HOW-TO BOOKLET #3086

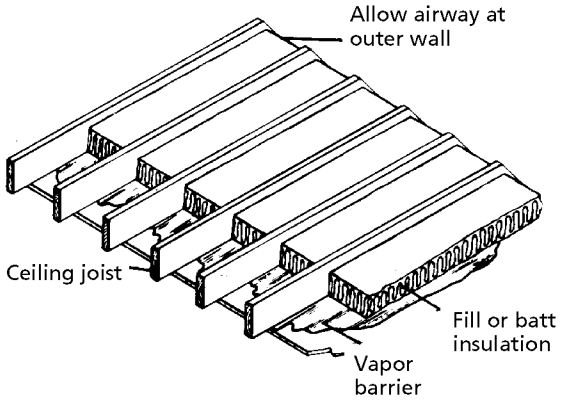
INSULATE AN ATTIC

TOOL & MATERIAL CHECKLIST

- ❑ Insulation with Correct R-Value
- ❑ Razor Knife
- ❑ Tape Measure
- ❑ Stepladder
- ❑ Gloves
- ❑ Staple Gun
- ❑ Straightedge Board
- ❑ Foil-Faced Tape
- ❑ Safety Glasses
- ❑ Respirator

Read This Entire How-To Booklet for Specific Tools and Materials Not Noted in the Basics Listed Above.

Fig. 1



Typical unfinished attic floor insulation installation

Attic insulation, or more specifically, ceiling insulation that is generally installed in an attic or attic crawl space, is easy to install and will save you plenty in both heating and cooling bills.

There is a variety of types of insulation on the market. One type, insulation board sheathing, has to be installed while the house is being built, or when you put on an addition to the house. Following are the types of insulation that you can install, provided you have access to the attic or ceiling space above the living area.

Flange Batts. One side has a vapor barrier, while the other side has a kraft "breather" paper wrap. This product is generally used in crawl spaces.

Foil-Faced Fiberglass Insulation. One side has an aluminum foil type covering. The other side is exposed. This is considered the standard material for attics, sidewalls, crawl spaces, and other insulation installations. It is highly advertised.

Paper-Faced Fiberglass Insulation. It is similar to foil-faced insulation, but with a kraft paper vapor barrier.

Unfaced Fiberglass Rolls. No vapor barrier at all here. If you want a vapor barrier, use polyethylene film, usually called sheet plastic or polyfilm.

Loose Wool. Usually fiberglass, this material comes in bags and looks like chunks of pink cotton. It is spread or blown between rafters and framing members.

Vermiculite. This is expanded mica. It looks like the stuff you use to pot plants. It is poured or blown between framing members.

Other types of insulation available are the foamed types. These products have to be installed by a professional (usually) since special equipment is needed to correctly place the material.

Vapor barriers, attached to or separate from the insulation, must always face the warm side of the room. On an attic floor, the barrier is down toward the heated rooms below. If the attic floor will be covered and the attic space heated, you can use unfaced insulation between the floors, or insulation between the rafters. On the rafters, the vapor barrier faces the room, not the roof.

PURCHASING ENOUGH R-VALUES

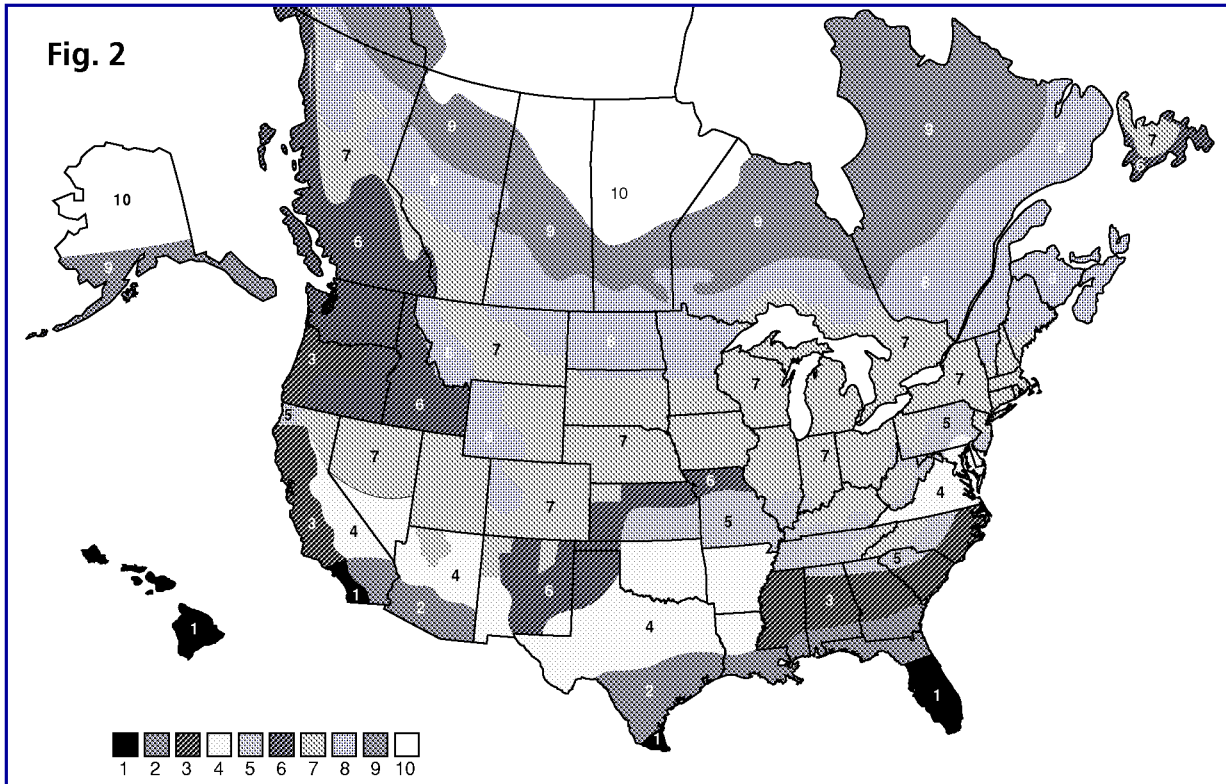
All house insulation is based on R (or resistance) factors. The higher the R-values, the more insulation quality of the product.

Before you buy any insulation, consult **Fig. 2**, for your insulation zone. To determine how much insulation your attic needs, simply check Table of Material R-Values.

TABLE OF MATERIAL R-VALUES

MATERIAL	R-VALUE (PER INCH)
Batts and Blankets:	
Glass Fiber	3.3
Rock Wool	3.7
Loose Fill and Blown-In:	
Perlite	2.7
Vermiculite	2.4
Cellulose	3.6
Glass Fiber	2.2
Rock Wool	2.9
Rigid Boards:	
Molded Polystyrene	4.0
Extruded Polystyrene	5.0
Fiberglass Board	4.5
Isocyanurate Board	6.0 to 7.0
Phenolic	8.0

Fig. 2



RECOMMENDED TOTAL R-VALUES FOR EXISTING HOUSES IN TEN INSULATION ZONES[a]

Component	Ceilings Below Ventilated Attics		Floors Over Unheated Crawl Spaces, Basements		Exterior Walls[b] (Wood Frame)		Crawl Space Walls[c]	
Insulation	Oil,Gas, Heat Pump	Electric Resistance	Oil,Gas, Heat Pump	Electric Resistance	Oil, Gas, Heat Pump	Electric Resistance	Oil, Gas, Heat Pump	Electric Resistance
1	19	30	0	0	0	11	11	11
2	30	30	0	0	11	11	19	19
3	30	38	0	19	11	11	19	19
4	30	38	19	19	11	11	19	19
5	38	38	19	19	11	11	19	19
6	38	38	19	19	11	11	19	19
7	38	49	19	19	11	11	19	19
8	49	49	19	19	11	11	19	19
9	49	49	19	19	11	11	19	19
10	55	55	19	19	11	11	19	19

a These recommendations are based on the assumption that no structural modifications are needed to accomodate the added insulation.
b R-Value of wall insulation, which is 3-1/2 inches thick, will depend on material used. Range is R-11 to R-13. For new construction R-19 is recommended for exterior walls. Jamming an R-19 batt in a 3-1/2 inch cavity will not yield R-19.
c Insulate crawl space walls only if the crawl space is dry all year, the floor above is not insulated, and all ventilation to the crawl space is blocked. A vapor barrier (e.g., 4- or 6-mil polyethylene film) should be insulated on the ground to reduce moisture migration into the crawl space.

INSULATE SAFELY

If you are working with fiberglass insulation, wear safety glasses, gloves, and a paper respirator. The fine particles of fiberglass fly through the air as the material is being installed and can cause irritation. also, wear a shirt that can be buttoned at the collar and the cuffs, or preferably a plastic raincoat. And, after working for about 15 minutes, take a break and move into a fresh air area for several minutes.

FLOORS IN UNFINISHED ATTICS

Batt, blanket, and loose fill insulation may be used between ceiling floor joists. You need not fasten the insulation between the joists. Gravity holds the insulation in place. Keep in mind that the vapor barrier must be beneath the insulation, facing toward the heated room below (**Fig. 1**).

If the floor joists are exposed, lay temporary flooring (use plank or plywood piece) across the joists and hang a temporary work light. Also remember to leave the insulation in its wrapper until you're ready to use it. Insulation is packaged in a compressed state and expands greatly when the wrapper is opened.

Begin laying the batts or blankets at the outer edge of the attic space and work towards the center (this will allow more headroom in the center of the attic for whatever cutting and fitting there is to be done). Lay in long runs first and use the leftovers for shorter spaces. Insulation should be installed around wiring, taking care not to disturb it. Be sure to butt insulation tightly at the joints for a complete barrier to heat flow. You can tape the joints with foil-faced tape.

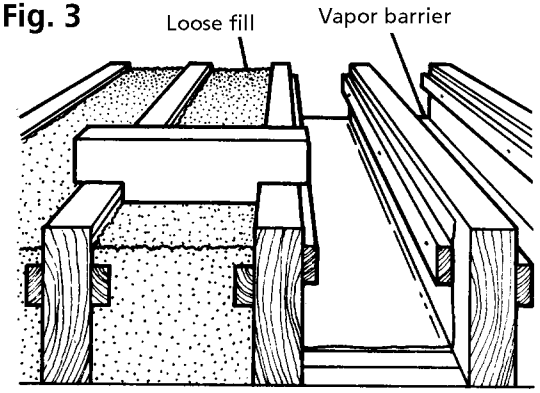
Insulation must be kept 3" away from recessed light fixtures, unless the fixture is marked IC (insulated ceiling) — a fixture designed for direct insulation contact. Insulation placed over an uninsulated fixture, like a recessed light, may cause it to overheat and start a fire. Be sure to fill the space between the masonry chimney and wood framing with noncombustible material such as unfaced fiberglass insulation. If you are insulating around a metal flue, do not place the insulation flush to the flue. Always leave at least a 3" space.

Ends of batts should be cut to fit snugly around cross bracing. If a second layer of insulation is needed and the cavity has been completely filled, the additional layer of unfaced material should be placed at right angles to the joists.

If there is insulation in the ceiling and the foil is incorrectly facing upward between the floor joists, try to remove this first layer of insulation and turn it over so the foil faces the heated rooms below. Do not damage the vapor barrier. Otherwise, slit the foil with a razor knife. Then add unfaced insulation on top of this first layer of insulation.

For already-installed unfaced insulation, remove the insulation, install a polyfilm moisture vapor barrier over the top of the ceiling between the joists, and replace the insulation. If you need to increase the insulation in this application, simply lay unfaced insulation over the installed strips.

Fig. 3



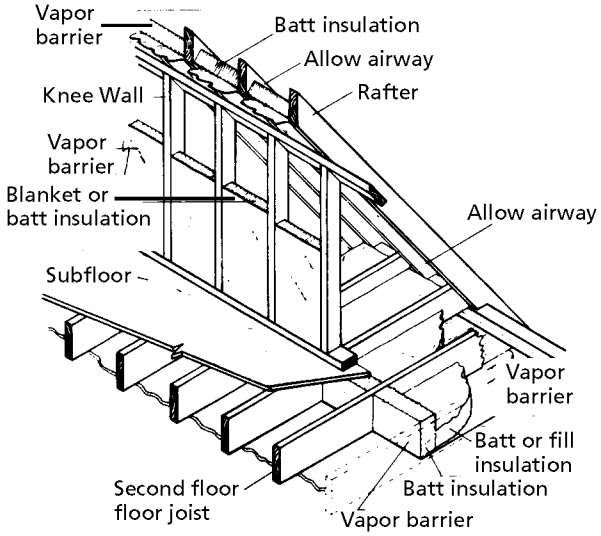
Loose fill insulation is placed between joists and leveled with a notched board to maintain the right height of the material. A polyethylene vapor barrier is installed beneath the insulation. It can be tacked into place with wooden battens.

If the ceiling is insulated with either loose fill or vermiculite insulation, you can increase the R factor by simply pouring more of this material between the joists, right on top of the old existing insulation.

If the ceiling is insulated with blanket or batt insulation and has some loose fill or vermiculite insulation placed on top of it, you can either add unfaced insulation or more loose fill insulation on top of the existing insulation to increase the R factor.

Because of the low roof pitch, it may be difficult to extend the insulation back to the eaves. Make this job easier by smoothing the insulation out with a broom or notched board (**Fig. 3**). Be careful to get the material centered between the ceiling joists.

Fig. 4



Attic rafter and knee wall insulation installation

INSULATING BETWEEN RAFTERS AND KNEE WALLS

Fig. 4 shows how batts or blankets are installed in rafter and knee wall attic situations. Knee walls are partial walls that extend from the floor to the rafters. They are commonly found in 1 1/2-story homes and are most frequently used as bedrooms or bonus space. The height of the wall will vary from 4' to 6'.

If you install insulation between the rafters, you do not need insulation in the floor—and vice versa. When hanging insulation on a vertical, staple the paper flanges to the inside of the framing members—not over the top of them. The flanges "offset" the insulation about 3/4" below the edges of the framing and create an air space when the ceiling (or walls) is finished with gypsum board or paneling. When cutting insulation to length, use a piece of scrap plywood and a length of board that has a straight edge. Sandwich the insulation between the plywood and the board, stand on the board with one foot, and then slice the insulation with a razor knife. The cut will be very quick and clean. Clean or change the blade in the razor knife frequently.

Insulation that goes between rafters should have a vapor barrier. This covering should point down toward the room or the warm side of the room.

To create the R factor you need, you'll probably have to install unfaced insulation between the rafters first and then install faced insulation over it. You can lightly tack the unfaced insulation to hold it in place while you cover it with the foil- or kraft-faced material. A helper could come in handy for this job.

If the rafters are already insulated and you want to add to the R factor, you will have to remove the existing insulation and install unfaced insulation. Then cover the unfaced material with the old insulation you carefully removed from between the rafters.

If the existing insulation has a vapor barrier that faces the roof, try to remove the insulation and reinstall it so the vapor barrier faces the room.

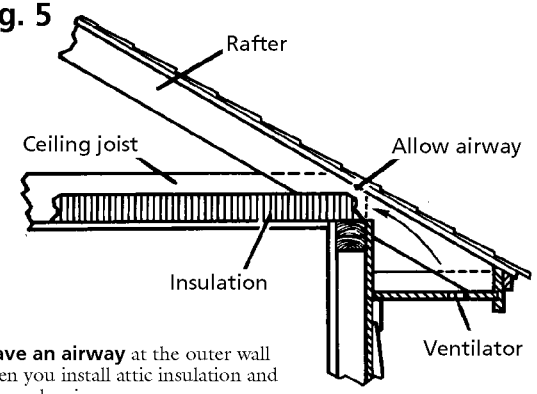
ATTIC VENTILATION

Insulated attic spaces need ventilation. While this should extend far enough out to cover the top plate of the walls, it should not block the flow of air from the eave vents. For best results, install ventilation baffles at the inside of the eaves.

Condensation in the attic area is a fairly common problem, especially in cold regions during the winter. When warm moisture from the living spaces below rises to the roof and meets the cold outside air, condensation forms. If severe enough, this moisture can cause rotting of the sheathing and framing. wood roofs are not as susceptible, because moisture can escape easier. Asphalt roofs are less permeable and moisture can cause real trouble. Therefore, attics ought to be ventilated if they are insulated. This can be done with various vents (**Fig. 6**) as described in How-To Booklet #3078: Venting Attics.

Air Changes per Cubic Foot. The amount of ventilation needed within any space is based on cubic feet per minute, or cfm. To translate this into cfm per square foot, keep in mind that for 10 air changes per hour a minimum cfm of 0.7 per square foot is needed. Tests have shown air temperatures in an attic can be reduced by 44.5 percent using 1.5 cfm per square foot, reduced by 67 percent when using 2.0 cfm per square foot

Fig. 5



Leave an airway at the outer wall when you install attic insulation and a vapor barrier.

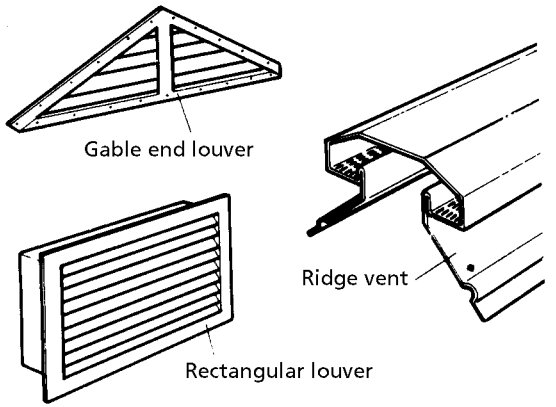
Attics Without Vapor Barriers. One square feet of free area is needed for each 150 square feet of attic space (1/150). If half of the vents are in the eaves and half are located at least 3' above the attic floor, you can reduce the required free area to 1/300.

Attics with 6-mil Polyethylene. The attic calls for a free area of 1/300—or 1 square foot of free area for every 300 square feet This assumes that half the vents are located at least 3' above the attic floor.

Vaulted (Cathedral) Ceiling. You will need a continuous air space above the insulation, with continuous eave vents and continuous ridge vents, or you must have individual vents in the eave as well as near the ridge for each rafter space.

Climate. In areas having a high heat gain during the summer, attics with or without a vapor barrier should have a total free area of 1/150; half of the vents should be in the eaves and half near the ridge of the roof.

Fig. 6



Different styles and types of vents.