

## Building America Solution Center

### Attic Knee Walls

#### Scope



#### Fully Aligned Air Barrier

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

#### ENERGY STAR Certified Homes Notes:

[Note: Guidance for ENERGY STAR Certified Homes Version 3.0, Revision 08 is coming soon.]

ENERGY STAR Certified Homes (Version 3.0, Revision 07) recommends using a rigid air barrier, but it is not a requirement.

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. ENERGY STAR recommends, but does not require, rigid

air barriers. Open-cell or closed-cell foam shall have a finished thickness  $\geq 5.5$  inches or 1.5 inches, 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  $\geq 1$  inch 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  $\geq 6$  mil.

ENERGY STAR highly recommends, but does not require, inclusion of an interior air barrier at band joists in [Climate Zone 4 through 8](#).

All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls, with the exception of adiabatic walls in multifamily dwellings. 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.

Exterior air barriers are not required for attic knee walls that are  $\leq 24$  in. in height if an interior air barrier is provided and insulation extends in all directions from the top of this interior air barrier into unconditioned space at the following levels: CZ 1-5:  $\geq R-21$ ; CZ 6-8:  $\geq R-30$ .

## Description

Knee walls, the walls that separate conditioned from unconditioned space in an attic, can be a source of significant air leakage if a continuous air barrier is not provided to prevent unconditioned air from flowing under the knee wall and under the floor boards of the attic room. There are two ways to block off this air flow: either a continuous air barrier can be provided from the top of the knee wall down to the attic floor, including the spaces between the attic floor joists from the bottom of the knee wall to the ceiling deck below, or a continuous air barrier can be installed from the top of the knee wall along the attic roofline to the top plate of the home's exterior wall. With either method the air barrier should be installed before installing attic floor insulation to the unconditioned portion of the attic. 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. Air barrier material can include thin sheet goods such as rigid insulation, dry wall, OSB, plywood, or rolled batt insulation that is covered with spray foam. These materials may be installed by insulators, framers, or drywallers. This task should be included in the contract for the appropriate trade depending on the workflow at the specific job site.

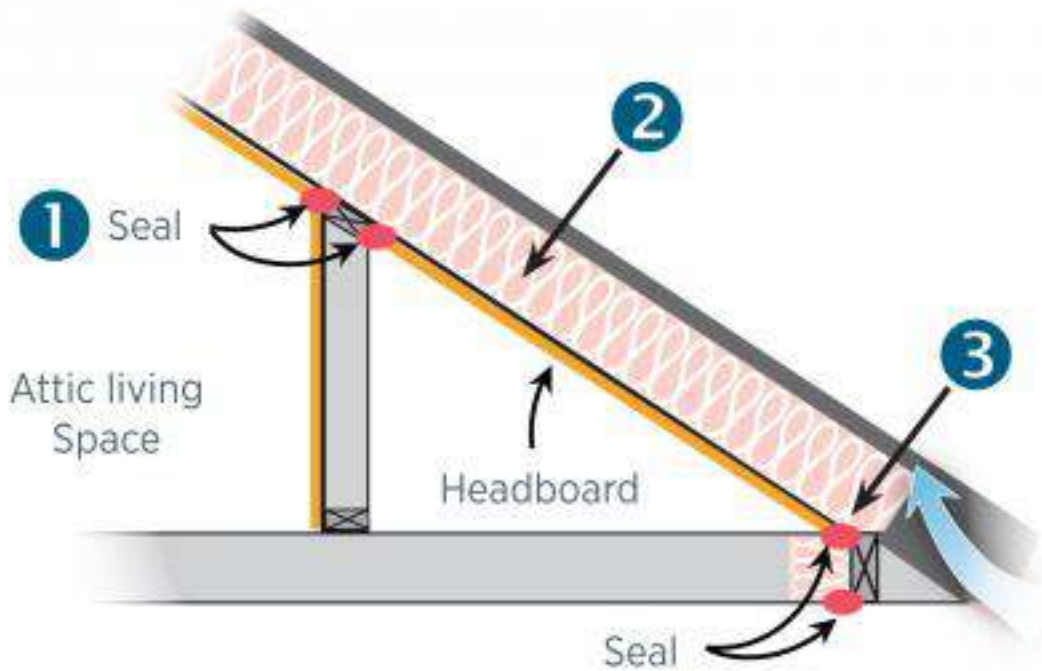
Air barrier effectiveness is measured at the whole-house level. High-performance branding programs and the 2009 IECC require that builders meet specified infiltration rates at the whole-house level. See the "compliance" tab for these specified infiltration rates.

## How to Air Seal Knee Walls along the Roofline

5 Insulate and air seal the ceiling of the attic room.

6 Continue the insulation along the roofline to the roof edge.

7 Cover the insulation with a sheet material (drywall or rigid foam insulation) that is caulked where it meets the plywood floor sheathing, which is extended to the outside wall.



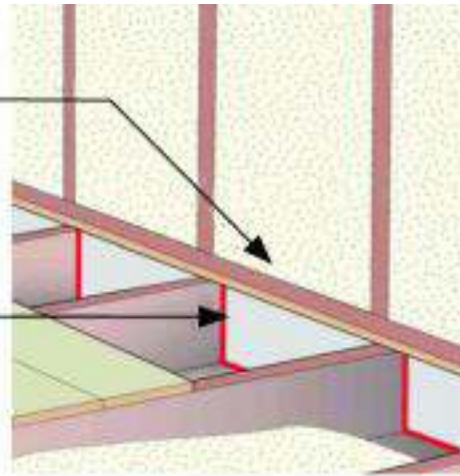
**Figure 1** - One way to air seal and insulate kneewalls – add insulation and a rigid air barrier along roof line of unconditioned attic space outside kneewall

## How to Insulate and Air Seal Floor Joist Cavities under Knee Walls

Step 1a: Insert solid wood blocking or rigid foam board in the floor cavity openings. Seal the edges with a continuous bead of caulk or foam sealant.

Kneewall framing and cavity insulation

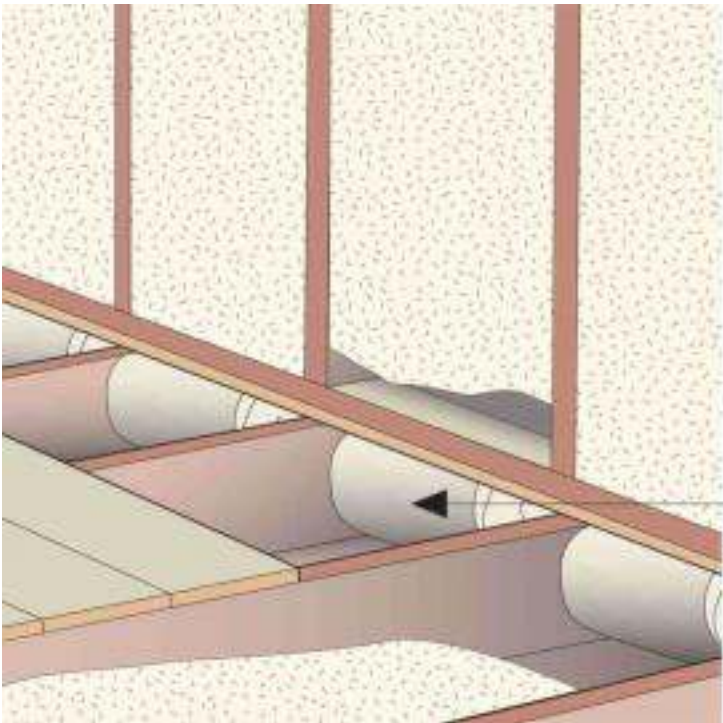
Solid blocking inserted in each floor bay cavity and sealed with continuous bead of caulk.



**Figure 2** - Air seal floor joist cavities under kneewall with rigid foam, plywood, or OSB caulked in place

-OR-

Step 1b: Stuff cavities with rolls of fiberglass batt and cover them with spray foam to the edges.

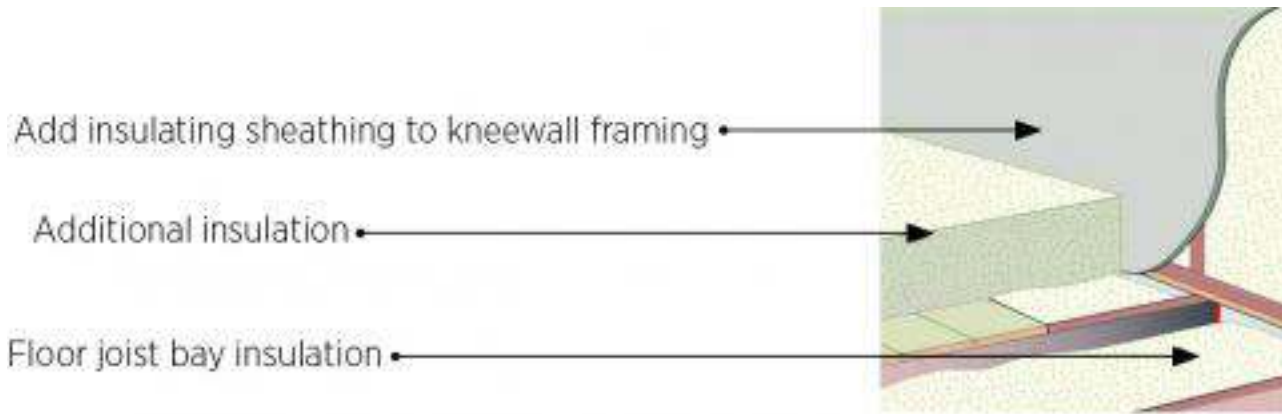


Fiber glass roll as backing for spray foam

**Figure 3** - Stuff cavities under kneewalls with rolls of fiberglass batt and spray foam in place

Step 2: Add insulating sheathing to the knee wall framing.

Step 3: Fill the attic floor joist bays with insulation (batt, blown, or spray foam) to meet or exceed the code minimum R-value.



**Figure 4** - Cover insulated kneewall with rigid foam, caulked at edges. Add attic floor insulation