Inspection Procedures for Attics

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Overview

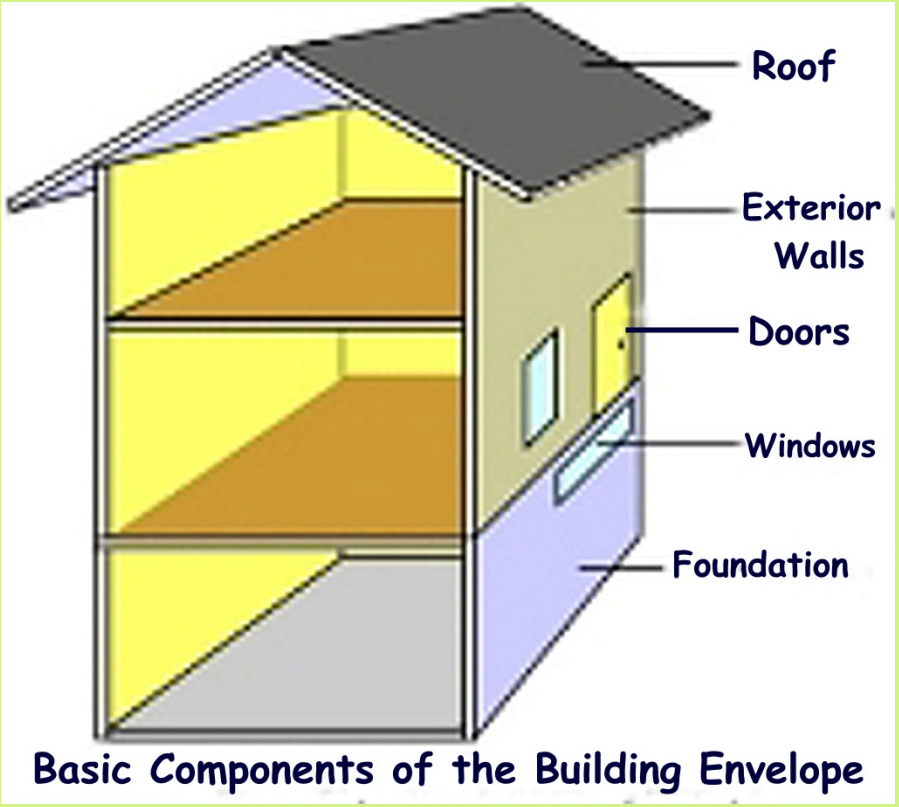
This session is an overview of the attic inspection process. Topics include:

- Attic Bypasses-Documentation and direction to correct
- Electrical Issues- Documentation of wiring, fusing, K&T wiring, junction boxes and how to treat these issues
- Calculating effective insulation values
- Recessed lights and exhaust fans-location and treatment
- Chimneys and flues- documentation and treatment
- Attic hatches and kneewall access
- Attic Venting

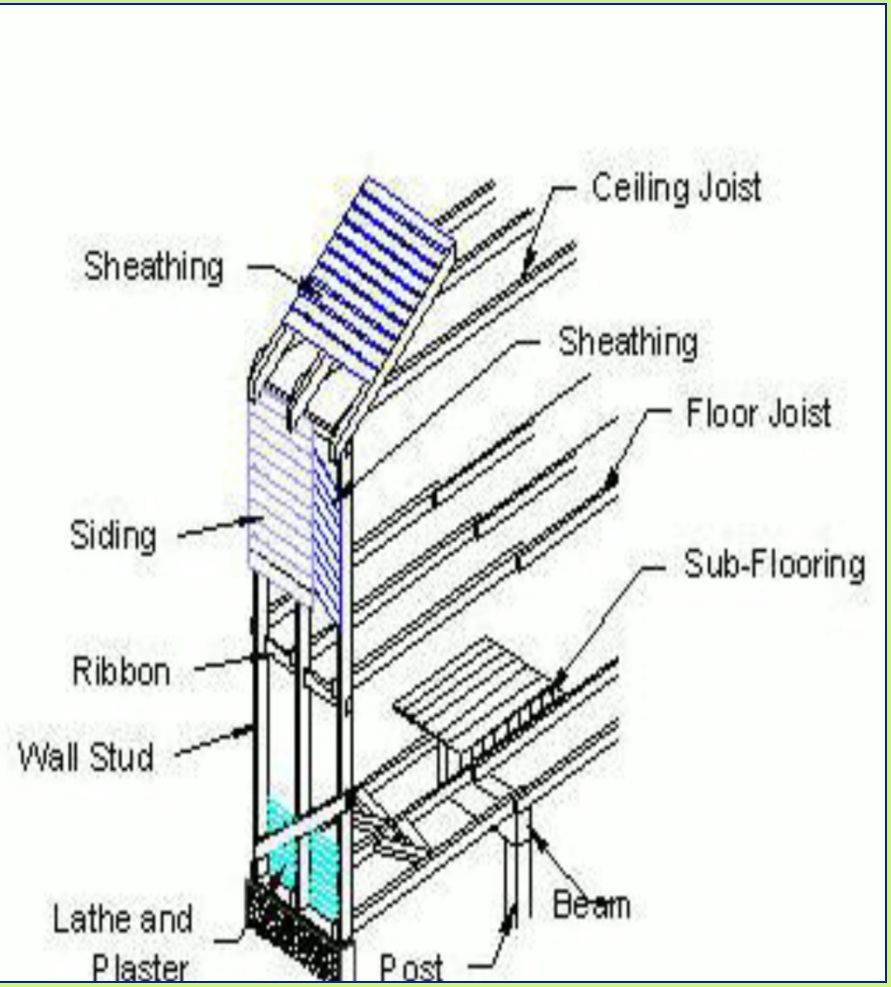
Building Envelope Evaluation

What is the Building Envelope?

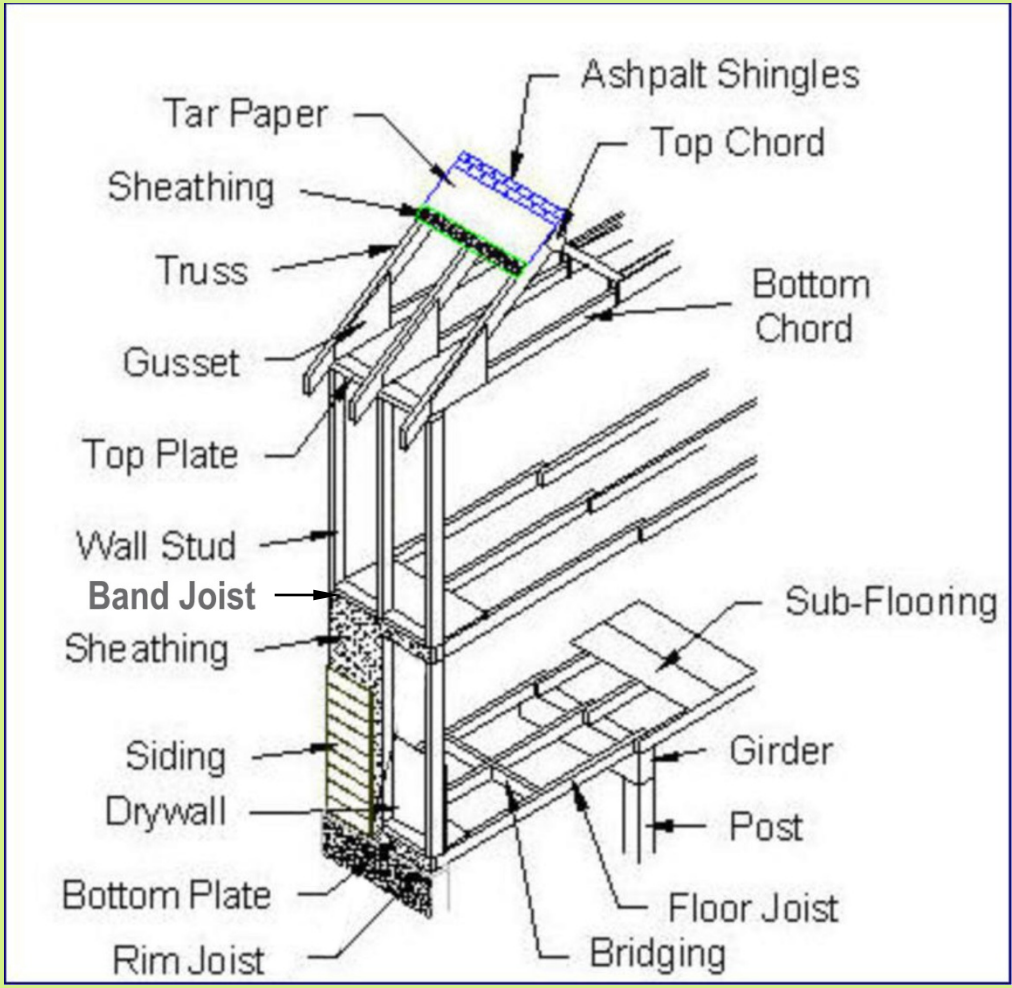
- Any part of the building that creates a boundary between indoor and outdoor space.



Framing Types and Why it Matters



Balloon Frame



Platform Frame

Attic Bypass

Must be sealed prior to insulating!

Sealing Bypass-Step 1

Stuff the large holes with a durable material

Sealing Bypass- Finish

Foam or caulk opening to air seal

Role of the Inspector

The Rehab Inspector must:

- Locate the bypasses
- Understand that Balloon Framing has many bypasses
- Provide adequate information to contractor on what is expected (spec writing)

Air Sealing and R-Value

If bypasses are not air sealed, the R-value of installed insulation is devalued by 60% or more.

Example: If bypasses are not sealed, and R-38 level of insulation is installed, the effective R-Value will be R-15 or less.

Insulation

- How it Works
- R-Values of Common Types
- Factors that Affect R-Value

How Insulation Works

- Insulation slows heat loss/gain by trapping still air in small pockets within the insulating material.
- The trapped air within the material is actually the insulator.
  - **Important: Most insulation does not stop air movement!**

Common Insulation Types and R-Values

Insulation Type	*R/Inch*
Cellulose-loose fill	3.7
Cellulose-dense Pack	3.2
Fiberglass Batts	3*
Polyisocyanurate	7.0
Spray Foam	3 - 6.5

* If properly installed

Evaluating Insulation

- Identify insulation by:
  - Type
  - R-Value (Use manufacturer’s rating or chart)
  - Condition
  - Quality of installation

Existing Insulation

- Existing insulation may cover bypasses-CHECK!
- Insulation coverage must be continuous
- Insulation must be installed correctly

Effective R-Values for Batt Insulation*

1. Measure the insulation thickness.
2. Determine the condition of the installation using the following criteria:

- ***Good-****No gaps or other imperfections*
- ***Fair-****Gaps over 2.5% of the insulated area (This equals 3/8 inch space along a 14.5 inch batt.)*
- ***Poor-****Gaps over 5% of the insulated area (This equals 3/4 inch space along a 14.5 inch batt.)*

* From BPI

What’s wrong with this picture?

Attic Insulation

Compression

Is this OK?…

Thermal and Pressure Boundaries

- Define Thermal Boundary
- Insulation Strategies
- Define Pressure Boundary
- Alignment of Thermal and Pressure Boundaries
- Interactive Effects

Thermal Boundary

Refers to location of insulation in the building envelope

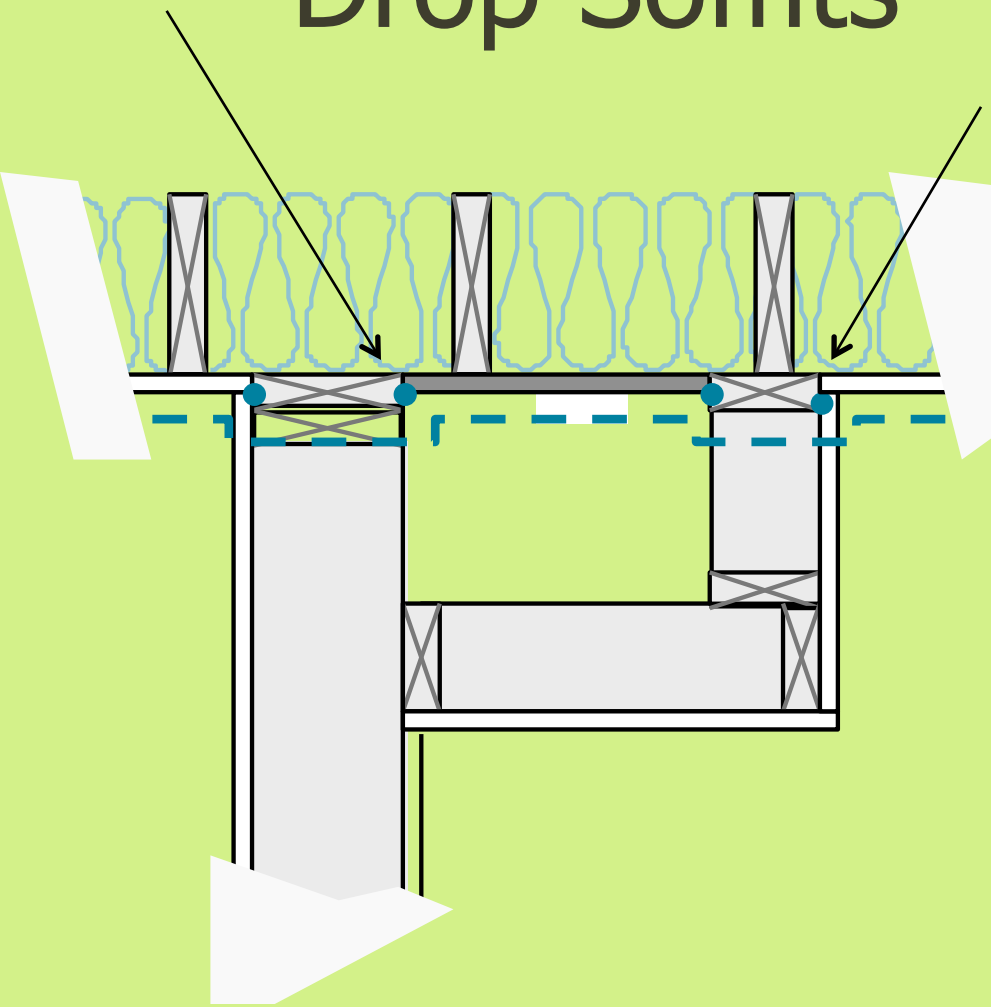
- Should be continuous
- Should be aligned with the Pressure Boundary (air barrier)

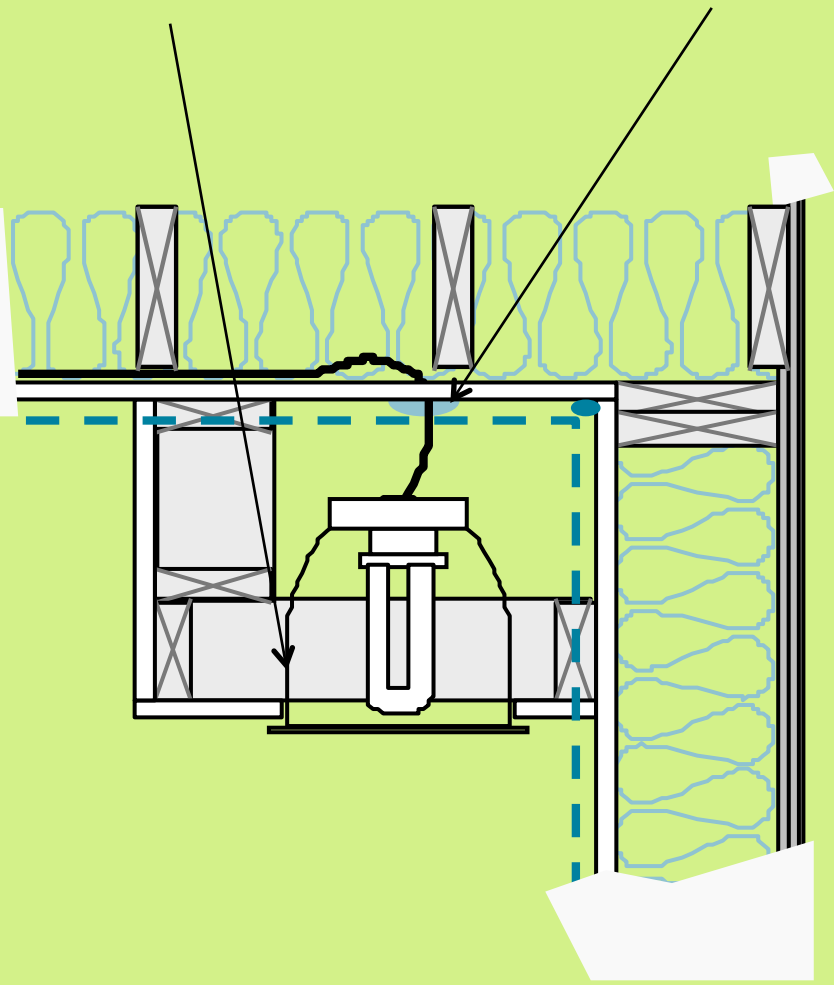
Does this look continuous?

Insulation Strategies

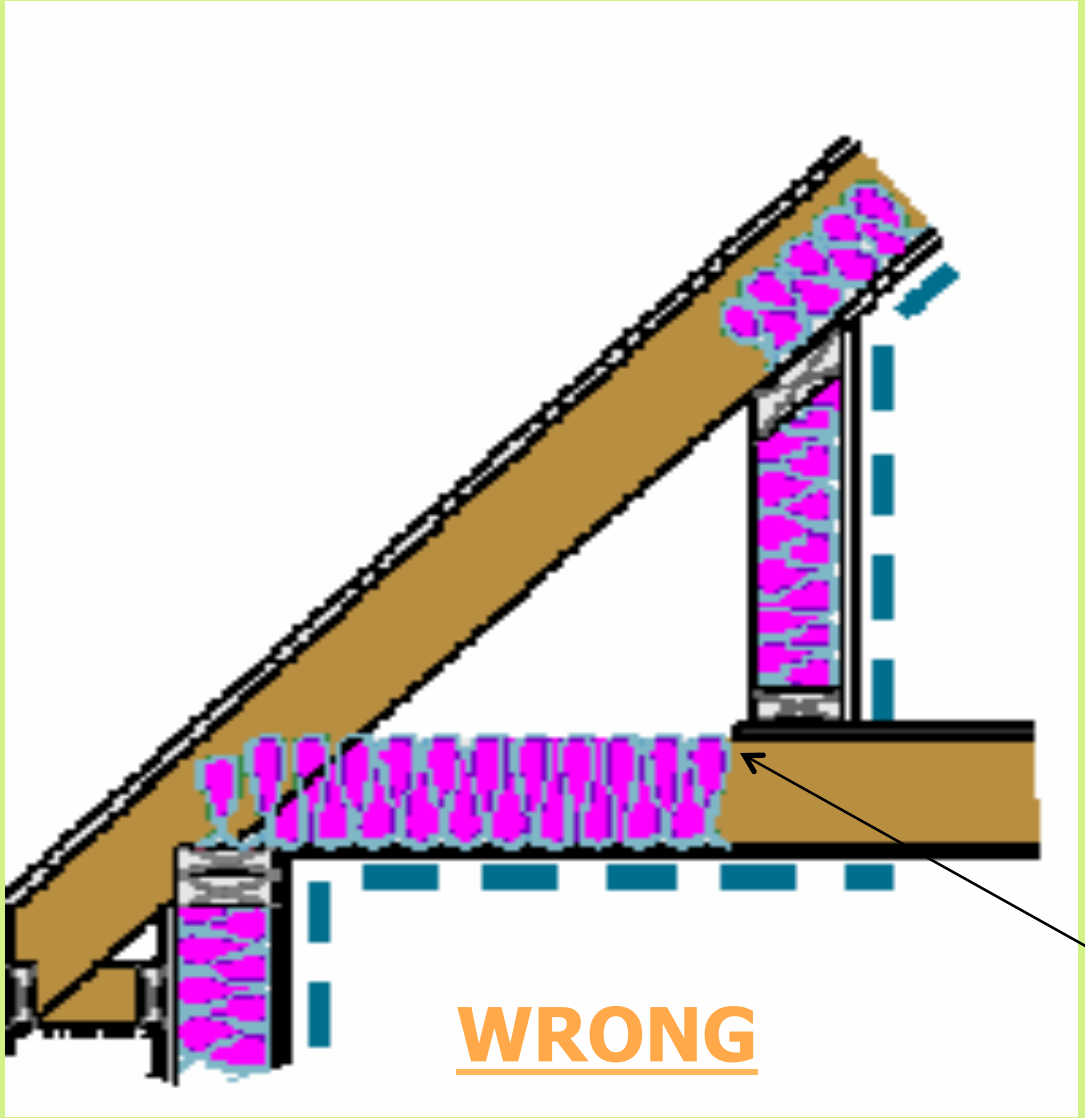
- Drop Soffits
- Kneewall Attics
- Attic Slopes
- Attic Flats
- Minimizing Windwash

Drop Soffits

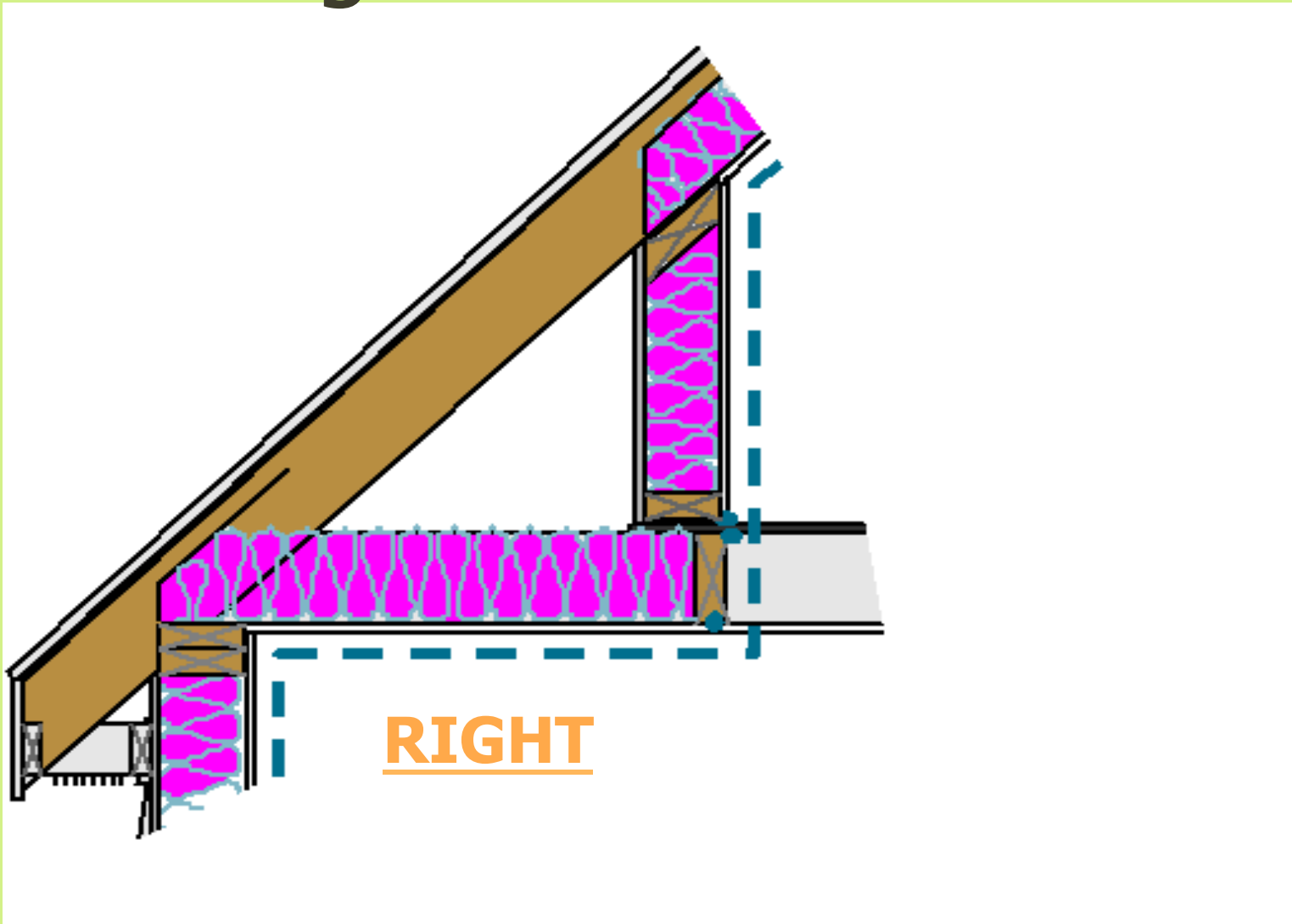




Insulating Kneewalls

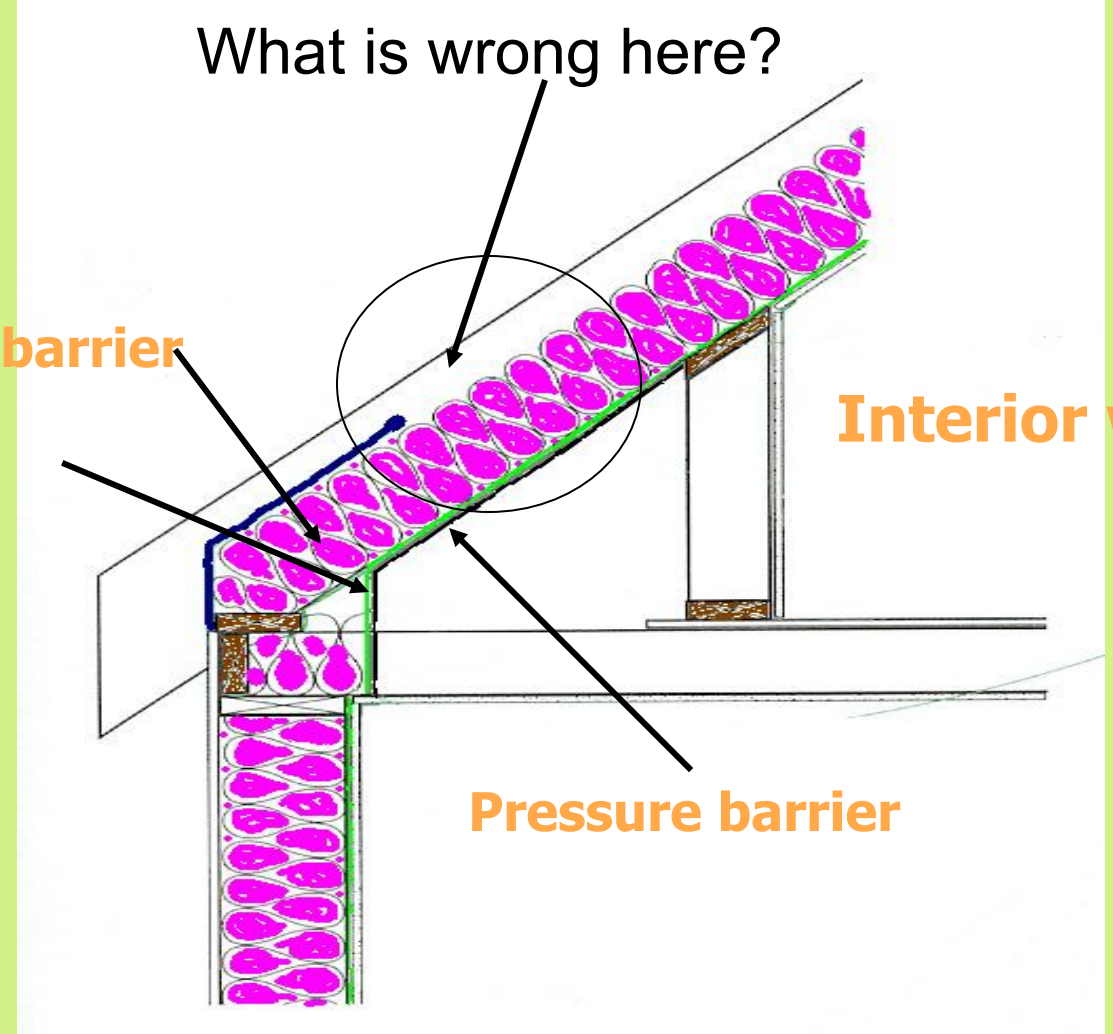


Insulating Kneewalls



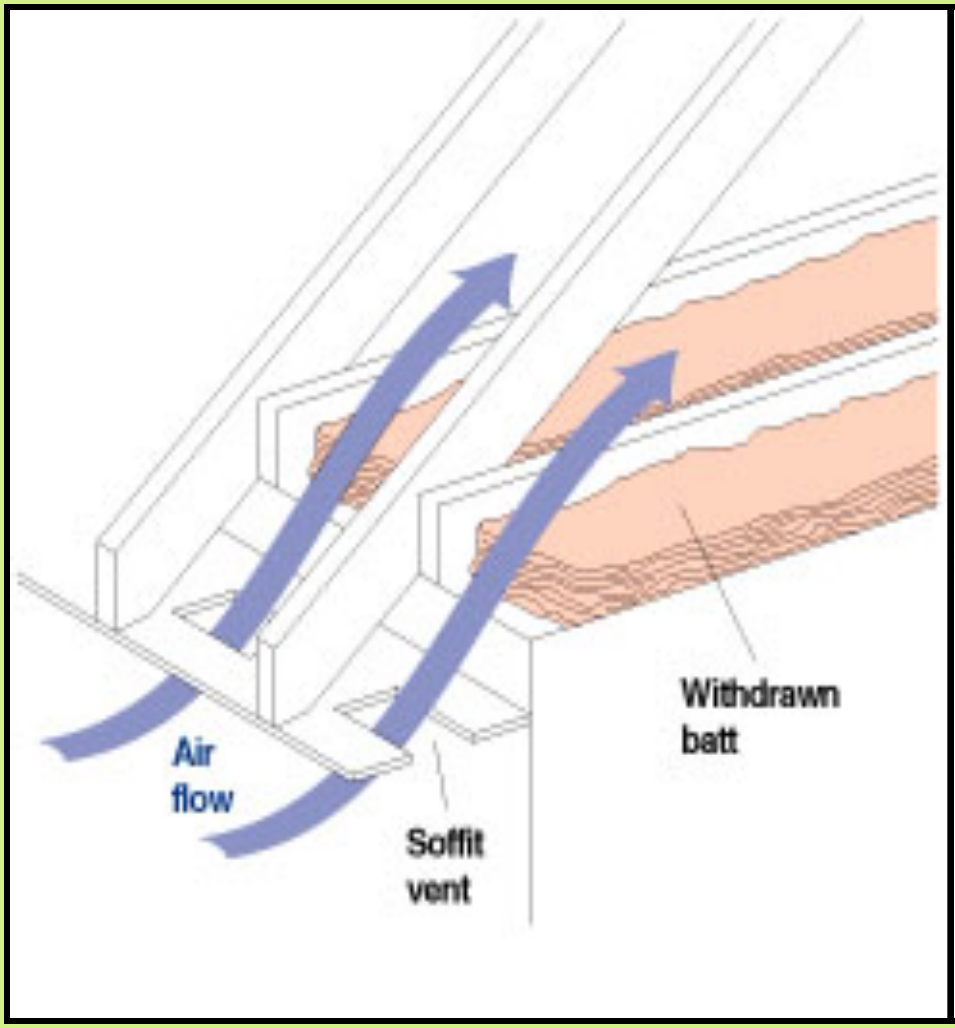
Knee Wall Attics

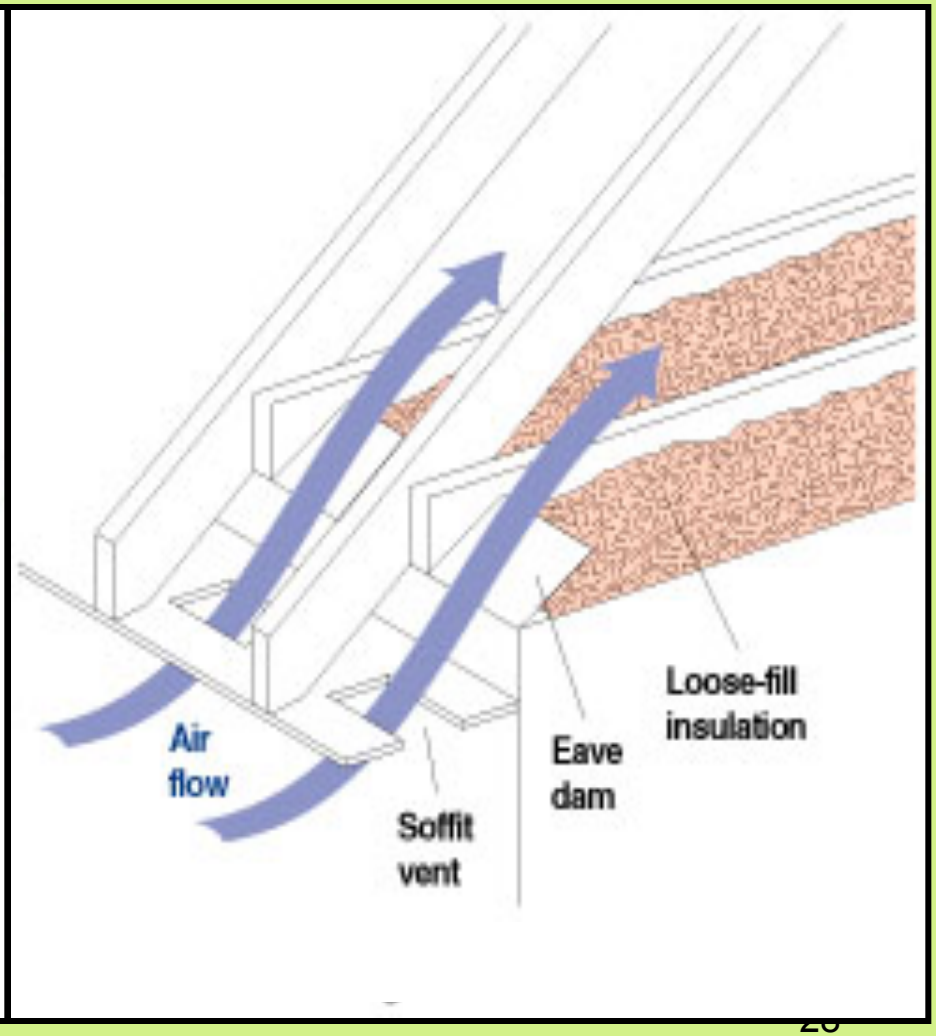
Keeping the space *inside* takes a little more thought...



Wind wash can reduce R-values

Windwash: Problems and Design





Minimizing Windwash with Attic Baffles?

Insulating Attic Flats

- When the cavity depth is small, or angles are an issue, a variety of insulation materials may be required to get the desired R-Value needed to reduce heating/cooling loss
- It is important to attain a *continuous R-Value* across the entire flat
- It is CRITICAL to AIR SEAL before or while installing insulation

Insulating Attic Slopes

- Depends on the design of the slope and the amount of workspace available
- It’s important to create an equal R-Value across the slope, the kneewall and the flat
- A variety of materials can be used depending upon the situation

Pressure Boundary

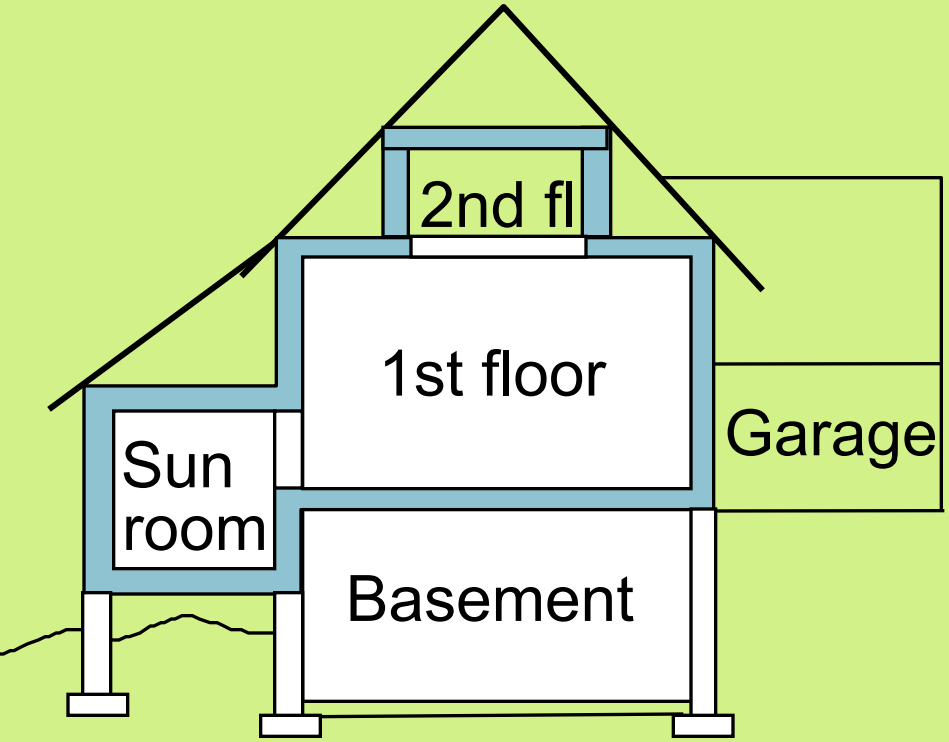
- Refers to location of the air barrier that separates conditioned air from unconditioned air
  - i.e. exterior walls and ceilings
- Should be continuous and airtight
- Should be aligned with the thermal boundary

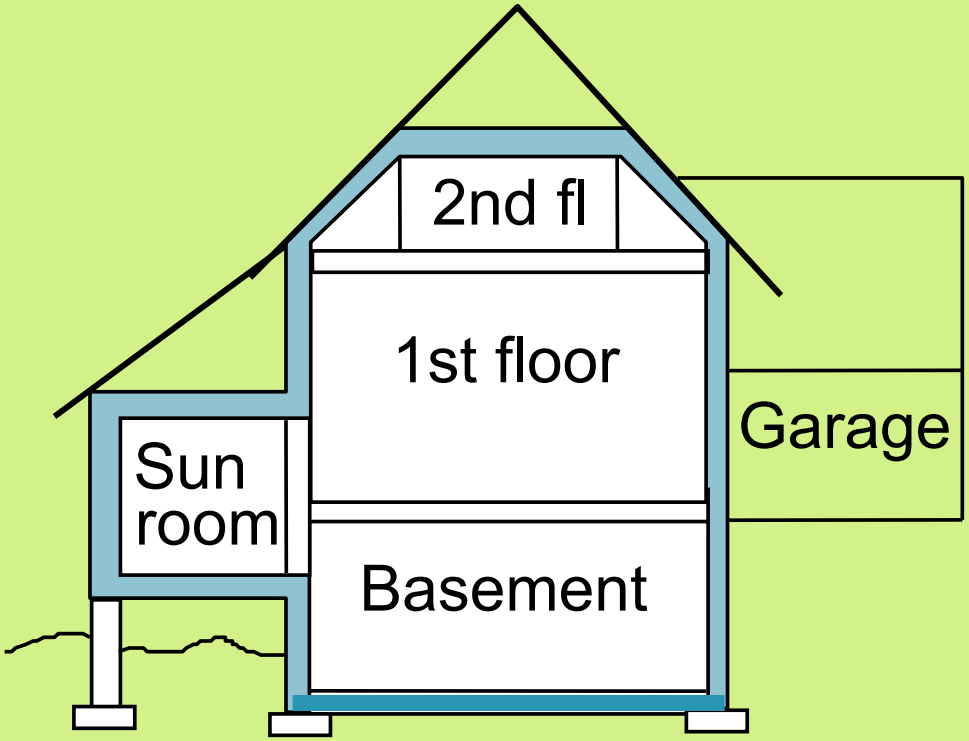
Pressure and Thermal Boundaries

Activity

Determine the Pressure and Thermal Boundaries

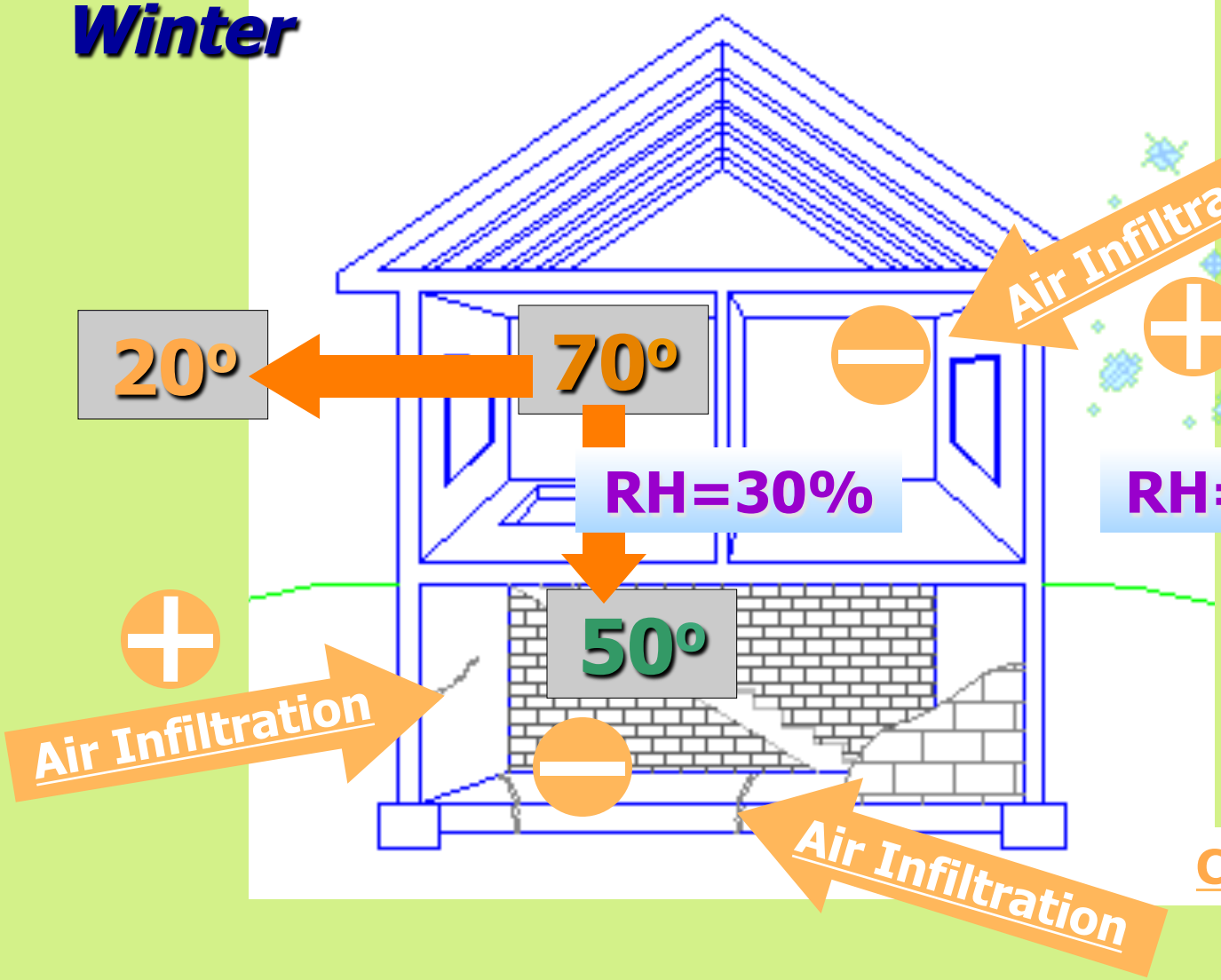
Thermal/Pressure Boundary Alignment





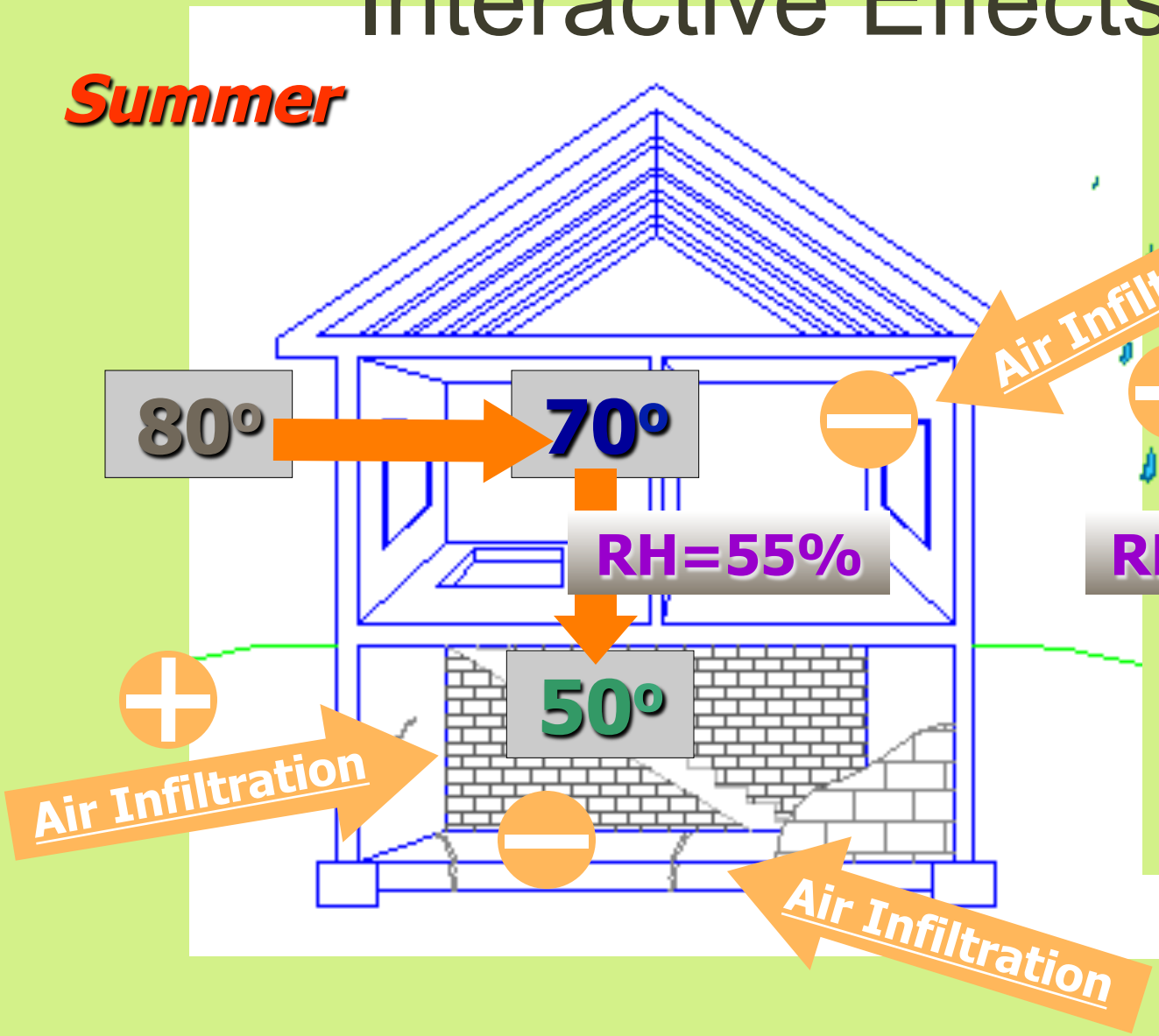
Interactive Effects

Winter



Click for RH

Interactive Effects



Air Sealing

- AIR SEALING reduces heat flow from air movement and prevents water vapor from entering the attic

- Air sealing and moisture control make insulation more effective

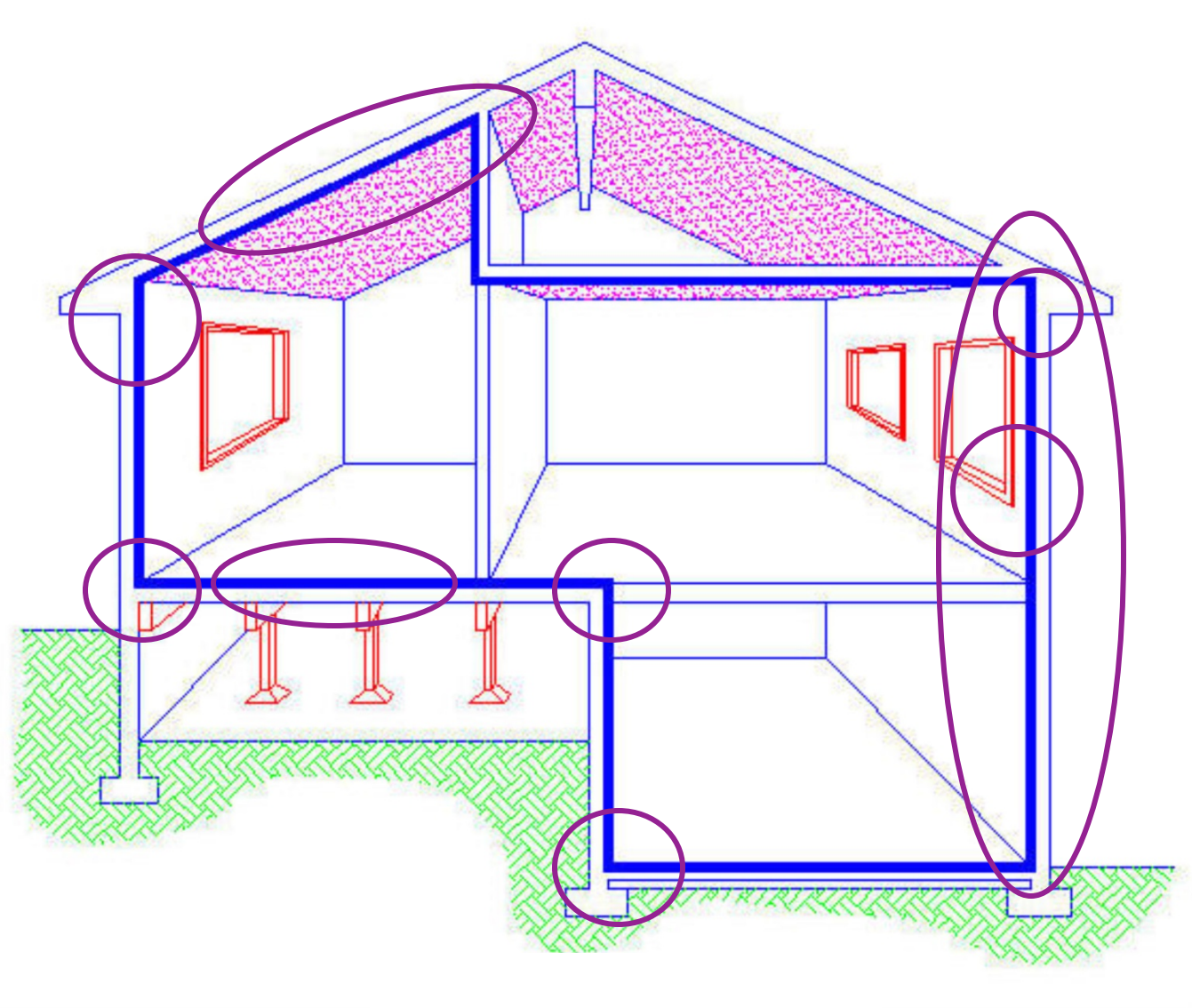
Air Sealing Strategies

- Identify location of thermal and pressure boundaries
- Remember that it is critical to align the two barriers
- Because of Stack Effect, air sealing at the top and bottom of the building is the first priority
- Locate and air seal bypasses in the shell area: pipe/wire penetrations and holes

Air Sealing Materials

- Many different materials can be used to create an effective Air Barrier, but only if properly installed and sealed at the joints with caulk or other appropriate material
- Examples of air sealing materials:
  - Dense-packed cellulose
  - Caulk (Less than 1/8” hole) (Not great in the attic, because attics are dirty and caulk won’t adhere to surfaces)
  - Expandable foam

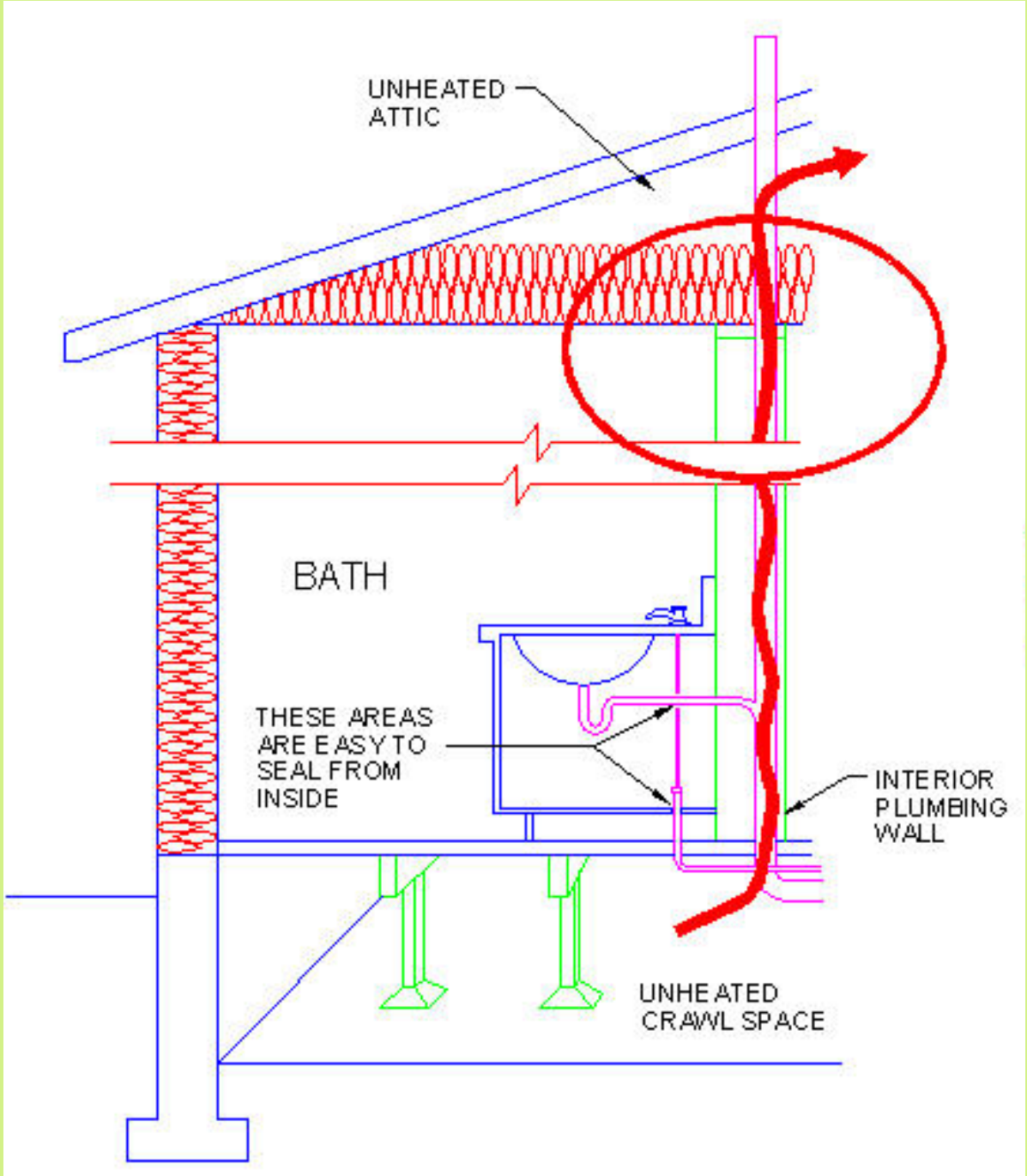
Continuity in an Air Barrier



Look for Clues...

Are the pressure and thermal boundaries aligned and continuous?

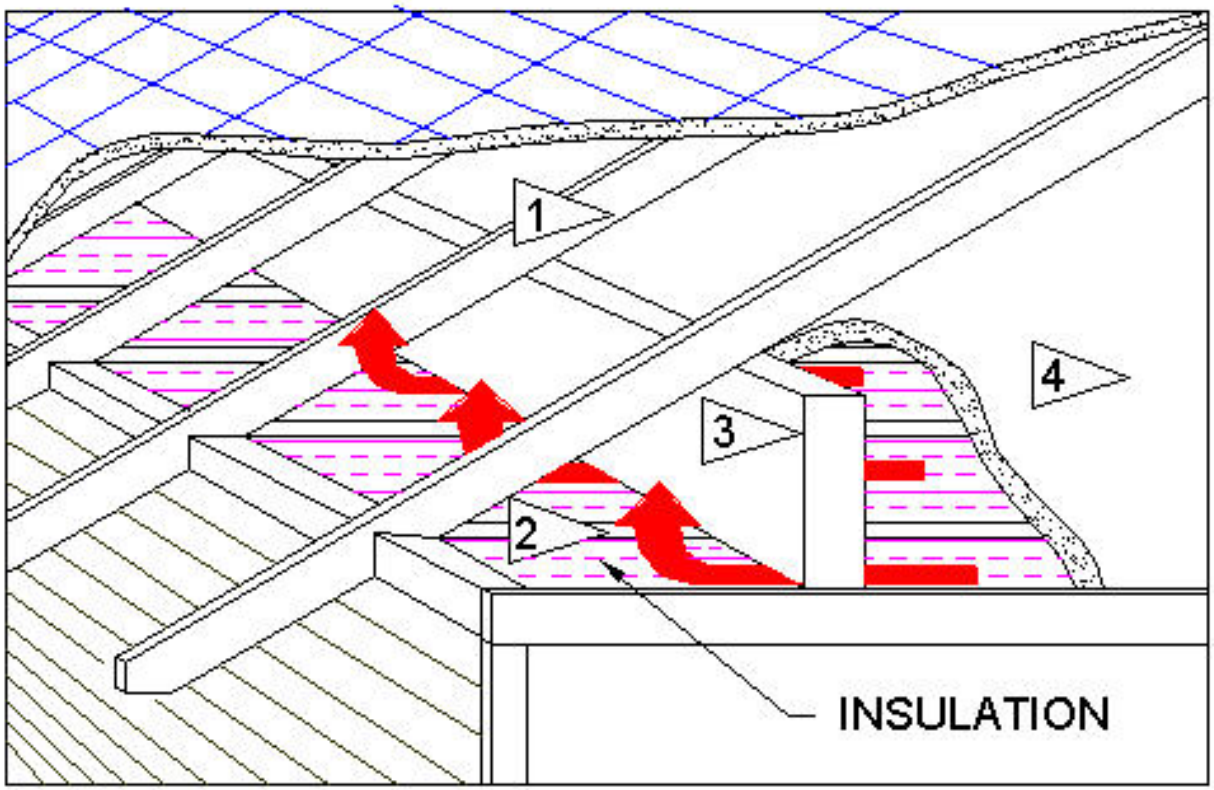
The Bypass


UNHEATED
ATTIC
BATH
THESE AREAS
ARE EASY TO
SEAL FROM
INSIDE
INTERIOR
PLUMBING
WALL
UNHEATED
CRAWL SPACE

Attic Bypass

Pipe Chase

Cross-Section of an Attic



1 RAFTERS

2 JOISTS

3 KNEEWALL

4 NEW FLOOR IN CONVERTED LIVING SPACE

Electrical Issues

Knob & Tube Wiring Hazards

Electrical Issues

Existing Knob and Tube Wiring:

- Knob and Tube wiring must be replaced under CHIP
- 60 amp panel boxes must be upgraded along with the wiring.

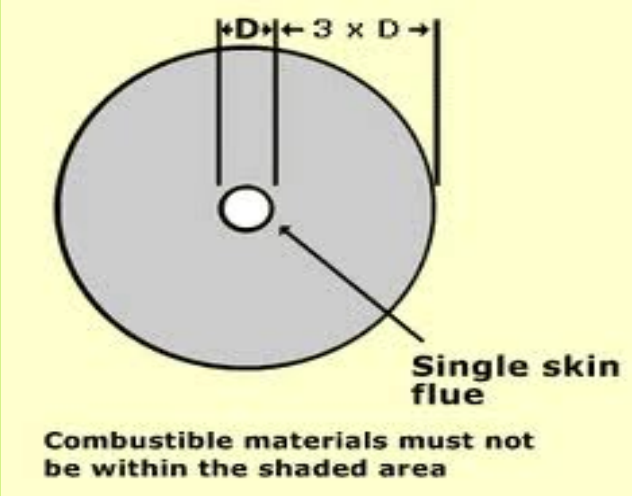
Electrical Issues

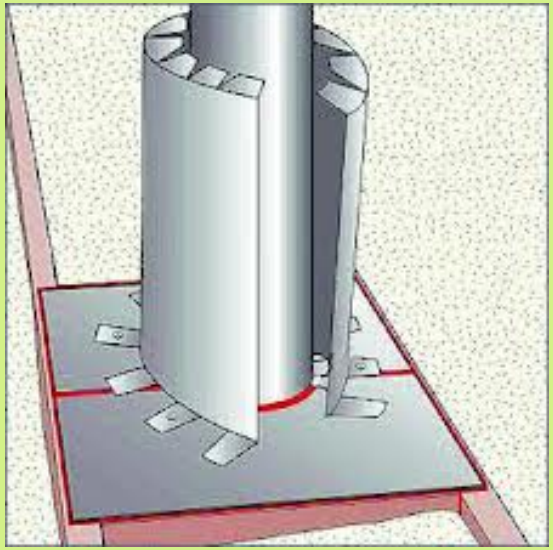
Locate and indicate location of all junction boxes. All Junction boxes must be covered and flagged prior to installing insulation.

Needs cover and flag

Heat Producing Devices

- Chimneys, recessed lights and exhaust fans are classified as heat producing devices
- All must have clearance from combustibles (generally 3”)



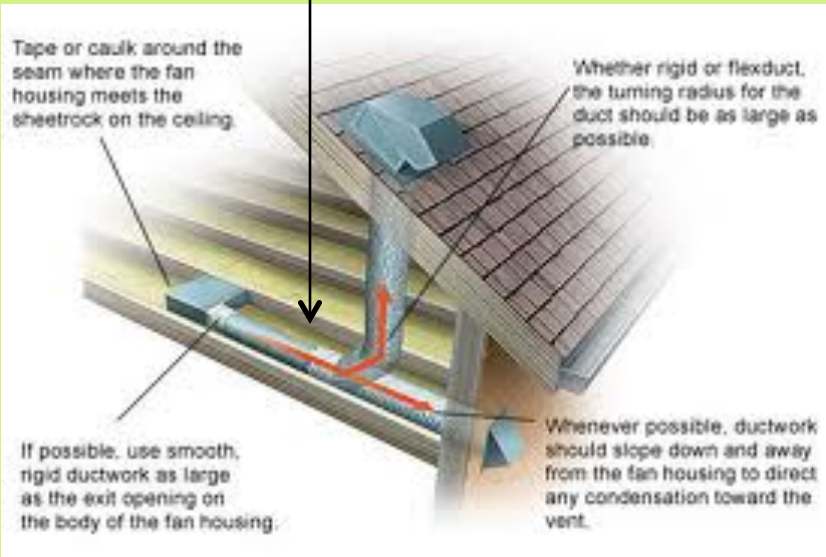


Heat Producing Devices

- In addition, exhaust fans must be vented to daylight
- Shielding shall be higher than insulation level

Bad

Good

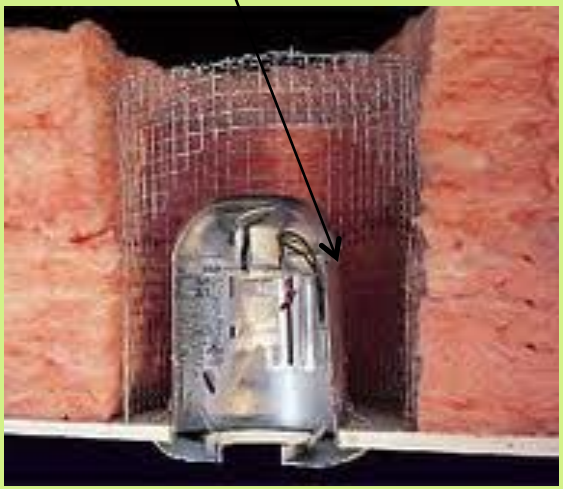


Recessed Lights

There are two types of recessed lights:

- "Non IC Rated"-must have clearance from insulation
- "IC Rated- may be covered with insulation

Non-IC Rated



IC Rated

Attic Access

- Attic accesses must be insulated to the same level as the attic
- Attic access must be weather-stripped and air tight
- Attic access must have dam to prevent insulation from falling through access opening
- Dam must be able to support the weight of a person.

Gap

Opening

Attic Venting

- All attics shall be vented (IRC Section R806)

  Exception: slate roofed homes with skip sheathing (non-continuous)
- "The minimum net-free vent area shall be 1/300 of the vented space provided that at least 40 and not more than 50 percent of the required venting area is provided by vents located in the upper portion of the attic or rafter space"

Attic Venting

- If all or the majority of the attic venting is in the upper portion of the attic, the minimum net free vent area shall be 1/150 of the area of the vented space

An example of this option:

House with eave area too small to install vents and unable to install gable vents for low venting (hip roof).

Attic Venting

Upper portion venting options include:

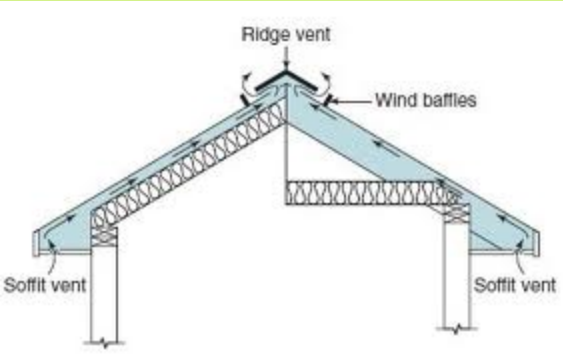
- Ridge Vents
- Roof Vents
- Gable Vents

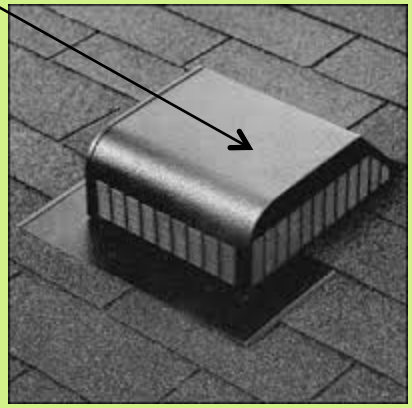
Low venting options include:

- Soffit vents
- Gable vents installed more than 3’ from roof peak.
- All installed venting shall have Net Free Vent Area (NFVA) rating

Attic Venting

- Venting Options
- High/Low
- Gable Vent
- Roof Vent
- Ridge Vent





Spec Writing

- The key to a successful and effective insulation job begins with accurate and thorough instructions based on the inspection.
- This is the basis of spec writing-all that is written by the inspector is easily understood and properly completed by the contractors.

Spec Writing for Attic Insulation

The Specs should include all of the following:

- Total Attic Area to be insulated
- Location of all bypasses and how to air seal
- Location of heat producing devices and how to treat
- How to treat attic access
- Junction box information
- Recessed lights, exhaust fans location and treatment
- Dropped soffits-how to air seal and insulate
- Type and amount of insulation to use
- Is additional venting needed-what kind?

Attic Write-up Example

- Attic Prep Work Order

  The house is balloon-framed with many bypasses. Seal all bypasses by stuffing cavities with unfaced fiberglass and air seal with 2-part foam.

  Seal the chase way around the brick chimney with flashing and high-temp silicone. Dam around the chimney leaving a 3 inch clearance.

  Flag all 8 junction boxes. Add covers to 3 lacking covers before flagging.

  Dam around bathroom exhaust fan to prevent insulation contact.

  Install baffles around soffit vents to block insulation.

  Build wood dam around attic access at least 14”.

Attic Write-up Example

- Attic Insulation Work Order

  Install Cellulose loose fill insulation in attic to a level of R-38. Insulation shall be installed uniformly across entire attic to a minimum depth of 12”.

  Ensure that insulation is not blown over heat producing devices or other areas with protective damming.

  Ensure that insulation does not cover soffit vents or gable vents.

  Ensure that attic hatch is insulated to same level as attic, and weather stripped.