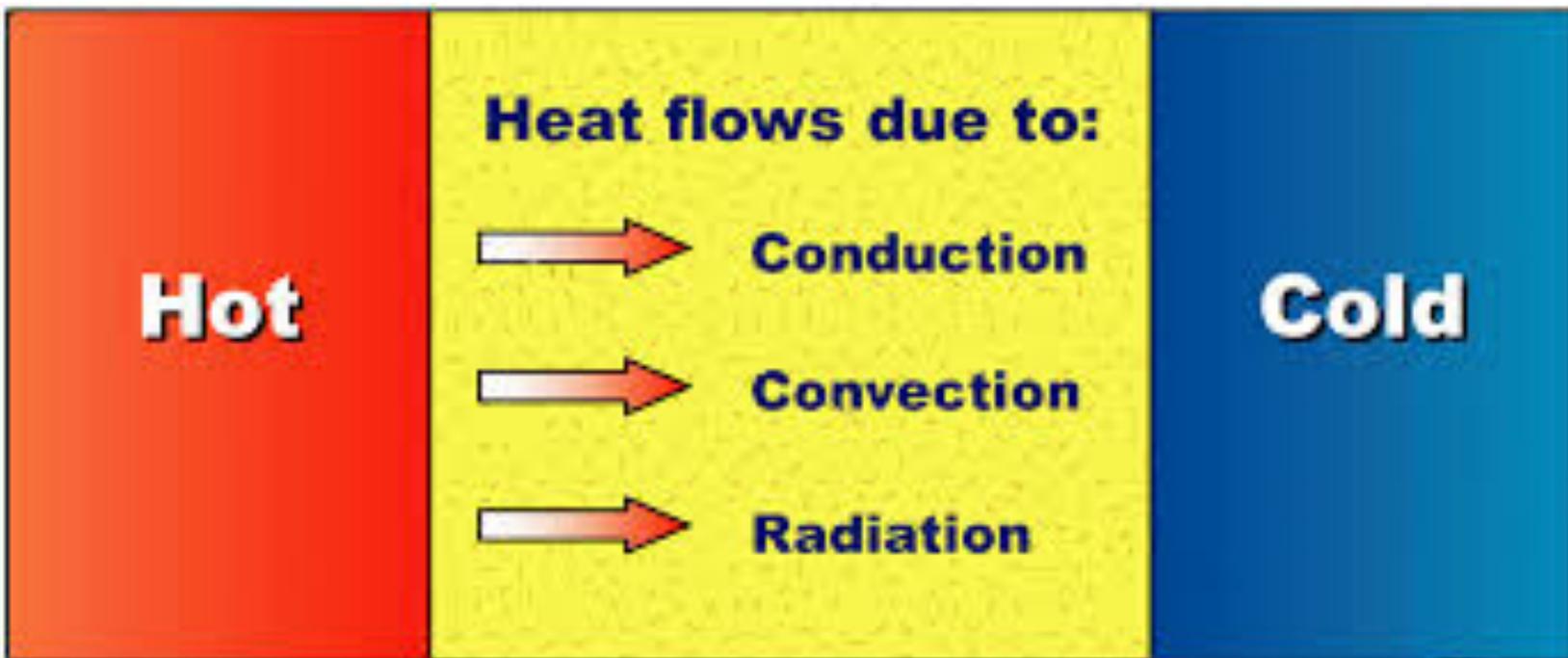


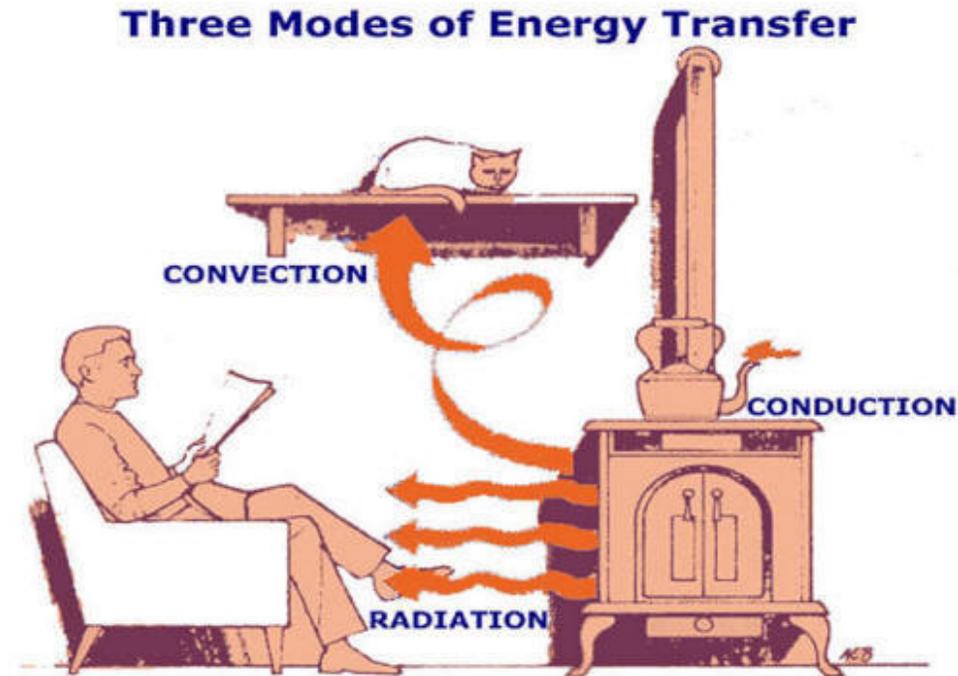
Overview of This Webinar

- How does heat move?
- What is a fully-aligned air barrier and why do we need one?
- Pictorial overview of ENERGY STAR-required air barrier alignment items
- Communicating the benefits of air barriers to buyers
- Review of FirstEnergy incentives and ENERGY STAR marketing resources

How Does Heat Move?



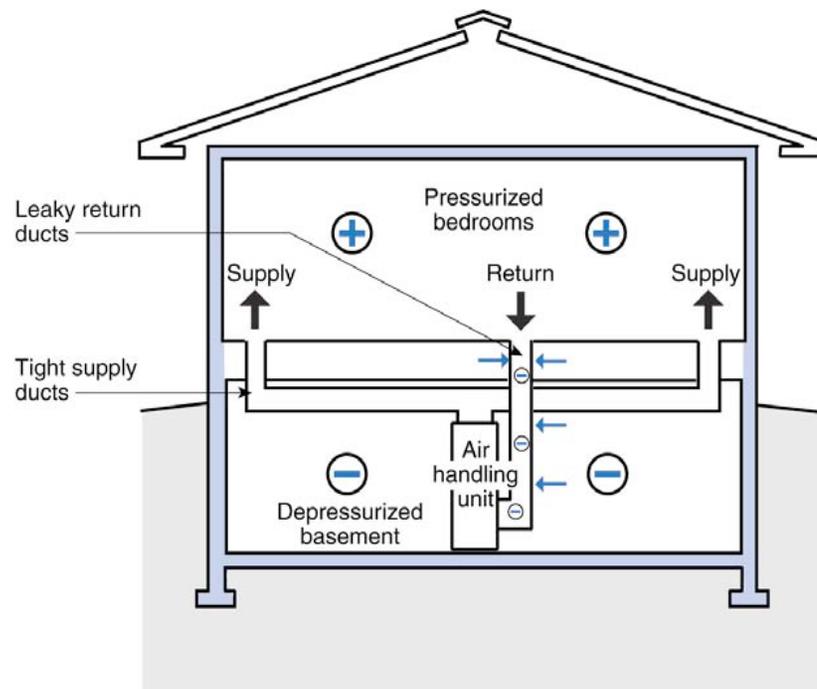
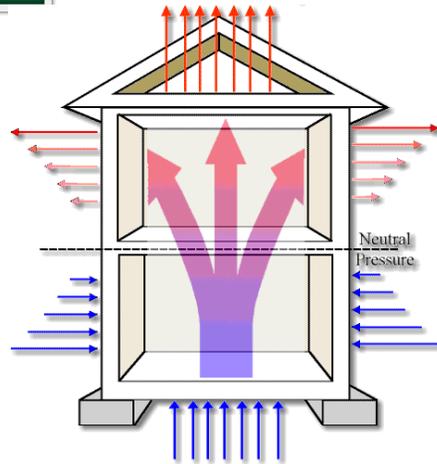
How Does Heat Move?



It is most effective to control heat loss through a building envelope in this order:

1. **Convection** - heat movement in a fluid (liquid or gas) at a nonuniform temperature owing to the variation of its density and the action of gravity.
2. **Conduction** - transmission through or by means of a conductor.
3. **Radiation** - the process of emitting radiant energy in the form of waves or particles.

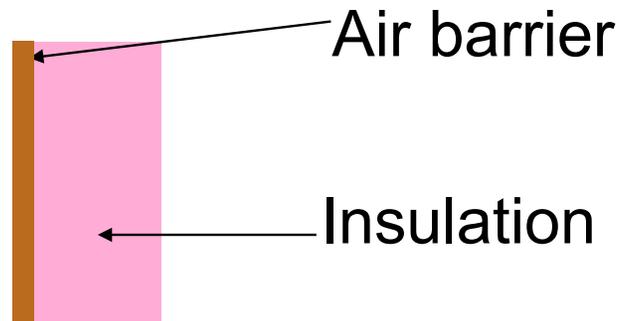
What drives air movement (Convection)?



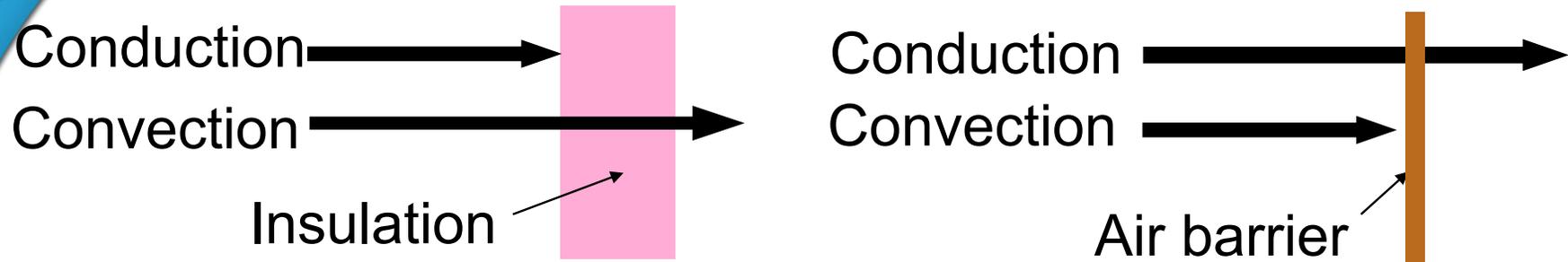
- Pressure difference
 - Stack Effect
 - Unbalanced HVAC system (leaky ducts)
- Pathway
 - Holes in envelope
 - Holes between spaces

What is a fully aligned air barrier

- A fully aligned air barrier is a situation where the insulation (thermal boundary) and air barrier (pressure boundary) are physically touching and working together.

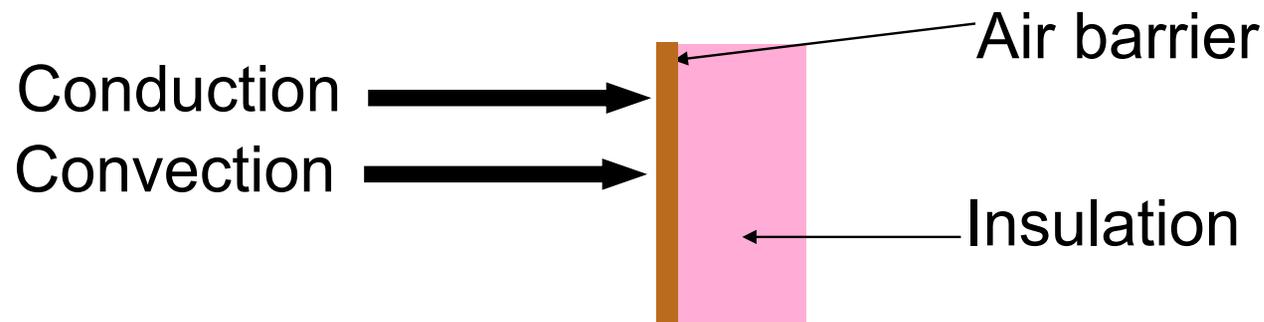


Why is Air Barrier Alignment Important?



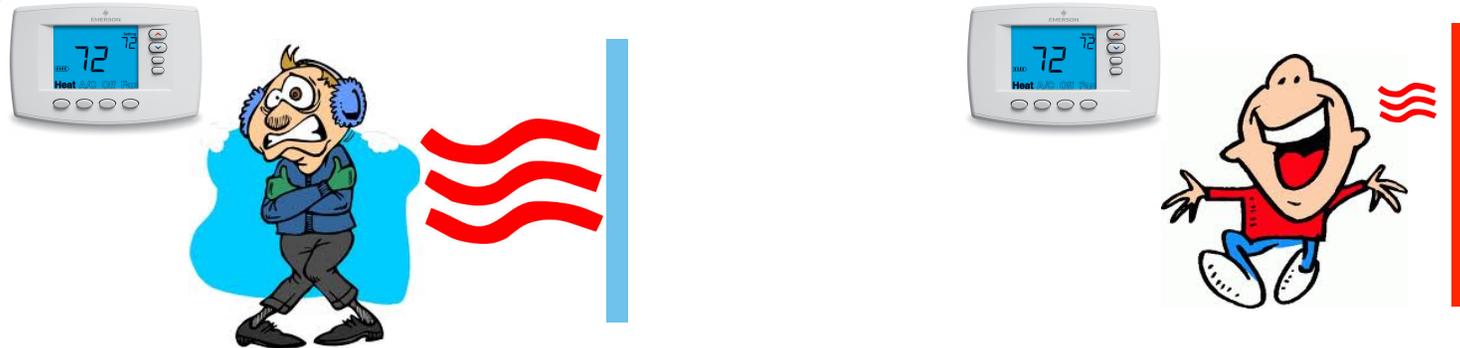
Most building insulation is better at slowing Conduction, not Convection

Most air barriers are better at slowing Convection, not Conduction



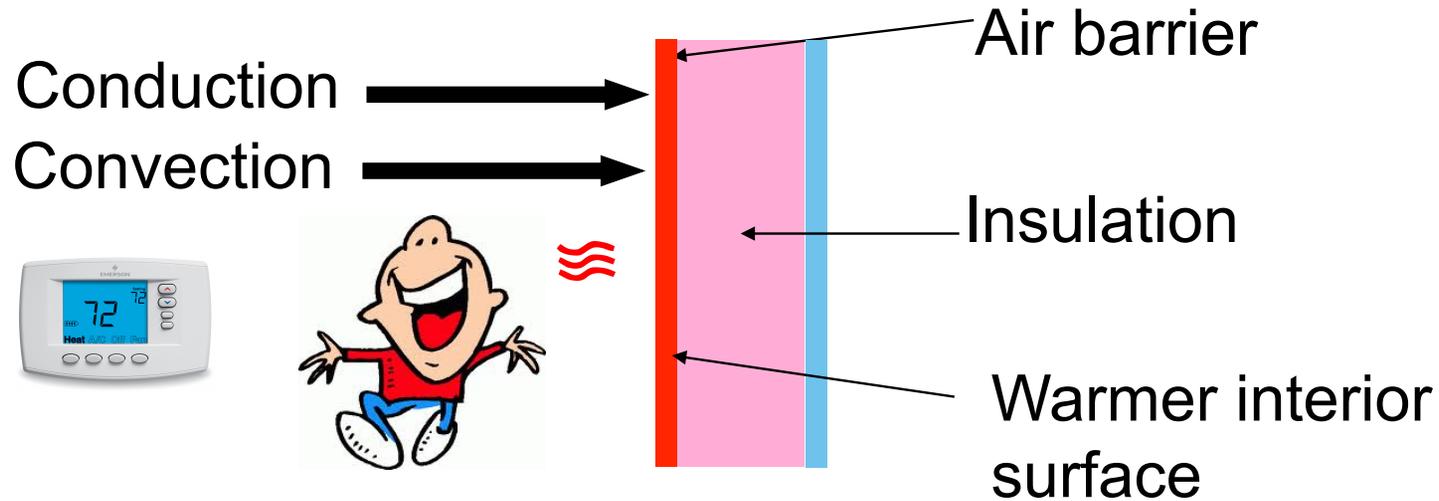
When used together, Air Barriers and Insulation can stop a greater proportion of heat flow through the building envelope.

Why is Air Barrier Alignment important?



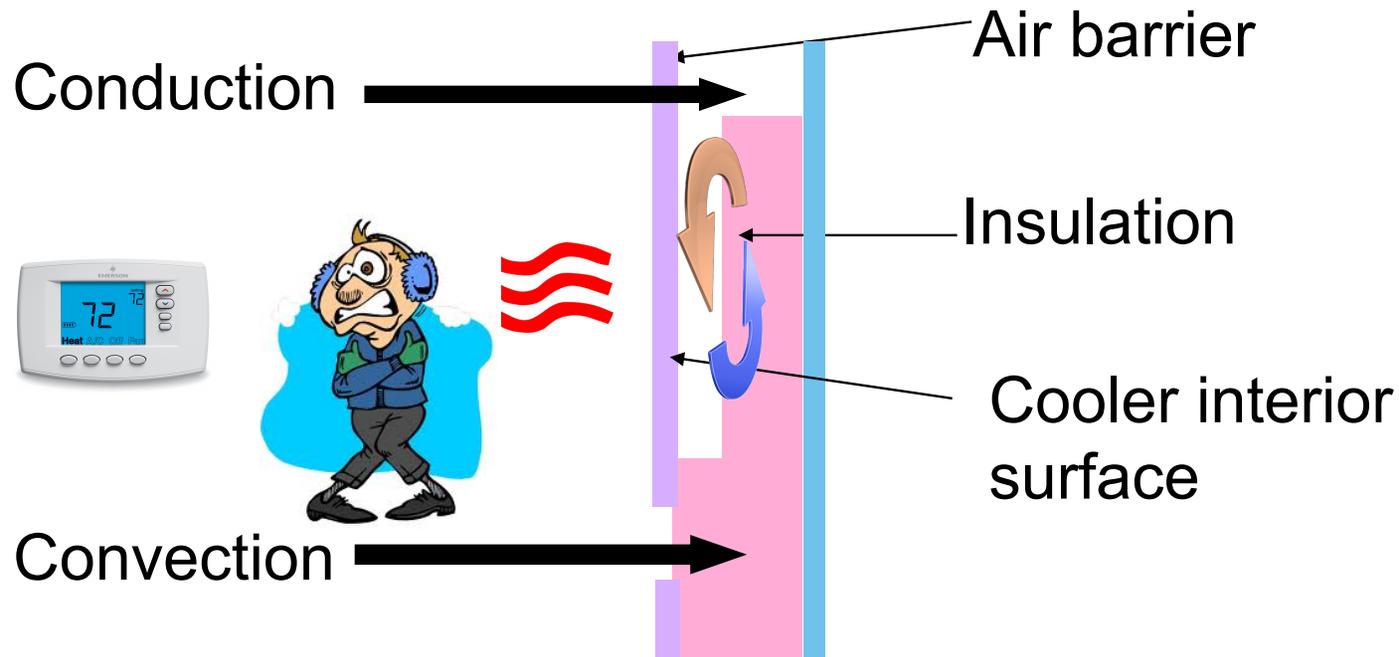
Radiation- Since humans are warm creatures, when we are close to cold surfaces, we radiate heat to that surface, and we are uncomfortable. When we are close to warm surfaces, we radiate less heat to that surface, and we are more comfortable. This is one way we can be uncomfortable in a room even when the thermostat reads what should be a comfortable temperature.

Air Barrier Alignment



A Fully aligned air barrier can slow all three types of heat loss, leading to more comfortable inhabitants.

What if Air Barrier Alignment is off?



Air barrier misalignment can be caused by either a missing element, or a gap between the elements. When the air barrier alignment is off, convective loops can form more easily inside the walls, increasing cold spots in the walls, and decreasing comfort. This increased heat loss will also cause HVAC equipment to work harder to maintain temperature.

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

3 FULLY-ALIGNED AIR BARRIERS

1 WALLS



DETAIL 3.1.1 ^{6,7,10}

Walls behind showers and tubs

- A. Install insulation without misalignments, compressions, gaps, or voids in all exterior wall cavities behind all tubs and showers.
- B. Back with a rigid air barrier or other supporting material to prevent insulation from sagging and create a continuous thermal barrier.*
- C. Seal all seams, gaps, and holes of the air barrier with caulk or foam before tub/shower installation.

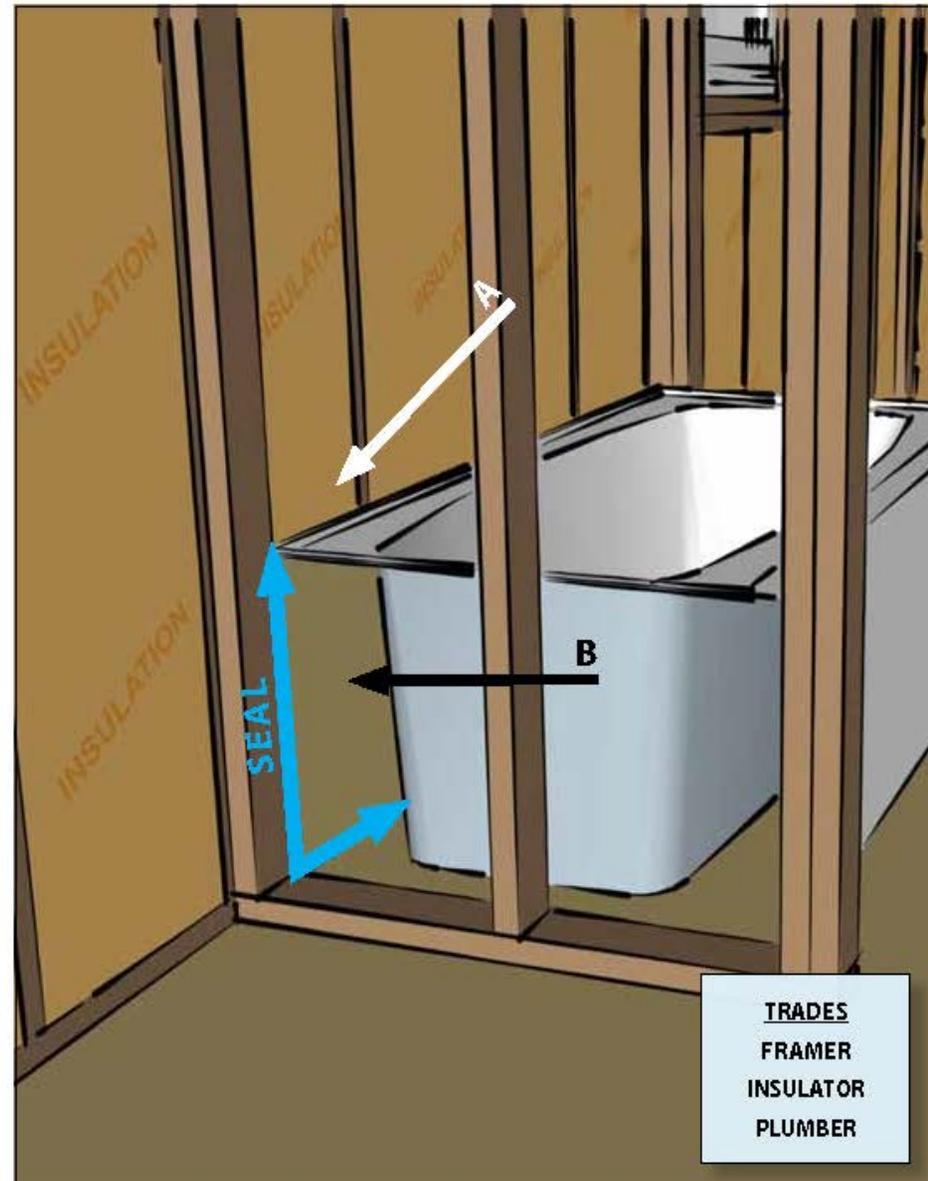
* EPA recommends using a rigid air barrier, but it is not a requirement.

FOOTNOTES

6. For purposes of this checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers. Open-cell or closed-cell foam shall have a finished thickness $\geq 5.5"$ or $1.5"$, respectively, to qualify as an air barrier unless the manufacturer indicates otherwise. If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads $\geq 1"$ diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.

7. EPA highly recommends, but does not require, inclusion of an interior air barrier at band joists in Climate Zone 4 through 8.

10. All insulated vertical surfaces are considered walls (e.g., exterior walls, knee walls) and must meet the air barrier requirements for walls. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.



3.1.1

Walls behind showers and tubs



No air barrier installed prior to tub installation.

B



Air barrier installed behind the tub.

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

3

FULLY-ALIGNED AIR BARRIERS

1

WALLS



DETAIL 3.1.2^{6,7,10}

Walls behind fireplaces

- A. Install insulation without misalignments, compressions, gaps, or voids in all exterior wall cavities behind all fireplaces.
- B. Back with a fire-proof rigid air barrier or other supporting material to create a continuous thermal barrier and prevent a fire hazard.*
- C. Seal all seams, gaps, and holes of the air barrier with fire-rated caulk or foam before fireplace installation.

* EPA highly recommends using a rigid air barrier, but it is not a requirement.

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INSULATOR

3.1.2 Walls behind fireplaces



No rigid air barrier is installed behind fireplace.



Rigid air barrier is installed behind fireplace.

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

3

FULLY-ALIGNED AIR BARRIERS

1

WALLS



DETAIL 3.1.3 ^{6,7,10}

Attic knee walls

- Install a top and bottom plate or blocking at the top and bottom of all knee wall cavities.
- Back attic knee walls with a rigid air barrier or other supporting material to prevent insulation from sagging and create a continuous thermal barrier.*
- Seal all seams, gaps, and holes of the air barrier with caulk or foam.
- Install insulation without misalignments, compressions, gaps, or voids in all knee wall cavities.

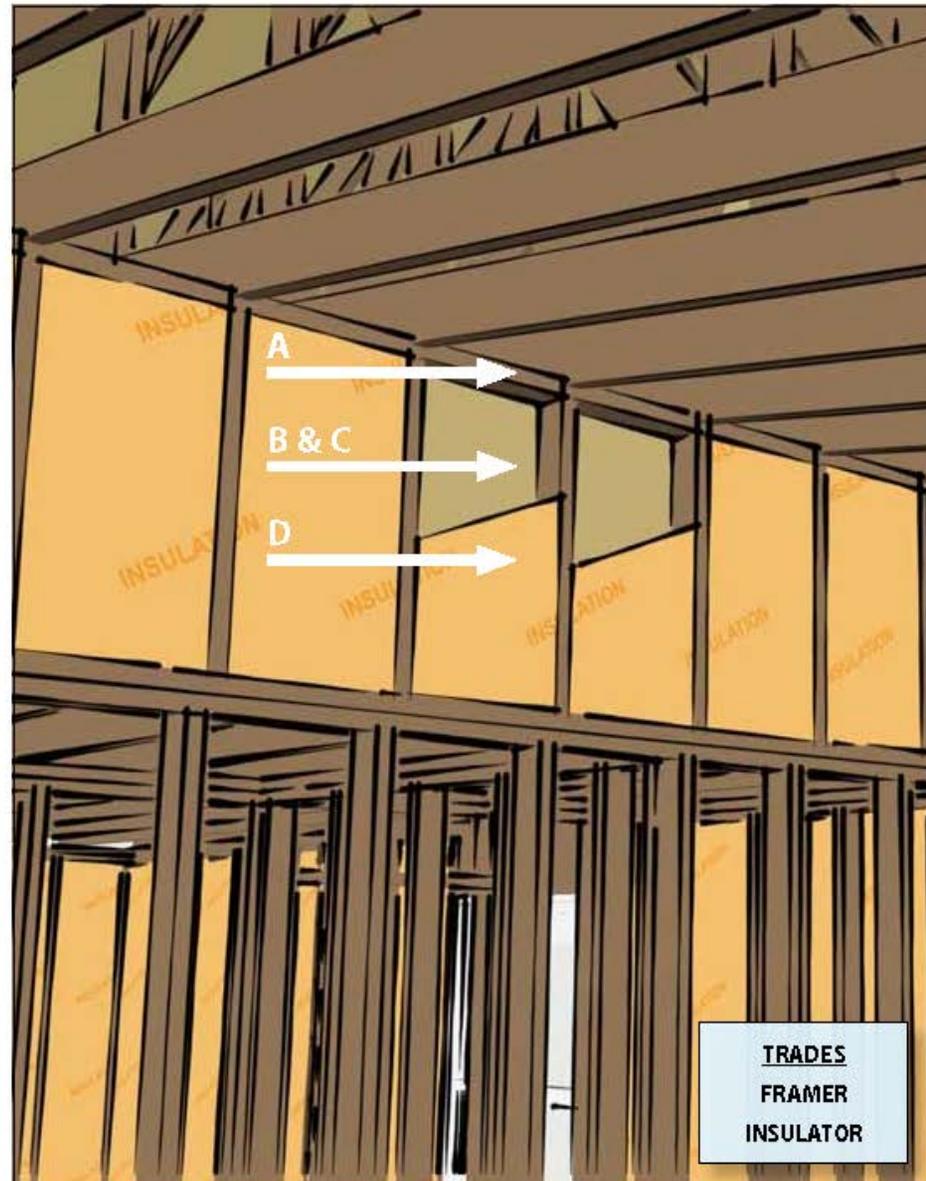
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7. EPA highly recommends, but does not require, inclusion of an interior air barrier at band joists in Climate Zone 4 through 8.

10. All insulated vertical surfaces are considered walls (e.g., exterior walls, knee walls) and must meet the air barrier requirements for walls. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.



3.1.3 Attic knee walls

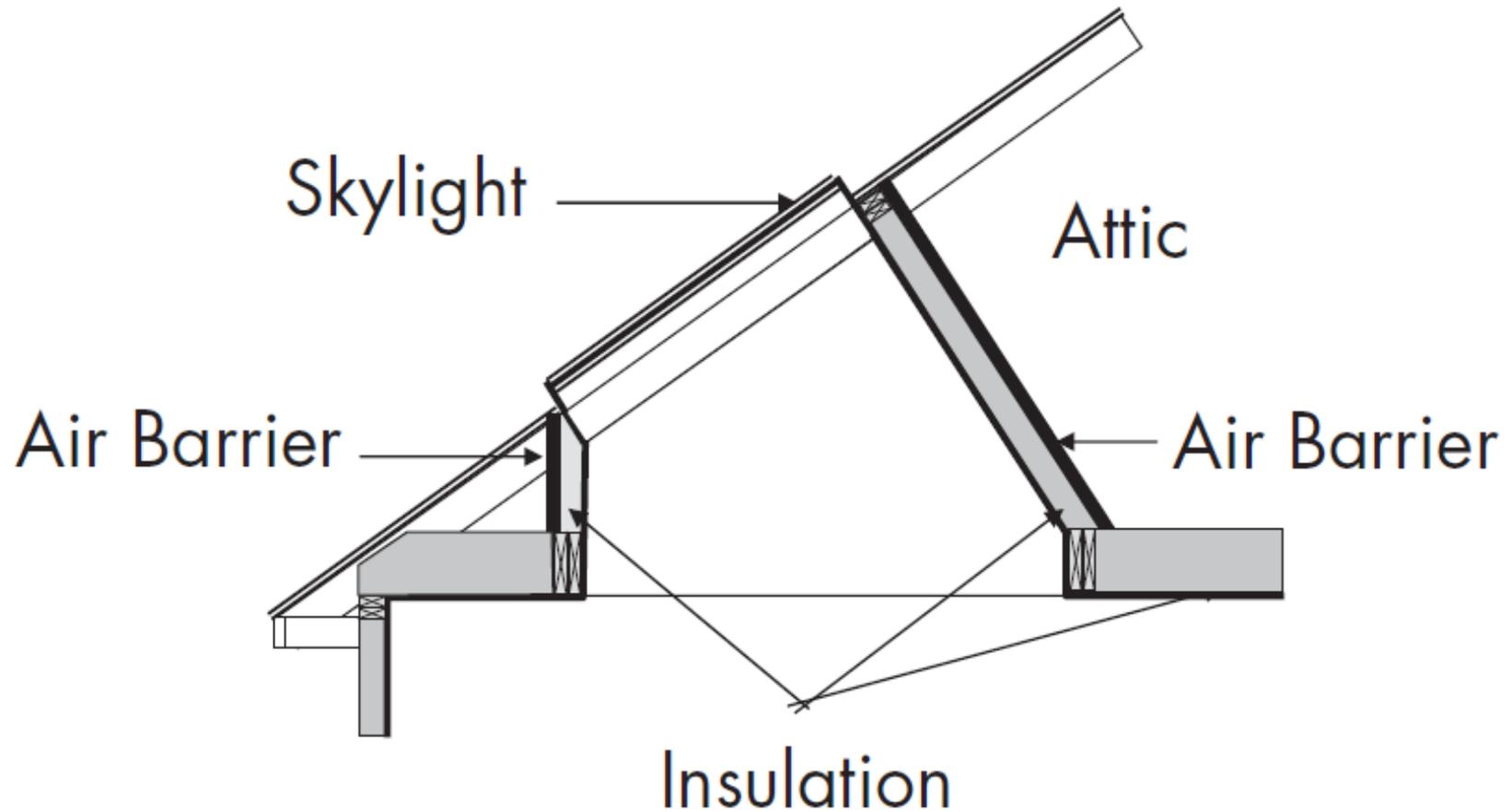


Improperly installed insulation and no rigid backing.



Properly insulated, backed, and air-sealed knee wall.

3.1.4 Skylight shaft walls



3.1.4 Skylight shaft walls



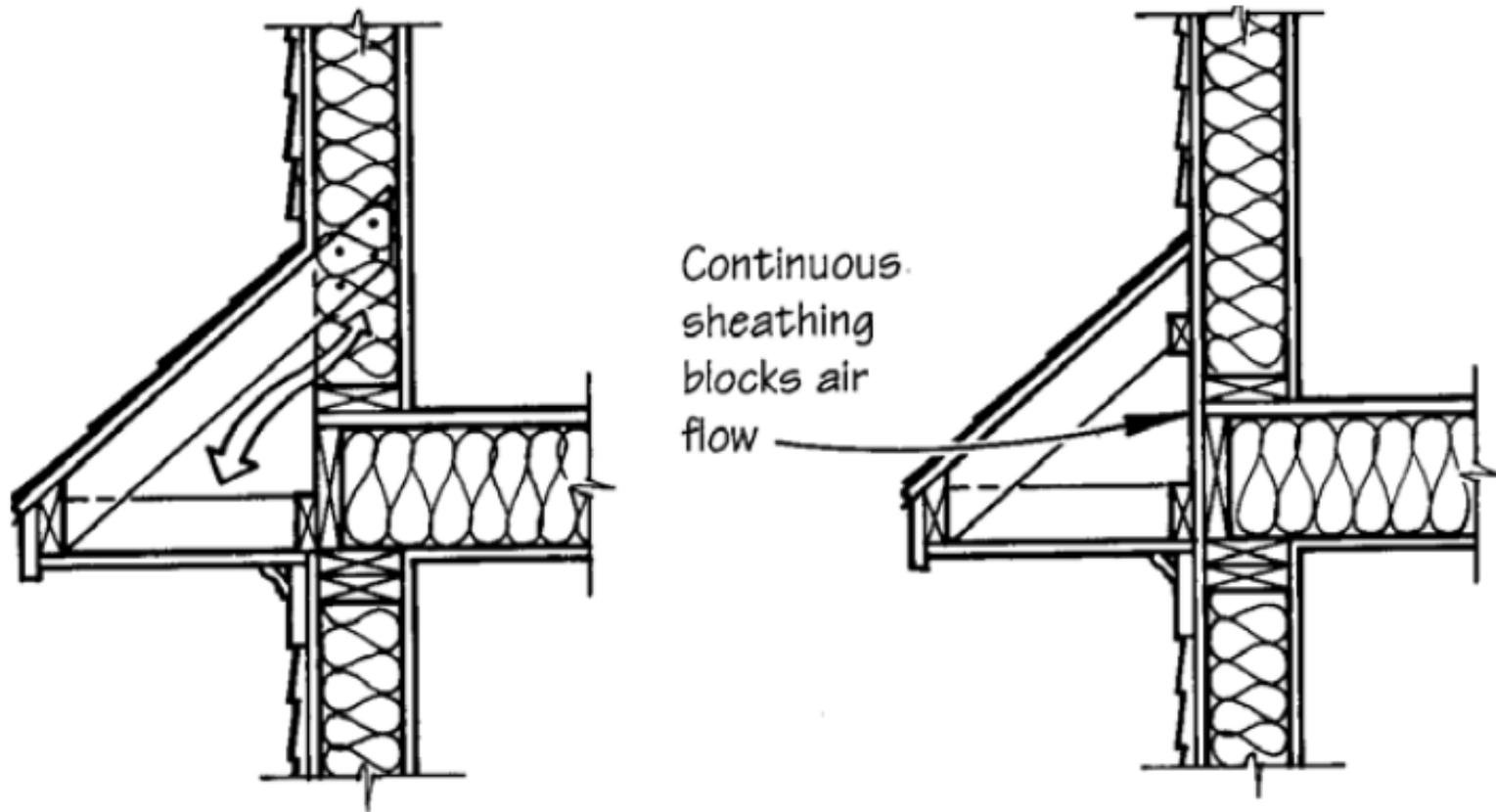
Rigid air barrier not installed to hold insulation in place.

A



Rigid air barrier is installed to hold insulation in place, and sealed.

3.1.5 Wall adjoining porch roof



Install an air barrier at porch roofs

3.1.5 Wall adjoining porch roof



No air barrier between porch attic and conditioned space.

A



Air barrier is installed prior to porch attic framing.

3.1.5 Wall adjoining porch roof



Air barrier not sealed between porch attic and conditioned space.

B



Air barrier is sealed between porch attic and conditioned space.

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

3 FULLY-ALIGNED AIR BARRIERS

1 WALLS



DETAIL 3.1.6^{6,7,10}

Staircase walls

- A. Install insulation without misalignments, compressions, gaps, or voids in all exterior wall cavities underneath all staircases.
- B. Install a rigid air barrier to prevent insulation from sagging and create a continuous thermal barrier.*
- C. Seal all seams, gaps, and holes of the air barrier with caulk or foam.

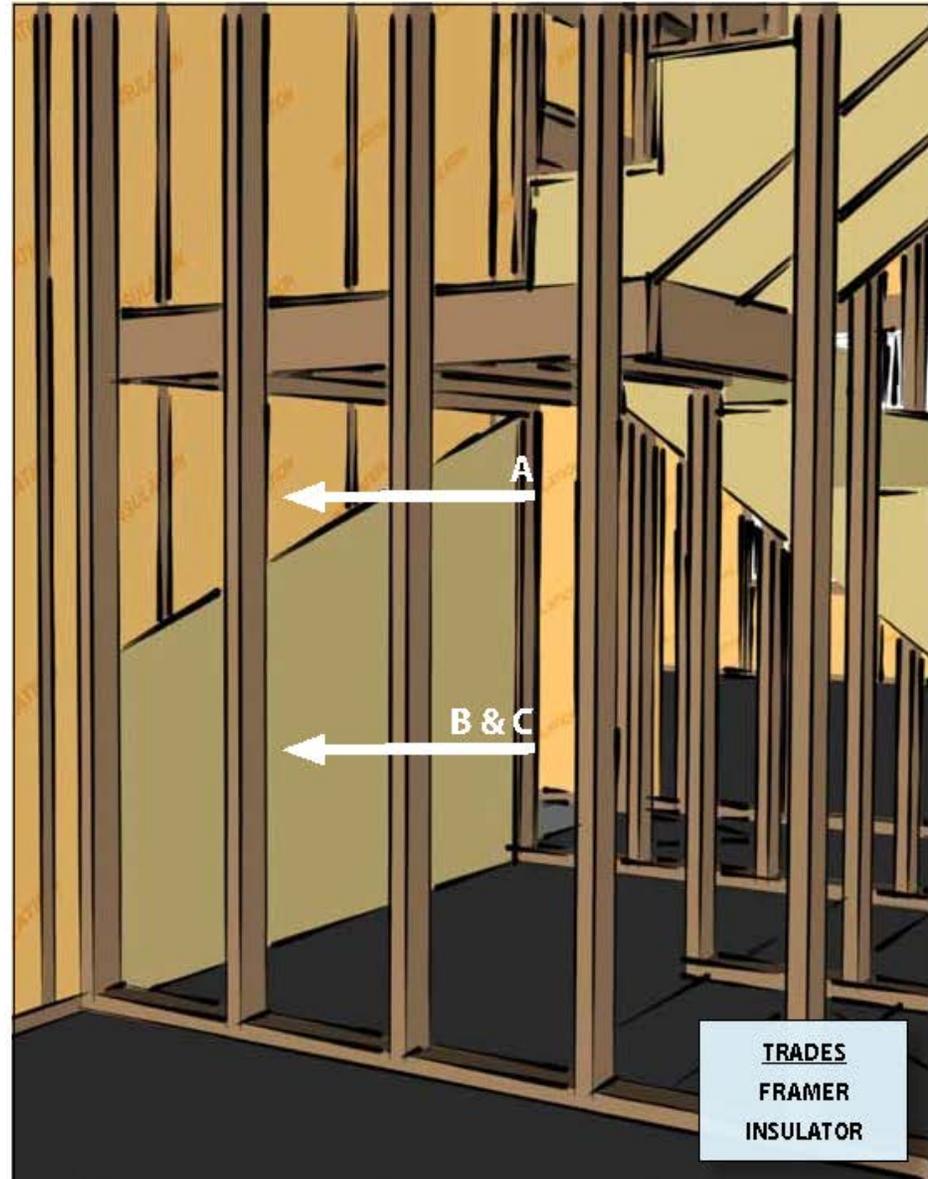
* EPA highly recommends using a rigid air barrier, but it is not a requirement.

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7. EPA highly recommends, but does not require, inclusion of an interior air barrier at band joists in Climate Zone 4 through 8.

10. All insulated vertical surfaces are considered walls (e.g., exterior walls, knee walls) and must meet the air barrier requirements for walls. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.



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3.1.6 Staircase walls



No air barrier installed under staircase.



Air barrier installed under staircase and sealed.

Picture taken from house looking into attached garage.

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

3 FULLY-ALIGNED AIR BARRIERS

1 WALLS



DETAIL 3.1.8^{6,7,10}

Garage rim/band joist adjoining conditioned space

- Install a continuous rigid air barrier or other supporting material to separate the garage from the conditioned space.*
- Seal all seams, gaps, and holes of the air barrier with caulk or foam and complete before installing the insulation.
- Install insulation without misalignments, compressions, gaps, or voids in all band joist cavities.

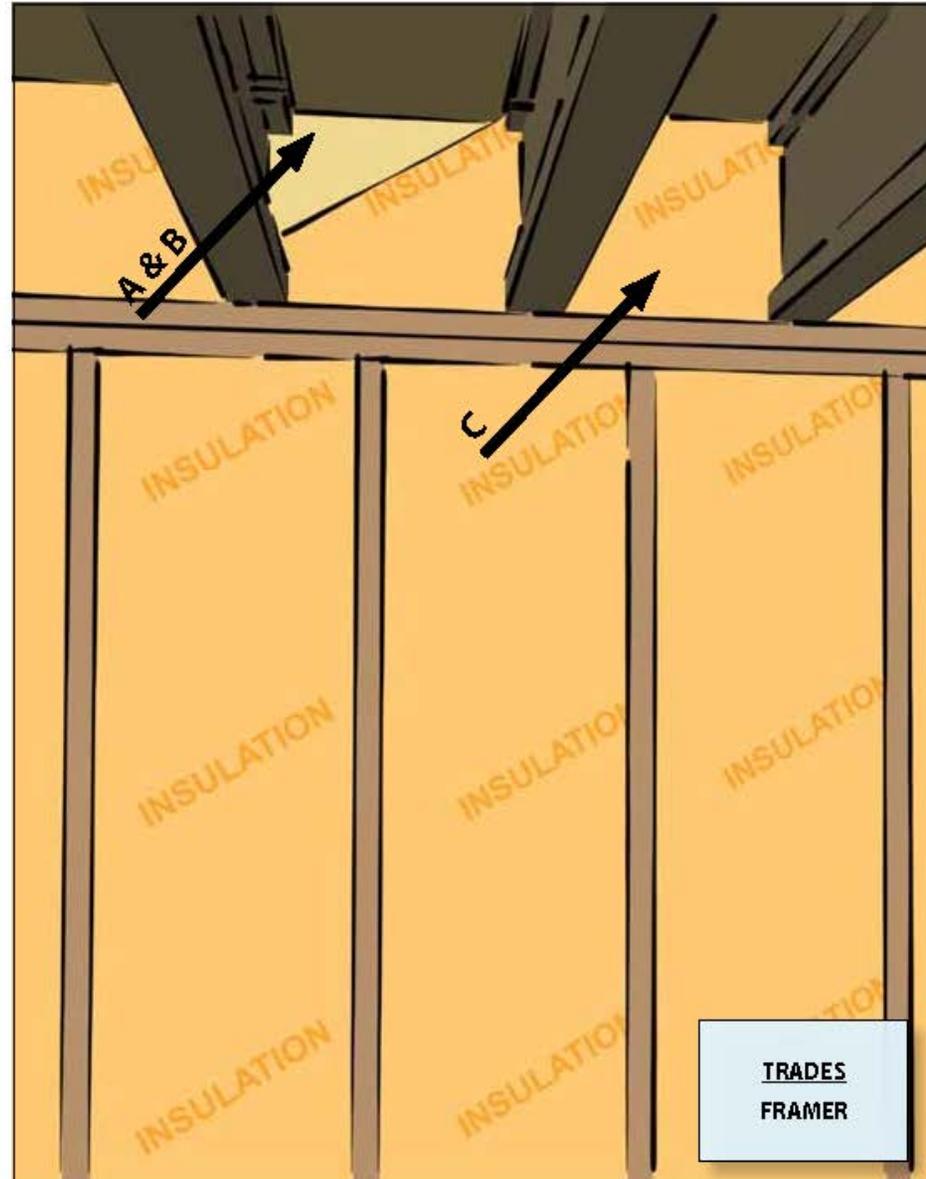
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3.1.8 Garage rim / band joist adjoining conditioned space



A



No air barrier is present between garage and conditioned space.

Air barrier is present between garage and conditioned space.

3.1.9 All other exterior walls



Insulation is misaligned due to inside stapling of batts .



Insulation is properly installed.

3.2.1 Floors above garage



Insulation is misaligned with floor above.



Insulation is in contact with floor above.

IN CZ's 5 and up the cavity should be full anyway (R-30 min)

THERMAL ENCLOSURE SYSTEM RATER CHECKLIST

3 FULLY-ALIGNED AIR BARRIERS

2 FLOORS



DETAIL 3.2.2^{6,8,9}

Cantilevered floor

- Install a rigid air barrier or other supporting blocking to separate the cantilever from the conditioned space.*
- Seal all seams, gaps, and holes of the air barrier with caulk or foam.
- Install insulation without misalignments, compressions, gaps, or voids and align it with the sub-floor, the rigid air barrier (A), and the exterior face of the cavity.
- Once insulated, enclose the cavity with a rigid air barrier material.

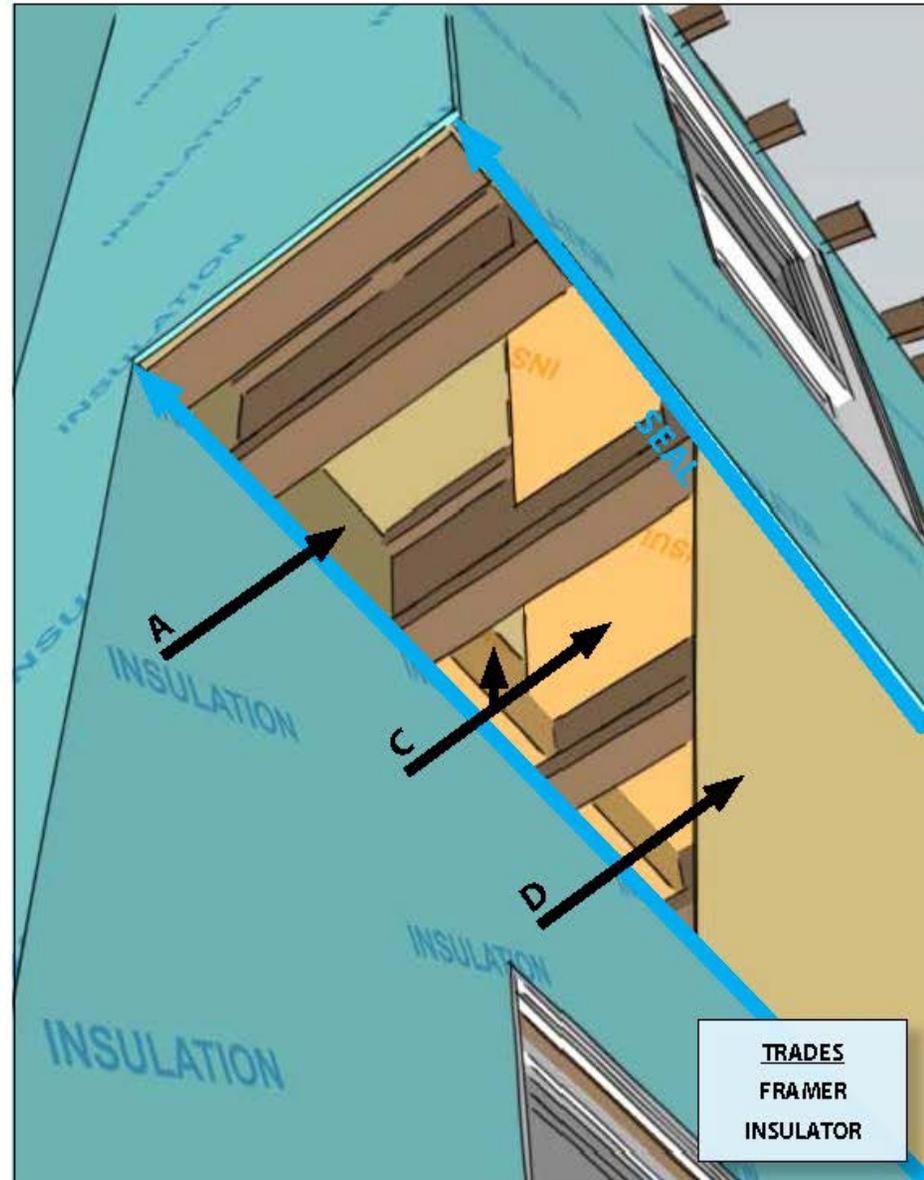
* EPA highly recommends using a rigid air barrier, but it is not a requirement.

FOOTNOTES

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8. Examples of supports necessary for permanent contact include stakes for batt insulation or netting for blown-in insulation. Batts that completely fill a cavity enclosed on all six sides may be used to meet this requirement without the need for supports, even though some compression will occur due to the excess insulation, as long as the compressed value meets or exceeds the required insulation level. Specifically, the following batts may be used in six-sided floor cavities: R-19 batts in 2x6 cavities, R-30 batts in 2x8 cavities, R-38 batts in 2x10 cavities, and R-49 batts in 2x12 cavities. For example, in a home that requires R-19 floor insulation, an R-30 batt may be used in a six-sided 2x8 floor cavity.

9. Fully-aligned air barriers may be installed at the exterior surface of the floor cavity in all Climate Zones if the insulation is installed in contact with this exterior air barrier and the perimeter rim and band joists of the floor cavity are also sealed and insulated to comply with the fully-aligned air barrier requirements for walls.



3.2.2 Cantilevered floor



Cantilever is not blocked or insulated.



Cantilever has been properly insulated, air sealed, and cavity has been blocked.

3.2.3

Floor above unconditioned basement or unconditioned crawlspace



C



Sub-floor insulation has gaps, compression, and misalignment.

Sub-floor insulation is properly installed and supported to be in contact with subfloor. .

3.3.1 Dropped ceiling/soffit below unconditioned attic



A



No air barrier is present between the dropped ceiling/soffit and the attic.

Air barrier is present between the dropped ceiling/soffit and the attic.

3.3.2 All other ceilings



Wind baffle installation will not allow insulation over the top plate.

A



Wind baffle installation will allow proper insulation depth over the top plate.

5.1.1 Duct/flue shaft



Vent sleeve not completely sealed.



Vent and air barrier sealed.

5.1.2 Plumbing/piping



Fibrous insulation is not an air barrier and cannot be used for sealing holes.



Neatly cut holes have been properly sealed with foam.

5.1.3 Electrical wiring



Holes have been cut excessively larger than needed making it difficult to seal.

Wiring penetrations have been neatly sealed with foam.

5.1.4

Bathroom and kitchen exhaust fans



Roughly cut hole that is larger than the fan making it difficult to seal.

Fan with a cleanly cut and properly sized hole has been air sealed to drywall.

5.1.5

Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and fully gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to $\geq R-10$ in CZ 4 and higher to minimize condensation potential.



A



Non ICAT recessed light installed.

ICAT labeled recessed light with trim kit installed.



5.2.1

All sill plates adjacent to conditioned space sealed to foundation or sub-floor with caulk. Foam gasket also placed beneath sill plate if resting atop concrete or masonry and adjacent to conditioned space.



B



Foam sprayed at exterior sheathing and sill plate connection leaving gaps beneath sill plate.

Installed foamed exterior sheathing intersection as well as the sill plate to sub-floor connection.

5.2.3

Sheetrock sealed to top plate at all attic/wall interfaces using caulk, foam, or equivalent material. Either apply sealant directly between sheetrock and top plate or to the seam between the two from the attic above. Construction adhesive shall not be used



Top plate to drywall connection not sealed.



Top plate to drywall connection sealed from attic with foam sealant.

5.2.4

Rough opening around windows & exterior doors sealed with caulk or foam ²³



Fibrous insulation is not an air barrier and cannot be used to air seal openings.

Rough opening around window has been filled with low-expansion foam to air seal.

5.2.7

In multi-family buildings, the gap between the drywall shaft wall (i.e., common wall) and the structural framing between units fully sealed at all exterior boundaries



Air leakage path in a common wall.



Approved common assembly installed.



5.3.2

Attic access panels and drop-down stairs equipped with a durable $\geq R-10$ insulated cover that is gasketed (i.e., not caulked) to produce continuous air seal when occupant is not accessing the attic ²⁴

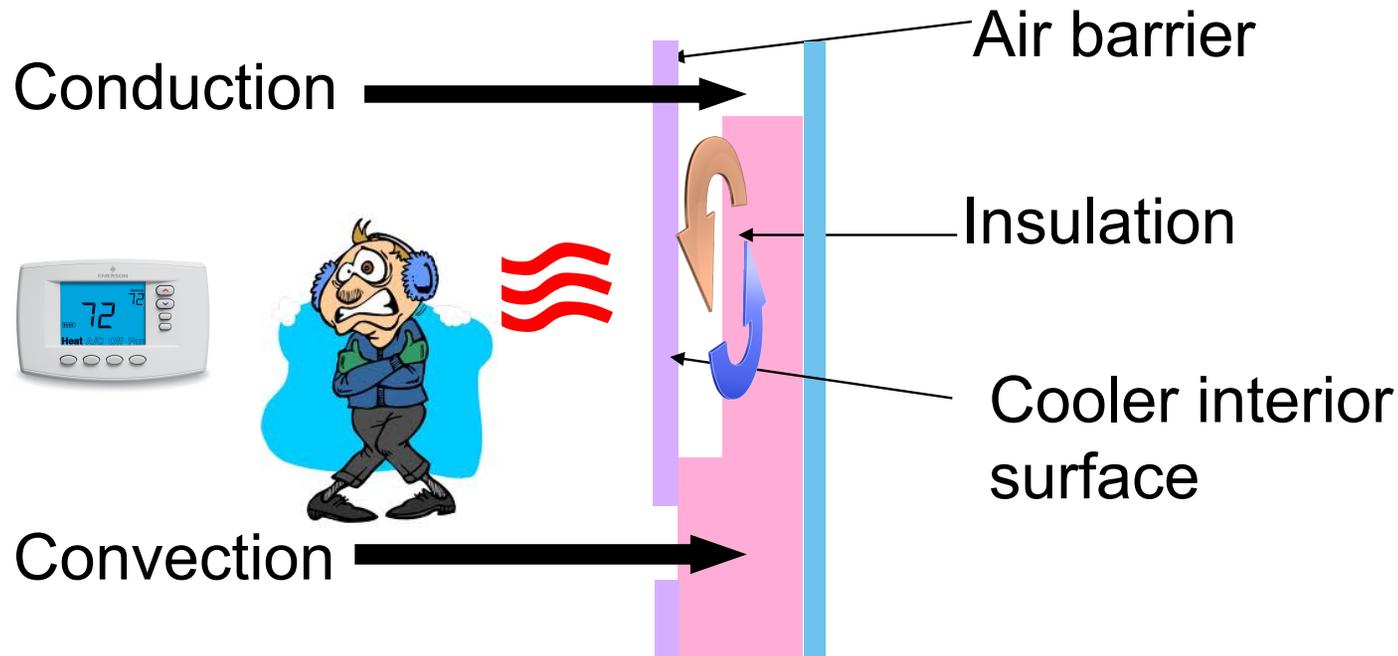


Attic access panel does not have an insulation cover installed.



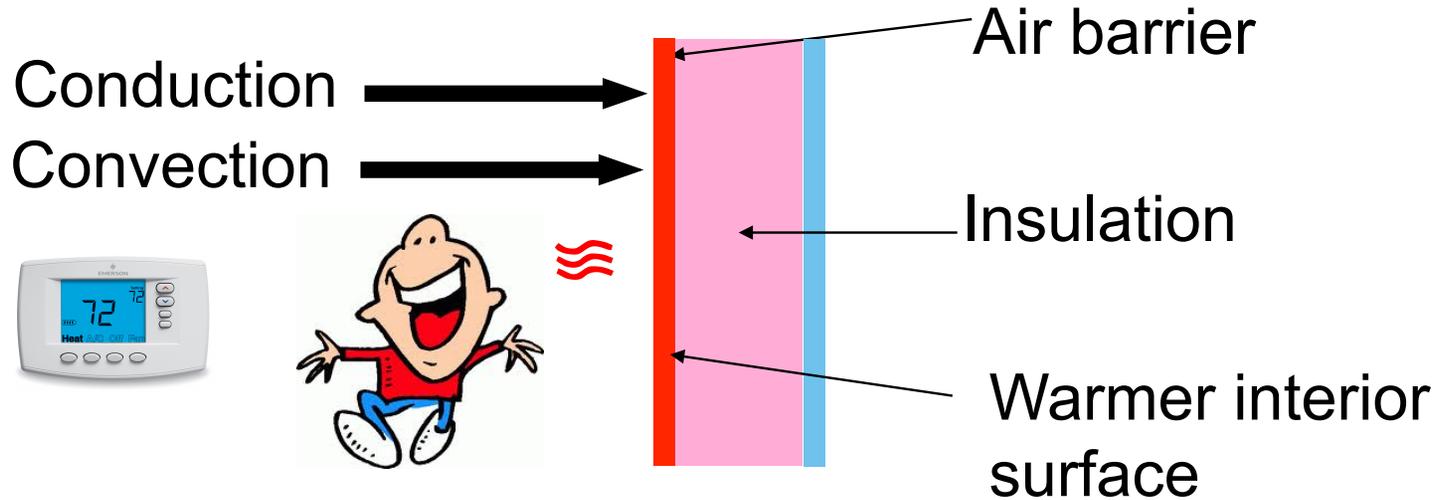
Attic access hatch has been properly insulated by attaching a fiberglass batt, gasketed, and opening has blocking.

Most misalignments are one of three types



- Missing insulation
- Missing air barrier
- Gaps between air barrier and insulation

Benefits of Air Barrier Alignment



- No Discussion = No Benefit = No increased value, only increased cost.
- How can we convey the above ideas to buyers in a way that they can understand?

Explaining the Benefits of Air Barrier Alignment

- Know your audience, ask questions about their existing home. Understanding the Building Science will help you explain why your new home will be more comfortable than their existing home, or non-certified new homes.
- Comfort
 - “Air Sealing” = “Draft Stopping”
 - Use Props - Wall mock ups! Granite countertop vs rigid insulation to demonstrate conduction.
 - Excessive air infiltration causes humidity issues and inconsistent temperatures across rooms and floors.
- Ice dams and icicles are primarily a draft stopping issue, explain this.



ENERGY STAR Sales Tips

- Become an [ENERGY STAR Partner](#)
- Order ENERGY STAR [Marketing Brochures](#)
- Access [My ENERGY STAR Account \(MESA\)](#) for: Co-Brandable Brochures, Banners and the ENERGY STAR Consumer Video





ENERGY STAR Sales Tips

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Retailers

The following ENERGY STAR marks are available to partners. When using any of these marks, be sure to comply with the [ENERGY STAR Brand Book](#).

New Home Industry

Utilities/EEPS

[A Quick Reference Guide for New Homes Partners](#) (2.31MB) highlights the main guidelines for proper use of the ENERGY STAR marks by partners in the ENERGY STAR Certified Homes program. This Quick Reference Guide is a clickable PDF. Please follow the instructions on page 2 of the Guide. This document supplements, rather than replaces, the ENERGY STAR Brand Book.

Residential & Commercial Products Programs

Service & Product Providers

Any questions about the ENERGY STAR marks and the ENERGY STAR Brand Book can be sent to logos@energystar.gov.

Buildings & Plants

Jump to:

Small Businesses

✚ Linkage Phrase Mark



Congregations

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For Contractors

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✚ About File Formats

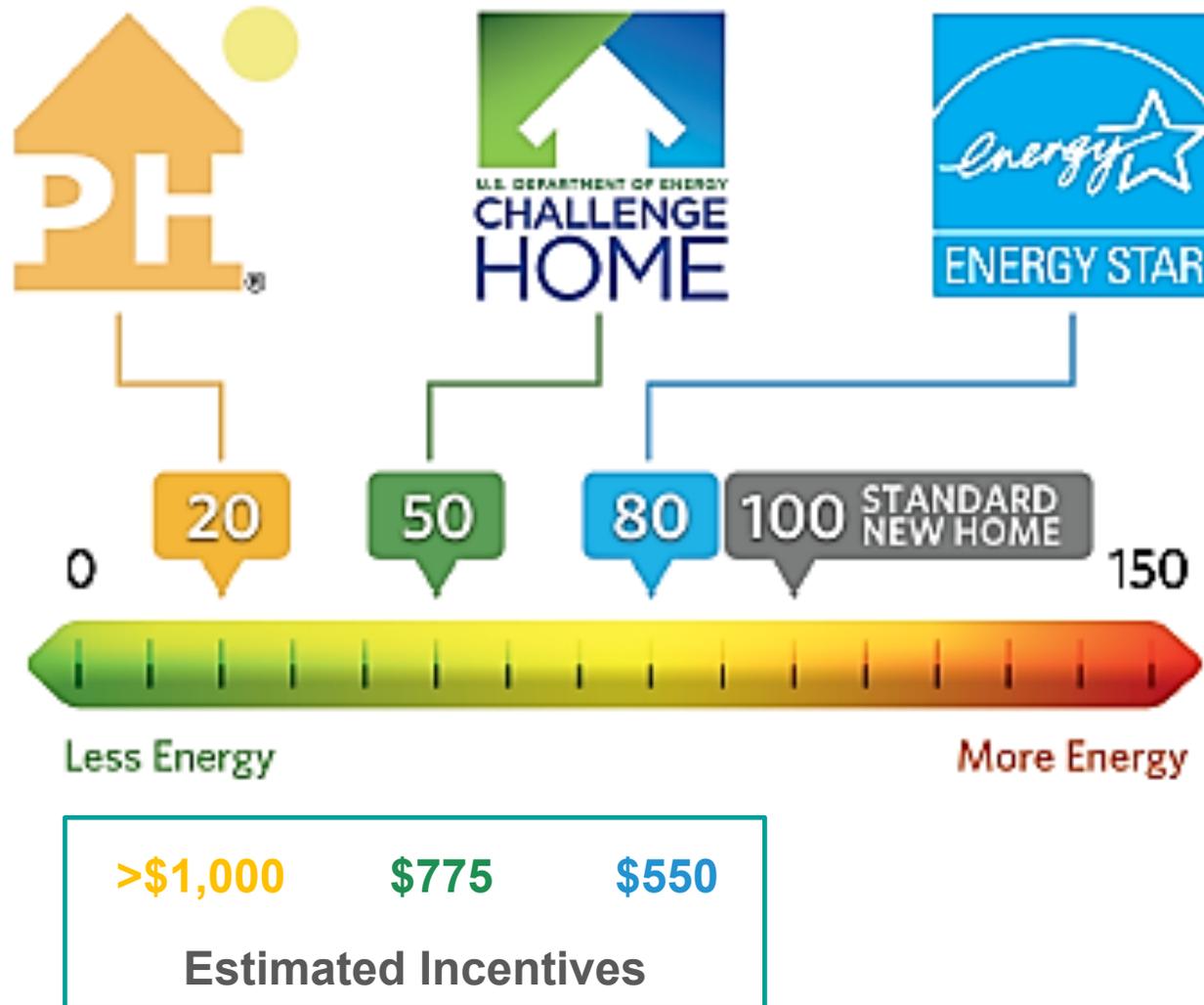


FirstEnergy New Homes Program Requirements – Review

FirstEnergy's Energy Efficient New Homes Program

- Builder incentives
 - \$400 per unit + \$0.10/kWh in projected savings
- Eligibility
 - Located in service area of a FirstEnergy Utility
 - Certificate of Occupancy Dates:
 - FirstEnergy Ohio utilities: after March 23, 2011
 - Met-Ed, Penelec, and Penn Power: after October 28, 2009
 - West Penn Power: after June 1, 2013
 - 15% more efficient than 2009 IECC (or relevant code when permitted)
 - **ENERGY STAR certification**

FirstEnergy Incentives – Review



These incentive amounts are not guaranteed. Incentives vary by project.

ENERGY STAR:

www.energystar.gov/newhomes

DOE Challenge Home:

<http://www1.eere.energy.gov/buildings/residential/>

Passive House:

<http://www.passivehouse.us>

Building Science Corporation:

<http://www.buildingscience.com/>

Mechanical Ventilation

A Breath of Fresh Air for Tight Homes

Thursday, May 8

Noon – 1:00 p.m.

Registration: <https://www2.gotomeeting.com/register/348671346>