



LOOSE-FILL INSULATIONS

Source: DOE Consumer Energy Information: EREC Reference Briefs

Whether you are increasing the insulation levels in your current home or selecting insulation for a new home, choosing the right insulation material can be challenging. Fibrous loose-fill insulations such as cellulose, fiberglass, and rock wool are options you may wish to consider. This publication will introduce you to these materials—what they are, how they are applied, how they compare with each other, and other considerations regarding their use—so that you can decide whether loose fills are right for your home.

CHARACTER AND TYPES OF LOOSE-FILL INSULATION

The most obvious difference between loose fills and other types of insulation is their form. They are either produced as—or broken down into—shreds, granules, or nodules. These small particles form fluffy materials that conform to the spaces in which they are installed. Loose fills are most commonly sold in bags and are blown into building cavities using special equipment. All three primary types of loose-fill insulation are considered “environmentally positive” because recycled waste materials are used in their production.

Cellulose loose-fill insulation is made from wastepaper, such as used newsprint and boxes, that is shredded and pulverized into small, fibrous particles. Chemicals are added to provide resistance to fire and insects. Also, less energy is required to produce loose-fill cellulose than to produce other insulations. Fiberglass loose-fill insulation is spun from molten glass into fibers. The glass is typically melted in high-temperature gas furnaces. Most major manufacturers use 20% to 30% recycled glass content. Rock wool (or slag wool) loose-fill insulation is similar to fiberglass except that it is spun from blast furnace slag (the scum that forms on the surface of molten metal) and other rock-like materials instead of molten glass. The production of rock wool uses byproducts that would otherwise be wasted.

PRIMARY APPLICATIONS OF LOOSE-FILL INSULATIONS

Loose-fill insulations are well suited for places where it is difficult to install other types of insulation, such as irregularly shaped areas, around obstructions (such as plumbing stacks), and in hard-to-reach places. They can be installed in either enclosed cavities such as walls or unenclosed spaces such as attics. Blown-in loose fills are particularly useful for retrofit situations because, except for the holes that are sometimes drilled for installations, they are one of the few materials that can be installed without greatly disturbing existing finishes. Rock wool or slag wool loose-fill insulation is often used for insulating existing walls and ceilings in mobile homes.

In most new construction, however, the more common choices in insulation are batts or rolls because they can be installed without the use of special equipment before walls are finished. Batts are available in standard widths designed to match the cavities created by wall studs.

Loose fills are sometimes used in new construction, though. A mixture of loose-fill insulation and an adhesive can be sprayed into wall cavities before the walls are closed. Such methods may result in fewer gaps in the building’s thermal envelope than can occur with batts.

COMPARATIVE PERFORMANCE OF LOOSE-FILL INSULATIONS

Insulation materials are compared on the basis of their R-values per unit of thickness, density per unit of volume, and weight per unit of area.

There are several performance characteristics to consider when selecting an insulation material. Among the most important to compare are insulating capacity, weight, convective heat loss, settling and loss of insulating capacity, fire resistance, and moisture resistance.

Recommended Specifications by Insulation Type			
	Cellulose	Fiberglass	Rock Wool
R-value/inch	3.2-3.8	2.2-2.7	3.0-3.3
Inches (cm) needed for R-38	10-12 (25-30)	14-17 (35-43)	11.5-13 (29-33)

INSULATING CAPACITY

A material's resistance to heat flow is expressed as its R-value. The higher the R-value, the better the material insulates, and the lesser the thickness you will need. (However, in an open, unrestricted attic application, the height limit of insulation thickness is of no great concern. But if you use your attic for storage, heavy objects will compress insulation and decrease its benefits.) Different insulations also have different densities, or weights. There are weight limits for certain ceiling types.

SETTLING AND LOSS OF INSULATING CAPACITY

Many loose-fill insulations installed in attic cavities will lose some of their installed R-value over time because of settling. Cellulose loose fill settles more than rock wool or fiberglass loose fill—about 20% compared to roughly 2% to 4%. Therefore, install about 20% more blown-in cellulose insulation to offset this settling. Cellulose manufacturers are required by federal law to state “settled thickness” on their bags. Because this can be confusing to consumers, many cellulose producers also specify “installed thickness” on their bags. Regardless, installed thickness can be estimated by adding 20% to the stated settled thickness, but be sure not to exceed previously mentioned weight limits.

When insulating an attic be sure to prevent the blown insulation from blocking the air flow from the eaves and from covering old non-insulation contact recessed lights. Because insulation can be fluffed by using excessive air during installation, measuring the height of insulation may not be a good indication of its R-value. Using the manufacturer's recommendations on the bag, determine the number of bags needed to provide the desired R-value.

FIRE RESISTANCE

Loose-fill insulations offer very good resistance to fire. Although fiberglass and rock wool are naturally fire resistant, cellulose's fire resistance is achieved by adding chemicals. To ensure that it does not present a fire hazard, cellulose must pass tests established by the Consumer Product Safety Commission.

INSTALLATION

Loose-fill insulations are typically installed with special equipment that blows the insulation through a hose and into the cavity. Although loose fills can be installed in both new and retrofit situations, they are especially popular for retrofit projects because they can be installed with minimal disturbances to existing finishes.

Installation often calls for the “two-hole method,” which entails drilling two holes spaced vertically between the exterior walls' framing studs. The holes should be 2 inches (5 centimeters) in diameter. Working between each stud, drill one hole 16 inches (41 centimeters) from the top of the wall. Drill the other hole 24 inches (61 centimeters) from the bottom of the wall.

The insulation is blown into the holes, then the installation holes are sealed. Installation is most commonly done by professionals who are experienced at operating the equipment to ensure proper density and complete coverage.