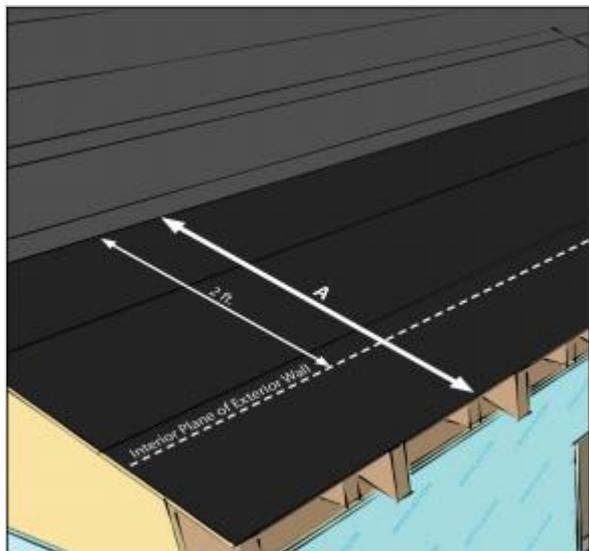


Roof Eaves Sealed with Self-Adhering Membrane in Cold Climates

Last Updated: 06/08/2016

Scope



In 2009 IECC CZ 5 and higher, install self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall.

In cold climates (IECC 2009 IECC [Climate Zones 5 and higher](#)), install a protective membrane along the roof eaves to help protect the edge of the roof from ice dam formation.

- Use a self-sealing bituminous membrane with a peel-and-stick adhesive backing or a similar product.
- Install the membrane from the eaves to at least two feet in from the plane of the wall.
- The lower edge of the membrane should cover the top edge of the metal drip edge.
- On roofs with a slope that is equal to or greater than 8 units vertical in 12 units horizontal, install 3 or more feet of ice and water shield from the eave edge up along the slope edge ([IRC 2015](#)).

This membrane is not required by ENERGY STAR in cold-dry climates or in warm climates (IECC 1-4).

See the [Compliance Tab](#) for related codes and standards requirements, and criteria to meet national programs such as DOE's Zero Energy Ready Home program, ENERGY STAR Certified Homes, and Indoor airPLUS.

Description

Cold climates present a special challenge to a home's roof. During the cold months when snow and freezing rain fall, a thawing-freezing process can occur that could lead to the formation of ice dams. Ice dams can occur during certain conditions, such as when snow accumulates on the roof, then melts although the air temperature is at or below freezing. This melting can occur because the sun warms the surface of a dark roof or because of air leaks in the ceiling which allow heated air from the home to escape into the attic and warm the underside of the roof. The melted snow flows down to the roof eaves and refreezes in the cold air. Some of this water will drip off the edge and freeze in the form of icicles, but water can also freeze above the edge of the roof and form ledges or dams that continually build up and begin to block the liquid water flowing down from above. Once the process starts, ice can rapidly dam up to the point where several gallons of water are being held back. In severe cases, ice dams have caused roof collapses. In less severe cases but sometimes just as damaging, the accumulating water can back up between the shingles then saturate and penetrate the roof underlayment and begin leaking into the attic. (See the Training tab for a video about ice dam formation.)

To protect the roof from ice dam damage, install a self-adhered, self-sealing bituminous membrane over the roof deck along the eaves (see Figure 1). The membrane should extend up from the eaves to two feet above the inside edge of the exterior wall plane. Bituminous membrane is a heavy, flexible material that has been impregnated with a petroleum-based solution like tar to make it waterproof. Most products are sold in long rolls; many come with a "peel-and-stick" adhesive backing. Bituminous membrane is self-sealing in the sense that it will remain somewhat soft and will seal around nails driven through it, for example to hold shingles.

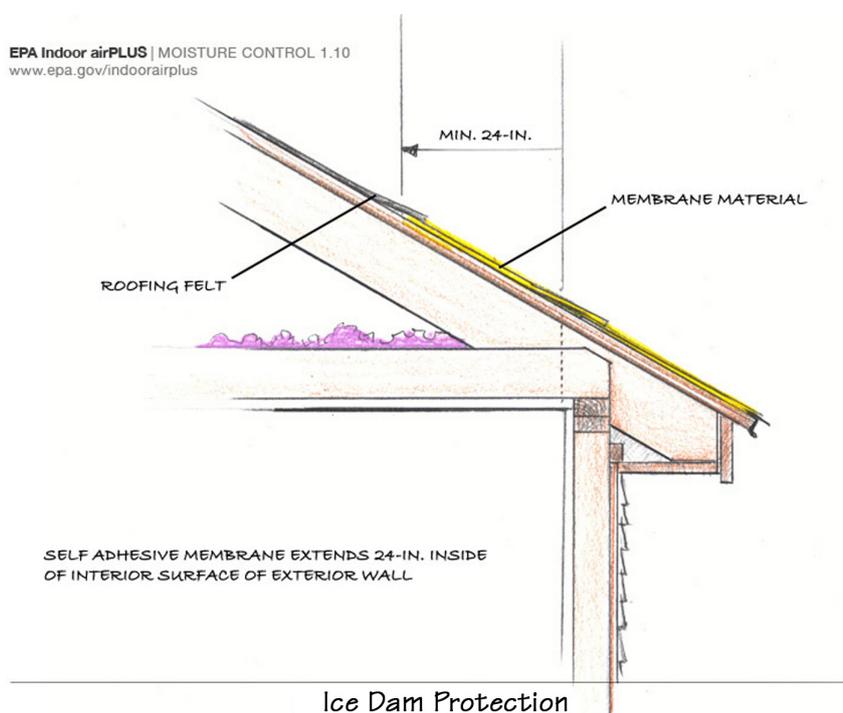


Figure 1 - To protect roofs from ice dam damage, install self-sealing bituminous membrane along the roof eaves and extending up the roof deck at least 2 feet beyond the interior plane of the exterior wall. ⓘ

Although most ice dams are likely to occur within 2 feet up the roofing deck from the interior plane of the exterior wall, some builders will choose to cover the entire roof deck with self-adhering self-sealing membrane especially in high-wind areas. Builders in warm-climate hurricane-prone areas may also choose to cover their roofs with self-adhering membrane for storm protection.

How to Install Self-Sealing Bituminous Membranes along Eaves

1. Clean the roof deck (typically plywood) from the edge of the eaves to at least two feet up the roofing deck from the interior plane of the exterior wall where the material will be applied. Make sure the area is free of loose nails and wires, debris, dust, oil, or water to ensure the membrane will adhere properly.
2. Install eave drip edge.
3. Measure the length of the eave to be covered.
- 4.

Cut the self-sealing bituminous membrane to length. For extremely long eaves, cut the material in shorter, more manageable lengths and apply, starting at the lower point and working up, overlapping the membrane sections by 6 inches in shingle-like fashion. Some peel-and-stick membranes come with a split backing above the adhesive, allowing you to peel and fasten first one half than the other. If using this type of product, align and adhere the lower half first.

5. Secure the material in place with a heavy roller. The material must lay flat with no gaps, creases, or folds.
6. Install the underlayment directly over the membrane. Install rake drip edge (See Figure 2). Continue with roof construction.

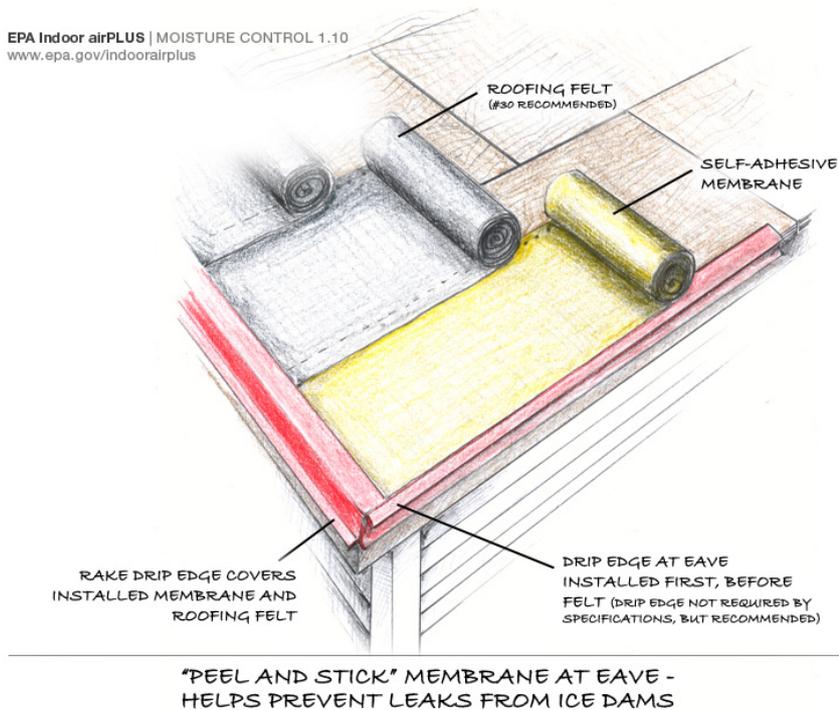


Figure 2 - Install the self-sealing bituminous membrane over the eave drip edge, then install roofing underlayment, then rake edge. 

How to Install Self-Sealing Bituminous Membranes along Eaves for Ice Dam Protection

In cold climates ([IECC climate zones 5 and higher](#)), the self-sealing bituminous membrane must be installed at least 2 feet beyond the interior plane of the exterior wall. In simple terms, this means that the membrane must be installed all the way from the edge of the roof deck over the eave and up the roof over the attic space at least 2 feet. To successfully do this, use the following overall installation guidance:

1. Determine how far up the roof deck from the eave edge the self-sealing bituminous membrane should be installed. To do this, measure from the exterior wall inward 2 feet and add the estimated wall depth including interior and exterior sheathing, framing, drywall, and siding. Next simply mark the roof deck directly above your measurement and ensure the membrane is installed to at least that point on the roof deck.
2. Calculate, based on membrane roll width, how many courses of membrane need to be installed.
3. Install the membrane starting at the eave edge and working up the roof deck. Courses should overlap per manufacturer's recommendation.

Installation note: Make sure the self-sealing bituminous membrane extends over the metal drip edge. This will ensure that water will not find access at the very edge of the eave.

Exception: Self-adhesive bituminous membranes do not need to be applied in dry climates as defined in IECC Figure 301.1. Refer to the [Map of Climate Zones](#) to determine "Dry Climates," and consult code officials when local climate conditions might dictate the need for protection from ice dams.

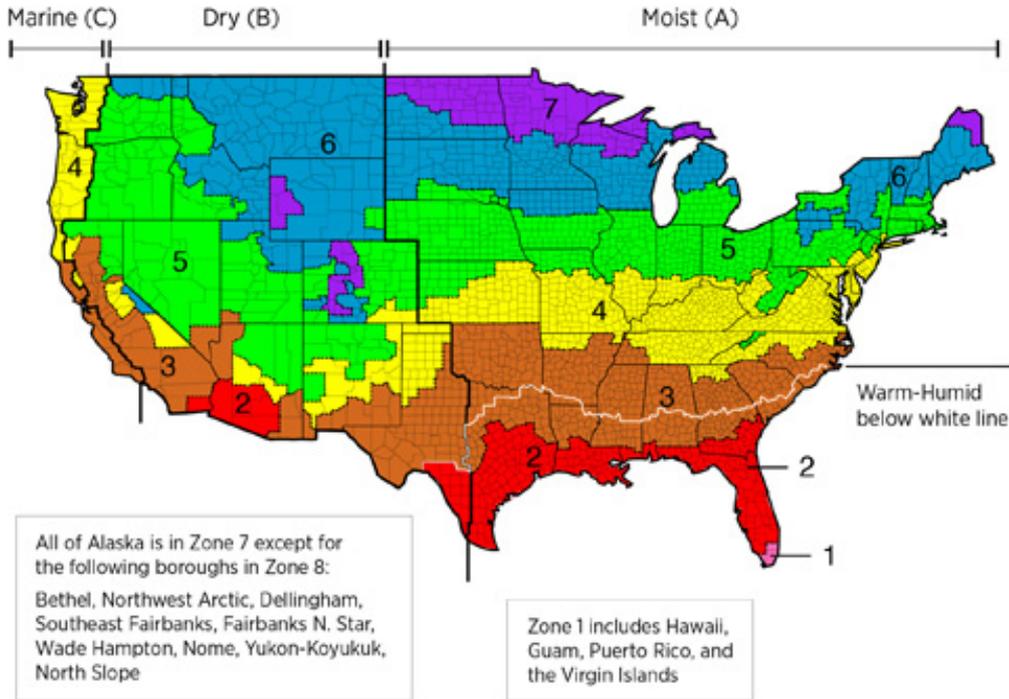
Ensuring Success

To ensure that the area above the eave is well sealed, the area must be cleaned prior to installation of the self-adhering bituminous membrane. Once applied, the membrane must be rolled flat so that no folds or creases are present.

Climate

ENERGY STAR Version 3/3.1 (Rev. 08)

Water Management System Builder Requirements, Water-Managed Roof Assembly. In 2009 IECC Climate Zones 5 and higher, self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall. Not required in dry (B) climates as shown in 2009 IECC Figure 301.1 and Table 301.1. See the Compliance tab for alternatives.



International Energy Conservation Code (IECC) Climate Regions

Training

Right and Wrong Images

None Available

CAD

None Available

Compliance

The Compliance tab contains both program and code information. Exact code language is copyrighted and may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

[ENERGY STAR Certified Homes](#)

ENERGY STAR Certified Homes (Version 3/3.1, Revision 08), Water Management System Builder Requirements

3. Water-Managed Building Materials:

3.4 In 2009 IECC Climate Zones 5 & higher, self-adhering polymer-modified bituminous membrane over sheathing at eaves from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall.^{3, 15}

Footnotes:

(3) Not required in Dry (B) climates as shown in 2009 IECC Figure 301.1 and Table 301.1.

(15) As an alternative, any applicable option in 2009 IRC Section R905.2.8.2 is permitted to be used to meet Item 3.3 and any option in 2009 IRC Section R905.2.7.1 is permitted to be used to meet Item 3.4. EPA recommends, but does not require, that products meet ASTM D1970.

Builders Responsibilities: It is the exclusive responsibility of builders to ensure that each certified home is constructed to meet these requirements. While builders are not required to maintain documentation demonstrating compliance for each individual certified home, builders are required to develop a process to ensure compliance for each certified home (e.g., incorporate these requirements into the Scope of Work for relevant sub-contractors, require the site supervisor to inspect each home for these requirements, and / or sub-contract the verification of these requirements to a Rater). In the event that the EPA determines that a certified home was constructed without meeting these requirements, the home may be decertified.

ENERGY STAR Revision 08 requirements are required for homes permitted starting 07/01/2016.

[DOE Zero Energy Ready Home](#)

Exhibit 1: Mandatory Requirements. Certified under ENERGY STAR Qualified Homes Version 3.

[2009](#), [2012](#), and [2015 IRC](#)

2009 and 2012 IRC Section R905.2.7.1, 2015 IRC Section R905.1.2 Ice Barriers. In locations with a history of ice formation along the eaves that can cause a backup of water as described in Table R301.2(1) install an ice barrier consisting of self-adhering polymer-modified bitumen sheet or two layers of underlayment cemented together. The barrier should extend from the lowest edge of the roof to at least 24 inches above the inside surface of the plane of the exterior wall. (IRC 2015 adds: If the roof slope is $\geq 8/12$ the barrier should extend up at least 36 inches from the eave edge of the roof.)

More Info.

Access to some references may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

Case Studies

None Available

References and Resources*

1. [Airtightness Results of Roof-Only Air Sealing Strategies on 1 1/2-Story Homes in Cold Climates](#)
Author(s): Ojczyk, Murry, and Mosiman
Organization(s): NorthernSTAR
Publication Date: July, 2014
Research report describing study of interior and exterior air sealing techniques to stop ice dams in five 1.5-story retrofit homes conducted by the NorthernSTAR Building America Partnership team run by University of Minnesota.
2. [DOE Zero Energy Ready Home National Program Requirements](#)
Author(s): DOE
Organization(s): DOE
Publication Date: August, 2015
Standard requirements for DOE's Zero Energy Ready Home national program certification.
3. [ENERGY STAR Certified Homes, Version 3 \(Rev. 08\) National Program Requirements](#)
Author(s): EPA
Organization(s): EPA
Publication Date: September, 2015
Document outlining the program requirements for ENERGY STAR Certified Homes, Version 3 (Rev. 08).
4. [Project Overcoat - An Exploration of Exterior Insulation Strategies for 1-1/2 Story Roof Applications in Cold Climates](#)
Author(s): Ojczyk, Mosiman, Huelman, Schirber, Yost, and Murry
Organization(s): NorthernSTAR
Publication Date: April, 2013
Research report describing study of exterior retrofit approach for air sealing, insulating, and water management conducted by the NorthernSTAR Building America Partnership team run by University of Minnesota.
5. [Technical Guidance to the Indoor airPLUS Specifications](#)
Author(s): EPA
Organization(s): EPA
Publication Date: October, 2015
Website providing technical guidance to help home builders and their subcontractors, architects, and other housing professionals understand the intent and implementation of the specification requirements of the IAQ labeling program.
6. [Technology Solutions Case Study: Cost Analysis of Roof-Only Air Sealing and Insulation Strategies on 1-1/2 Story Homes in Cold Climates, Minneapolis, MN](#)
Author(s): NorthernSTAR
Organization(s): University of Minnesota
Publication Date: December, 2014
This case study describes costs associated with the External Thermal and Moisture Management System developed by the NorthernSTAR Building America Partnership for retrofitting roofs with rigid foam over the roof deck, especially on one and a half-story homes.
7. [Technology Solutions Case Study: Project Overcoat: Airtightness Strategies and Impacts for 1 1/2-Story Homes, Minneapolis, Minnesota](#)
Author(s): NorthernSTAR
Organization(s): University of Minnesota
Publication Date: November, 2014
This case study describes the External Thermal and Moisture Management System developed by the NorthernSTAR Building America Partnership for retrofitting roofs with rigid foam over the roof deck, especially on one and a half-story homes.
- 8.

Water Management System Builder Checklist Guide

Author(s): EPA

Organization(s): EPA

Publication Date: February, 2011

Guide describing details that serve as a visual reference for each of the line items in the Water Management System Builder Checklist.

*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.

Contributors to this Guide

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