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Home Insulation Choices

In poorly insulated homes, keeping warm costs so much because heat doesn't stay in your home very long. Warm air produced by your heating system naturally wants to go to cold areas or surfaces. As a result, heat travels right through your home's walls, floors and roof. This is called heat loss, and to compensate for the house heat loss, the furnace will operate, costing you money. Insulation materials placed in walls, floors and the roof slow the flow of heat. During winter, insulation keeps the heat in, and in the summer, insulation keeps the cool air in.

Resistance is Key

The ability of an insulation material to reduce heat flow is measured in terms of resistance or "R-value". The higher the R-value, the better the insulation properties of the material used. Here in Tennessee, U.S. Department of Energy / Oak Ridge National Laboratory recommends that an existing home's attic be insulated to at least R-49, floors to R-30 and exterior walls to R-13. Achieving these R-values depends on the type and the thickness of insulation installed. For example, fiberglass batt insulation has an R-value of around 3.2 per inch of insulation, so one 3.5 inch batt will insulate a wall cavity to about R-11. The R-value of extruded polystyrene board insulation is R-5 per inch, so just two inches of that material have about the same insulation effectiveness as the glass-fiber.

Insulation Types

Different types of insulation have different uses. It's important to select the right type of insulation for the job you're doing and to install it according to manufacturer's instructions so it will be as effective as possible.

The easiest time to install insulation is when your home is under construction, but you can also add insulation to most existing houses. Insulation can be purchased in four basic forms:

1. Batts, Blankets or Rolls
2. Loose Fill
3. Rigid Board
4. Foamed in Place

**Batts, Blankets or Rolls.** Insulation batts or blankets consist of fibers made from spun rock, slag or glass. Glass fiber, the most common insulation, is made from glass and has an R-value of 2.2 to 3.2 per inch. The R-value of an inch of rock or mineral wool, made from rock or slag, is 3.1. Batts are cut to specific lengths, and blankets come in long, "cut-it-yourself" rolls. Both types are available in thicknesses that range from one inch to 12 inches and are wide enough to fit either a 16-inch or 24-inch cavity opening depending on your insulation needs. Batts and blankets work well when the space you want to insulate is an unfinished, framed-in area. Common applications include insulating unfinished walls, open attics and basement or crawl space ceilings.



You can buy batt and roll insulation with a built-in vapor barrier made of kraft paper or foil, or you can buy it “unfaced” (without a vapor barrier) and install a plastic barrier separately. A vapor barrier is necessary to prevent moisture absorption, which lessens the effectiveness of the insulation. Both glass-fiber and mineral wool are non-flammable, but their vapor barriers aren't, so they must be covered with a fireproof material such as a half-inch of sheetrock.

Finally, it's important not to compress batt or blanket insulation into a tight space. The insulation relies on tiny air pockets to slow heat flow, and crushing these pockets decreases the insulation's effectiveness.

**Loose Fill.** This type of insulation comes in bags and can be made from cellulose (mulched newsprint or wood fibers), glass-fiber and mineral wool. Its R-values range from a low of 2.2 per inch for glass-fiber to 3.7 per inch for cellulose fiber. For maximum R-value effectiveness, it's important to install loose fill insulations to the proper density. Cellulose, glass-fiber and mineral wool loose fill insulations are most commonly installed by a professional who blows it into finished walls and open or finished attic spaces. By applying special adhesives to loose fill insulation, unfinished wall cavity can also be insulated. The adhesives assure that the insulation will not settle in the wall cavity.

**Rigid Board.** The most common rigid board insulations are made from a wide range of plastic materials, including expanded polystyrene (R 4.0 to 4.5 per inch), extruded polystyrene (R 5.0 to 5.5 per inch), polyurethane (R 6 to 7.5 per inch), and polyisocyanurate (R 6 to 7.5 per inch). Because of their ability to resist moisture damage, polystyrene rigid board insulations are commonly used in basement and crawl space walls and around slab foundations. However, for exterior below-ground installation, only extruded polystyrene products are recommended. All rigid board products can be used to insulate cathedral ceilings and insulation sheathing under exterior siding.

Plastic rigid board insulations are flammable and must be covered with a fire-resistant material such as a half inch of sheetrock.

**Foamed-in-Place.** Some of the plastic insulations are also available in a foam form that can be sprayed by professionals into walls or roof cavities during construction. The most common is polyurethane, and when foamed in place, it has an R-value of about 6 per inch. Advantages of foamed-in-place insulations include providing excellent air sealing and vapor barrier control, as well as being excellent insulation qualities.

## General Guidelines

Seal first, then insulate. Adding insulation to your home's attic, walls or floors will not be effective if heat can easily travel through cracks and holes between framing members and around windows and doors. Seal all major cracks and openings before insulating.

Install a vapor barrier between your living space and your insulation. Installing a vapor barrier is necessary to keep moisture out of your insulation and other building materials. The air in your house contains large quantities of moisture due to showers, cooking and washing clothes. This moisture can pass right through your walls, roof and floor. It condenses when it hits a cold surface, causing blistering paint, wet insulation and possibly structural damage. For existing homes, vapor barrier paints can be used.

Ensure adequate ventilation. Adding insulation increases the need for ventilation in attics and crawl spaces. Pay close attention to ventilation requirements for these areas.

Insulation Type	R-value/Inch
Glass Fiber - Loosefill	2.2
Glass Fiber - Batts or Rolls	3.2
Cellulose Fiber	3.7
Mineral Wool/Fiber	3.1
Expanded Polystyrene Board	4.0 - 4.5
Extruded Polystyrene	5.0 - 5.5
Polyurethane Board or Spray	6.0 - 7.5

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