

***What are the differences between open cell and closed cell foam?***

***How can spray foam be utilized?***

***What requirements are found in the International Residential Code (IRC) for spray foam?***

***What requirements are found in the International Energy Conservation Code (IECC)?***

# Spray Foam Insulation

## Open Cell Spray Foam

Open cell spray foam is when more than half of its cells are open.

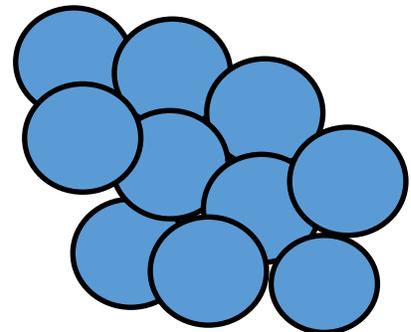
- Lower R-value per inch than closed cell
  - *R- 3.5 - 4.2*
- Becomes an air barrier when installed at 4.5 inches.
- Can shrink over time
- Open cell is porous can allow water vapor to be absorbed
- Requires an ignition or thermal barrier per the IRC
- Must comply with IRC Section 316
- Can be used as part of the assembly requirements for vapor retarders found in Section 702.7 of the IRC



## Closed Cell Spray Foam

Closed cell spray foam is when its cells are completely enclosed by walls.

- Higher R-value per inch than open cell
  - *R- 6.0 - 7.0*
- Becomes an air barrier when installed at 1.5 inches.
- More rigid than open cell
- Requires an ignition or thermal barrier per the IRC
- Must comply with IRC Section 316
- Can be used as part of the assembly requirements for vapor retarders found in Section 702.7 of the IRC



# Spray Foam Insulation

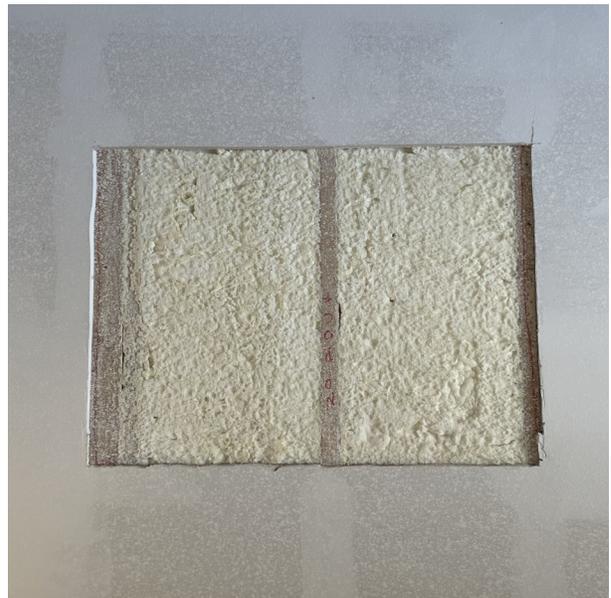
## 2021 International Residential Code

### 316.2 and 316.3

- Packages and containers of foam plastic (including spray foam) that is delivered to jobsite must contain a label from an approved agency with the following information:
  - Manufacturer's name
  - Product listing
  - Product identification
  - Information to demonstrate the product will comply with the requirements

### 316.3

- Foam plastic insulation 4" or less
  - Flame spread 75 or less
  - Smoke index 450 or less
- Foam plastic insulation more than 4"
  - Flame spread 75 or less
  - Smoke index 450 or less
  - Comply with 316.6
- Spray foam insulation more than 4"
  - Flame spread 25 or less
  - Smoke index 450 or less
  - Separated from interior of building by 1/2" gypsum board or other material tested with NFPA 275



# Spray Foam Insulation International Residential Code 316.4 & 316.5 Thermal Barriers

Thermal barriers are required to separate the spray foam and other foam plastics (insulation) from the interior of the building. The following materials are permitted to be used:

- 1/2" gypsum board
- 23/32" wood structural panel
- Material tested and meets NFPA 275

The following specific requirements may apply

## ***Masonry or concrete***

- Not required in masonry or concrete walls, floor, or roof if separated from the interior by a minimum of 1" of concrete or masonry

## ***Roofing***

- If foam plastic is part of a roof assembly or under roof covering and separated from the interior of the building by one of the following:
  - Tongue and groove wood planks
  - Wood structural panel sheathing
- Comply with Section 803
- 15/32" with exterior glue, exposure 1, and supported edges

## ***Foam-filled exterior doors***

- Exempt from Surface Burning Characteristics and Thermal Barriers (316.3 & 316.4)

## ***Foam-filled garage doors***

- Exempt from Surface Burning Characteristics and Thermal Barriers (316.3 & 316.4)

## ***Re-siding***

- Not required if installed over existing wall finishes with residing.
  - If foam plastic is not more than 1/2" and tested with NFPA 259

# Spray Foam Insulation International Residential Code 316.4 & 316.5 Thermal Barriers

The following specific requirements may apply (continued)

**Attics**—thermal barrier not required when complying with all of the following:

- Attic access required by 807.1
- Spaces entered only for repairs or maintenance
- Foam plastic tested in accordance with 316.6 and has one of the following ignition barriers material
  - 1 1/2" mineral fiber insulation
  - 1/4" wood structural panels
  - 3/8" particleboard
  - 1/4" hardboard
  - 3/8" gypsum board
  - Corrosion resistant steel with thickness of 0.016"
  - 1 1/2 cellulose insulation
  - 1/4" fiber cement panel, soffit or backer board



**Crawl spaces**- thermal barrier not required when complying with all of the following:

- Crawl space access required by 408.4
- Spaces entered for repairs or maintenance
- Foam plastic tested in accordance with 316.6 and has one of the following ignition barriers material
  - 1 1/2" mineral fiber insulation
  - 1/4" wood structural panels
  - 3/8" particleboard
  - 1/4" hardboard
  - 3/8" gypsum board
  - Corrosion resistant steel with thickness of 0.016"
  - 1/4" fiber cement panel, soffit or backer board



# Spray Foam Insulation International Residential Code 316.4 & 316.5 Thermal Barriers

The following specific requirements may apply (continued)

**Foam backer board-** Thermal barrier not required if:

- Foam plastic has thickness of 1/2" or less, meets the potential heat of 2000 Btu per foot<sup>2</sup>, and uses one fo the following:
  - Separated from interior of building of a minimum of 2" of mineral fiber insulation
  - Installed over existing exterior wall finishes and comply with re-siding
  - Tested in accordance of approved tests of NFPA 286

**Interior trim-** Thermal barrier not required if:

- Density at least 20 lbs per cubic foot
- Trim thickness not more than 1/2" and width is 8" or less
- Trim can not be more than 10% of wall ceiling area of room or space
- Flame spread of 75 or less
- No limit on smoke index

**Interior finish**

- Tested in accordance of approved tests of NFPA 286
- Flame spread of 200 or less and Smoke index of 450 or less

**Sill plates and headers** -thermal barrier not required when complying with all of the following:

- Thickness of foam plastic is 3 1/4" or less
- Density of foam plastic is between 1/2 to 2 lbs per cubic foot
- Have flame spread of 25 or less and smoke index of 450 or less when tested

**Sheathing**

- If exposed in attic comply with attic requirements
- If used as exterior wall sheathing comply with re-siding requirements

# Spray Foam Insulation International Residential Code 316.5.13, 316.6, 316.7, and 316.8

The following specific requirements may apply (continued)

## ***Floors***

- Thermal barrier not required on the walking surface of floor system when covered by 1/2" wood structural panel or equivalent
- Required on the underside of floor system when the floor is located in the interior of the building

## ***Specific approval***

Foam plastic that does not meet the requirements of Sections 316.3 - 316.5 (Surface burning characteristics, Thermal barrier, and Specific requirements) shall be approved by the following:

- Approved tests of NFPA 286 with the acceptance criteria of the following
  - Section R302.9.4
  - FM4880,
  - UL 1040
  - UL 1715

## ***Termite damage***

Foam plastic use in "very heavy" termite probability must comply with Section 318.4 (Foam plastic protection)

## ***Wind resistance***

Comply with the following:

- Foam plastic that complies with ASTM C578 and ASTM C1289 used as exterior wall sheathing
- Comply with SBCA FS 100 for wind pressure resistance
  - Except if installed directly over a sheathing material that is separately capable of resisting the wind load

# Spray Foam Insulation

## International Energy Conservation Code

### ***Thermal Envelope Requirements***

Spray foam can be utilized for various components of the thermal envelope.

- Insulation for thermal resistance of building's thermal envelope
  - Roof/ceiling - above roof deck, or attic
  - Above grade walls - mass, steel framing, or wood or other
  - Below grade walls
  - Crawl space walls
  - Floors
  - Slab on grade floors - unheated or heated
- Air barrier and air leakage requirements
  - Open cell and closed cell spray foam is an approved material for air barrier in accordance with Section C402.5.1.3
    - Open cell - thickness of 4.5" or more having a density of 0.4 and 1.5 pcf
    - Closed cell - thickness of 1.5" or more having minimum density of 1.5 pcf
  - Spray foam and other foams can be used to air seal the following:
    - Penetrations
    - Joints and seams
    - Window and door space between jambs and framing
      -  Fast expanding foam is not permitted for sealing of windows
    - Top and bottom plates
    - Narrow cavities
    - Rim joists