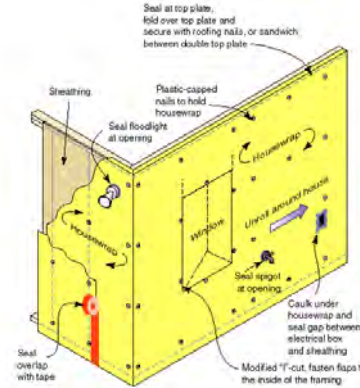


Air Barrier Installation



Air Seal Exterior Sheathing

- No unsealed gaps or holes
- Tape or caulk sheathing seams / penetrations
- Caulk or glue to framing



- Seal to framing, top plate, bottom plate
- Seal window & door openings
- Seal all penetrations



Shower/Tub on Exterior Wall

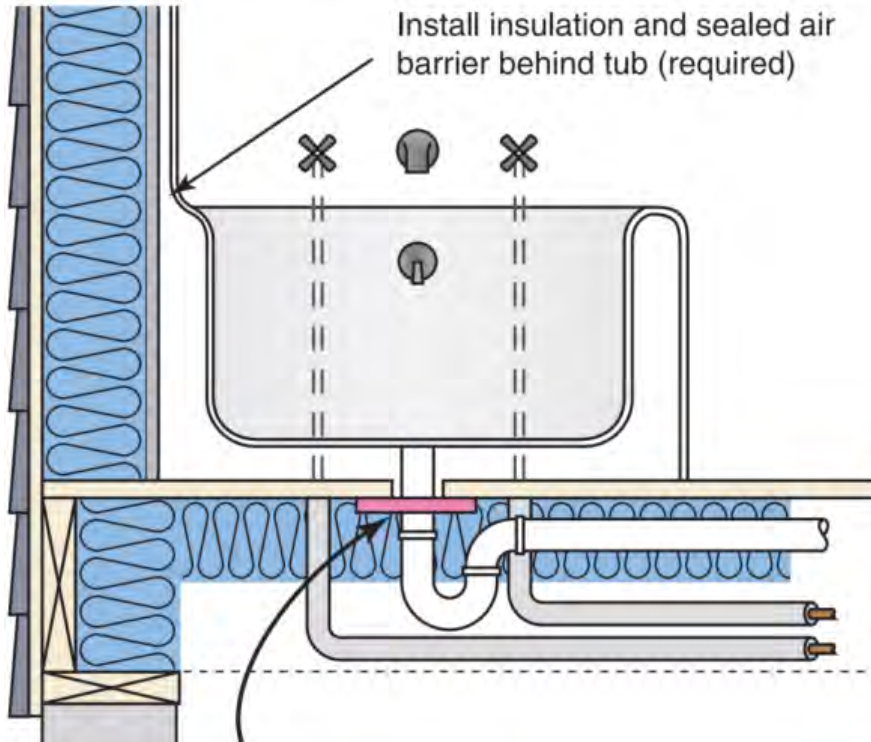


Shower/Tub on Exterior Wall

- Coordinate with your subcontractors so that insulation and air sealing details are not missed before it is too late!



Plumbing and wiring



Cantilevered floor

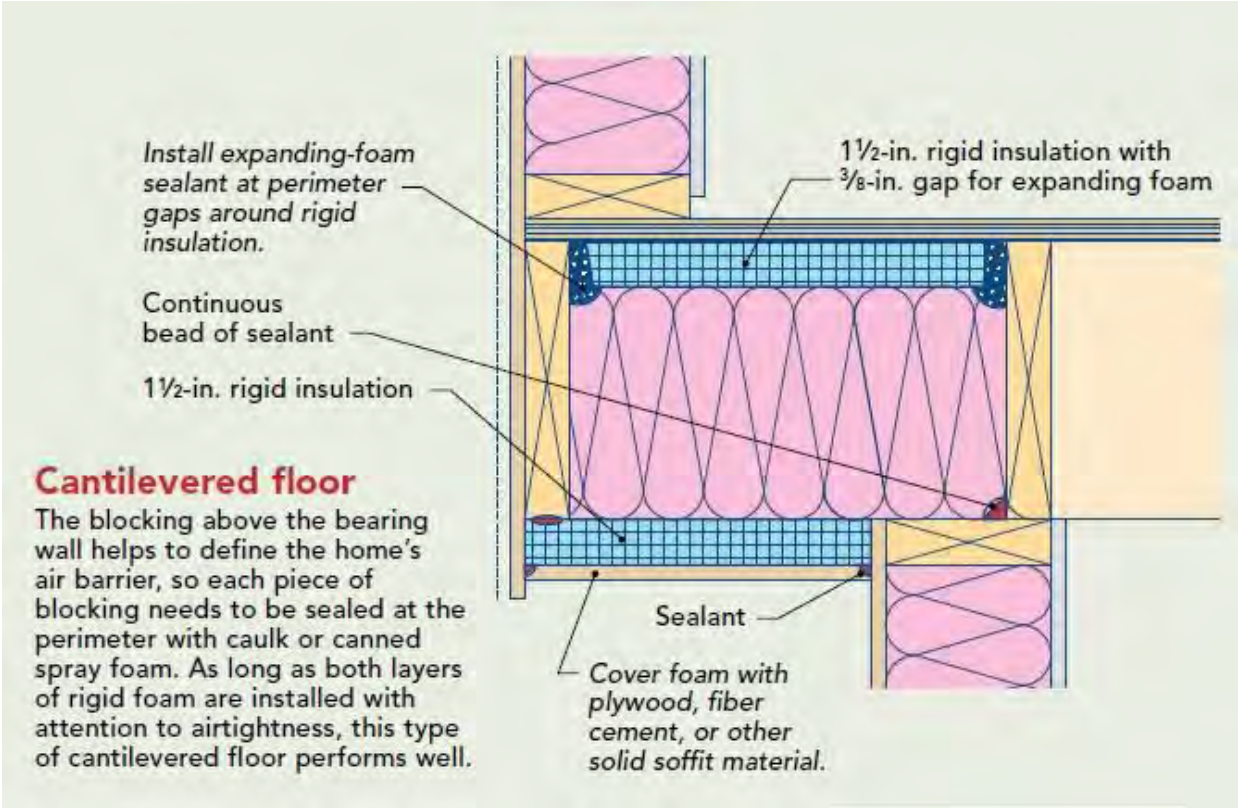


Didn't Install Blocking
(Just Covered Over With Insulation)



Fiberglass does not stop airflow!

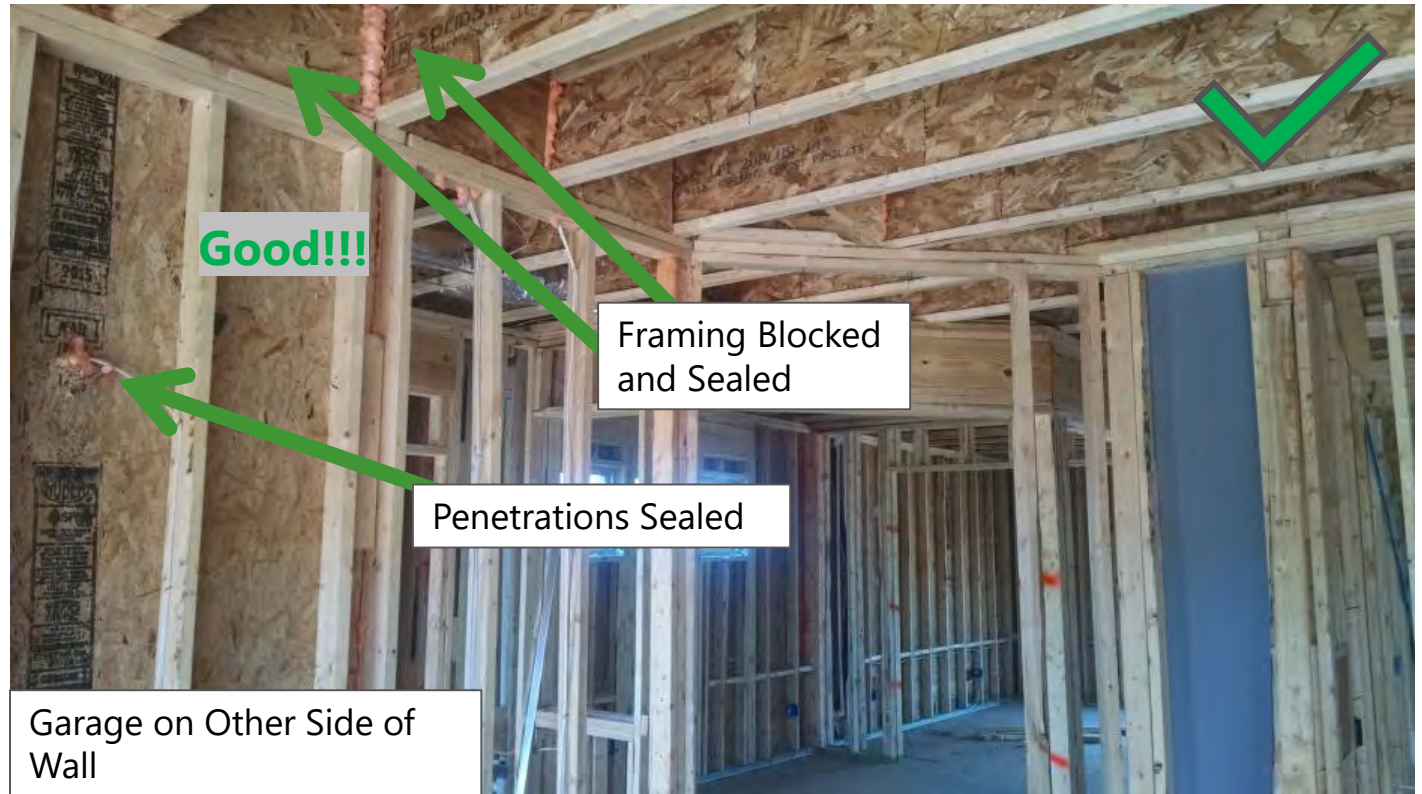




Garage Separation



Garage Separation



Cantilever support wall

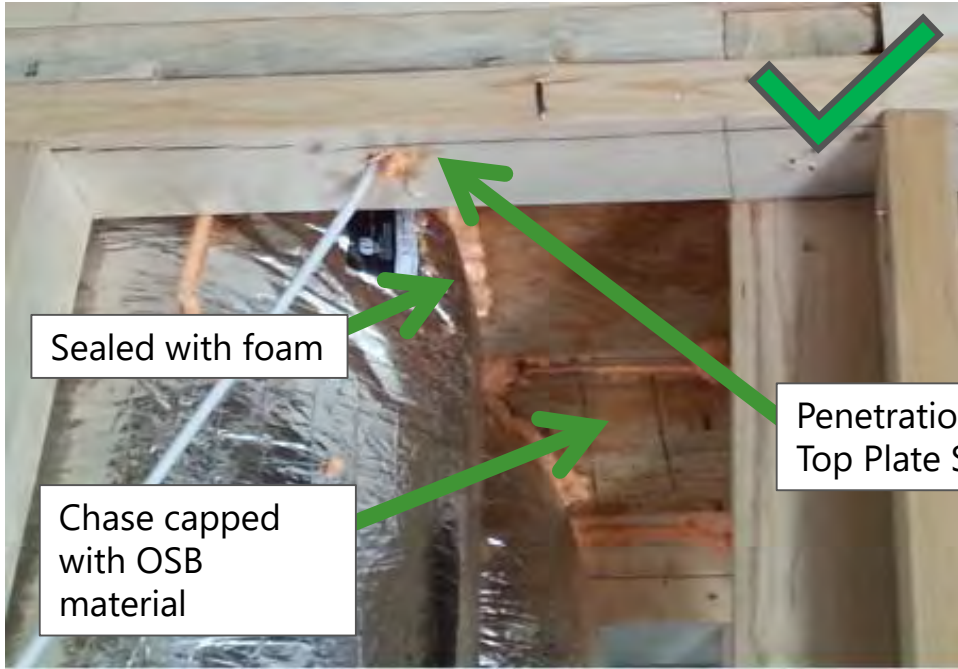


Duct Shafts

Cap chases with rigid material and seal tight around ducts or flue pipes

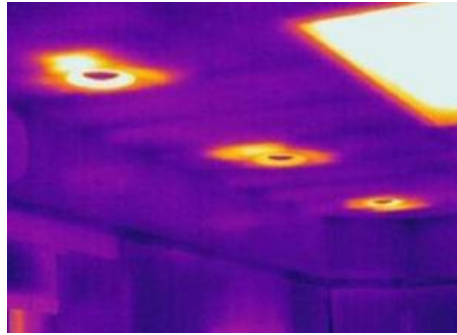


Duct Shafts



Recessed Lights

- **Standard Can Light**



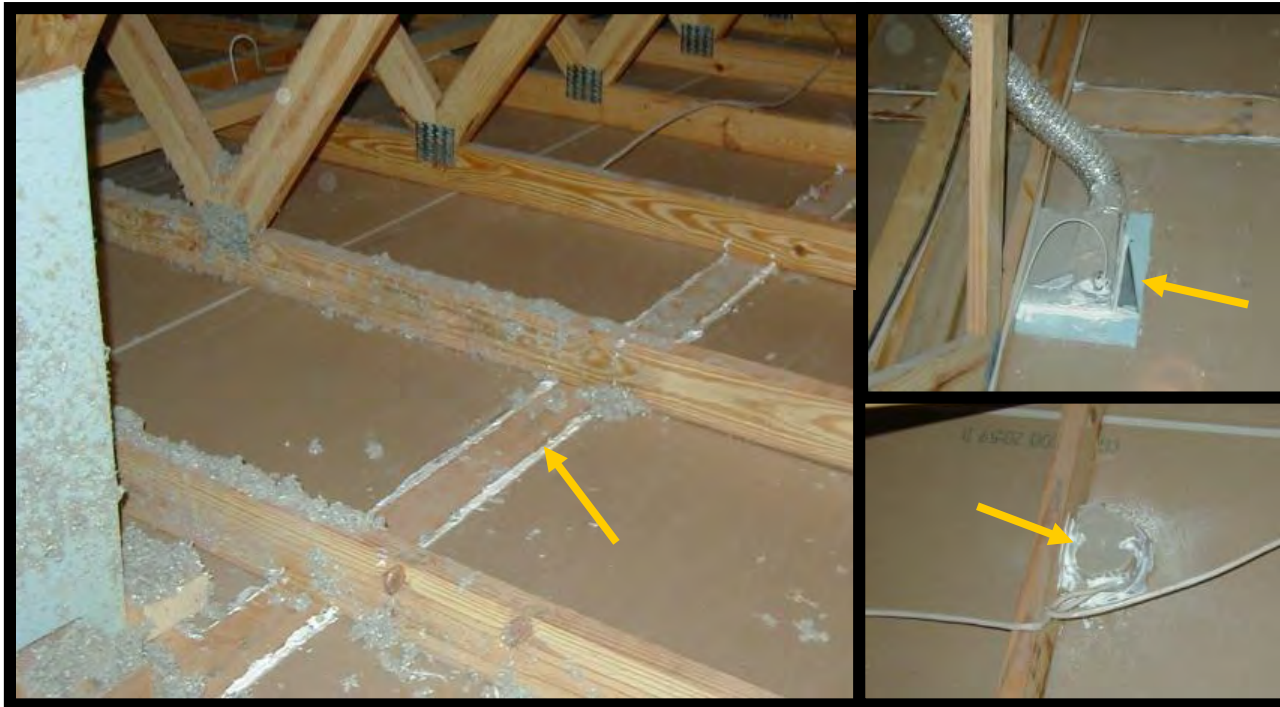
Airtight and IC Rated



- All recessed luminaires shall be labeled as having an air leakage rate not more than 2.0 cfm tested at 75 pa
- All recessed luminaires shall be sealed with a gasket or caulk between the housing and the interior wall or ceiling covering

Air Sealing After Drywall

- Top plate to drywall (interior wall cavities often connect to attic)
- HVAC, plumbing and electrical penetrations



Sill (bottom) plate



Sill (bottom) plate

- Dirty carpet on **exterior** wall indicates leak at wall sill plate
- On **interior** wall indicates wall leaking to attic



Air Sealing 101 - No BIG Holes!

- First, cover with sheet material and seal
- Then insulate



Air Sealing - Tubs



Looking for Leaks

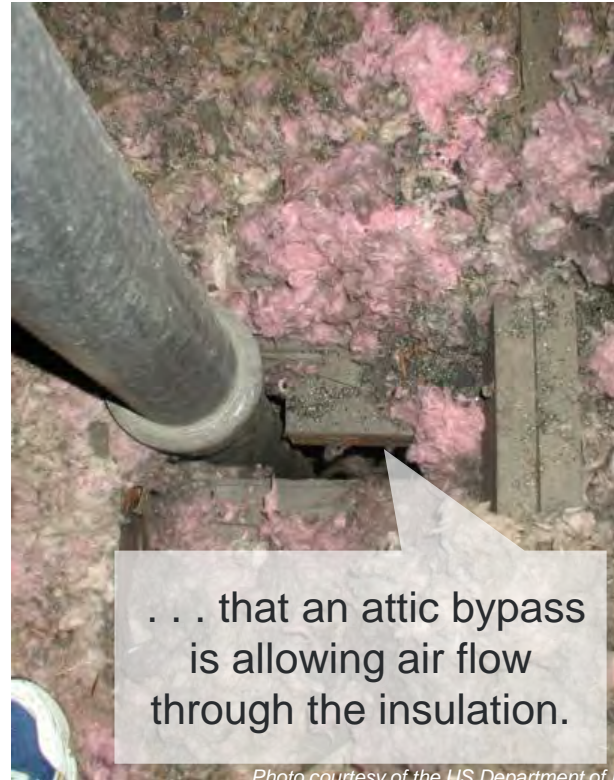
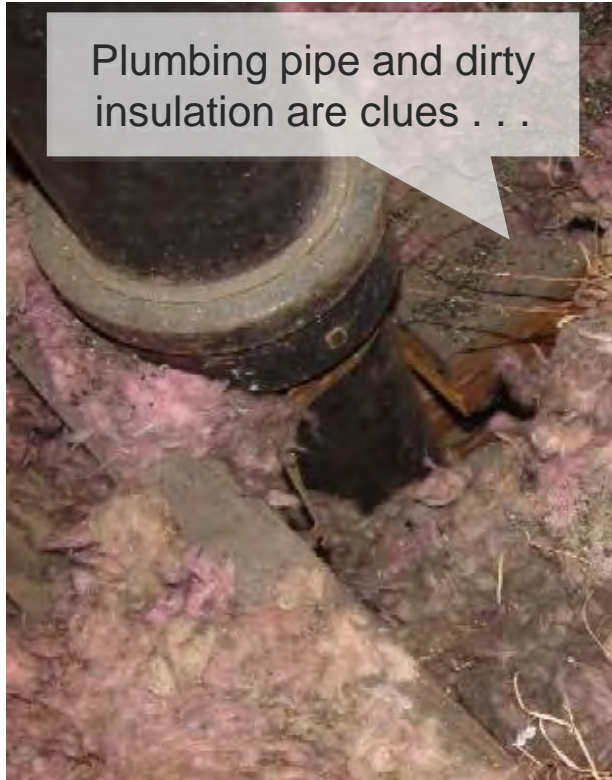
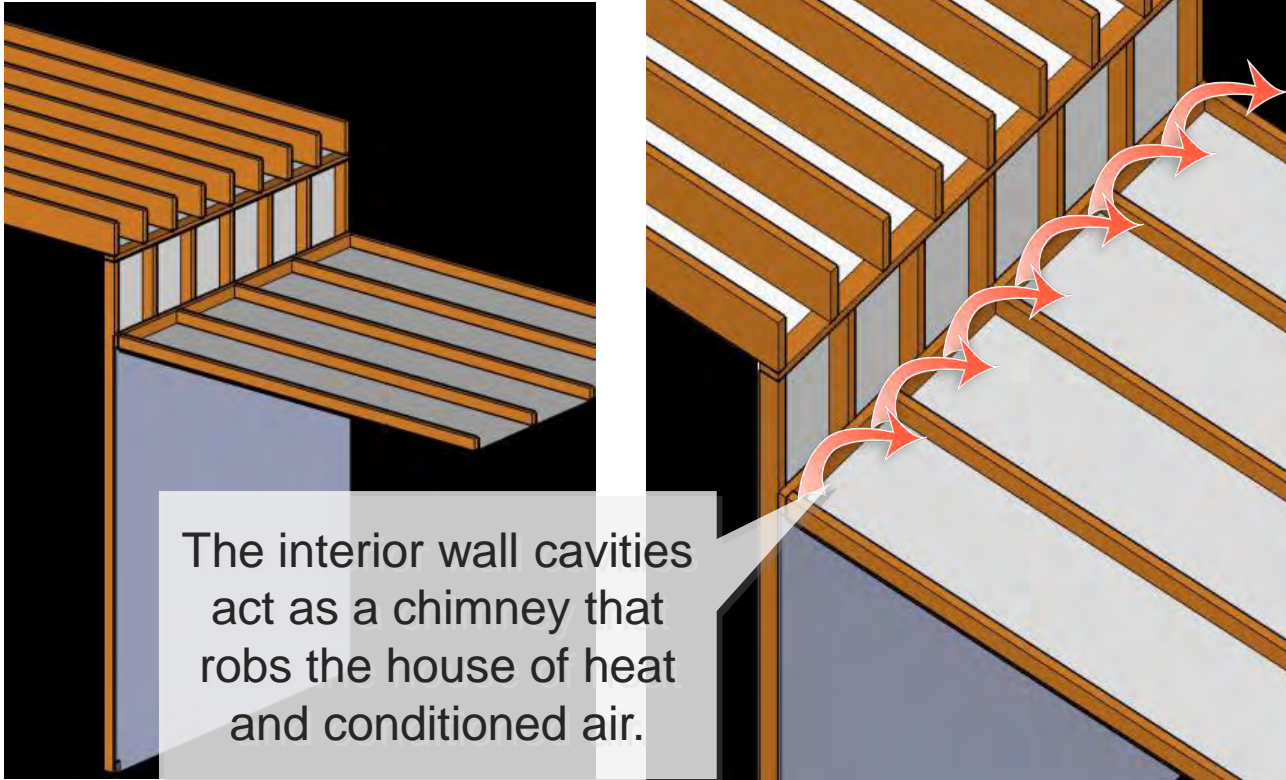


Photo courtesy of the US Department of Energy

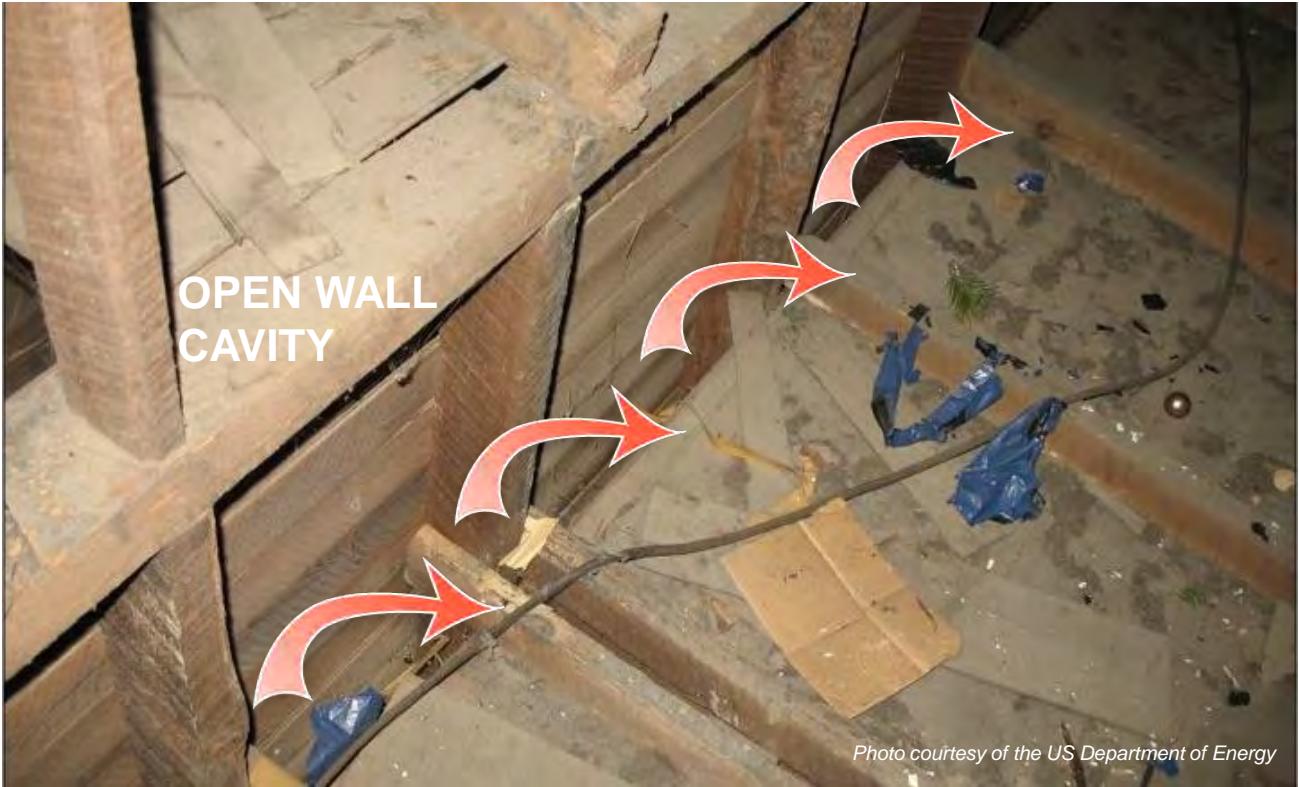
Sealing Attic penetrations



Changes in Ceiling Height

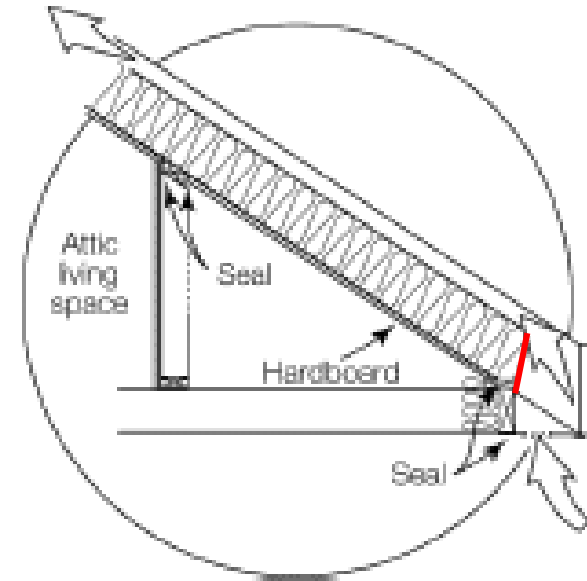
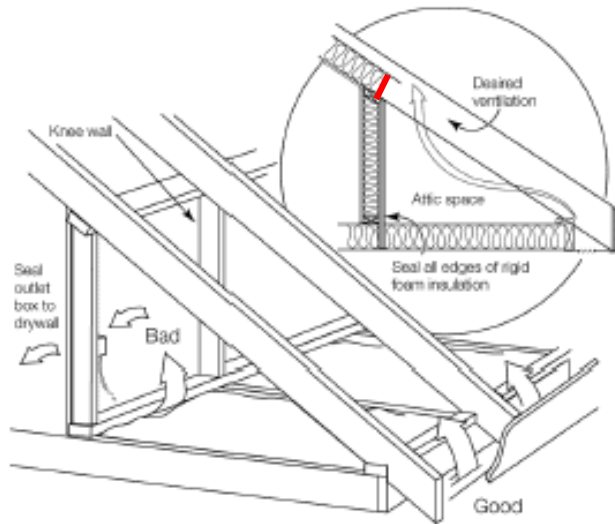


Changes in Ceiling Height



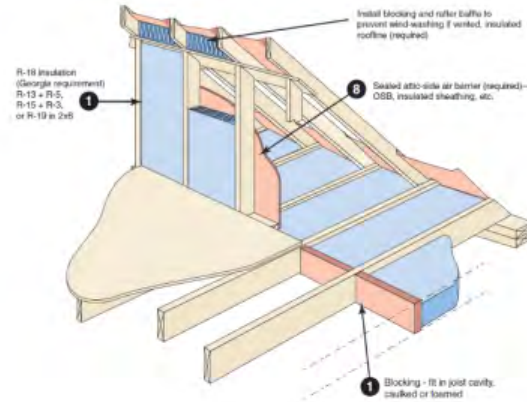
Sealing Attic Kneewalls

An attic *kneewall* has unconditioned attic space on one side and conditioned space on the other

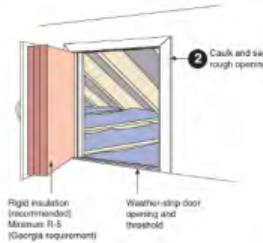


ATTIC KNEEWALLS

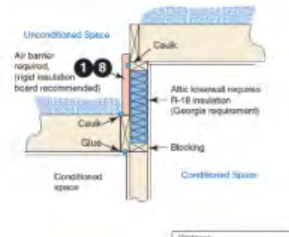
(Want higher R-value with attic- side air barrier)



Attic knee-walls



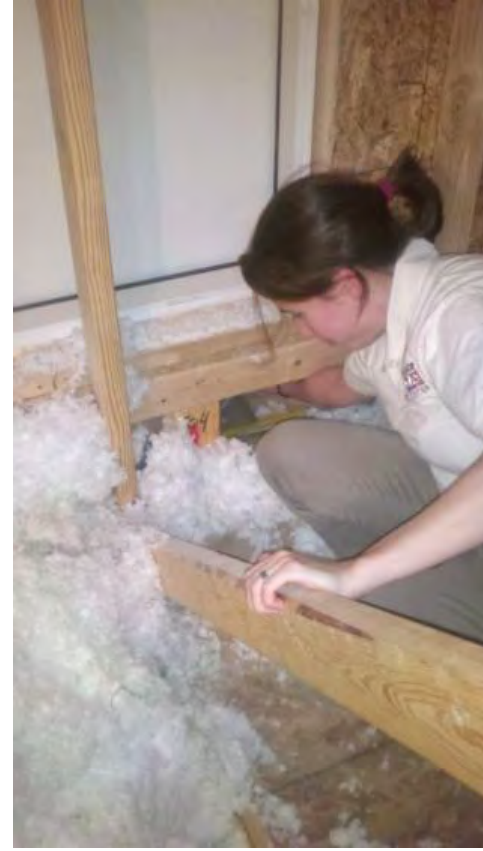
Two-level attic



No Blocking under Attic Kneewalls

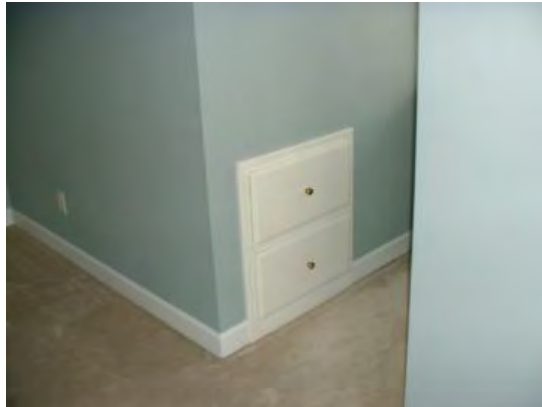


KNEEWALL – PICS SHOWS NEED FOR BLOCKING & SHEATHING

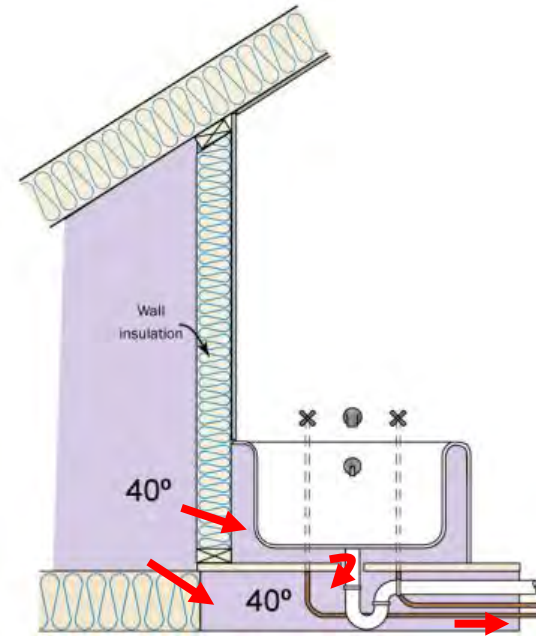


Proper Blocking under Attic Kneewalls





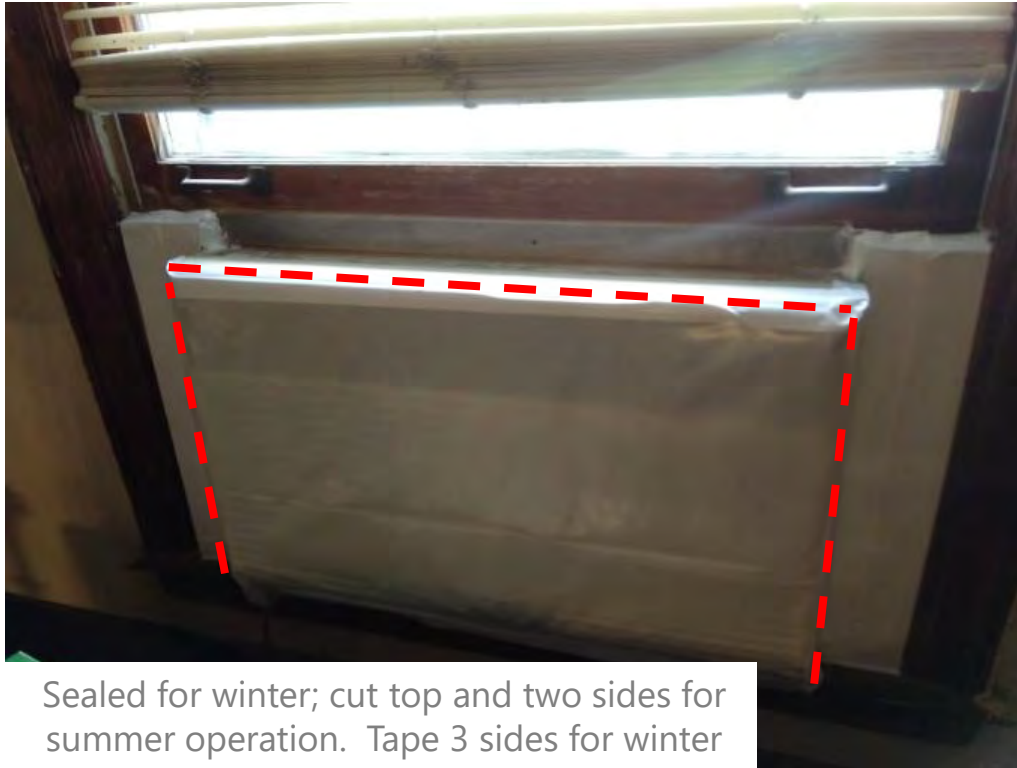
INEFFECTIVE KNEEWALL INSULATION DUE TO LACK OF CONTINUOUS CONTACT WITH AIR BARRIER



Sealing ducts with mastic



Sealing window unit AC's



Sealed for winter; cut top and two sides for summer operation. Tape 3 sides for winter



Seal gap with pipe insulation

Convection Heat Flow

- Heat transfer through a fluid (liquid or gas) – usually air. For air, the formula for calculating convective heat transfer is

$$q = 1.08 \times \text{CFM} \times \Delta T = \text{convective heat flow (Btu/hr)}$$

- CFM = Cubic Feet per Minute of air being transported
- ΔT = temperature difference of entering air and ambient air (°F)

Example:

A supply fan delivers 50 cfm of OA into a 75°F home when the ambient is 90°F.
Sensible heat added is $q = 1.08 \times 50 \times (15) = \underline{810}$ Btu / hr

402.4.1.1 Air sealing checklist (required)



TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION*

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance, <i>R</i> -value, of not less than <i>R</i> -3 per inch. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between framing and skylights, and the jambs of windows and doors, shall be sealed.	—
Rim joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors, including cantilevered floors and floors above garages	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking. Alternatively, floor framing cavity insulation shall be in contact with the top side of sheathing, or continuous insulation installed on the underside of floor framing, and shall extend from the bottom to the top of all perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	Crawl space insulation, where provided instead of floor insulation, shall be permanently attached to the walls.

402.4.1.1 Air sealing checklist (required)



TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION*

Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	—
Narrow cavities	—	Batts to be installed in narrow cavities shall be cut to fit or narrow cavities shall be filled with insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	—
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Plumbing and wiring	—	In exterior walls, batt insulation shall be cut neatly to fit around wiring and plumbing, or insulation, that on installation readily conforms to available space, shall extend behind piping and wiring.
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the shower or tub.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical and communication boxes. Alternatively, air-sealed boxes shall be installed.	—
HVAC register boots	HVAC supply and return register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.	—
Concealed sprinklers	Where required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	—

a. Inspection of log walls shall be in accordance with the provisions of ICC 400.