WAKELEE Associates, LLC
National Construction Consultants
General Contractors

WATTS # 13

Technical
Training
Series

Ice Dams – Causes and Prevention

Ice Dams are common occurrences in older homes in northern regions of the United States, but can happen anywhere a pitched asphalt shingle roof is subjected to freezing temperatures and precipitation. Ice dams develop when the temperature of the upper portion of a snow or ice covered roof rises *above* freezing, and the temperature of the down-slope portion of the roof remains *below* freezing. There are several reasons this temperature differential can occur, but the most common contributing factors are inadequate attic insulation, and poor air circulation.

Diagram #1 illustrates a roof susceptible to ice damming. The eaves and roof ridge are not vented, the insulation R-value[1] is less than required by modern building codes, and there is no self-sealing water barrier, commonly called rain and ice shield, under the shingles above the eave. The heat from the conditioned living spaces is drawn into the cooler attic through the thin insulation and any unsealed openings in the ceiling. When the air gets too warm inside, the roof surface temperature increases enough to start melting any frozen precipitation that has accumulated. Meanwhile, the ice and snow above the un-heated eave is frozen solid onto the cold roof surface. When the water reaches the ice below, it collects and is forced up the slope and under the asphalt shingles. Without an impermeable water barrier, the water seeps through the sheathing and into the eaves and attic. An initial indication of a problem could be icicles forming under the eave and behind the fascia boards. When enough water has backed-up, interior ceiling damage will result.

Diagram #2, in contrast, shows a roof constructed with the proper components to drastically reduce the likelihood of ice dams forming. The code compliant insulation allows substantially less ambient heat into the attic. Eave and ridge vents keep the attic close to the same temperature as outdoor air, which prevents melting of the accumulated frozen precipitation from below, as long as the outdoor temperature stays below freezing. The rain and ice shield is extended two feet above the conditioned space to block any water that may accumulate when outdoor temperatures rise above freezing. While it is still possible to have an ice dam and related water damage with a modern roof, conditions have to be much more severe before damage occurs.

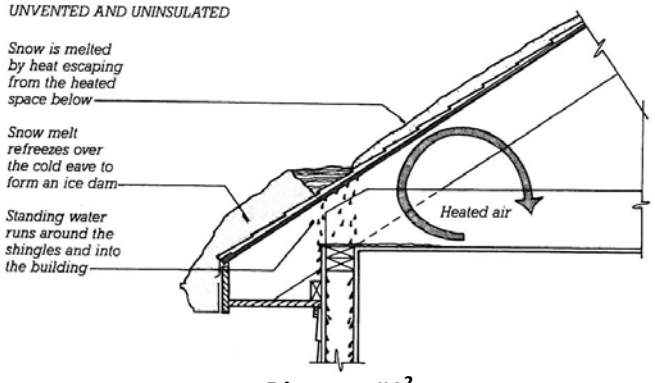

Diagram #1[2]

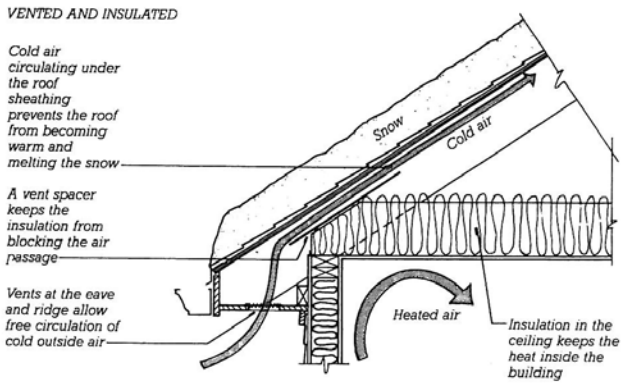

Diagram #2[2]

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November 15, 2010

[1]Resistance of a material to transfer heat -- Refer to WATTS #2 for explanation of R-value
[2]Source of diagrams: *Fundamentals of Building Construction,* Edward Allen , Copyright 1999 by John Wiley & Sons Inc.