

Ice Dams

Ice dams are formed when a large mass of ice collect on the lower edge of the roof or in the gutters during cold-climate seasons. They can create giant icicles hanging from the eaves that are not only dangerous to people walking underneath, but are often a sign of serious problems with the roof and/or the attic.

Non-uniform roof temperatures lead to ice dams, which occur when temperatures drift between 10 and 30 °F (-12 and -1 °C). Ice dams usually form when the snow depth on the roof is significant. If the attic temperature is above freezing, air warms the roof sheathing from underneath, melting the snow on the shingles. This water runs down the roof until it meets a roof overhang. The overhang section is not warmed by the attic and will be at the outside (i.e., cold) air temperature (see Figure 1).

If the air and the overhang are below freezing, the water will freeze on the roof surface and start the ice dam. As more rain or melting snow runs down the roof, it meets the mass of the ice dam and backs up. The water will collect, flow under the shingles, and seep into the house, causing tea-colored stains on walls and ceilings and destroying gypsum boards, plaster and insulation.

In a well-designed and well-constructed home, the attic has its own dry and cool environment, quite separate from the living space. If the attic is not isolated from the rest of the house with proper air sealing (vapor retarder) and insulation, it can become warm and moist. Adding ventilation to an attic will help prevent ice dams from forming. A homeowner can also remove the snow from the roof to eliminate the source of melting water, but that can be both difficult and dangerous. The objective is to keep the attic cold in winter by having good attic ventilation (using continuous soffit and ridge vents) and upgrading attic insulation. Continuous ridge vents are far more effective than individual upper level vents (such as louvers or pot vents). Make sure that there is an open air path between the soffit and ridge vents (i.e., insulation baffles are open).

However, ventilation alone will not help in all cases due to the often neglected air-leakage issue. Therefore, in addition to adequate ventilation of the attic space, it is recommended to seal all penetrations between the attic and the living space, including recessed lighting fixtures, the attic hatch, baseboards, HVAC registers (i.e., air vents in the ceilings), electrical outlets and partition walls to avoid any air leakage from the living area into the attic. Other potential air leakage locations that need to be sealed include, but are not limited to, plumbing stacks and chimneys, attic mounted ductwork and attic knee-walls.

Several states in cold and very cold climate regions require using an ice dam membrane in new construction. Ice dam membranes are applied directly to the lower edge of the wood roof sheathing surface before the roofing material is installed. The membranes should also be installed at roof valley locations, places where the roof changes pitch and around all penetrations such as skylights, plumbing vents and other roof vents. These membranes contain rubberized asphalts and an inner sheet of polyethylene. Ice dam membranes work to seal around all nails that penetrate the membranes as the finish roof is installed. The water from an ice dam may still back up under the roofing materials, but it can't pass through the membrane and seep into the house.

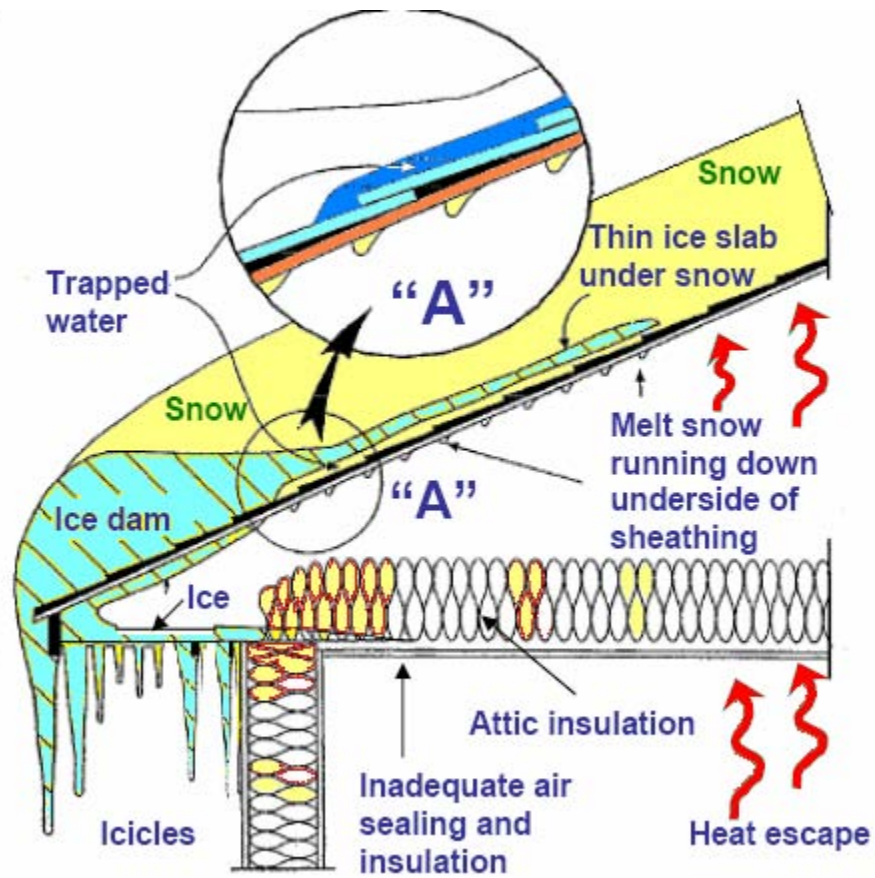


Figure 1.

Typical ice dam formation in the attic due to inadequate insulation, ventilation and excessive air-leakage