The Attic
Vented vs. Unvented
Energy Code Support Program

- What are the differences between a vented attic and unvented attic?
- What are the requirements for a vented attic as found in the International Residential Code?
- What are the requirements for an unvented attic as found in the International Residential Code?
- How does a vented or unvented attic effect the requirements of the International Energy Conservation Code?

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The Attic
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The thermal envelop is an assembly of components including framing, insulation, and air barriers working together to separate the conditioned space from the unconditioned space.

The location of the thermal envelope is determined on if the attic is a vented attic or an unvented attic.

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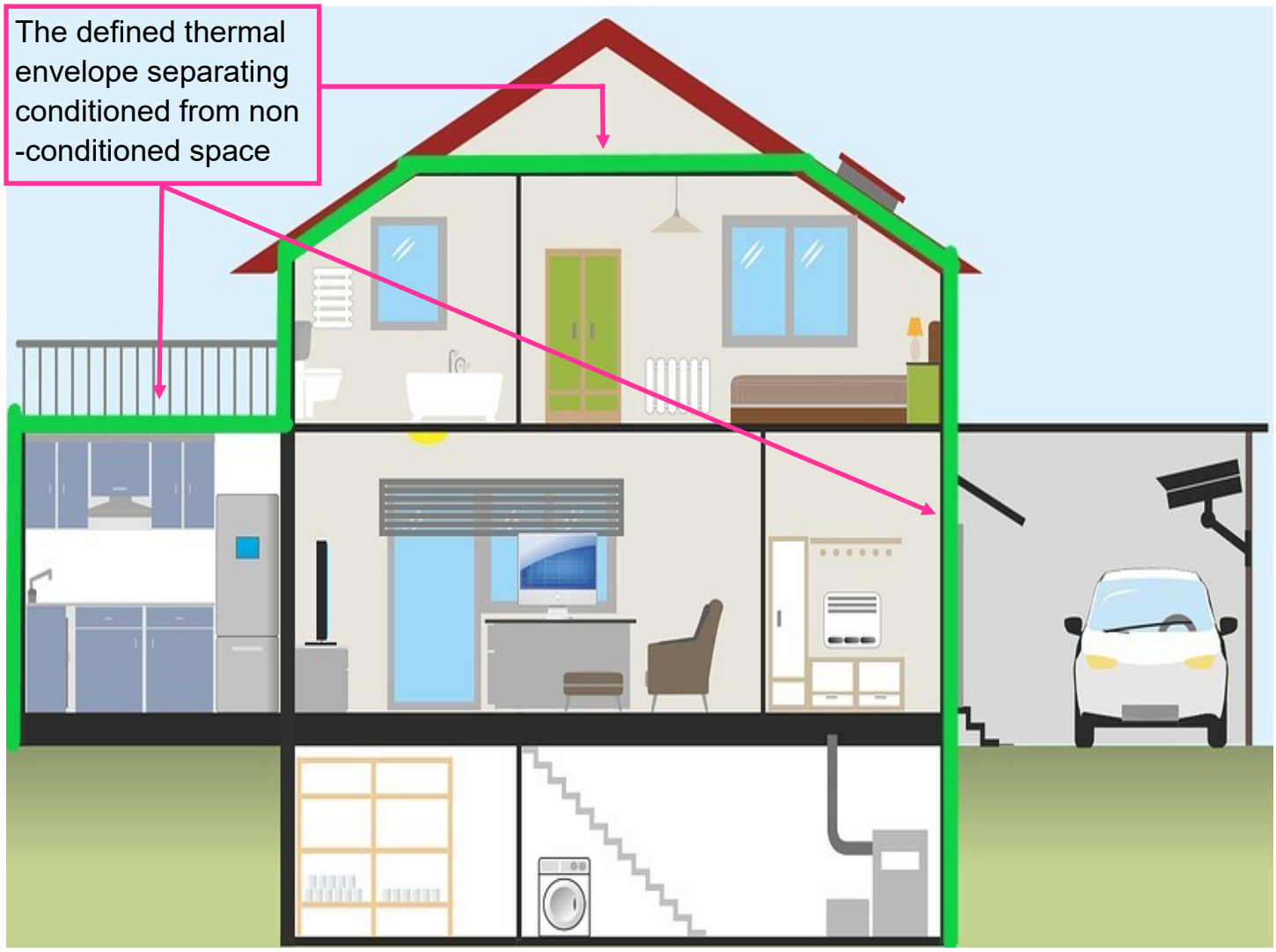
Vented Attic

Vented Attic

A vented attic is a space with vents installed to move air through the space. The amount of ventilation required is found in the International Residential Code (IRC) and explained in following pages.

In a vented attic the thermal envelope will be located at the ceiling assembly.

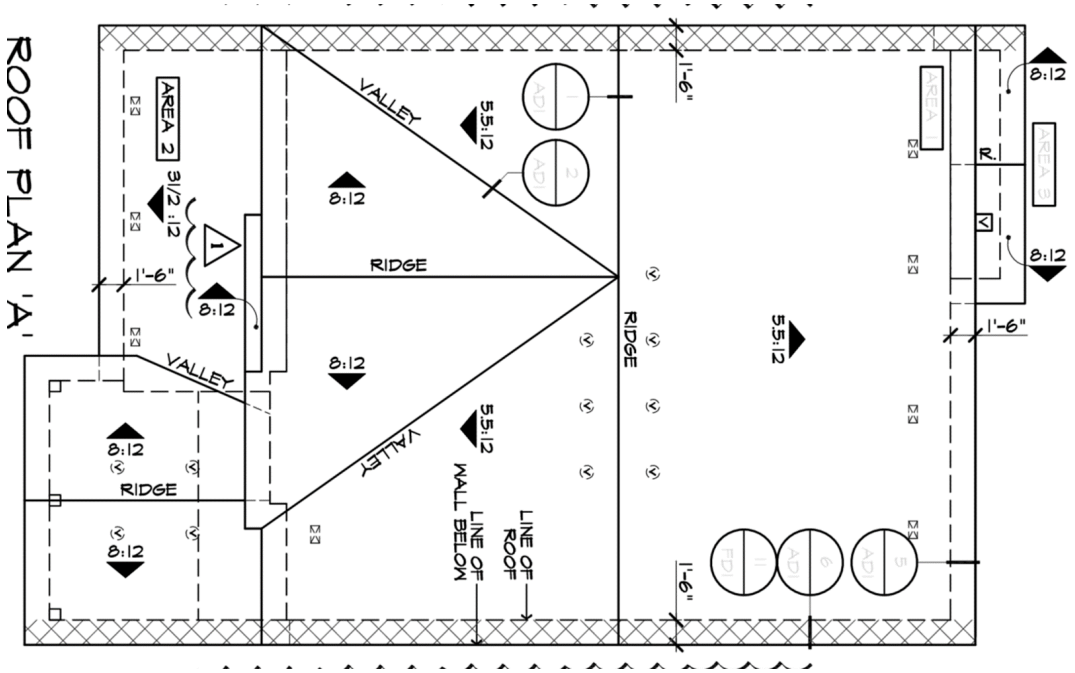


Vented Attic
International Residential Code
806.1 - 806.4

Enclosed attics and rafter spaces are required to have cross ventilation for each separate space.

The minimum amount of net free ventilation for each space is 1/150 of the area being vented.

AREA 2:PORCH AND GARAGE				
VENTILATION REQUIRED:				
ATTIC AREA =	388	SQ. FT. /	150	2.59 SQ. FT.
			X 144 =	373 SQ. IN.
		TOTAL HIGH AND LOW =		373 SQ. IN.
			x 50% =	186 SQ. IN.
VENTILATION PROVIDED:				
HIGH	SYMBOL			
4.00	RVG51	50	SQ. IN. EA. =	186 SQ. IN.
LOW				
27.00 LIN. FT.	SOFFIT VENTING	6.9	SQ. IN. EA. =	186 SQ. IN.
			TOTAL =	373 SQ. IN.
LOW VENTILATION PROVIDED AT 1 HOUR WALL CONDITION:				
LOW				
3.00	O'HAGIN VENTS	72	SQ. IN. EA. =	186 SQ. IN.
	SYMBOL			



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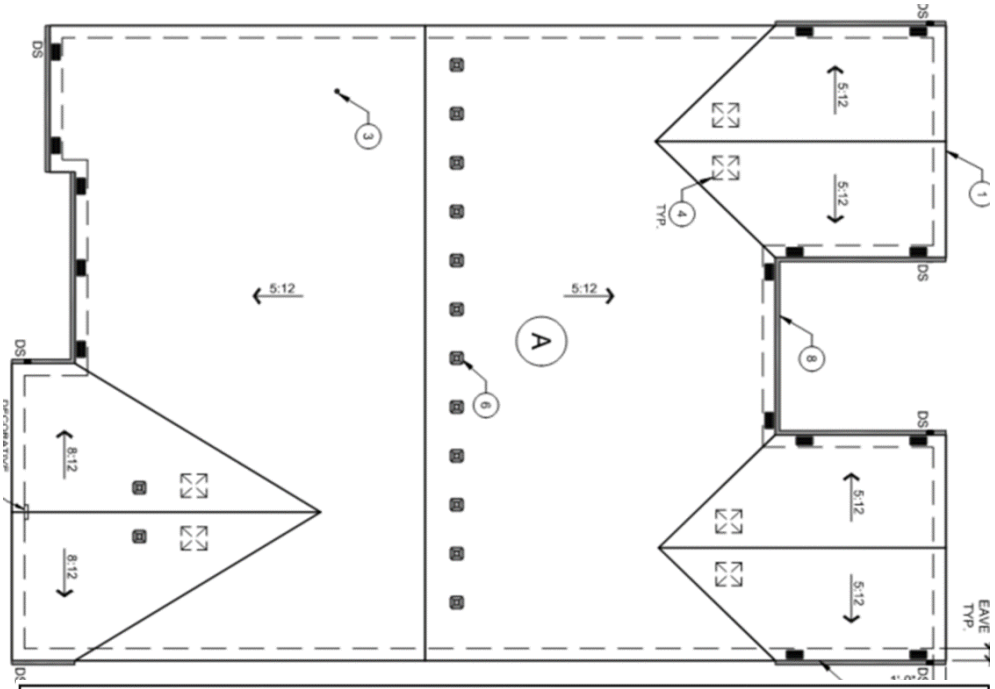
Vented Attic
International Residential Code
806.1 - 806.4

Enclosed attics and rafter spaces are required to have cross ventilation for each separate space.

The exception to this net free ventilation is 1/300 of the area being vented when complying with the following requirements.

- Climate zones 6, 7, and 8 has a class I or II vapor retarder installed on the warm side of the ceiling
- Minimum of 40% but not more than 50% of the ventilation is placed in the upper portion of the roof.
- The upper roof ventilation shall be located not more than 3 feet from the ridge or highest point of the roof.
- The remainder of ventilation is to be located in the lower portion of the roof



A ROOF VENTILATION CALCULATIONS			1/300	
TOTAL ROOF AREA =	3258.92 SQ. FT.	VENTING REQUIRED =	1564.28 SQ. IN.	
UPPER VENTING PROVIDED	14	ROOF HAT VENT - 53.00 SQ. IN. EA. =	742.00 SQ. IN.	
		UPPER TOTAL =	742.00 SQ. IN.	46.9%
LOWER VENTING PROVIDED	15	16X8 SOFFIT VENT - 56.00 SQ. IN. EA. =	840.00 SQ. IN.	
		LOWER TOTAL =	840.00 SQ. IN.	53.1%
		TOTAL VENTING PROVIDED =	1582.00 SQ. IN.	

3258 Roof Area

3258 / 300 = 10.86 ft^2

10.86 x 144 = 1,563.84 in^2

Upper venting
14 vents at 53 in^2

14 x 53 = 742 in^2

(46.9%)

Lower venting 15 vents at 56 in^2

15 x 56 = 840 in^2

(53.1%)

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Vented Attic
Energy Code Support Program

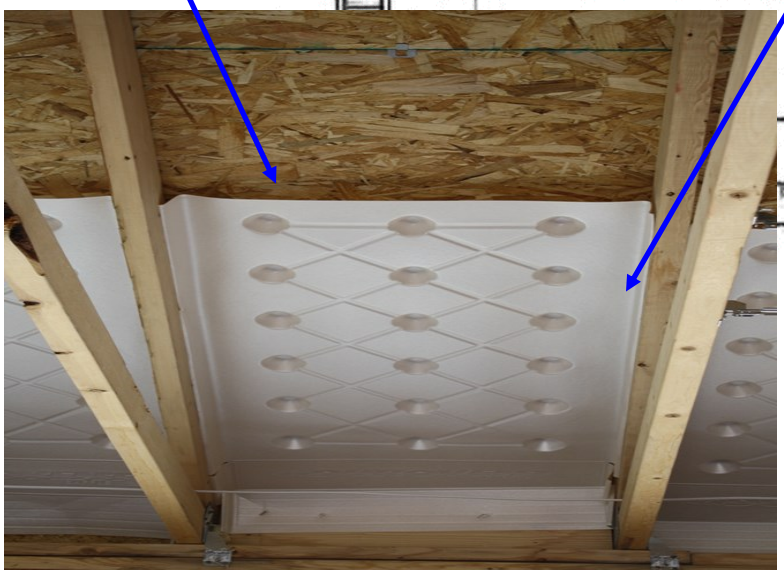
International Residential Code 806.3

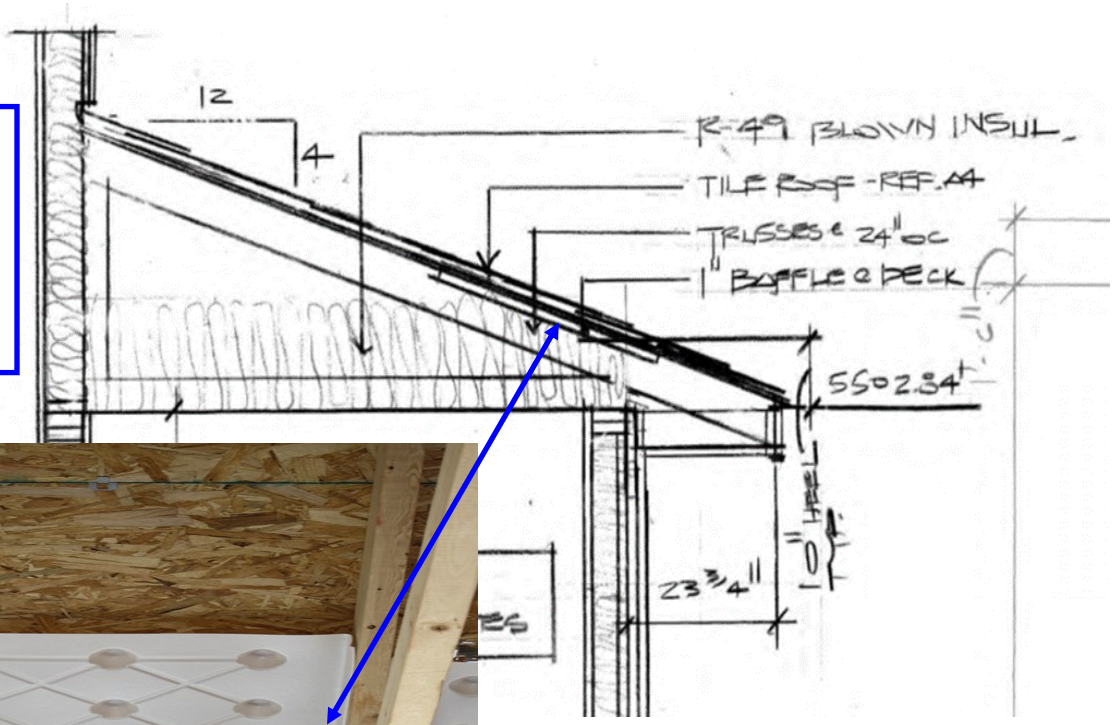
- Eave/cornice vents not blocked by blocking, bridging, or insulation.
- Minimum 1 inch space between insulation and roof sheathing

International Energy Conservation Code R402.2.3

- Baffles required at eave and soffit vents
- Baffles are required at all bays to be continuous
- Solid material to maintain a net free opening for venting

1” space for air to move over the insulation and meet the requirements of

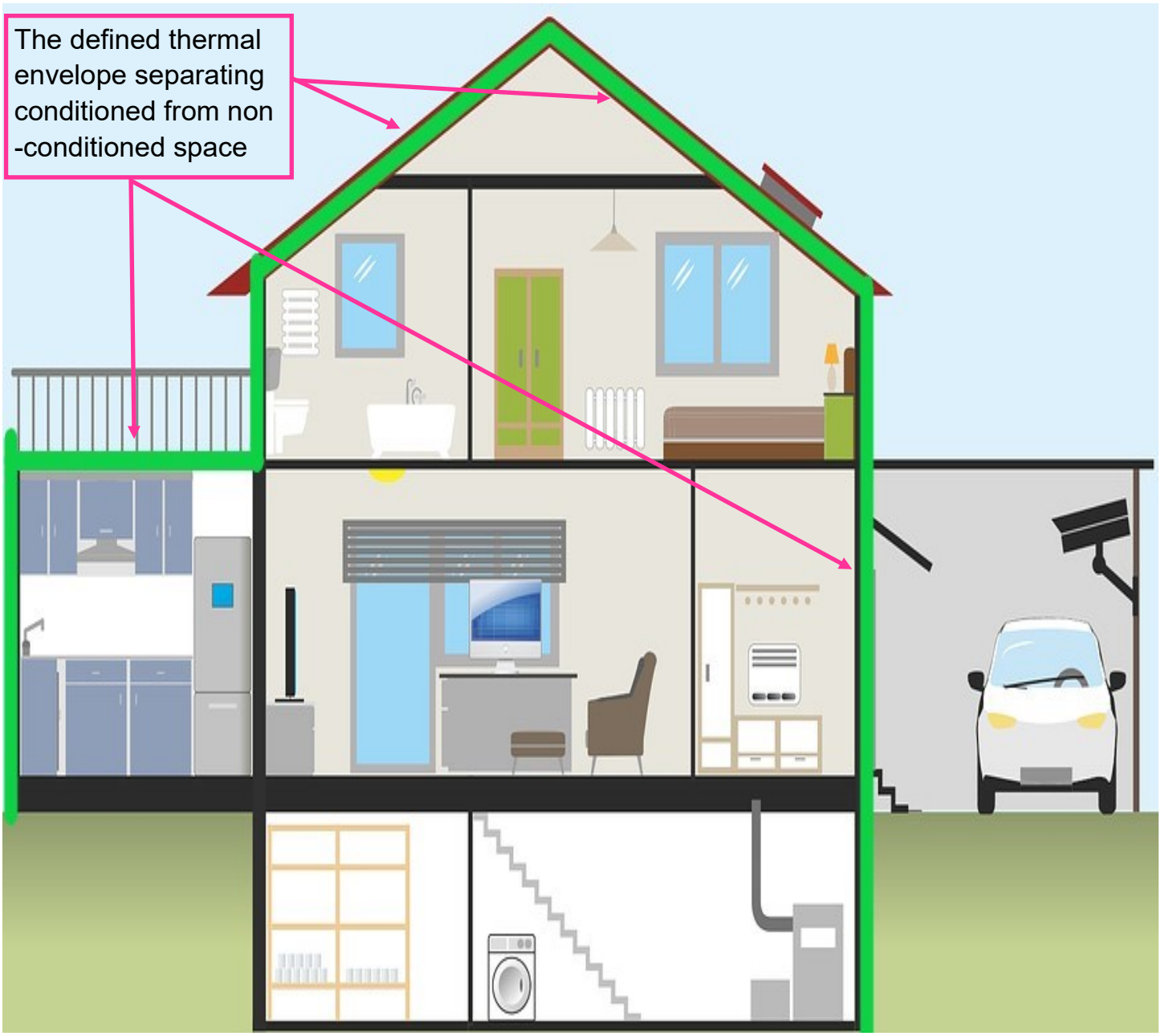




Unvented Attic

A unvented attic is also called a conditioned attic. It is created with no vents to the outside and enclosing the space within the thermal envelope.

In an unvented attic the thermal envelope is located at the underside of or above the roof deck.



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Unvented Attic
International Residential Code
806.5

Unvented attics must comply with the following items:

- Attic completely inside the thermal envelope
- Class I vapor retarder is not installed at the ceiling assembly
- If wood shingles or shakes are to be installed a minimum 1/4” space separates the shakes/shingles from the roof underlayment
- Climate zones 5, 6, 7, & 8 any air impermeable insulation shall be class II vapor barrier, or have Class II vapor retarder coating or covering in direct contact with the underside of the insulation
- Insulation must comply with 5.3 and comply with either 5.1 or 5.2

5.3

Where preformed insulation board is used as the air-impermeable insulation layer, it shall be sealed at the perimeter of each individual sheet interior surface to form a continuous layer.

CLIMATE ZONE	MINIMUM RIGID BOARD ON AIR-IMPERMEABLE INSULATION *R-VALUE*
4A, 4B	R-15

Unvented Attic
International Residential Code
806.5

5.1

The following requirements will apply depending on the insulation type installed. Use the one(s) that apply to the project.

- Air-impermeable insulation shall be applied to the underside of roof sheathing
- Air impermeable insulation installed below the structural sheathing or rigid insulation installed above roof sheathing will comply with Table 806.5 for condensation control
- When both air impermeable and air permeable insulation is used on the underside of the roof sheathing.
    - Follow Table 806.5 for condonation control
    - Air permeable insulation must installed directly under the air impermeable insulation
- Rigid insulation installed above roof sheathing must maintain temperatures
    - Temperature at 45°F minimum at underside of roof sheathing
    - Temperature at 68°F for the interior

Air Permeable Insulation

- Fiberglass batts
- Mineral fiber

Air Impermeable Insulation

- Open cell spray foam
- Closed cell spray foam
- Extruded Polystyrene (rigid)
- Polyisocyanurate (rigid)

Unvented Attic
International Residential Code
806.5

5.2

Climate zones 1, 2, & 3 must comply with the following:

- Vapor diffusion port must be installed with 12” from the highest point of the roof
- Port area must by sized by 1/600 of the ceiling area
- The vapor permeable membrane of the vapor diffusion port must have a minimum permeance rating of 20 perms
- The vapor diffusion port shall be the air barrier where it is installed
- The vapor diffusion port must protect attic from snow and rain entering the attic
- Framing members can not block the water flow to the port
    - A minimum of 2” space between blocking and the roof sheathing
    - Air permeable insulation is permitted within that space
- The minimum slope of roof is 3:12
- When only air permeable insulation is utilized it must be installed directly under roof sheathing
- When air impermeable insulation is used with air permeable insulation it is not required to comply with Table 806.5 for condensation control
- When air permeable insulation is installed directly below roof sheathing, the attic must comply with the following:
    - Air supplied to attic at minimum rate of 50CFM per 1,000 sq ft
    - Air must be supplied by ductwork supplying air to occupied spaces when system is running
    - Air can be provided by a supply fan when system is operating
    - Supply air to attic is not required when both air permeable and air impermeable insulation are used and Table 806.5 are met

TABLE R806.5 INSULATION FOR CONDENSATION CONTROL

CLIMATE ZONE	MINIMUM RIGID BOARD ON AIR-IMPERMEABLE INSULATION *R-VALUE*
4A, 4B	R-15

This R-values does not supersede the IECC roof insulation values

Vented or Unvented Attic
International Energy Conservation Code

Energy Code Requirements

- Defining the thermal envelope on the plans (R103.2.1)
- Insulation R-values (Dependent on the energy compliance path utilized for the project)
    - Vented attic
        - Located at the ceiling assembly
    - Unvented attic
        - Located at the underside of the roof sheathing or above the roof deck
        - Will contain above grade walls and/or knee walls that will require to be insulated
- Air Barriers and air sealing (R103.2.1 and R402.4)
    - Air barrier at any dropped ceiling or soffit and is air sealed - *vented attic specific*
    - Air sealing at attic access openings - *vented attic specific*
    - Air seal junction of top plate and top of exterior wall
    - Air barrier and air seal knee walls - *unvented attic specific*
    - Air seal the framing/and or jambs of skylights, windows, and doors
        - Fast expanding spray foam not permitted
    - Air seal ducts and flue shafts to the exterior or unconditioned space
    - Air seal all penetrations with a material that allows for expansion, contraction, and vibrations
    - Air seal narrow cavities of 1” or less
    - Air seal holes created by wiring, plumbing, or other obstructions in the air barrier
    - Air barrier and air seal electrical boxes on exterior walls - *unvented attic specific*
    - Air seal supply and return boots that penetrate the ceiling - *vented attic specific*
    - Air seal concealed sprinkler heads per manufacturer’s requirements - *vented attic specific*