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Building Unvented Attic Assemblies Using Fiberglass and Mineral Wool

New Version of IRC Opens Path for Fiberglass and Mineral Wool

The 2018 International Residential Code (IRC) adds a new option for the use of fiberglass and mineral wool insulation in unvented roof assemblies in Climate Zones 1, 2, and 3 following basic requirements outlined in the code. This option gives builders an alternative to using spray foam insulation while providing the ability to use cost-effective, easy-to-install, air-permeable insulation systems.

Manufacturers offer different systems, such as fiberglass loose fill insulation blown behind netting, fiberglass loose fill insulation adhered to the underside of the roof deck, and batts attached to the underside of the roof sheathing with different mechanical systems such as staples, wires, and bands. These systems offer high levels of thermal performance, from R-19 to as high as R-49.

The 2018 version of the IRC allows this practice in Climate Zones 1,2, and 3. The North American Insulation Manufacturers Association is sponsoring research with the Department of Energy to verify that the practice can be expanded into additional climate zones.

5 Basic Requirements

To use fiberglass and mineral wool in unvented attics, the IRC has 5 basic requirements. The system must:

01. Be built in Climate Zone 1, 2 or 3

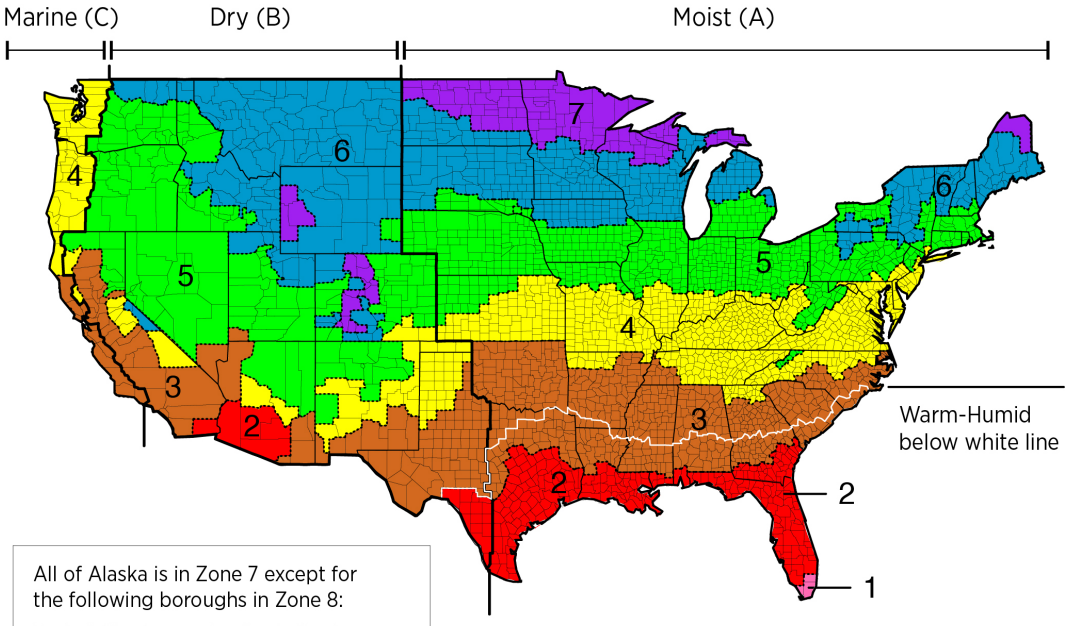
02. Have a vapor diffusion port

03. Have a moderate to steep slope – greater than or equal to 3:12

04. Not have items that prevent the flow of moisture to the port, such as blocking

05. Have conditioned air supplied to the attic space

DOE Climate Zone Map



All of Alaska is in Zone 7 except for the following boroughs in Zone 8:

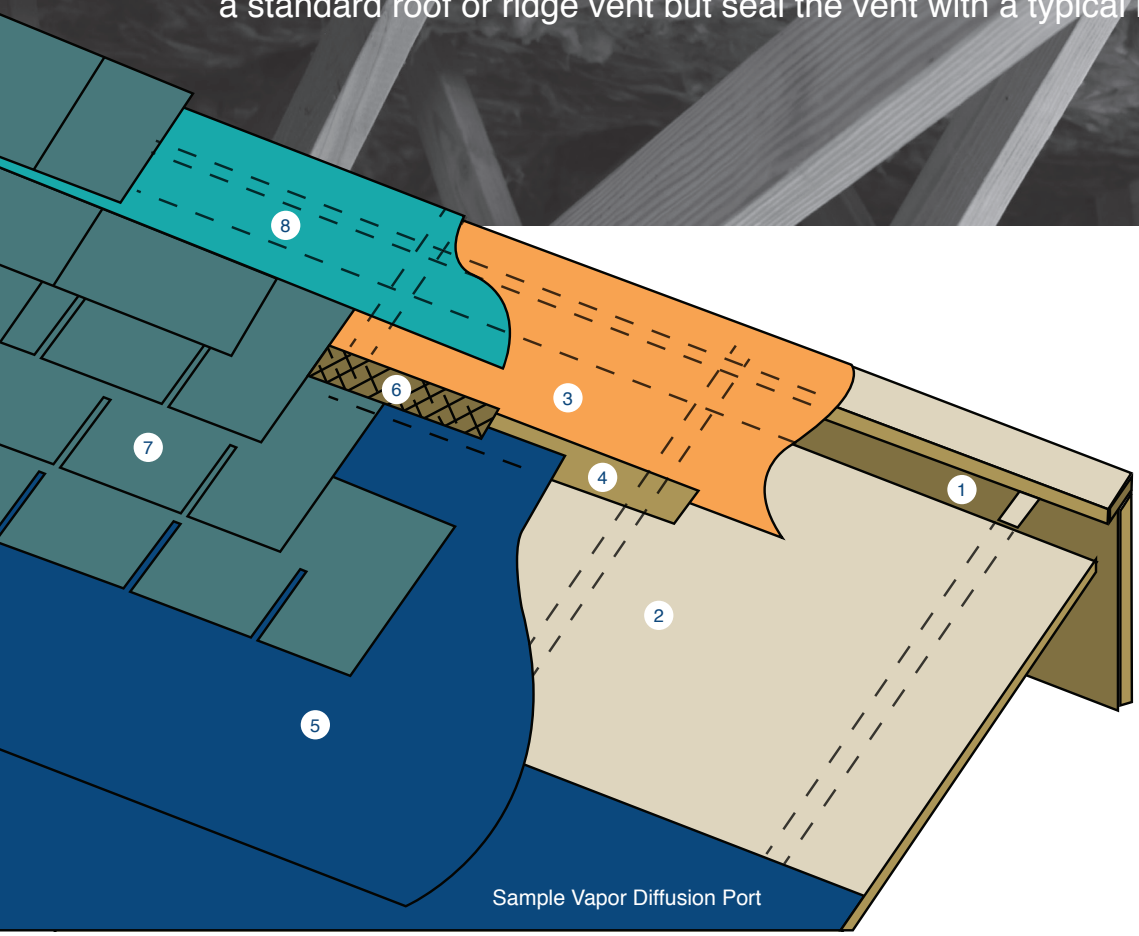
Bethel, Northwest Arctic, Dellingham, Southeast Fairbanks, Fairbanks N. Star, Wade Hampton, Nome, Yukon-Koyukuk, North Slope

Zone 1 includes Hawaii, Guam, Puerto Rico, and the Virgin Islands

Source: https://basc.pnnl.gov/images/iecc-climate-zone-map

Getting Vapor Diffusion Ports Right

A vapor diffusion port prevents air from moving into or out of the attic – but it does allow water vapor to leave the space. One way of building the port is to construct a standard roof or ridge vent but seal the vent with a typical house wrap.



Sample Vapor Diffusion Port

01. Vent holes or strip cut in roof sheathing sized per the IRC code requirement or 1/600th of the ceiling area.

02. Roof sheathing.

03. Membrane that is vapor permeable but prevents air from entering—housewrap is typically used in this application.

04. Durable adhesive tape (compatible with both surfaces) holds the vapor permeable membrane (3) in place and air seals between the roof sheathing (2) and the membrane (3).

05. Roofing underlayment—typically 15 or 30 pound asphalt felt.

06. Durable adhesive tape that is compatible with both surfaces to hold the roofing underlayment in place.

07. Asphalt roofing shingles - or other low perm material in contact with the roof.

08. Typical roof ridge vent to protect the membrane (3) and prevent rain, snow, and debris from entering.

Here are some important features of unvented attic assemblies:

01. **Port Area:**
The area of the port must be at least 1/600th of the ceiling area (Note: sample calculation #1, below), and the lowest part of the port must be within 12 inches of the peak of the roof.

02. **Location:**
Although not required by the code, the vapor diffusion port(s) should be evenly distributed over the highest points of the roof. (Note: The code requires "An approved vapor diffusion port be installed not more than 12" from the highest point of the roof, measured vertically from the highest point of the roof to the lower edge of the port.")

03. **Roof Slope:**
The roof slope must be at least 3:12 because flat and low-slope roofs don't readily vent moisture.

04. **Obstructions:**
There cannot be obstructions within the insulation (such as blocking between roof trusses) closer than 2 inches to the roof sheathing because this can obstruct water vapor movement within the insulation from easily moving to the vapor diffusion port.

05. **Conditioned Space:**
The IRC requires at least 50 cubic feet per minute of conditioned air be supplied to the unvented attic space for every 1,000 square feet of ceiling area (Note: sample calculation #2, below). This helps makes sure humid air that may be in the attic is diluted and lessens the chance of any condensation issues.

A home with 2700 square feet of ceiling area requires a vapor diffusion port with a minimum area of 4.5 ft^2 or 648 in^2. A typical ridge vent is 1½ inches wide which requires 3/4 inch of the roof sheathing to be cut from each side of the ridge. If there is a ridge board, the width may need to be wider to assure there is 1½ inches of clear vent area. In order to meet the minimum 4.5 ft^2 vent area, the vent would need to be a minimum of 1½ inches wide and 36 feet long. When building a vapor diffusion port using a manufactured ridge vent—install the ridge vent in accordance with the manufacturer's instructions.

(SAMPLE CALCULATION #1—2700 ft^2/600 = 4.5 ft^2 or 4.5 ft^2 x 144 = 648 in^2 and 648 in^2/1.5 in = 432 in or 36 ft)

A home with 2700 square feet of ceiling area requires 135 CFM of conditioned air.

(SAMPLE CALCULATION #2—2700/1000 x 50 = 135 CFM)

NOTE: This is a summary of the International Residential Code requirements when using air-permeable insulation (fiberglass and mineral wool) in unvented attic applications. You should not rely upon this summary to determine compliance with the code requirements. For the detailed code requirements refer to section "R806.5 Unvented attic assemblies and unvented enclosed rafter assemblies" in the 2018 International Residential Code.

Learn more at InsulationInstitute.org

NAIMA (North American Insulation Manufacturers Association) is the recognized voice of the insulation industry, bringing together North American manufacturers of fiberglass and mineral wool insulation products. Through the Insulation Institute™, we leverage the collective insulation expertise of our organization and our members to empower homeowners and professionals to make informed insulation choices. Our mission is to enable a more comfortable, energy efficient and sustainable future through insulation—and we are constantly working with building professionals, homeowners, government agencies, and public interest, energy, and environmental groups to realize that vision.

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