

# RETROFIT Improvements

Making Homes Safer & More Resilient in Disaster-Prone Areas

## Preventing Ice Dams



### SCOPE

This document provides homeowners with an overview of strategies to help prevent ice dams for existing homes with vented attics in cold climates.

### PURPOSE

To minimize the formation of ice dams on the roof and improve the durability of the roof coverings and avoid leakage of water that accumulates upslope of ice dams.

### BENEFITS

- Prevents water leakage and structural damage to roofs, walls, insulation and finishes
- Prevents damage to rain gutter due to excessive ice load
- Prevents expenses of removing ice dams or replacing damaged roof components
- Reduces energy bill and improves comfort

### RETROFIT OPPORTUNITIES

- Reroofing
- Attic weatherization
- HVAC upgrade where ducts are in the attic

### HAZARD AND RISK

Ice dams form at the roof eave as a result of the heat from the house escaping into the attic and melting the bottom layer of the snow piled up on the roof. The water then runs down the roof pitch until it reaches the point where it freezes forming an ice dam. Outdoor temperature cycles contribute to repetitive melting and freezing causing the ice dam to expand over the winter months.

Ice dams can damage roof shingles and lead to water leaking into the attic and into the house. Water-stained ceilings and walls, worn-out roof shingles, sagging gutters, icicles, peeling paint, and discolored roof sheathing are evidence of ice dam damage. Repeated water leaks can cause structural damage to roof sheathing and underlayment, thus reducing their wind resistance over time.

A combination of the following reasons contributes to ice dam formation:

- Attic ventilation is inadequate and air movement underneath the roof deck is insufficient
- The ceiling is not adequately insulated leading to indoor heat transfer to attic and roof deck
- The ceiling boundaries and penetrations (such as recessed lights and bath fans) are not adequately air sealed leading to indoor heat escaping into the attic
- Air ducts and other heat sources such as recessed lights in attics are not adequately sealed or insulated leading to warm air escaping into the attic

Ice dams are an issue in cold climates where there is a prolonged heating season and sustained snow coverage.

**FIGURE 1.**  
Example of an  
Ice Dam

Source:  
*Building Science  
Corporation*



### SOLUTION

Some degree of ice damming may occur on any roof just because of the daily temperature cycle and sun exposure. The goal is to minimize and contain ice formation to reduce the risk of water leakage and moisture related issues inside the home.

## TIPS

- When reroofing, it's always recommended to install an ice barrier membrane at the perimeter of the roof. This layer will provide added protection against water seepage into the roof deck.
- Baffles should be installed along the entire length of the eave. When adding insulation in the attic, install the baffles first and make sure that the ventilation channels remain clear.
- Attic ducts may already be insulated. Check the local code requirements for minimum duct insulation to decide if additional insulation is warranted. Where duct insulation is damaged or missing, those ducts can be replaced or insulated in place.
- Seal around recessed lights or other ceiling penetrations and provide additional insulation around heat sources such as recessed lights.

## COST

The cost of retrofitting the house to prevent ice dam formation varies depending on the existing conditions like insulation thickness, soffit vents and extent of air leakage to attic.

The most reliable method for preventing ice dams is to make sure that the temperature of the roof deck does not rise to the snow melting point and remains closer to the outdoor temperature. The following practices help achieve that goal:

1. Promote overall attic ventilation by providing adequate soffit and ridge ventilation openings.
2. Promote air flow at the eave between the roof deck and the attic insulation by installing baffles (i.e., vent channels or chutes) that allow attic insulation to be installed without blocking the air pathway.
3. Minimize air leakage from the house into the attic by sealing penetrations at the ceiling and at wall top plates where continuous drywall is interrupted with framing, ducts, lights, etc. Retrofit existing attic access hatch with rubber gasket or weather stripping and layers of rigid insulation.
4. Provide insulation at ceiling and any walls adjacent to the attic that meets the minimum code requirement for the climate zone. It's noted that at the roof eave, the space for insulation is limited and achieving the full insulative value is often not possible; therefore, the maximum amount of insulation that can fit underneath the ventilation baffles should be provided at this location. Where HVAC ducts are in the attic, minimize air leakage and heat transfer by air sealing and insulating ducts.

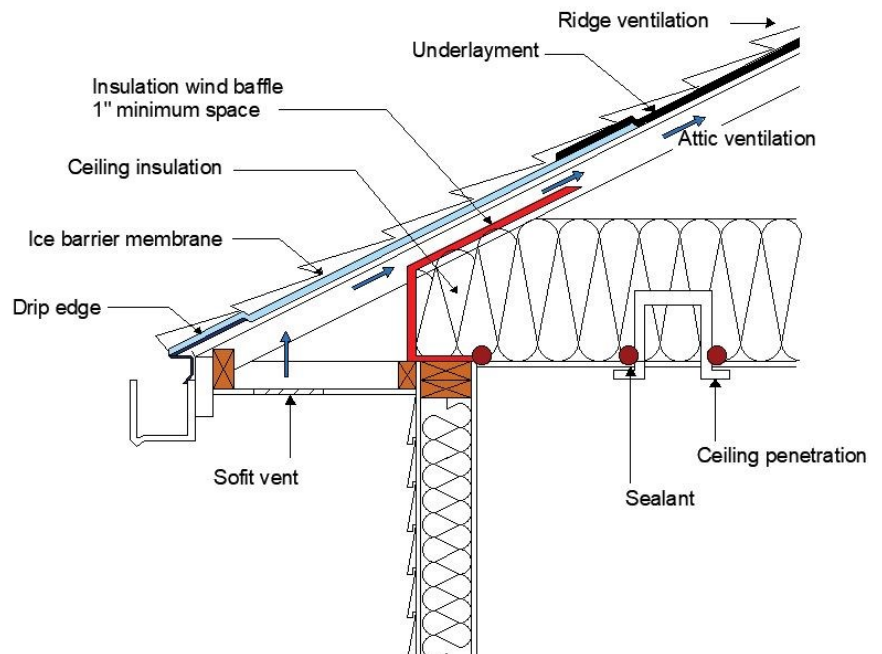


FIGURE 2. Solution for Vented Attics [1]

Source: Home Innovation Research Labs



## ADDITIONAL RESOURCES

1. Office of Policy Development and Research, Durability by Design - A Guide for Residential Builders and Designers:  
<https://www.huduser.gov/portal/sites/default/files/pdf/Guide-Durability-by-Design.pdf>
2. Building Science Insights, De-Icing Ice Dams  
<https://www.buildingscience.com/documents/building-science-insights/bsi-097-de-icing-ice-dams>