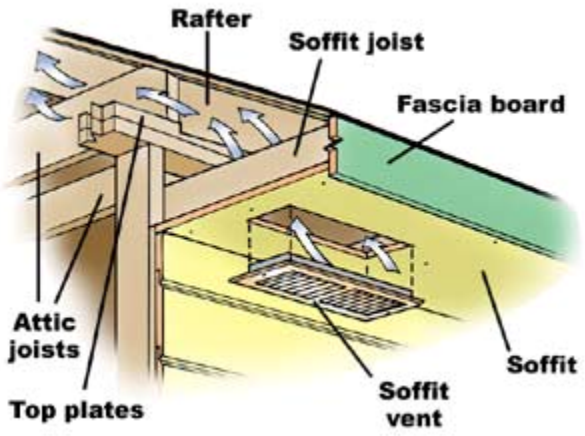
16. Plug air leakages in the attic floor using fiberglass insulation, Great Stuff, or caulk. This includes around wires, plumbing, ceiling light fixtures, chimneys, exhaust fans, pull down stairs, and whole house fans. The entry hatch to the attic, which can usually be found in an upstairs hallway, is just a piece of plywood. It is a huge source of heat loss. Cover the inside of the plywood hatch with 4-5" of rigid foam insulation. See also www.toolbase.org/Technology-Inventory/Interior-Partitions-Ceilings/attic-access-insulation

17. If you do experience ice damming, you might be tempted to think that the exterior wall insulation, through which the water seeped, has been damaged. That's what I thought after our late 1980's ice damming episode. However, in 2010 I remodeled the upstairs bathrooms, which were ground zero for our ice damming. When I removed the drywall and inspected the insulation, it was actually in good enough shape to be reused.

18. Ventilate, ventilate, ventilate. A cold attic is the best attic when it comes to ice damming, and a ridge and soffit vent circulation system is a must to keep the attic cool in both summer and winter. See http://en.wikipedia.org/wiki/Ridge_vent .

19. When our homes were constructed during 1975-81, the builder did not ventilate the soffits or install ridge vents (see images above and below). You can cut ventilation

holes under the soffits and cover them with louvered metal vents to keep animals out. While you're working on the soffits, stick your hand inside the opening and check for insulation that is touching the roof sheathing, and push any away from the sheathing. There should be no loose fill insulation in the soffit itself; only above the outside wall and living space. How much soffit vent area do you need? Take the square footage of the attic and divide it by 2. Say you have a 40'x25' attic, which is 1,000 square feet. Dividing 1,000 by 2 yields 500, which means you need 500 square inches of soffit ventilation space. If you have 20 two foot wide soffit spaces between the trusses on each side of the roof (40 total), you'll need 12.5 square inches of soffit ventilation area per vent (500/40). This equates to a square with 3½" sides. However, since the metal soffit vent cover's louvers reduce air flow somewhat, try for a 4" square (16 square inches). It should be obvious by now that just poking a 1" hole in the soffit with your electric drill isn't going to provide nearly enough ventilation.



20. Your roof should also have a ridge vent. The ridge vent/soffit combination is very effective at using natural convection to cool the attic during the hot summer months. A cooler attic during the summer translates to more comfortable rooms below. And, since summer heat is the enemy of any roof, a cooler roof will last considerably longer.

http://www.roofingcontractor.com/RC/2006/03/Files/Images/rc0306_prodfocus_img9_lg.jpg

21. This natural air circulation system doesn't work well when the ridge vent is covered with snow. However, most single detached houses have gable vents at each end of the attic which vent warm air. Make sure these vents are clear (not blocked by storage boxes, for example) so that plenty of air can circulate through the vent.

22. Your roof exhaust fan can supplement the ridge & soffit ventilation system. If you have a roof exhaust fan, consider having an electrician install a thermostat bypass switch. The electrician can rewire the fan so that you have a bypass switch in the room or hall below that will permit you to manually turn on the fan. But, if you do install such a switch, you must remember to turn the exhaust fan on when the first snowflakes begin to fall. (This is a really simple wiring job. Just connect the black and white wires of some 14/2 cable to each end of the fan's thermostat. The black and white wires at the other end of the cable connect to the terminals of a single pole light switch. When the switch is "on," the fan runs continuously. When "off," the thermostat controls the fan.)

23. Install heat tape at the edges of your roof and in

the gutter. This may be the only long term fix for roofs that are above cathedral (vaulted) ceilings. You plug the tape into an electrical outlet and it melts the snow on the bottom of the roof and in the gutter. See http://inspectapedia.com/interiors/De-Ice_Cables.htm Arguments against heat tape include: it could prematurely wear out the shingles; it could create a fire risk; they are expensive to install and use; if incorrectly installed, water could leak through the fasteners into the attic; and the ice dam could just move to above the electric cable.

24. You might consider an all-in-one gutter cover (to keep leaves out of the gutters) and heat tape (to melt the ice). See www.heatercap.com

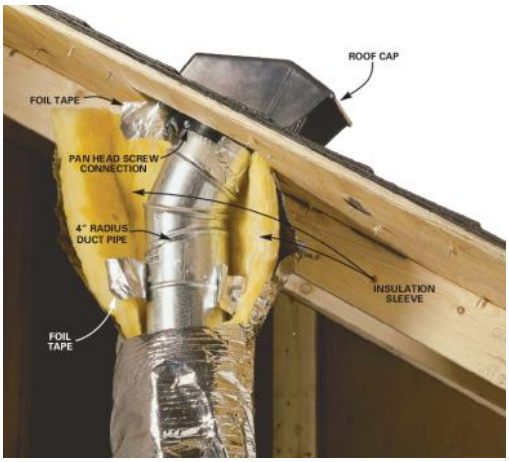
25. If your roof is getting worn, stained, or is more than 15 years old, consider a roof replacement that includes ridge vent (see image prior page) and water and ice shield (see image right. See http://minnesotaroofing.com/Roofing_shingles/Certainteed/Certainteed_Ice_and_water_shield.htm Water and ice shield is a rubber membrane that is installed over the plywood sheathing and under the shingles. It should extend at least 24" above the outside wall (add 24" to the distance between the gutters and the siding). It forms a seal around the roofing nails, which are a major source of water and ice leakage into the attic.

26. Consider replacing your gutters and downspouts with extra wide (6") ones. A bigger gutter means more room for ice to accumulate before it pushes into the attic. It won't stop ice damming, but it could buy you some time. Extra wide gutters are better able to handle summer downpours.

27. If you are having roof or gutter work done anyway, seal the crack between the top of the fascia board (the vertical board to which the gutters are attached) and the roof's plywood sheathing. This project can usually be done only if the roof shingles or gutters have been removed. A metal drip edge (see image right) is routinely installed by roofers at this spot to keep rainwater from seeping into the attic. However, the drip edge won't stop ice from pushing through the crack and into the soffit. Sealing that crack with Great Stuff or silicone caulk should help keep ice out of the attic.

28. Kitchen and bathroom exhaust fans should vent their warm moist air to the outside. Some lazy installers will just dump the air into the attic. Not only does this warm the roof which can contribute to ice damming, but it can lead to mold growth in the attic. Make sure your exhaust fans are properly vented. They can be vented through the roof with insulated "turtle vents." (see right image below). Note: rooftop vents may not work

well when covered with snow. Alternately, the fan may be vented through the soffit. (see left image below) If you choose soffit venting, make sure that 1) the soffit is vented with sufficient openings so that the warm moist air actually exits and doesn't bounce back into the attic, and 2) the duct is insulated.



29. I am unsure whether gutter helmets/covers, in general, help prevent ice damming or just make it worse. I do suspect, though, that gutter helmets could be damaged by ice that piles up in gutters. One could argue that ice damming may begin earlier on covered gutters because the ice will start building on top of the gutter cover, rather than first filling the gutter before it marches up the roof. I have had micromesh gutter covers for several years and am very pleased with them. See www.gutterglove.com After performing many of the fixes to my home described above, I have not experienced ice damming in over 20 years. And, the micromesh gutter cover which I installed just a few years ago did not lead to ice damming in 2010.

If you're the handy sort, you could do some of these fixes yourself. If you hire a contractor, you will want one who knows at least as much about ice damming as you learned from this article – an expert who knows enough to recommend which long term fixes are appropriate, be it a new roof, ridge or soffit venting, caulking, heat tape, more insulation, etc. While such a contractor could be a roofer, an insulation company, or a general contractor, what really matters is how much they know about this arcane subject, and whether they have the various resources to provide the services you need. It could be helpful to hire a structural engineer, architect, or building inspector to give you an unbiased opinion before you start work. Some contractors even have these kinds of professionals on their staff. As with all dealings with contractors, get referrals from neighbors and trusted friends and check reviews on the Internet. And, read http://members.cox.net/krandall/HF/Choosing a Contractor.htm available on the Hickory Farms web site.