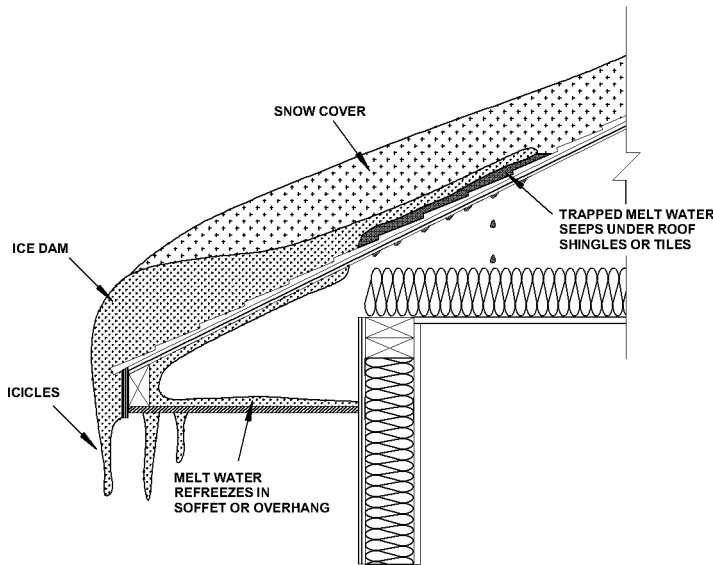


# Preventing Ice Dams and Associated Problems

Ice dams develop when “up roof” snow or ice melts and refreezes at the draining edge or in a roof valley. The effect of the ice accumulation in these “down roof” areas is to form a dam which backs up melt water. The accumulation of water in these areas can then pool and back up under the roof shingles or roof tiles and leak into the building. Ice damming can cause other problems as well: structural overloading, falling ice damage, gutter and scupper blockage.

roof will aggravate the situation by insulating the roof deck from colder outside temperatures and allowing the roof deck to become even warmer.

*Ice dams are a big problem in snow country.*  
 —Henrik Bull, Architect.\*



### Profile of Typical Ice Dam

Ice damming most commonly results from the combination of two conditions:

1. Warming of the underside of the roof deck, and
2. Eaves or overhangs that are below freezing.

Warming of the underside of the roof deck can occur when the insulation and the air barrier above the ceiling is inadequate or inefficient. Heat can leak up through the insulation layer because (1) the amount of insulation is inadequate or has been rendered inadequate due to environmental factors; (2) gaps in the insulation layer allow radiant heat transfer from the ceiling; and/or (3) gaps in the air barrier allow warm air leakage from the interior. Warming of the roof deck will melt the snow/ice on the top side of the roof. Snow cover on the

When melt water caused by the warm roof deck runs down the roof surface and contacts cold surfaces at the roof edge or at the roof overhang, the water will freeze and ice will accumulate. This accumulation will impede drainage causing the melt water to back up under the roofing shingles or tiles.

Melt water leaking into the vent space causes several problems:

1. Wetting the insulation will reduce the effective R-value of the insulation. This will further warm the vent space and roof deck and exacerbate the ice damming problem.
2. Dripping melt water will damage the building components and contents.
3. Melt water can run down the underside of the roof deck into cold areas at the overhang or soffit, freeze, and accumulate. This buildup of



Photo of Typical Ice Dam

\* “Designing Roofs for Snow Country,” *Fine Homebuilding* July 1999, p.99.

ice can cause icicles and structural damage.

NCFI closed-cell spray polyurethane foam can be utilized to insulate the underside of the roof deck to minimize the conditions under which ice dams form. Properly installed NCFI closed-cell spray polyurethane foam forms a complete air barrier. There are no seams or gaps to allow radiant heat loss or air leakage.

Some insulations will lose R-value due to environmental factors. In particular, high differences in the temperature profile across the insulation (high  $\Delta T$ ) can substantially reduce the effective R-value. Additionally, R-value will drop when moisture accumulates in insulations due to condensation or leakage. This R-value loss

will further aggravate the ice damming problem.

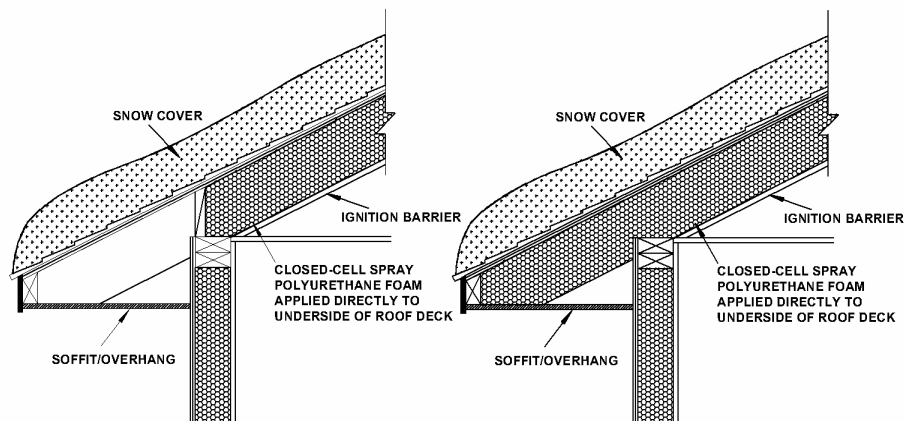
In contrast, NCFI spray polyurethane foam maintains its high R-value at extreme temperature differences ( $\Delta T$ ) and the closed-cell spray foam insulation is highly moisture resistant. (See Property Table below.)

With NCFI spray polyurethane foam, the roof surface stays cold, even under a snow cover, and melting is eliminated. With no melting, there is no melt water to back up under the shingles or tiles or to refreeze at the eave, soffit or overhang. Ice damming and its associated leakage and other problems are virtually eliminated.

Property	Test Method	Test Condition	Result*
R-Value	ASTM C 518	1 inch	7.0 °F·hr·ft <sup>2</sup> / Btu
Air Leakage	ASTM E 283	@ 1.57 psf	0.0 cfm/ft <sup>2</sup>
		@ 6.24 psf	0.0 cfm/ft <sup>2</sup>
Water Resistance	AATCC 127 Suter Hydrostatic Pressure Resistance Test	@ 184.9 + cm (Maximum hydrostatic pressure of testing equipment)	No failure

\*Based on NCFI Spray System 362

### Options for Installing NCFI Closed-Cell Spray Polyurethane Foam to Roof Decks



### Typical Attic and Cathedral Ceiling Installations

