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Installing Contractor Insulation Boot Camp

Lesson 8: Attic Ventilation & Insulation

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Attic Ventilation

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What we'll cover:

- Why venting is important
- Basic vent types
- Determining venting needs

Lesson Topics

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What we will cover:

- Failed measures
- Comparing insulation materials
- Estimating R-value
- Blowing cellulose into an open floor attic

Discussion: Attic Ventilation

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What are three benefits of a sufficiently ventilated attic?

Discussion: Attic Ventilation

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What are three benefits of a sufficiently ventilated attic?

1. Cools the roof
2. Cools the living space
3. Removes moisture

How Ventilation Works

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In a balanced system, wind blowing over the ridge and roof vents creates negative pressure that draws the warmer air out of the attic. Replacement air then enters through the soffit vents and exits at the ridge cap through ridge, roof or gable vents. Even without wind, the natural convection action of rising warm air maintains a continuous airflow along the underside of the roof.

Ventilation Guidelines

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- Do not recommend and/or install insulation in an attic space unless adequate and permanent ventilation is present or can be included in the work scope to meet minimum ventilation guidelines/codes.

Ventilation Guidelines

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- Adequate ventilation shall be maintained above all attic insulation by providing both low and high vents or gable end vents, unless there are architectural or customer circumstances for an exception.

Ventilation Guidelines

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- To achieve code requirements, provide attic venting when the attic is being treated and ventilation is needed. In the cases of inaccessible attic spaces requiring ventilation, it may be necessary to install access openings.

Ventilation Guidelines

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- One square foot of net-free vent area (NFA) shall be provided for every 150 square feet. One square foot of NFA provided for every square feet shall be permitted if both conditions in section 1202.2.1 of the 2023 CT State Building Code are met.

Ventilation Guidelines

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One level of venting may be used if adequate ventilation is maintained.

Ventilation that cannot be properly balanced to meet 50/50 high-low requirements based on roadblocks can use minimum of 75/25 ratio to meet program guidelines.

Ventilation Guidelines

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Acceptable roadblocks to installing lower ventilation include:

- 3rd story soffits
- Steep/uneven grade for ladders
- Soffits with open rafter tails
- Soffits that are too narrow for vents
- Aluminum soffits
- Non-perforated vinyl soffits
- Slate roof
- Wood shingle roof
- Metal roof
- Roof pitch (e.g., too flat or steep)
- Asbestos siding (gable vent)

Ventilation Guidelines

The use of window vents is allowed. The vents must be permanently fixed and must meet the minimum requirements for net free vent area as noted above.

Attic Ventilation Calculations

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- Attic Area Square Feet: Length x Width of the Attic Floor
- Minimum Net-Free Area + Total Attic Square Feet / 150
- Total Net-Free Area +Sum of Net-Free Area (across all vent options)
- Additional NFA Required = Min NFA – Total NFA
- Ventilation required: The calculation is based on 1/150 – 1 square foot of ventilation for every 150 square feet of the attic floor. The building code allows for 1/300 under certain conditions.
- Net Free Area: Each ventilation product is manufactured with a different net free area. If unknown, use ½ of the area to determine net free area.
- Approximation: All measurements are approximate. Each specific situation and property shall be verified and evaluated for the exact conditions and materials used before any work is specified or performed.

Adequate Venting: Net Free Area

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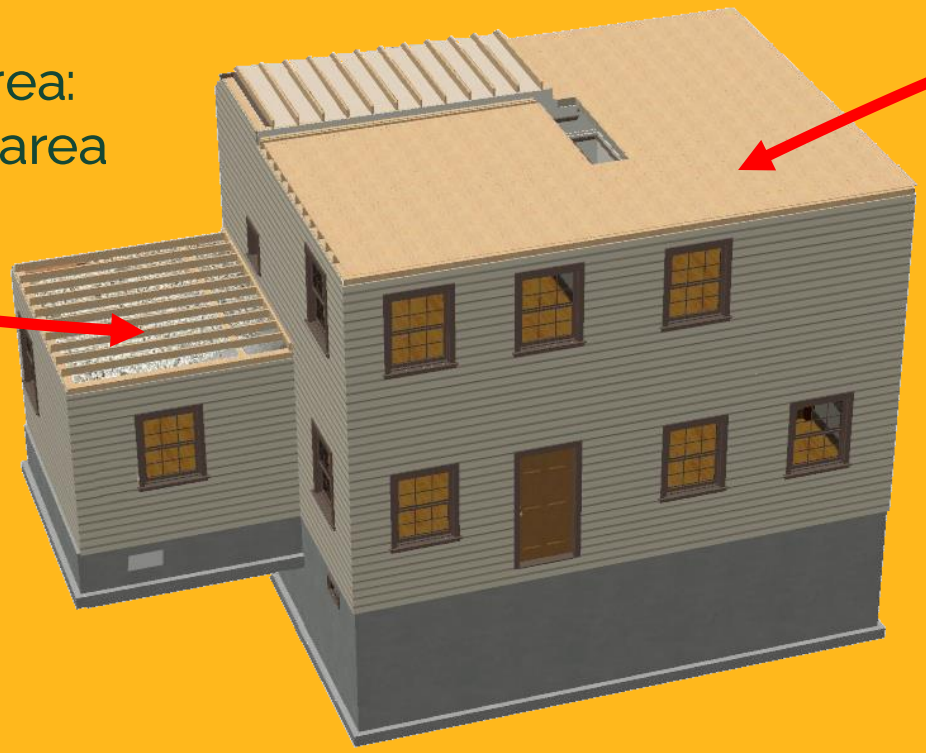
One square foot of *net free area* to every 300 square feet of attic floor when a vapor retarder is present

168 ft² attic area:
0.6 ft² net free area



720 ft² attic area:
2.4 ft² net free area

N.F.A. by Vent Type

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Vent Type	Net Free Area (ft^2)
Ridge vent (linear ft.)	0.12
Gable vent (12”x12”)	0.50
Soffit (4”x16”)	0.15
Soffit (8”x16”)	0.45
Roof vent (8”)	0.35

Net Free Area

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Master Flow® Roof Louver SSB960A Aluminum Slant-Back

Super slant-back roof vent with 60 in² of NFA allows heat/moisture to escape the attic. Available with an optional weather filter.

HOW MANY DO I NEED?

INSTALL INSTRUCTIONS

Net Free Area

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Cobra® SnowCountry® Advanced Exhaust Vent for Roof Ridge

Premium filtered ridge vent with 3" (76 mm) ring shank nails allows heat/moisture to escape the attic. Available in 11.5" (292 mm) & 9" (229 mm) widths.

INSTALL INSTRUCTIONS

Net Free Area

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UNDEREAVE VENTS

These screened aluminum vents are available in three sizes: 16" x 4" provides 28 square inches of net free area per piece; 16" x 6" provides 42 square inches of net free area per piece; and 16" x 8" provides 56 square inches of net free area per piece.

Attic Ventilation

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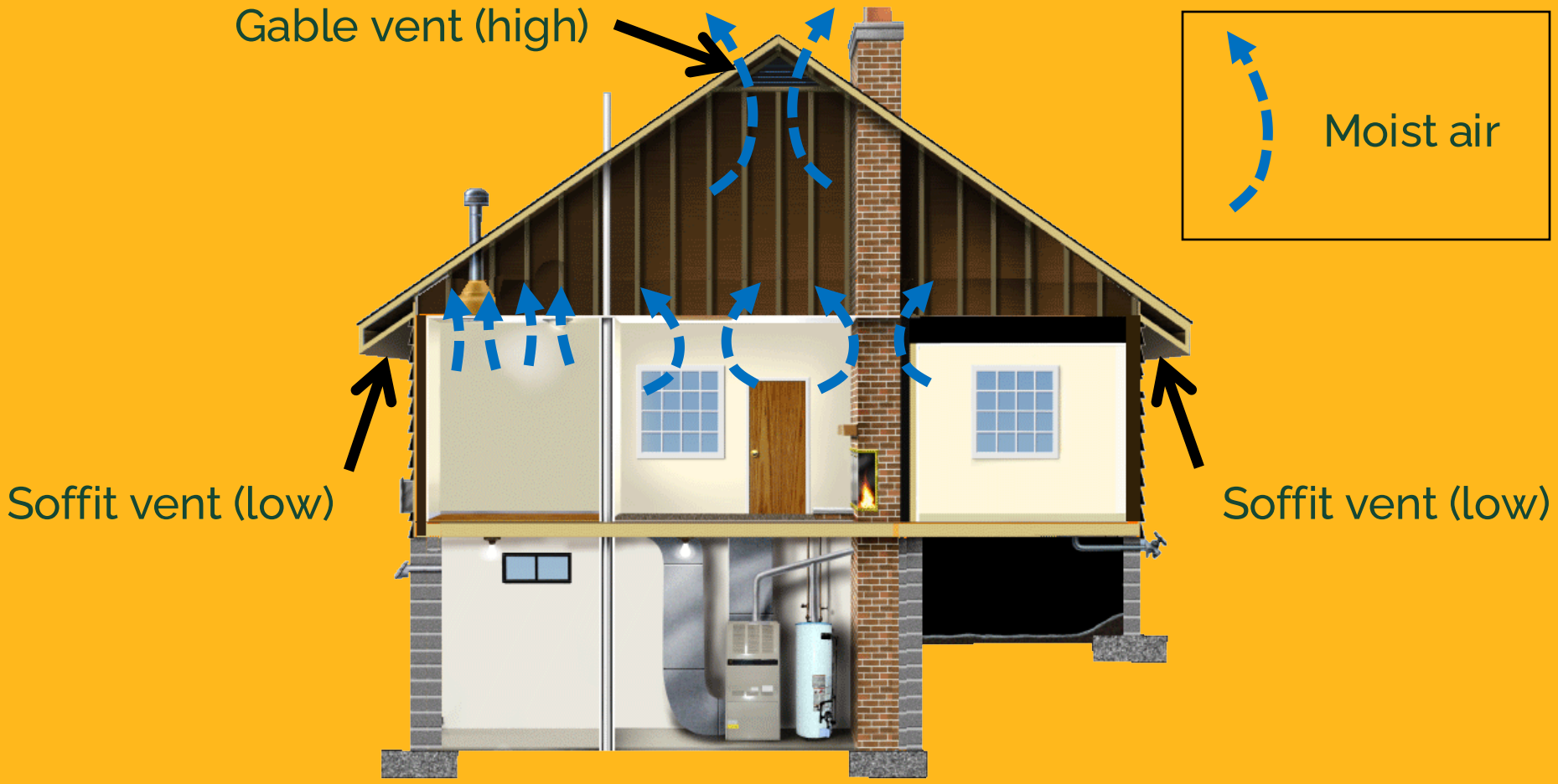
Vents allow moisture to leave the attic area



Common Passive Systems

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Soffit

Perforated

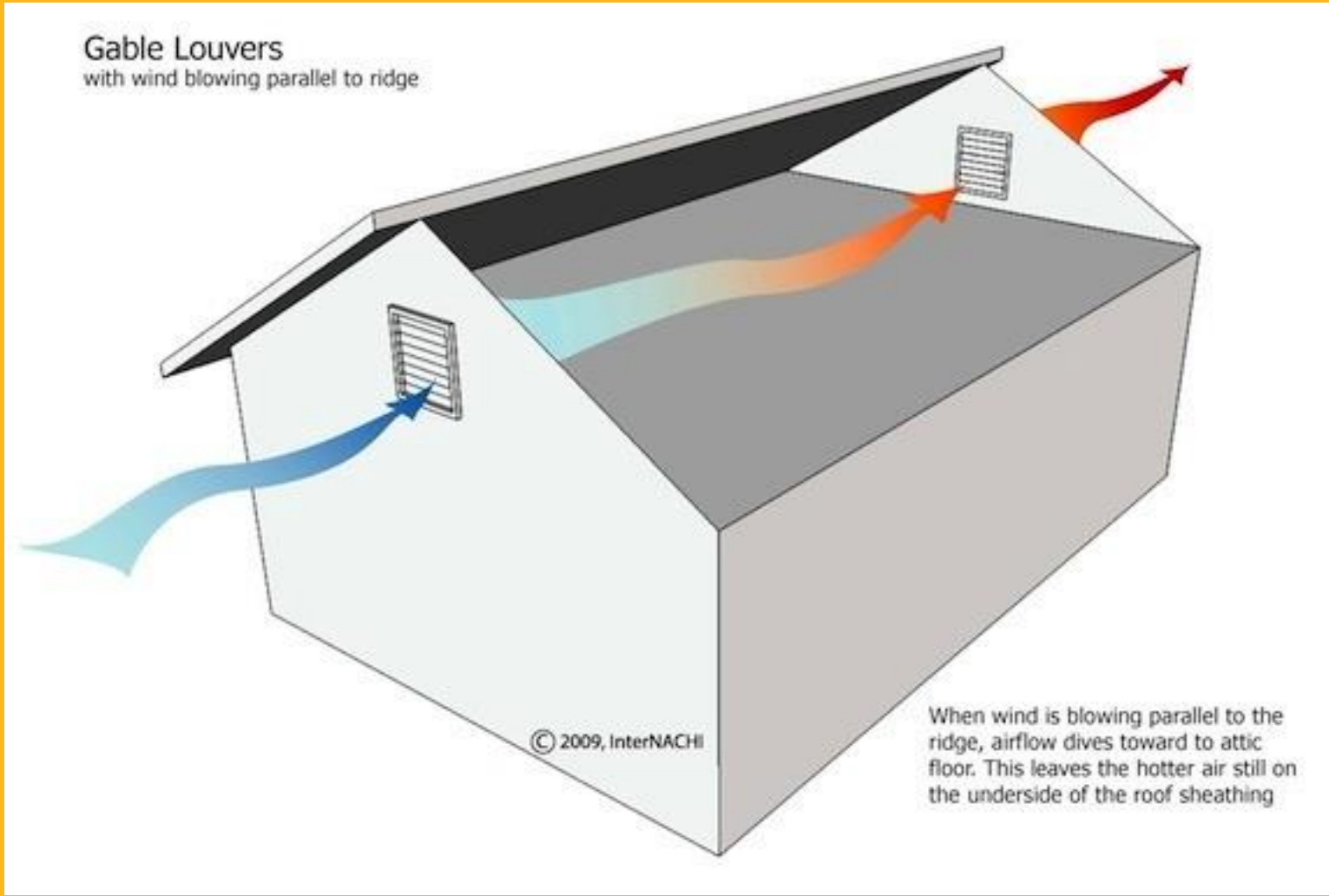
Louvered

Gable

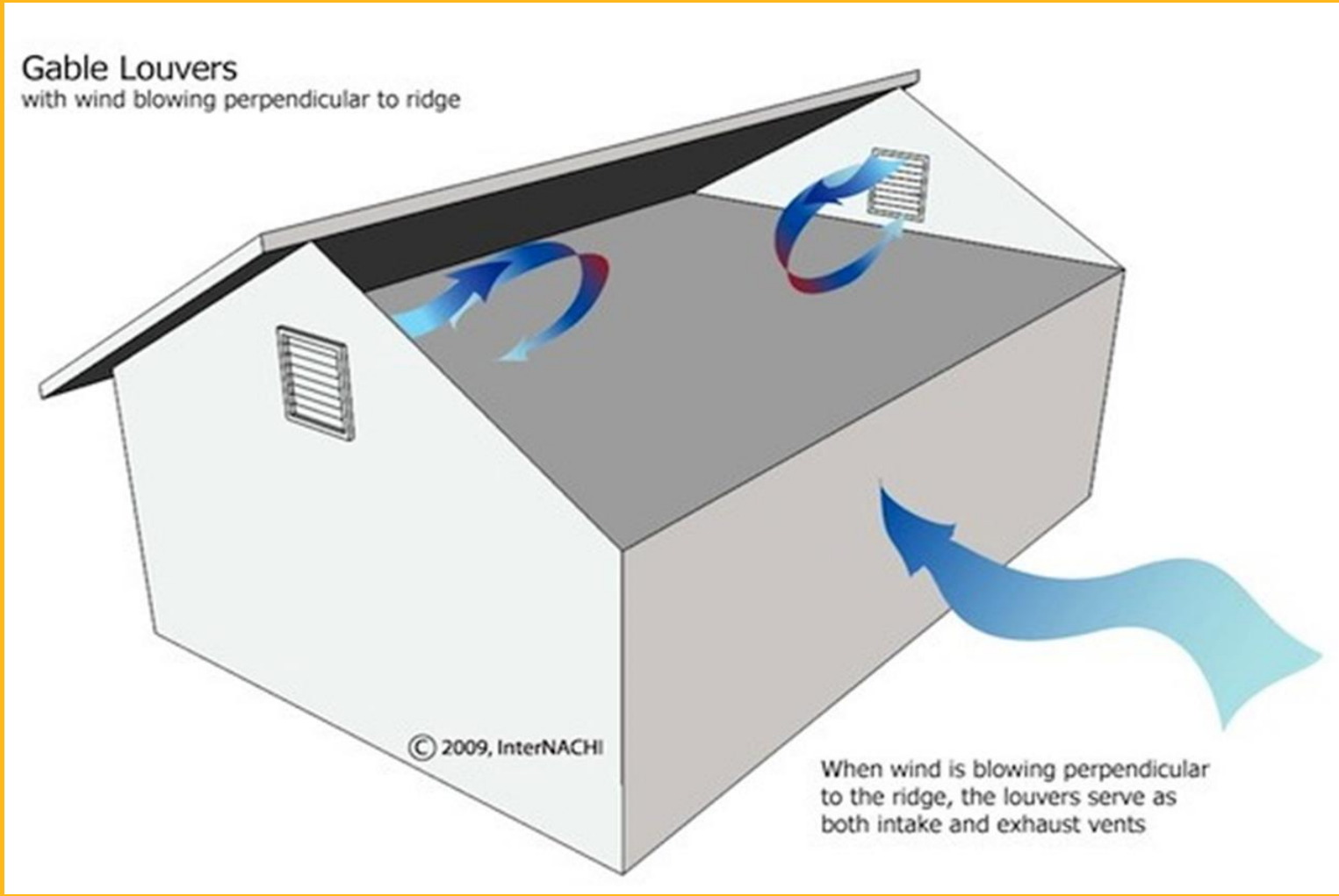
Roof

Ridge

Gable Vents


Gable Louvers
with wind blowing parallel to ridge
© 2009, InterNACHI
When wind is blowing parallel to the ridge, airflow dives toward to attic floor. This leaves the hotter air still on the underside of the roof sheathing

Gable Vents


Gable Louvers
with wind blowing perpendicular to ridge
© 2009, InterNACHI
When wind is blowing perpendicular to the ridge, the louvers serve as both intake and exhaust vents

Roof Vents

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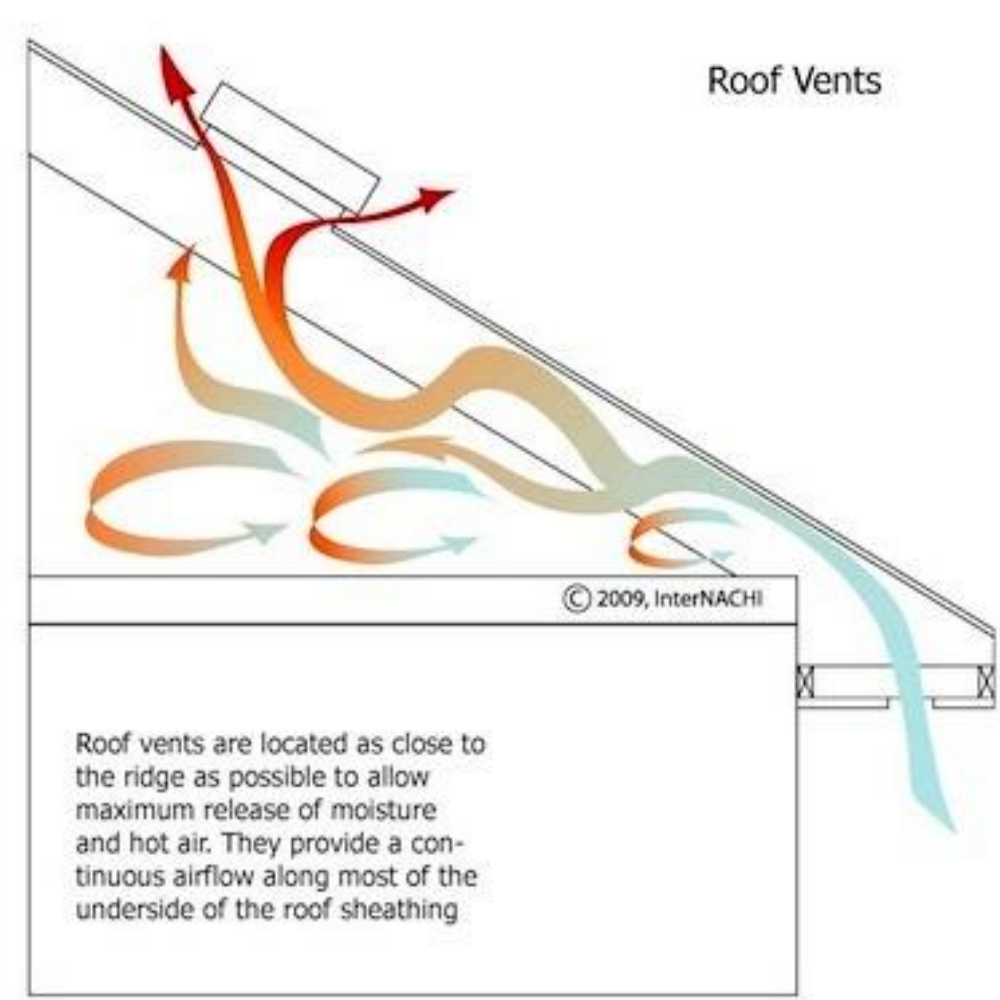
Roof Vents


Roof Vents
© 2009, InterNACHI
Roof vents are located as close to the ridge as possible to allow maximum release of moisture and hot air. They provide a continuous airflow along most of the underside of the roof sheathing

Turbine Vents (Whirlybird)

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Ridge Vent

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Ridge Vent

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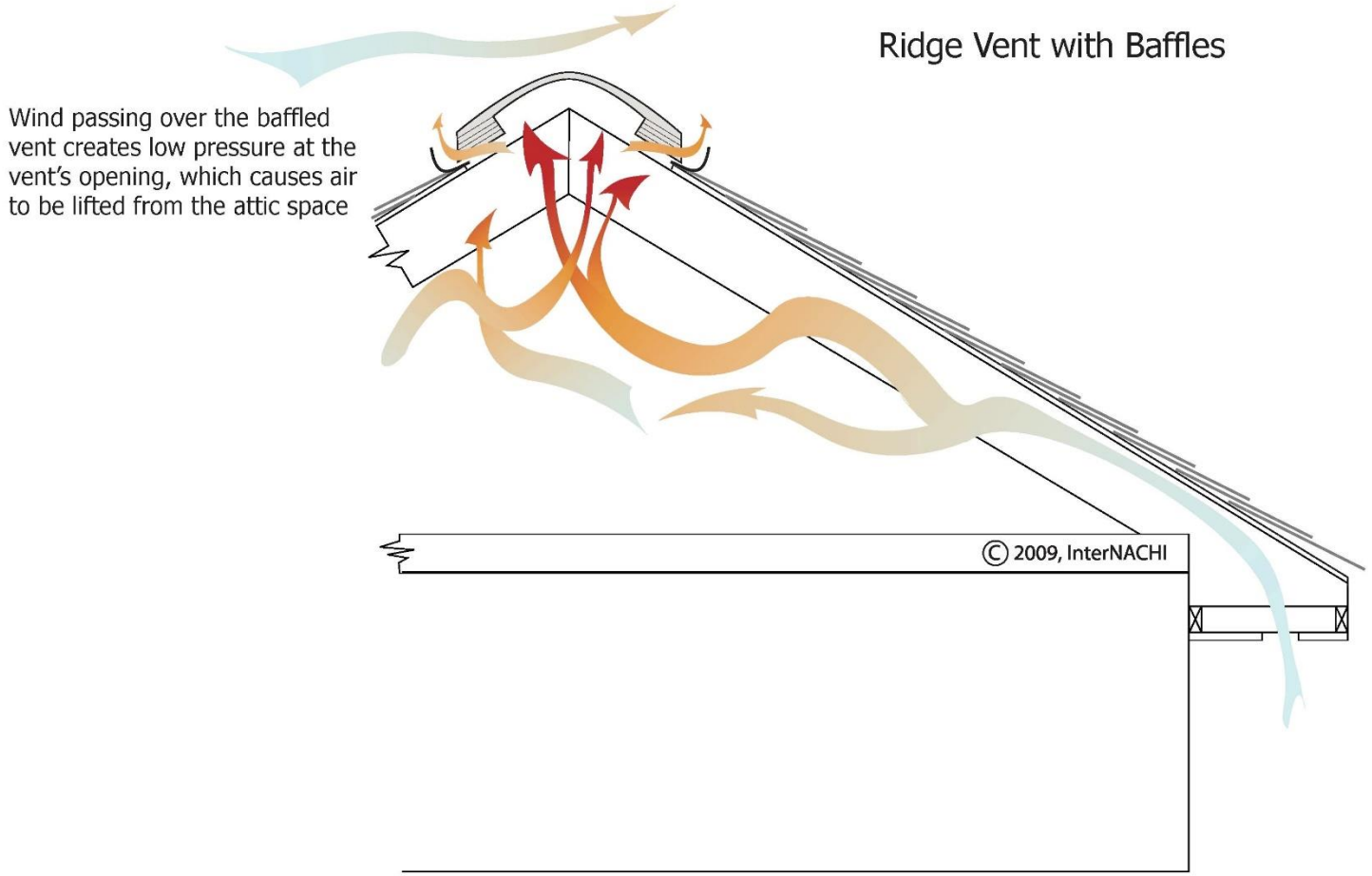

Common Active Systems

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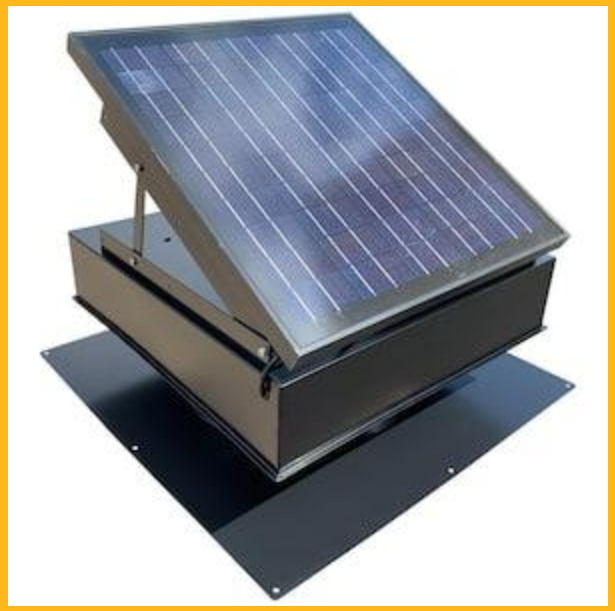

Mold in the Attic

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Mold is present in this attic.

Why?

Ventilation: Moisture as a Clue

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- Signs of moist air movement from conditioned space are often visible in cold attics
- Signs of inadequate ventilation include the following:
  - mold and mildew
  - rusty nails
  - rot
  - discolored wood

Wind Washing

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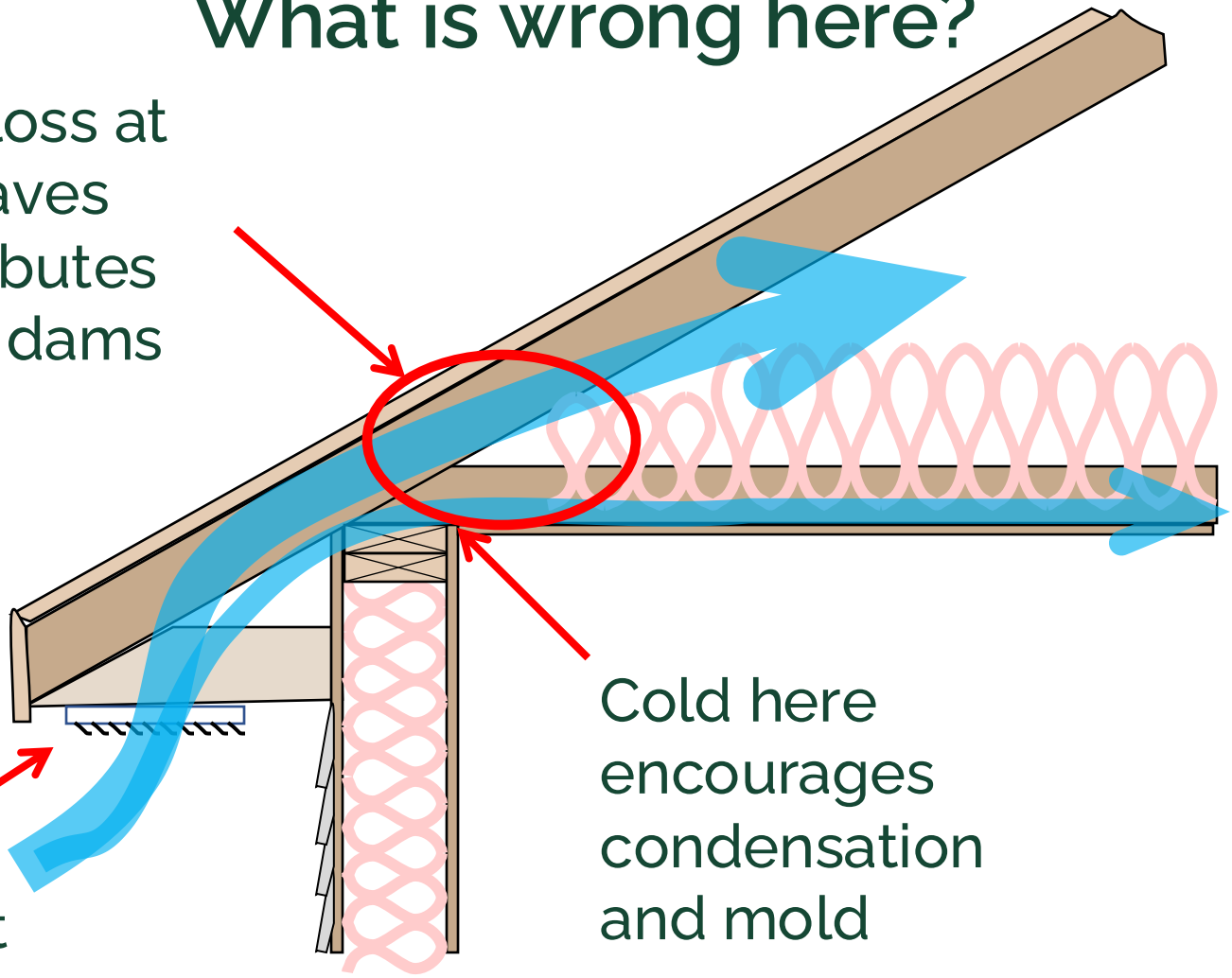
What is wrong here?

Heat loss at the eaves contributes to ice dams



Cold here encourages condensation and mold

Soffit vent

Preventing Wind Washing

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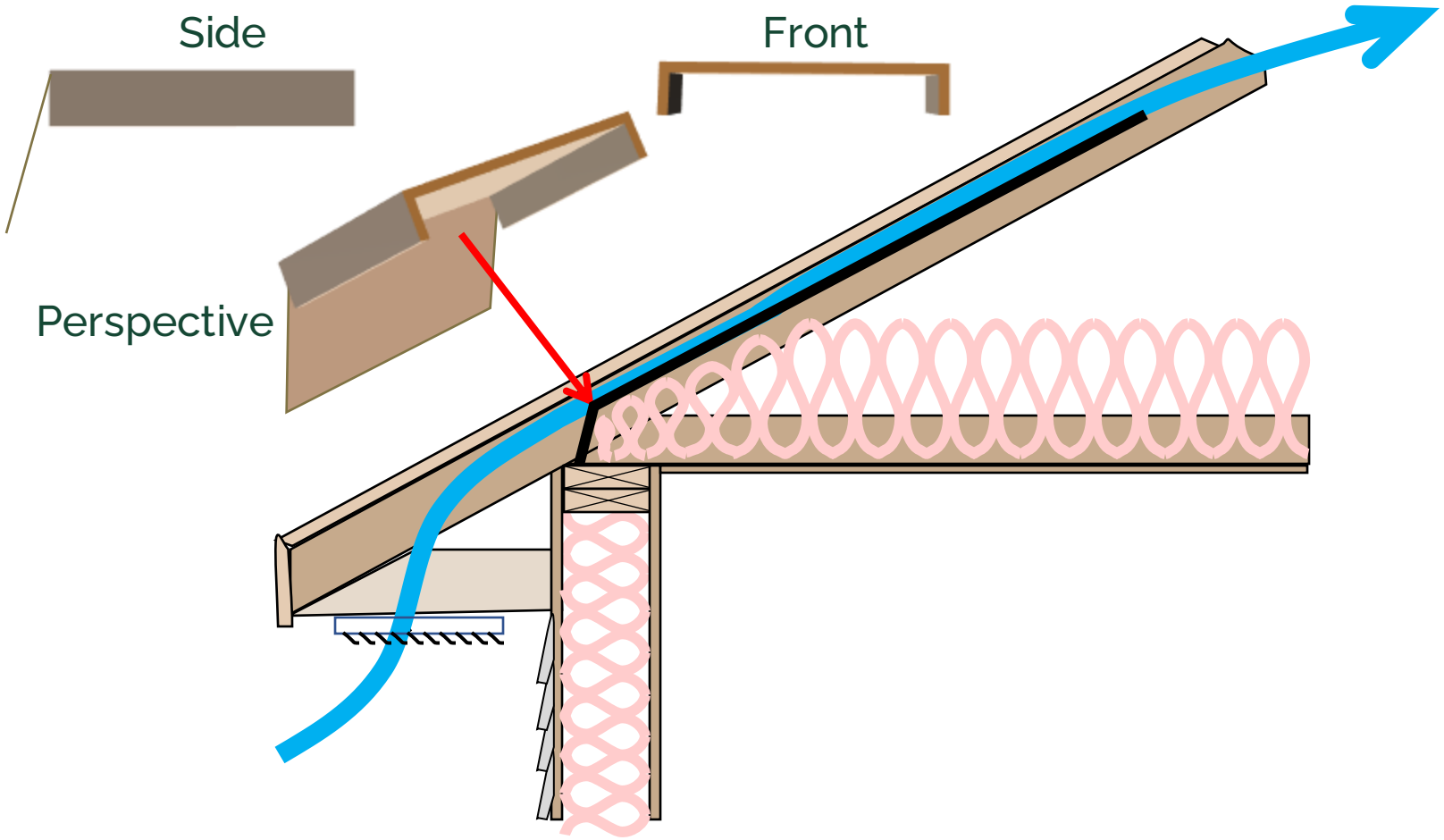
Damming



Where to Place Baffles

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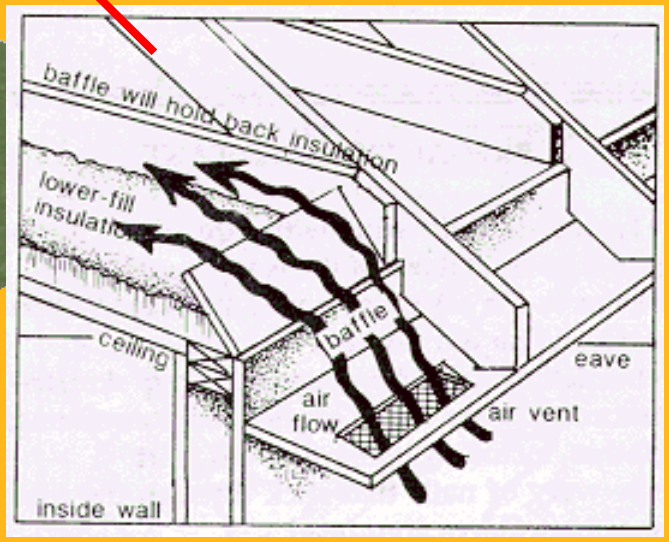
Where do you install baffles?



Baffle Installation

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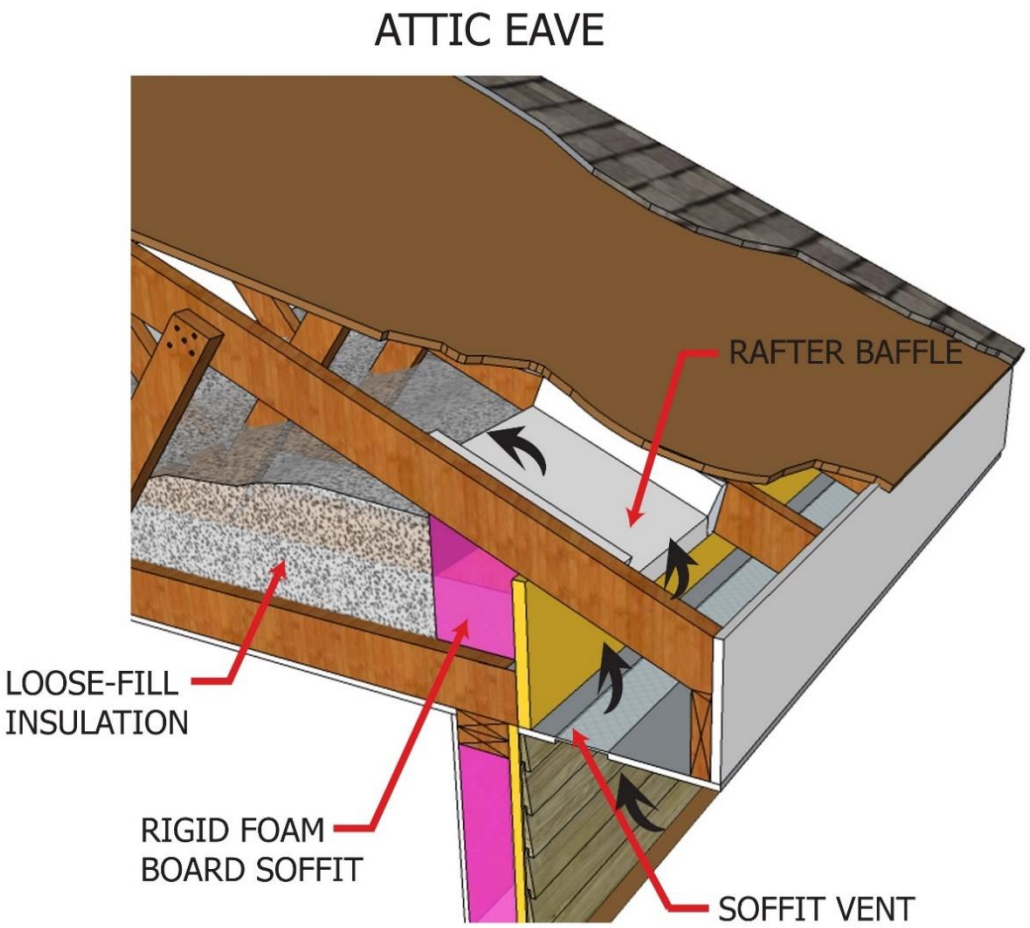

Installing Ventilation Baffles

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Extended to soffit area

Exterior wall top plate

Installing Ventilation Baffles

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Installing Insulation Baffles

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Damming a baffle

Two-Part Foam

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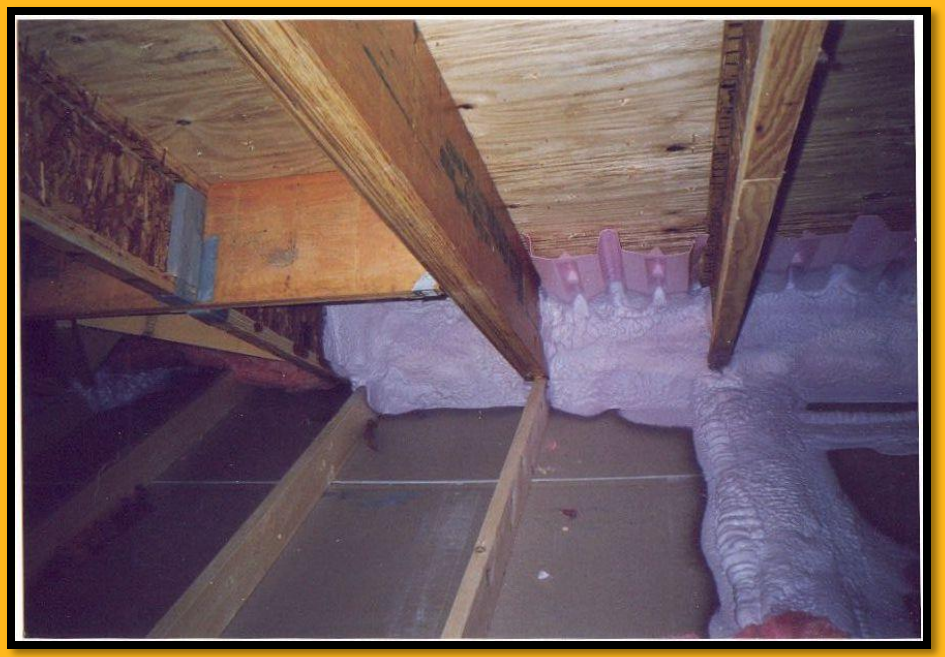
Two-part foam installed to seal between the top plate and the vent chute



Wind Washing Beneath Insulation

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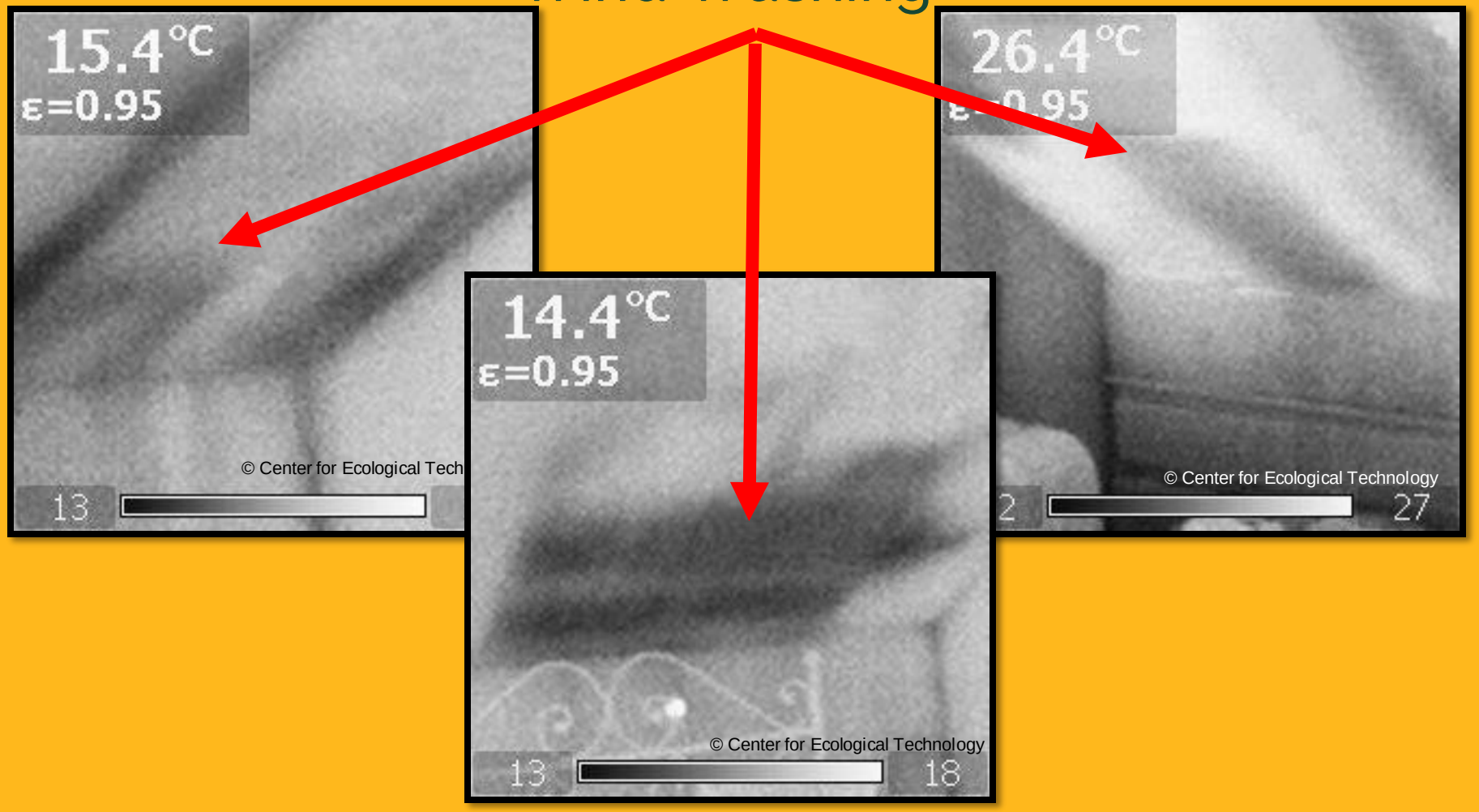
Wind Washing



Failed Measures

- (Attic 1) The Inspector measured 1037 sq. ft. of attic floor area that was insulated from R-14 to R-62. It was found that 13” of open blown cellulose (R-48) was added on top of 4” fiberglass batt insulation (R-14), leaving a total of 17” and R-62. This measure failed inspections as the verified 1037 sq. ft. fell short of the (presumed) 1510 sq. ft. by a margin of 31.3%.
- (Garage Walls) The Inspector measured and verified 165 sq. ft. of treated wall insulation, however, this area was between an unheated utility room and a garage, as well as the exterior half wall of the utility room. This measure failed inspection as the program does not incentivize the installation of insulation that does not border a conditioned living space.

Insulation: R-Value Per Inch

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Material	R-Value Per Inch
Fiber glass batting low density	3.1
Fiber glass batting high density	3.7
Fiber glass board (1 in. thick)	4.4
Cellulose fiber loose (1 in. thick)	3.7
Cellulose fiber dense (1 in. thick)	3.5
Expanded polystyrene (beaded)	4.0
Extruded polystyrene (blue/pink board)	5.0
Polyisocyanurate	6.0

Spray Foam

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Cellulose Open Blow

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Blown Fiber Glass

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Attic Depth Markers

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Blowing Cellulose

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- Blow insulation evenly over area to depth for labeled R-value
- Blow to consistent depth, using depth markers as guide
- No tapering at roof sheathing

Floored Attics

oup

Failed Measure

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The home reportedly had 900 sq. ft. of floored attic insulated from R-2 to R-26. It was found that a 733 sq. ft. floored area was present in the attic, which was partially treated with cellulose. Where cellulose was installed (in a 6-inch cavity) as much as R-22 was present. Much of the attic was found to have pre-existing fiberglass only, with no cellulose added. Areas were also present where there was no insulation at all under the flooring. No more than 1/3 of the area was treated with cellulose, which equated to 245 sq. ft. at the most. This was 72% less than the reported area and therefore this measure failed.

Floored Attics

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Dense-packing Floored Attics with Cellulose

Insulation can be installed either by removing and re-installing wood flooring or the drill and plug method (drill and fill).

Floored Attics: Discussion

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1. What types of flooring are typically found in an attic?
2. How is the area under the attic floor accessed?
3. How is the flooring removed?
4. How would you drill holes in the flooring to blow in the cellulose?
5. How do you determine if there are penetrations or obstructions under the flooring?

Floored Attics: Key Points

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Dense-packing Floored Attics

1. Insulation must be evenly distributed throughout the entire area
2. Check for obstructions before beginning to install insulation

Loose-Blown Insulation

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What are the challenges when insulating attics?

- Controlling where insulation goes during an open blow
- Assuring even coverage (R-value) up to the “edge” of the protected area
- Keeping the insulation in place after it has been installed

Do No Harm

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Insulating an attic which is not adequately ventilated will have a negative impact on the house as a system.

Problems may not be immediately evident; it may take years for the problem to surface.

Summary

Attic ventilation:

- Cools the roof
- Cools the living space
- Removes moisture from the attic
- Is best with high and low vent arrangement
- Should meet the 1:150/1:300 rule if the attic is to be insulated

Questions

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