

# Roof Winter Water Leakage & Ice Dam Problems

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## **Introduction**

This paper is an attempt to describe various roofing problems and repairs from water leakage into the interior of our town homes from the attic or ice dams on the roof.

The following is the paper that I wrote. This has been peer reviewed, by the Burnsville Building Inspectors Office, and it meets all the Burnsville building codes.

A little background here. This paper is based upon independent research that I have completed on my own, plus our insurance company, Midwest Family Mutual, hired an engineering firm, EFI Global, to determine the cause of extensive water damage to one of our townhouses. This Engineering Consultant's report was very detailed, contained valuable, use full information that addressed the root causes of the water leakage into this home. I have included this information into this paper.

Some of the typical roofing problems include ice dams, water stains on interior walls or ceilings and curled shingles.

A point to remember, if you have a water problem, a roofing contractor may not be the right person to fully rely on. They generally will want to replace the roof. If you do have a roofing problem, you will probably have the same problem during more than just the winter seasons. Someone who specializes in attic ventilation and insulation installation may be a better choice. It may be for your best interest that you contact both professionals before making this repair decision.

One can also hire a contractor who is an energy specialist or specializes in air sealing to do an in-home evaluation. A good specialist will use diagnostic equipment to evaluate the performance of your home, and generate a customized list of improvements.

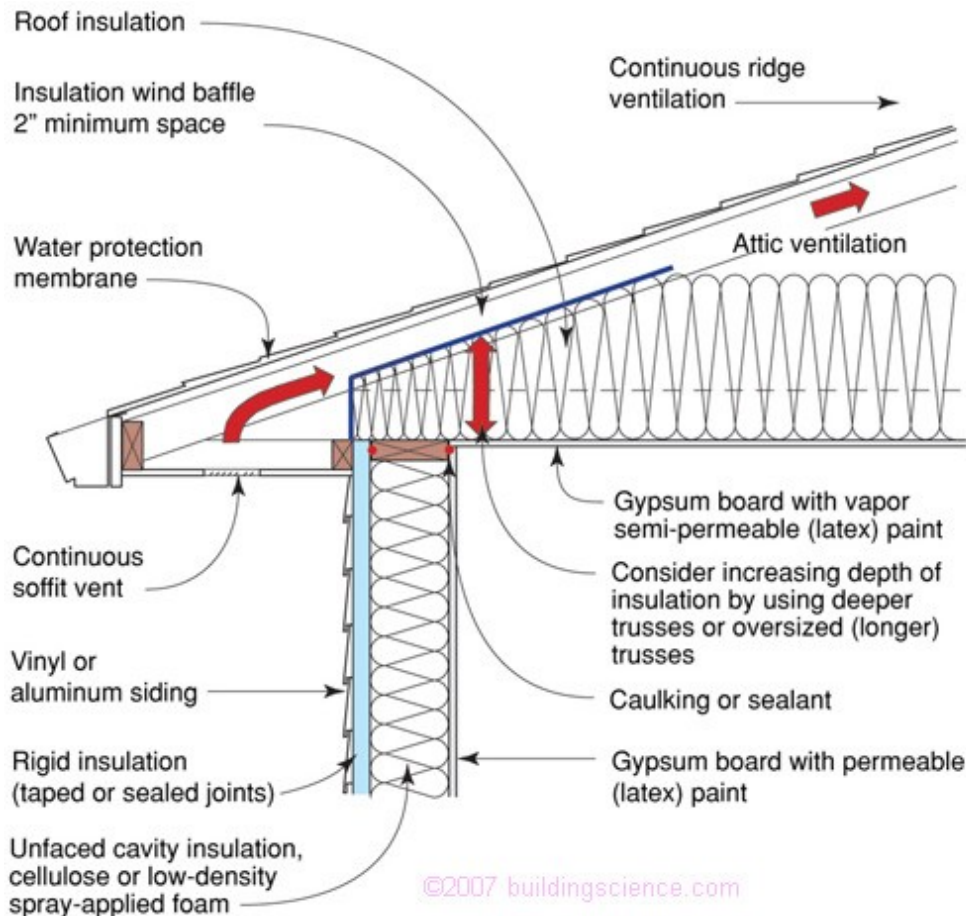
**Background** There are several factors needed for a sound functional roof.

**Under Shingle Water Membrane** According to the code the water membrane shall extend from over the metal or wood drip edge to a point not less than 24 inches measured horizontally inside the exterior wall line. Adding 5-6 feet here is a must with all of the problems from this past winter.

**Shingles** The exterior shingles must be flat, not curled, the correct weight, 25 pounds, and installed properly, to code with the proper under layment materials to the correct height from the lower roof edge going up the slope of the roof for 5 feet. The first row of shingles should extend beyond the fascia board by 1 inch; this prevents water draining off the roof, from running down on the fascia board.

**Ventilation** The roof must have adequate ventilation. This consists of vents under the eave on the lower part of the roof, and vents on the roof exterior towards the peak of the roof. The recommended vent area is 1 square foot of net free vent area (NFVA) per 150 feet of attic floor area. It is also recommended that the ratio of soffit intake to roof outlet should be at least 2:1.

**The below illustration is a cross section of a typical roof showing proper insulation and ventilation channels in the attic.**



**Insulation** The fundamental problem is that the attic space and roof get warm. The solution is to try to maintain a cold roof. Minnesota State code requires insulation that has an R-value of 49 or above for our climate. In addition, the ceiling must be airtight. Areas around the chimney, plumbing vents, wiring, or thin spots in the insulation are escape routes for warm air from living spaces into the attic.

**Heat Leaking Into The Attic** It is important that the attic temperature remains cold in the winter. Heat escaping from the living quarters of a home and into the attic warms the attic which causes the inside roof temperature to rise and cause the snow on the roof to melt, which is bad. Also warm air will hold more moisture than cool air, moisture in the insulation lowers the insulation's ability to insulate.

#### **Air Leakage Into An Attic Is A Potential Heat Sources That Must Be Removed**

**Recessed lighting** These fixtures are usually installed by drilling a hole in a ceiling and installing the fixture (a metal can) through the ceiling into the attic. The gap between the can and the ceiling must be sealed up and there must be insulation covering the top of the can that is in the attic, this prevents heat from the light bulb from entering the attic space.

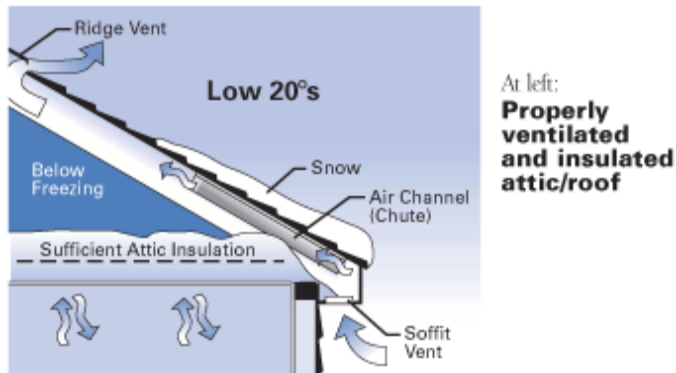
**Bathroom/Kitchen Exhaust Fans** The fan exhaust pipe must extend from the fan outlet through the attic continue through the roof or exterior wall to the outside of the dwelling. This exhaust pipe must also be insulated from the attic floor to the roof so heat from the interior of the living space does not warm the attic space, especially when the fan is operating. Exhaust fans must never vent into the attic space.

**Hot Water Heater and Furnace Exhaust Pipes** These pipes may be double layered (a pipe within a pipe) and carry very hot air when either the furnace or hot water heater are operating. Again make sure the pipe is sealed where it goes through the attic roof and the pipe is insulated from the attic floor to the roof.

**Clothes Dryer Ventilation** Most dryers are in the basement and are vented through the wall to the outside. If a dryer is on a living space floor, its ventilation must be the same as the hot water heater and furnace as explained above.

### Attic Air Chutes (Channels)

Below is a roof cross section showing the installation of an Air Channel in the attic. The channel is placed between each and every rafter in the attic's roof. The channels assure that there is proper air flow between the soffit vent and the attic space. Without this channel the ventilation may be pinched off by the insulation where the roof meets exterior wall.

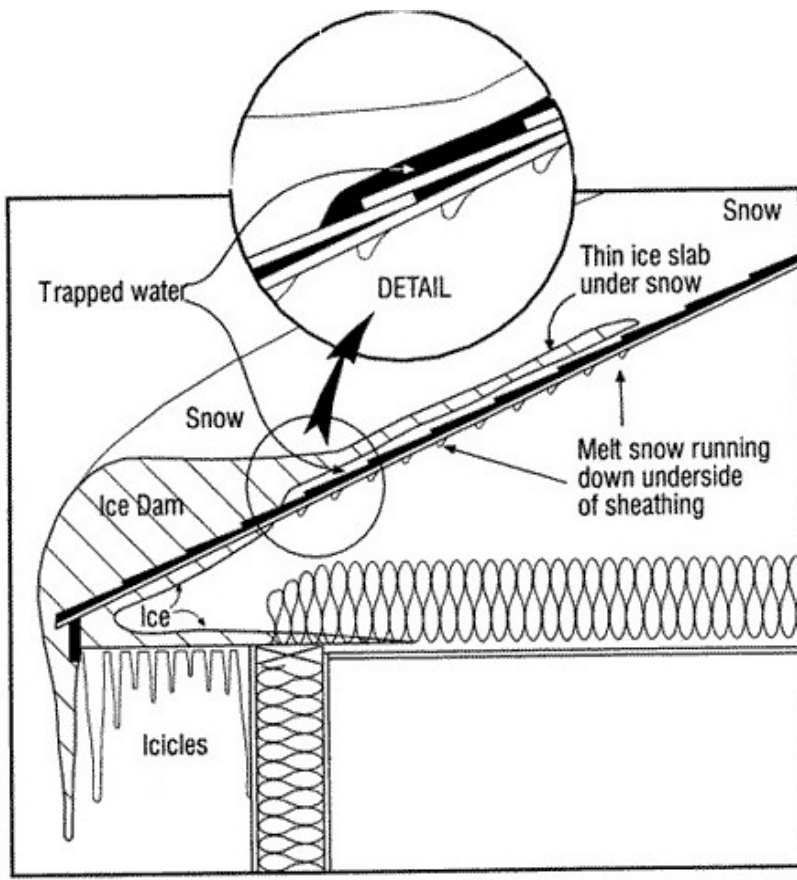


### Ice Damming

**The figure Below Illustrates a Roof Cross Section With an Ice Dam** Ice Dams are the large mass of ice that collects on the lower edge of the roof or in the gutters. As more melting snow (or rain) runs down the roof, it meets this mass of ice and backs up, sometimes under the shingles and into the attic or the house. Ice damming usually occurs with a significant depth of snow on the roof. If the attic temperature is above freezing it warms the roof sheathing which melts the snow lying on the shingles. This water runs down the roof until it meets the roof overhang, which is not warmed by the attic and will be at the temperature of the surrounding air. If the air and the overhang are below freezing the water will freeze on the roof surface and start the ice dam.

Properly ventilating and insulating the attic is usually the best way to minimize or prevent ice dams. If you have small louvered vents in the soffit you may want to replace them with larger vents, and during the winter season make sure they are cleaned out for maximum air intake and ventilation. If you need to remove an ice dam, it is best to have it steamed off. Do not use an axe or hammer to pound it off.

## Ice Dam Illustration



***WARNING! Performing ice dam removal is risking severe personal injury and damage to the roof if not done properly. Never walk on a snow covered roof and make sure if your using a ladder you follow the proper safety procedures. It is highly suggested that you contact a professional with the proper equipment and roofing experience to carry out this job.***