



SWD Technical Memo

Ice Damming in Cold Climates (Zones 7 and 8)

This memo has been produced in response to questions regarding insulating roof/attics assemblies in climate zones 7 and 8 related to the formation of ice dams.

Scope:

This Bulletin will discuss the causes of Ice Damming and related insulation strategies using SWD Quik-Shield 106,112 and 112 XC Spray Foam Insulation. This Bulletin will cover the strategies for minimizing ice dams in un-vented, vented attic ceiling assemblies. The construction techniques and strategies are referenced in Section R806.4 of the International Residential Code concerning unvented attic assemblies.

Description:

Ice damming is found in cold climates where substantial snow fall remains on the roofs for long periods of time. (Typically in climate zones with more than 8600 heating degree days.) It is described as the consequence of melt water at the top of the roof running under the snow and re-freezing lower on the roof. This creates a ridge of ice, or dam, along the eaves which traps further melt water. The result can be significant leakage, roof damage, and danger of falling ice.

Ice dams are created when the upper part of a roof structure is significantly warmer than the lower part. A study of ice dams was conducted and it was observed that ice dams seldom occurred when the outdoor temperatures were above 22°F (-5.5°C). Since ice dams did not occur when the attic air temperature was below freezing, the researchers arrived at a “window” of temperature conditions that lead to ice dams. They concluded that chronic ice dams can be avoided by keeping the roof sheathing temperature below freezing when the outside temperature is below 22°F (-5.5°C)

The Causes of Ice Dams:

- **Air Leakage:** The warm air can leak through the insulation and reach the roof sheathing, melting the snow on top of the roof.
- **Insufficient Levels of insulation:** Mainly found with vented attics where excessive heat from the house will cause the temperature of roof deck to melt the snow
- **Snow Thickness Variation:** After period of high wind the roof can be partially exposed at the ridge line. The temperature of the exposed roof can allow the snow to melt and cause damming. This situation is not avoidable but may be mitigated by ensuring that a ice and water shield barrier when fitted is installed in a waterproof manner to form continuous seal are flashing areas and joints over the lower 8ft of the roof

Un-vented Attics

When applying SPF without an air gap there should be a considerable covering of foam to the underside of the rafters to prevent thermal shorts. The underside of the roof deck and rafters should be totally covered with foam with no voids or cracks that would allow heat to penetrate to the roof line. Quik-Shield 106 and 112 can both be used for this application. The building code defines the prescriptive R value which should be applied depending on the climate zone. Changes to this should be made in with regard to the experience of the contractor and the building inspector.

Vented Attics

International Residential Code Section R 806.1 and R 806.2 defines the minimum venting area relating to the floor area of the attic that should be adhered to unless local codes require different ventilation ratios.

Providing an airtight ceiling plane is very important. Therefore the design of recessed lighting, ducting runs through the ceiling and attic access hatch sealing must be considered. Any air leakage also carries moisture into the attic. Continuous soffit vents should be provided with a path throughout the attic to allow cross flow circulation and allow venting from the roof ridge. Both Quik-Shield 106 and 112 are suitable for this application.

Cathedral ceiling applications

Where recessed IC lights are installed the depth of rafter needs to be sufficient to allow the required depth of foam to be applied above the light fixture. Foam should not be sprayed to an insulated recessed can fixture.

Summary

By adhering to the recommendation in this bulletin problems with ice damming can be dramatically reduced.

- The thickness of the spray foam and other attic insulation should meet code requirements by either prescriptive or performance based criteria.
- The experience and recommendation of the foam applicator regarding the thicknesses of foam required to prevent ice dams should be weighed and considered heavily
- We do not recommend the use of hybrid systems for climate zones where ice dams are likely. The International Residential Code restricts the insulation types to Air Impermeable when tested to ASTM E 283.
- Vapor retarders should be applied in accordance with the national building codes and local code officials' instructions.