

## Chapter 4: Insulation

Insulation levels expressed in R-values are determined by the compliance path as explained in Chapter 1, Compliance. For below-grade walls and slab-on-grade insulation details see Chapter 2, Foundations. For above-grade wall construction and insulation details, see Chapter 3, Framing. General insulation requirements, regardless of compliance path, are outlined in this chapter.

Installing the proper amount of insulation is important, but correct installation techniques are of equal importance to achieve specified R-values.

[502.1.4.6]

**Completely Fill All Exterior Wall Cavities.** Exterior wall cavities are considered to be any wall separating a heated from an unheated space. Areas that are sometimes overlooked are:

- Behind shower or bathtub enclosures (see Figure 4-1).
- Where interior and exterior walls meet.
- Corners.
- Stairwells to unheated basements.
- Skylight chases through attics.

**Exception:** Framed cavity can be empty or partially filled, provided:

- The wall assembly calculations are performed along with a completed performance calculation for the whole building; and
- Insulation installed in partially filled cavities is not included in the performance calculation.

## Tub Enclosure on Exterior Wall

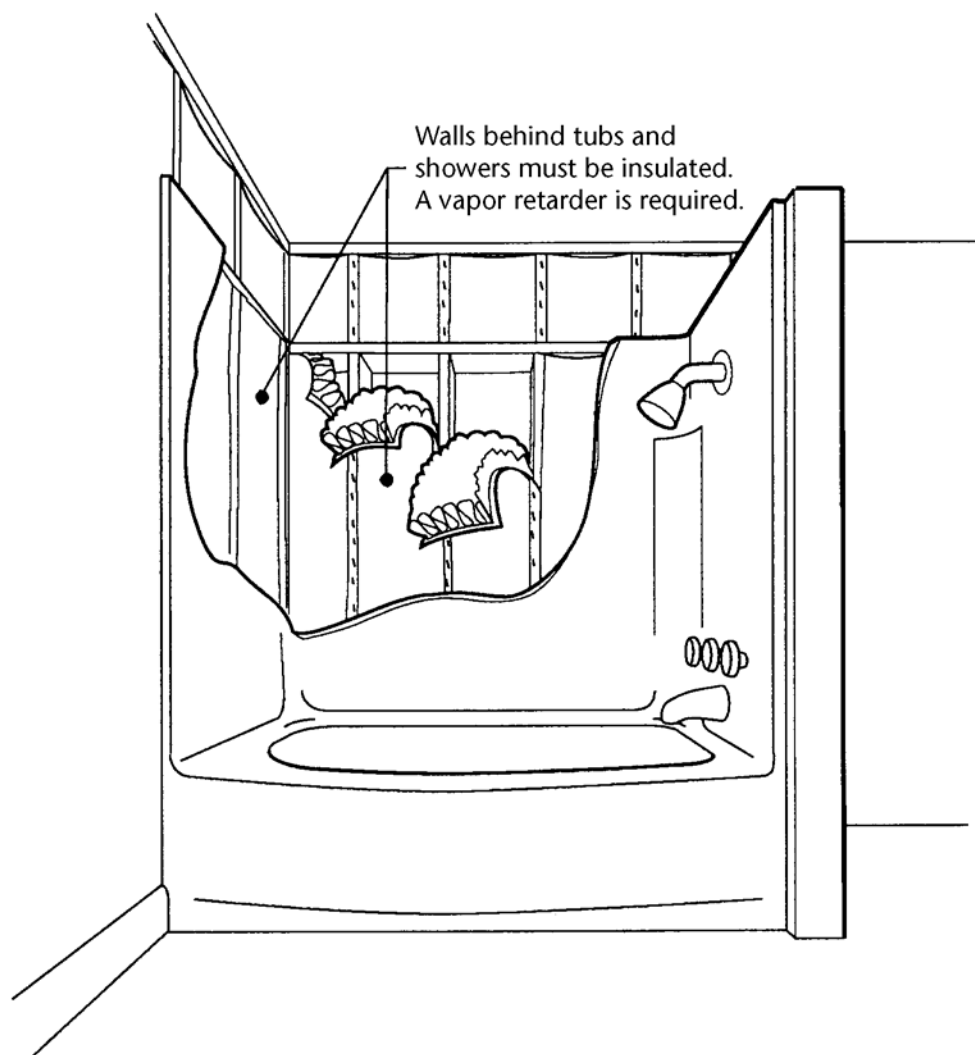


Figure 4-1

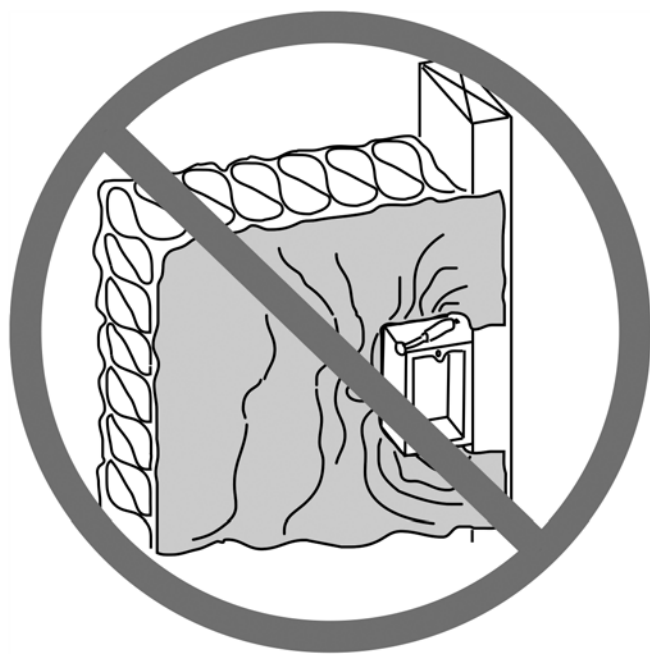
[502.1.4.1]

**Don't compress the insulation.** Compression of insulation will cause it to be less efficient. For example, if you compress an R-19 batt in half, you reduce the R-value by almost 50%. Common areas of compression are:

- Behind outlet and switch boxes.
- Behind plumbing pipes and wiring.

Compression problems can be avoided in these situations by cutting and fitting insulation around outlet and switch boxes (see Figure 4-2). Slicing about halfway through a batt will allow it to fit around a wire or pipe.

### Electrical Box Insulation Details



**Wrong!**  
Insulation is  
smashed behind  
the junction box

**Correct**  
Insulation is carefully  
cut to fit behind the  
junction box and  
snugly at sides

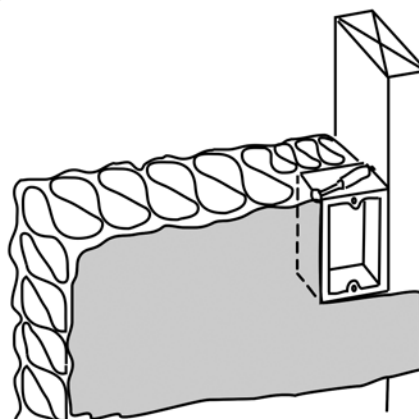


Figure 4-2

[502.1.4.6]

**Inset Stapling Faced Batts is not Allowed.** If faced batts are used (kraft paper or foil facing material) and if they have a stapling tab, they must be stapled directly to the face of the stud. Stapling to the side of the stud compresses the insulation and creates a convective air channel that reduces the effectiveness of the insulation (see Figure 4-3).

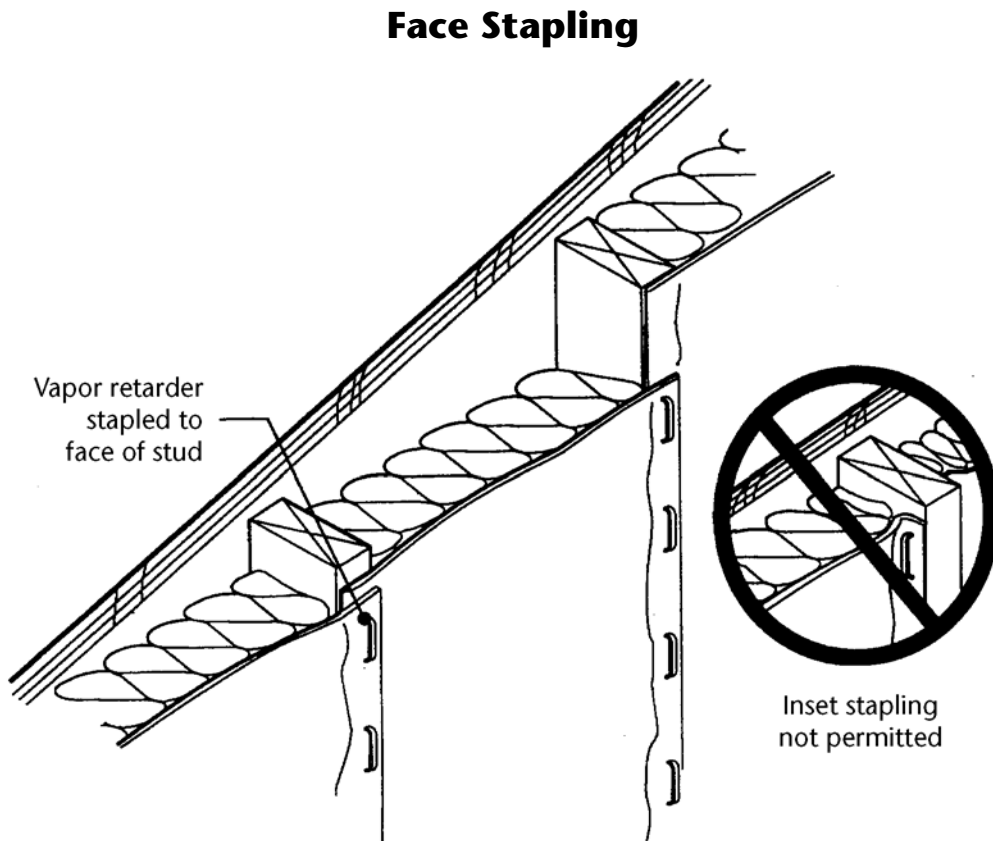


Figure 4-3

[502.1.4.5]

**Attic Baffles.** Baffles are necessary to maintain an airspace between the insulation and the roof sheathing when soffit or birdblock venting is used (see Figure 4-4). This promotes cross-ventilation of the attic, helping to remove unwanted moisture. It minimizes potential rot problems, and ice damming in winter.

Baffles are made of weather resistant material, typically wax-impregnated cardboard. Baffles must extend:

- 6 inches (vertically) above non-compressed batt type insulation.
- 12 inches (vertically) above full depth blown-in insulation.

### Attic Baffles

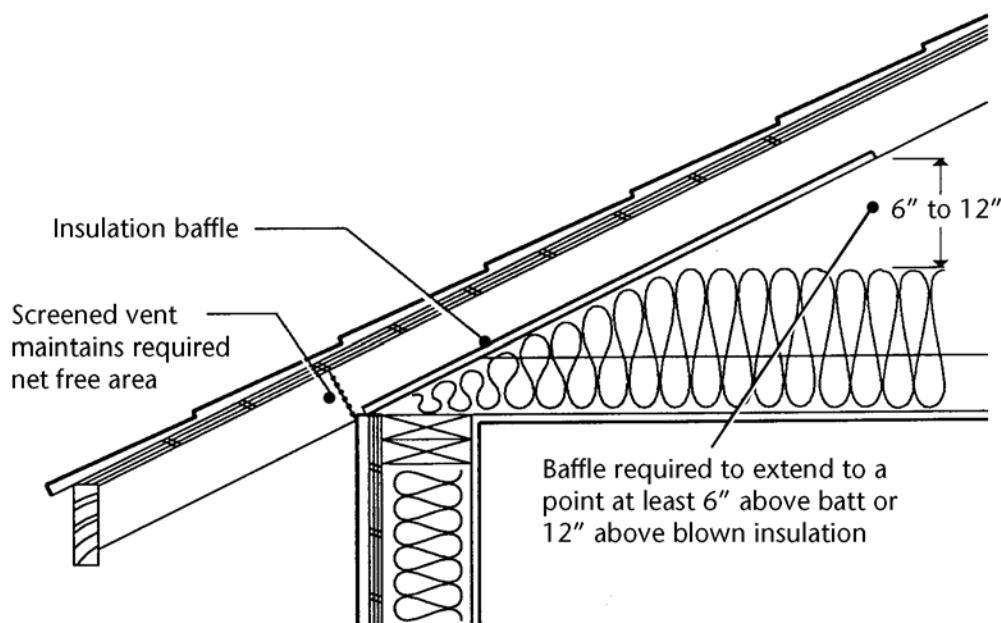


Figure 4-4

[502.1.4.4]

**Attic Access.** A baffle or dam around attic access hatch is also required when loose-fill or blown-in insulation is installed (see Figure 4-5). Requirements for access hatches and doors are:

- Wood frame, or equivalent, baffle installed around the opening. Cardboard is not acceptable.
- The hatch must be insulated to the same R-value as the surrounding ceiling with batt or rigid insulation.
- The hatch must be weatherstripped to stop air leakage between the attic and the interior.

### Attic Hatch

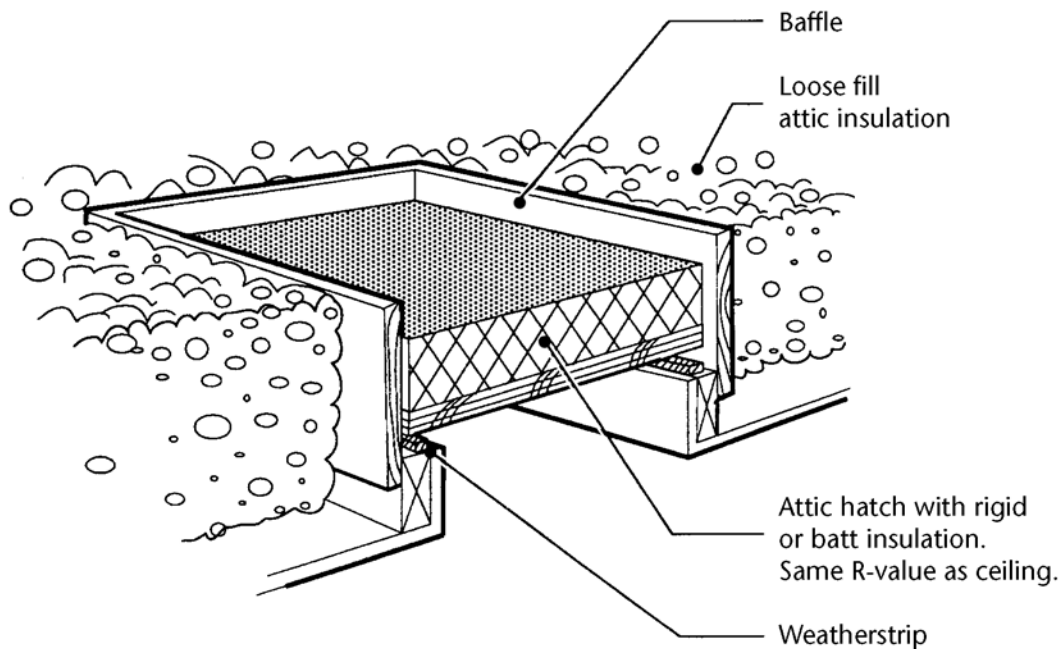


Figure 4-5

[502.1.4.1,  
502.1.4.7]

**Floor Insulation Supports.** Floor insulation must be installed in a permanent manner and in substantial contact with the surface being insulated (see Figure 4-6 or 4-7). Insulation can be held in place using:

- Polyethylene twine.
- Lath.
- Chicken wire.
- Other approved material.

Supports are required to be a maximum of 24 inches apart. If the insulation thickness is more or less than the depth of the joist, hangers are available to hold the insulation to the floor surface without compressing it. Metal rods or other supports that compress the insulation are not acceptable.

### **Floor Insulation Supports** Insulation Fills the Cavity

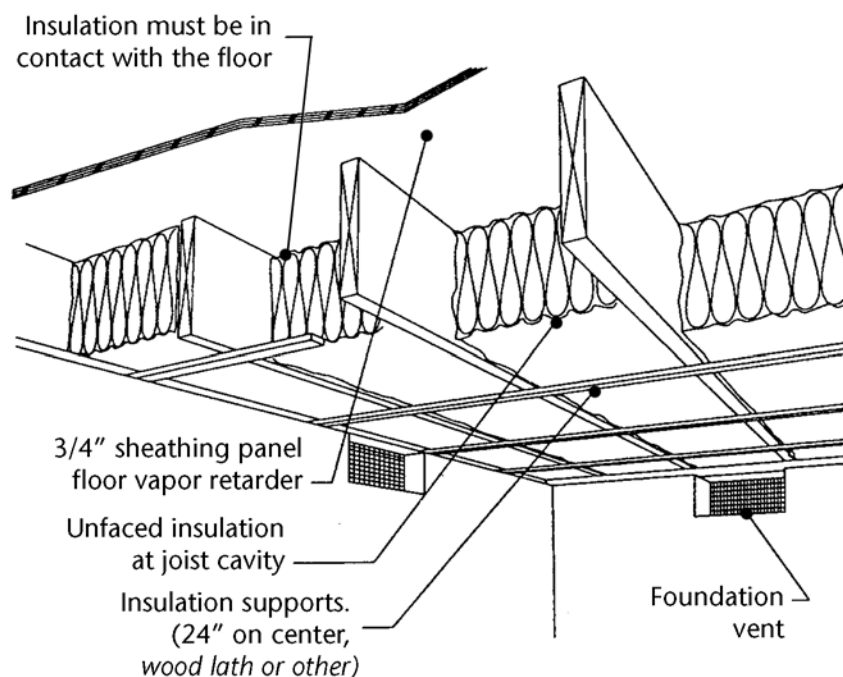


Figure 4-6

Post and beam floors require a different insulation attachment approach. The insulation is supported by lath and supports are attached to the posts and foundation wall (see Figure 4-7).

### Post and Beam Insulation Supports

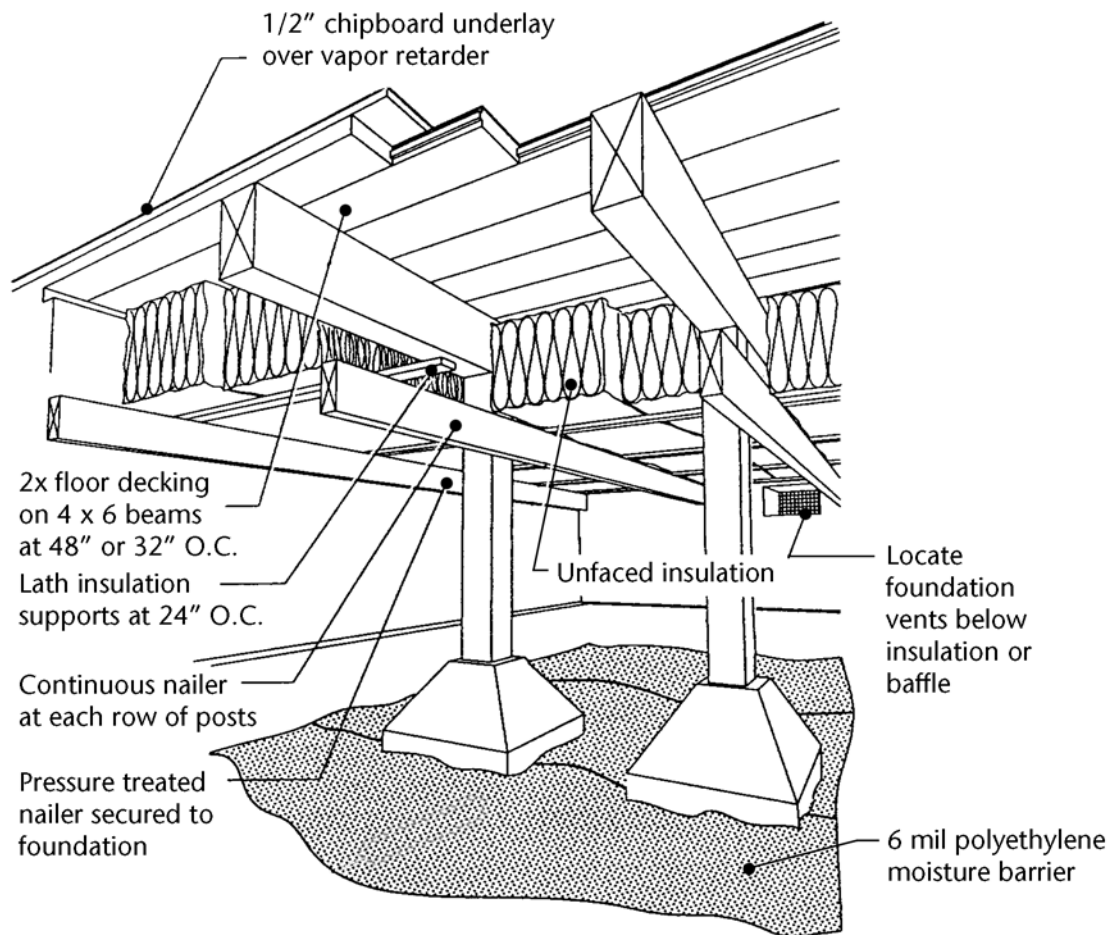


Figure 4-7

[502.1.4.7,  
Exception]

In either type of floor, when insulation butts against a foundation vent, a baffle must be installed to deflect the incoming air below the insulation level. These baffles are typically made of plywood installed at a 30° angle (refer back to Figure 2-2).



[502.1.4.7]

**Loose-Fill Insulation.** Loose-fill or blown-in insulation is commonly installed in ceilings (see Figure 4-8). The following requirements apply when using loose-fill insulation:

[502.1.4.1]

- The ceiling pitch must be 3-in-12 or less.
- Code-approved baffles must be installed.
- There must be minimum of 30 inches of clear distance from the bottom chord of the truss to the sheathing at the ridge.
- The insulation material must comply with the IBC for flame spread and smoke density requirements.
- R-value markers must be installed every 300 sq. ft.

### Loose Fill Insulation Requirements

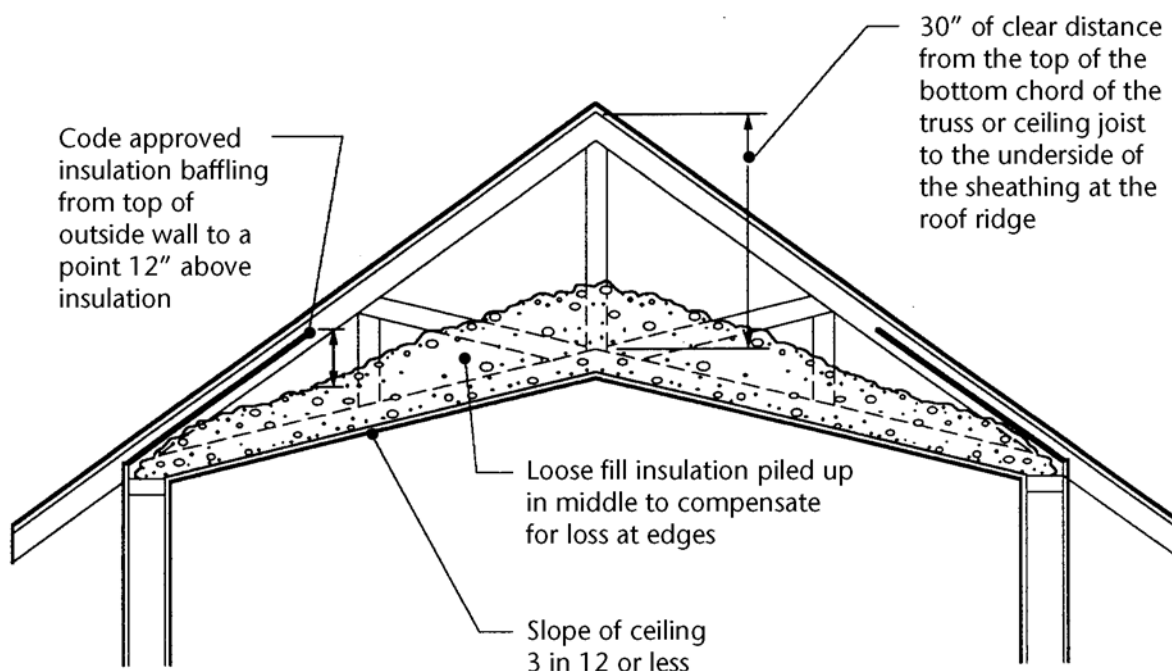


Figure 4-8

[502.1.4.4]

If areas of the attic need to be accessible for equipment maintenance, a catwalk should be constructed and supported above the loose-fill insulation (see Figure 4-9).

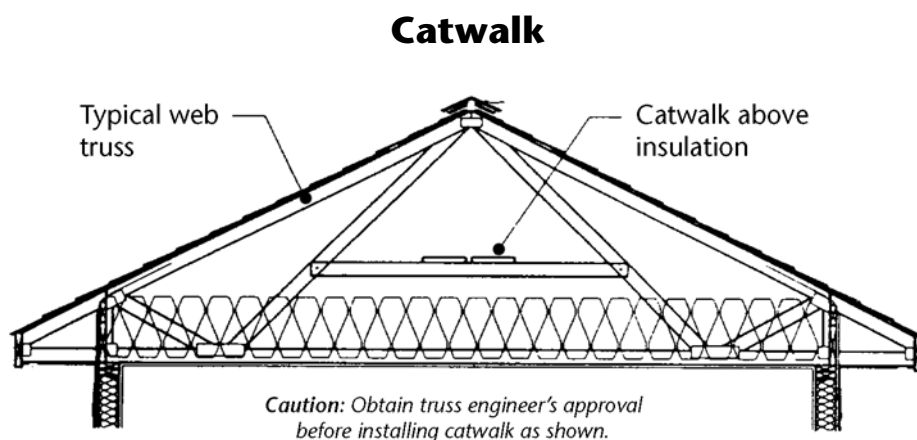


Figure 4-9

**Skylight Walls.** Skylight walls are insulated to the same level as the other walls in the house. Due to construction methods and close proximity of roof trusses, these walls are more difficult to insulate than a standard exterior wall.

A common skylight wall insulation technique is to tack insulation batts on the outside of the framed walls and secured in place with twine. *Remember, a vapor retarder is required.* The vapor retarder faces the inside, or warm side, as explained in Chapter 5, page 5-1.