

## Improving Existing Homes: Preventing Ice Dams

**BUILDING AMERICA  
ENERGY PERFORMANCE BRIEF**



Icicles indicate ice dams are forming  
(Photo Source: PNNL).

### When to Do This

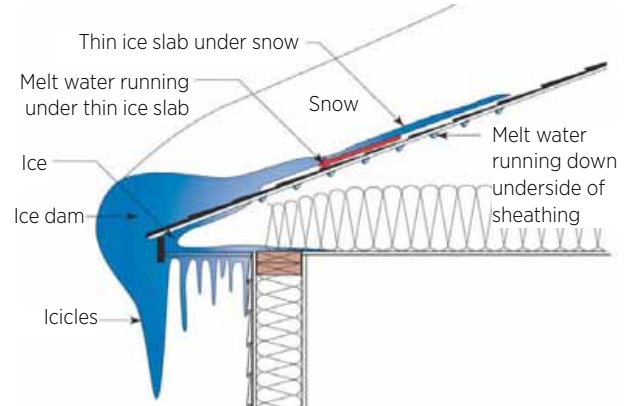
Whenever ice dams are occurring.

### Durability & Health

Icicles can fall on people causing injuries. Ice dams can allow water to back up and enter the attic under roof shingles, causing structural damage and mold. Excessive water and ice accumulation can cause roofs to collapse.

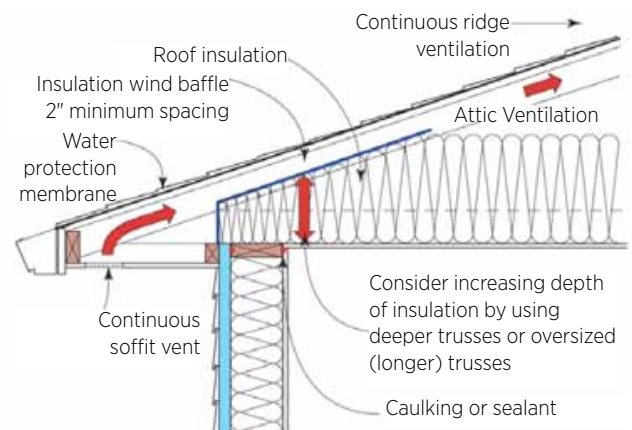


Ice dams can form when the roof deck temperature is above freezing and the air is below freezing. Melted snow eventually reaches the colder edge of the roof where it refreezes, creating an ice dam that collects more water and ice. The ice dam is often not visible under the snow except for the telltale icicles, which indicate melting is occurring somewhere on the roof (Source: Lstiburek 2011).



### How to Prevent Ice Dams in Vented Attics

- 1 Construct an airtight ceiling plane. Limit the number of holes through the ceiling and air seal every one.
- 2 Insulate well, especially over the top plates, use raised heel trusses or spray foam from under baffle to ceiling deck to get full insulation coverage.



- 3 Vent the underside of the roof deck, with vent screens at every rafter bay and a 2-inch airspace under the sheathing where ground snow loads are greater than 30 lb/ft<sup>2</sup> (Source: Lstiburek 2011).

## 2009 and 2012 IRC R905.2.7.1

### Code Requirement for New Construction and Additions

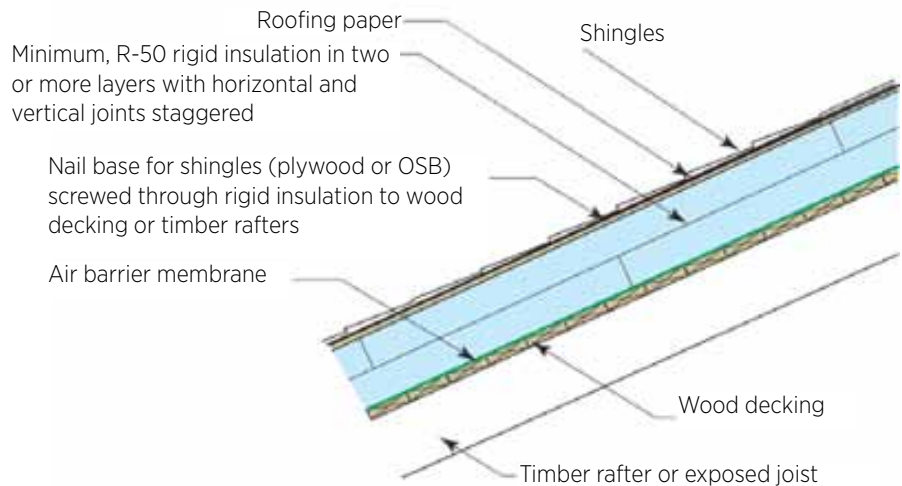
**Ice Barrier** – In areas where there has been a history of ice forming along the eaves causing a backup of water ... an ice barrier that consists of at least two layers of underlayment cemented together or a self-adhering polymer modified bitumen sheet shall be used in place of normal underlayment and extend from the lowest edges of all roof surfaces to a point at least 24 inches inside the exterior wall line of the building.

## References

DOE. 2010. *Building America Best Practices Series, Volume 12. 40% Whole-House Energy Savings in the Cold and Very Cold Climates*, PNNL-20139, U.S. Department of Energy. [www1.eere.energy.gov/buildings/building\\_america/publications.htm](http://www1.eere.energy.gov/buildings/building_america/publications.htm).

Lstiburek, Joseph. 2011. *Dam Ice Dam*, Insight 046, Feb. 2011, Building Science Corporation, [www.buildingscience.com/documents/insights/bsi-046-dam-ice-dam/](http://www.buildingscience.com/documents/insights/bsi-046-dam-ice-dam/)

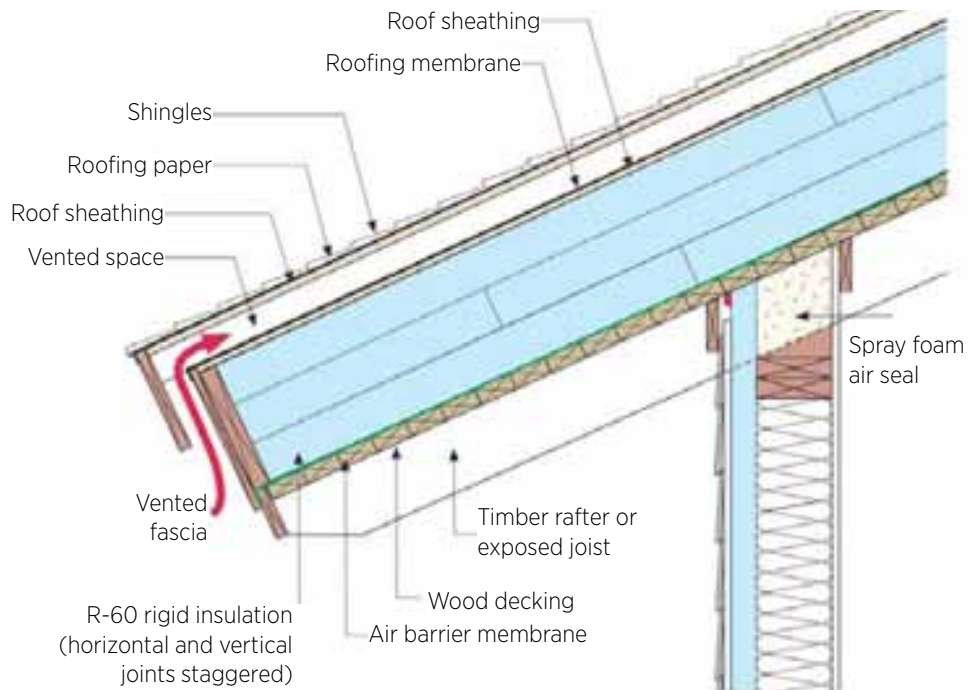
## How to Prevent Ice Dams in Unvented Attics



- 1 Cover roof sheathing with a fully adhered air barrier membrane.
- 2 Install two layers (to R-50 or greater) of rigid insulation over air barrier; stagger the seams.

Note, there is no vented space under the roof cladding to compensate for the insulation value of the snow layer. This roof should be used where the ground snow load is less than 50 lb/ft<sup>2</sup>. With ground snow loads greater than 50 lb/ft<sup>2</sup>, provide a ventilation space under the roof cladding as shown below (Source: Lstiburek 2011).

## How to Prevent Ice Dams in Unvented Attics in High-Snow-Load Areas



In regions with snow loads greater than 50 lb/ft<sup>2</sup>, the snow can provide enough thermal resistance to allow the roof cladding to be above freezing even when the air temperature is below freezing (one foot of snow = R-10 to R-15). To prevent ice damming with an unvented attic in these conditions, construct a “vented over-roof” over the top of the “unvented compact roof” (Source: Lstiburek 2011).

## For More Information

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