



Insulation Basics

An Online Continuing Education Course for Engineers

Course Number: BD-2002

Credit: 2 Hours / 2 PDH / 2 CPD

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INTRODUCTION

Thermal insulation in buildings is an important factor to achieving thermal comfort for its occupants. Insulation reduces unwanted heat loss or gain and can decrease the energy demands of heating and cooling systems.

Most heat is lost through the ceiling and roof of a home, but walls, windows and floors are also significant sources of heat loss.

In this course, you'll learn construction and installation practices designed to maximize energy savings in homes and small commercial buildings. Best practices are presented for minimizing summer heat gains and winter heat losses through ceilings, attics, basements, crawlspaces, slabs and walls.

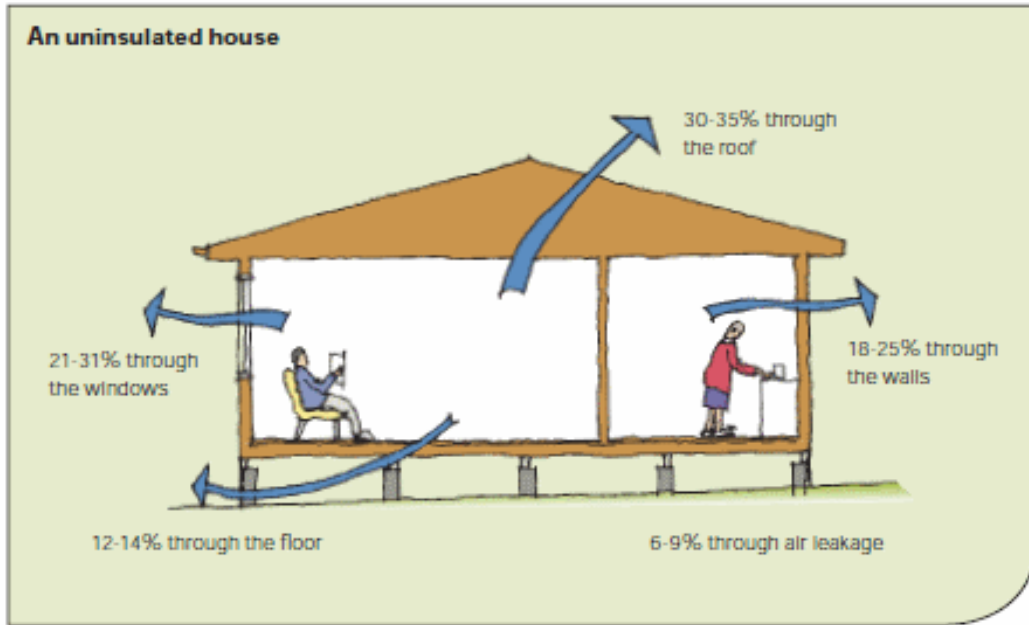
ATTIC ACCESS

Provide Adequate Insulation Coverage and Air Sealing for the Access between Living Space and the Unconditioned Attic

Don't Leave a Hole in the Ceiling

A home's attic access, such as an attic hatch, pull-down stairs, or knee-wall door, often goes uninsulated, representing one of the biggest deficiencies in the thermal barrier between the attic and conditioned space. This gap in the attic insulation increases heat loss in winter and heat gain in summer, and makes indoor living areas uncomfortable.

Such accesses are often not sealed properly. A 1/4-inch gap around the perimeter of an attic access can potentially leak the same amount of air supplied by a typical bedroom heating duct (~100 CFM). Unsealed, the attic access in a home leaks energy dollars and causes the house to be less comfortable.



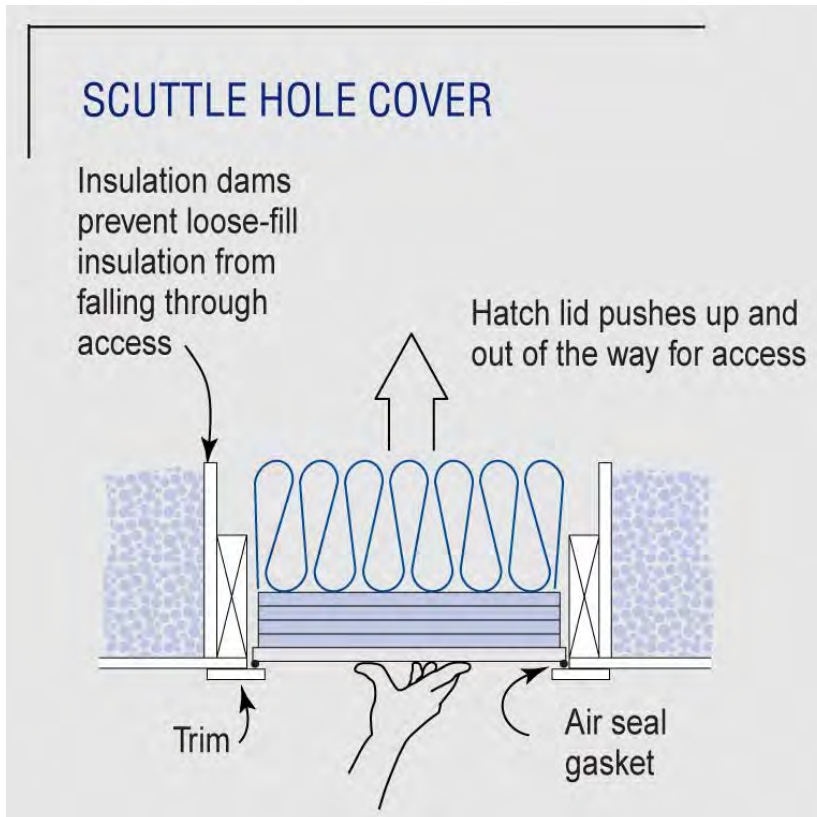
Sources of heat loss in an average uninsulated home

Attic Hatch

One inexpensive and common type of attic access is referred to as a scuttle hole or attic hatch, which is simply a removable portion of the ceiling that allows entry to the attic above. A scuttle hole is commonly located in a closet or main hallway.

To create the hatch, the installer should cut a plywood piece or save the ceiling drywall piece that is cut out for the hole. To ensure a tight fit, securely fasten the trim around the hole to the ceiling and make sure that it is flat and level. An uneven base can cause air leakage. Weather-stripping can be installed either on the hatch itself or on the inside of the trim or base where the hatch rests. Adding a latch bolt will help ensure a tighter seal.

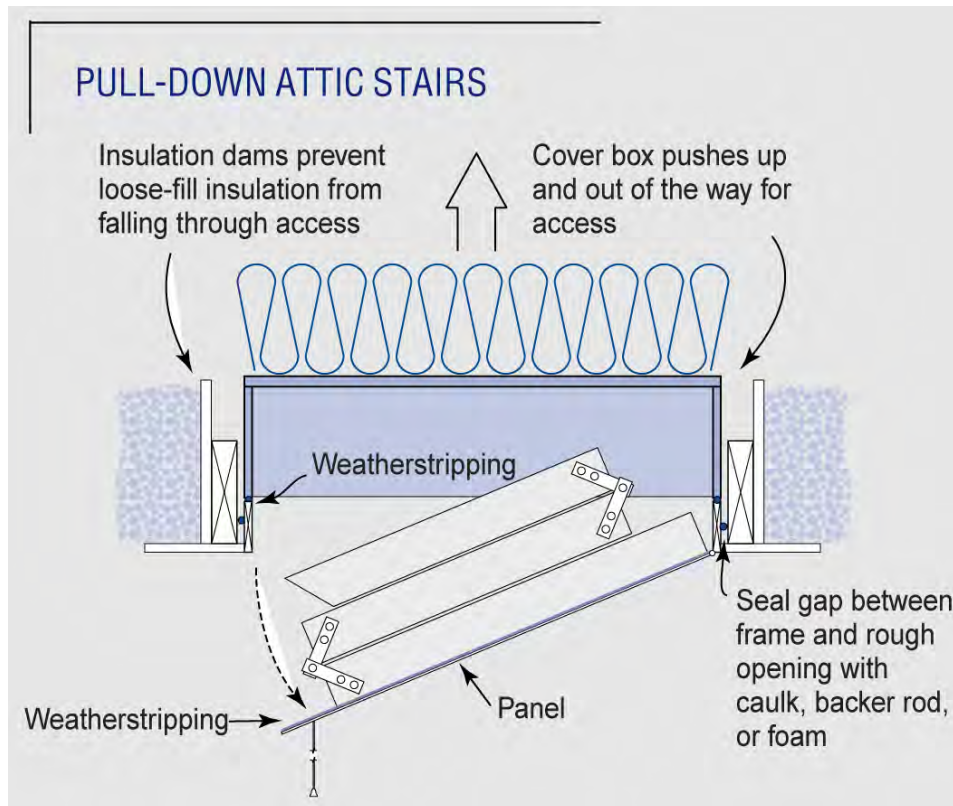




After the trim or base is aligned to seal properly, insulation should be added to the attic side of the hatch. Rigid insulated sheathing is recommended. Cut the insulated sheathing $\frac{1}{2}$ inch smaller than the hatch size to allow for clearance when moving the access panel. Apply 3 or 4 inches of insulation to the hatch with construction adhesive and screws. As an added measure, glue the kraft-paper side of batt insulation to the top of the last layer of rigid insulation.

Attic Stairs

Pull-down stairs are another common type of attic access. The frame for the stairs fits in a rough opening and leaves a gap, much like that for a door or window, which must be sealed. If the gap is small (less than $\frac{1}{2}$ inch), caulk can be used as the sealant. If a larger opening exists, then non-expanding foam or a backing material (backer rod) is recommended in conjunction with caulk. Expanding foam can be used, but care must be taken because of its highly expansive nature; it could warp the frame and interfere with the ability of the stairs to open or close properly.



An attic stair cover box is made from rigid insulation. It drops down from the attic side to seal and insulate the pull-down stairs.

To ensure a tight fit between the stairs' flat panel and the frame, weatherstripping or gasket material should be added either to the frame or the panel. Latch bolts may be installed to help ensure a tighter seal.

To insulate attic stairs access, a lightweight, moveable box can be constructed from rigid foam or fibrous duct board to fit over the stairs from the attic side. Insulating kits are also available through weatherization suppliers or from local hardware stores.

As with all home projects, follow the attic stairs manufacturer's instructions for proper installation. Manufacturer's guidelines often provide unique techniques and safety considerations for each particular unit. For safety and the extended life of the stairs, be sure to cut the stairs to the proper length. This action will prevent strain on the hinges and reduce wear on the pivotal joints of the stairs.

Attic Access Location

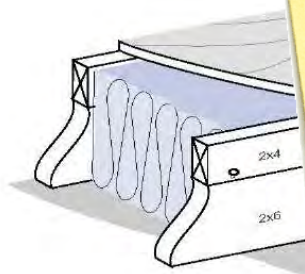
Location of an attic access is important. If possible, locate the access in an unconditioned part of the house (e.g., garage, covered patio, or porch) that is also secure against potential break-ins. A garage location, where the vented attic is uninsulated, can eliminate the need for sealing and insulation.

For a pull-down attic staircase, make sure that opening the stairs will not interfere with the placement of furniture. The position of the staircase in relation to ceiling joists might also affect location—placing the staircase between joists instead of across joists can speed installation because structural cross-member framing is not as complicated.

Attic Decking

Attic decking is often used to provide additional storage space or a platform for an HVAC unit or hot water tank installed in the attic. The decking is often installed directly on top of the ceiling joists; this limits the amount of space available for insulation and lowers the attic's average R-value.

To ensure proper insulation, install the decking over the ceiling joists. To accomplish this “edge” decking should be located or, as an option, be installed at the desired height. Install the decking over the insulation has been installed.



To view the remainder of the course material and to take the quiz for PDH credit, you must purchase the course. Close this window and click “Add to cart” on the product page.

Insulation under decking
on depth of 10 to 14
R-30 to R-38 insulation
tion needs to be added
t depth before installing

Construct an Attic Stair

Use the template shown here to construct a box from a single 4x8 foot sheet of 1/2-inch rigid insulation for a box 53 1/2 inches long (51 1/2 inches inside), 24 1/2 inches wide (22 1/2 inches inside), and 9 inches high inside. This box will fit stairs with an outside framing dimension of 53 1/2 inches by 24 1/2 inches. Adjust dimensions to fit the specific stairs being installed. Be sure to carefully measure both inside and outside dimensions to the appropriate length, width, and depth clearances for the cover box.

Create the box as shown: Apply adhesive/ mastic and use roofing nails to construct the two end and two side pieces. Assemble the side and end pieces into a box using adhesive and longer nails. Add the center support brace and cover piece with glue and nails. A faced insulation batt may be glued to the cover piece with adhesive applied to the paper backing.

Materials Needed:

- 1/2 -inch rigid insulation
- Insulation batt (optional)
- Duct sealing mastic or construction adhesive
- 1-inch roofing nails (8d or 16d)
- Tape measure, sharp utility knife and straightedge, or table/circular saw