

# BUILDING SHELL

## EVALUATING INSULATION

Insulation is the most important element in making a home comfortable and energy-efficient. Attic and wall insulation are the best energy investments for many homes.

Insulation is rated by R-value, which measures thermal resistance. Each type of insulation has a particular R-value for each inch of thickness. The International Energy Conservation Code (IECC) requires that new homes have R-values of at least R-38 in attics, R-19 in walls, R-13 in basement walls, and R-30 in floors above crawl spaces.

### Insulation Types and Choices

Fiberglass batts are the most common insulation found in existing homes. Many homes have fiberglass batts in both wall cavities and attics.

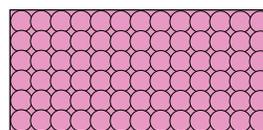
Loose-fill insulation can also be blown into walls. The blown blanket has no voids or edge gaps, if installed properly, and is usually more thermally resistant than fiberglass batts. Blowing insulation comes in two common varieties: fiberglass and cellulose. Both fiberglass and cellulose settle after they are installed. Cellulose settles 15 to 20 percent and fiberglass settles 3 to 5 percent. Settling isn't much of a problem in attics as long as a customer plans for it by adding more insulation in the first place.

Plastic foam insulation, like polystyrene and polyurethane, is available in 4-foot by 8-foot or 2-foot by 8-foot sheets of various thicknesses. Plastic foam insulation is a moisture and air barrier, unlike fibrous insulation. Foam sheets can be used to insulate masonry walls or to insulate the interior or exterior of frame walls.

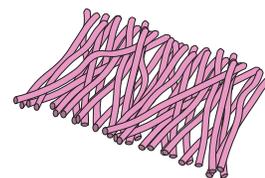
by professional crews with truck-mounted equipment although spray foam is also available in small

### Building Science How Insulation Works

Insulation traps air within fibers or plastic cells. The small air pockets contain still air. Heat must conduct through the still air, which is a slow process compared to conducting through a solid material or traveling by convection or radiation.

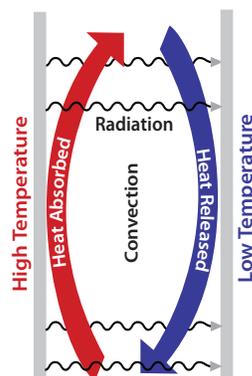


foam insulation

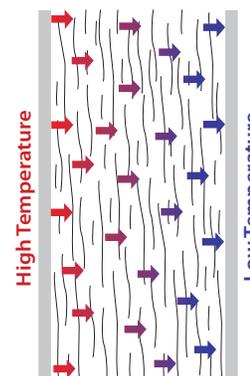


fibrous insulation

Heat convects and radiates through an empty wall cavity, which is a rapid process compared to heat traveling through insulation.



Heat convects and radiates across an empty



Heat conducts through the air pockets, trapped

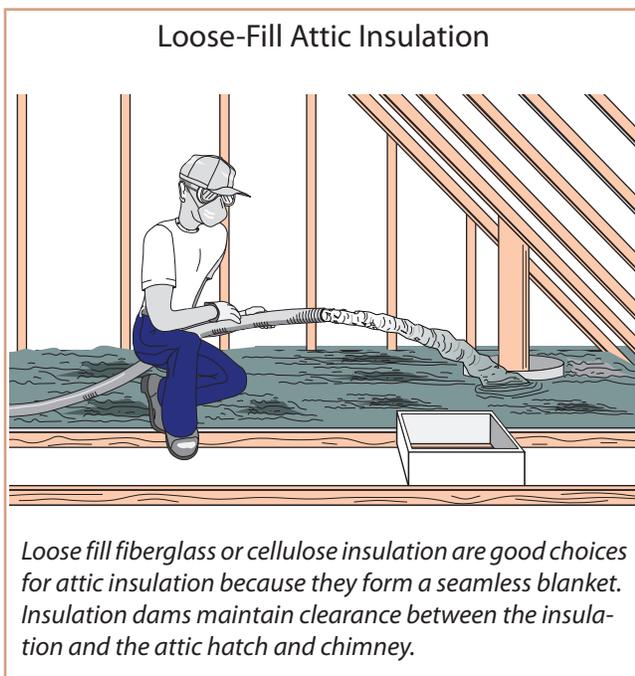
Sprayed polyurethane foam is sometimes used to insulate walls, foundations, or roofs. This sprayed foam is costly to install, but worth its higher price when adhesion, moisture-resistance, air-sealing ability, and structural strength are important. Sprayed polyurethane insulation is usually applied and large containers.

## Retrofit Attic Insulation

Loose-fill insulation is blown into attics using an insulation-blowing machine. It is inexpensive and easy to install. If your customer's ceiling has less than 6 inches of insulation (about R-25), adding insulation to a total of 14 to 16 inches (or about R-49) is an excellent investment.

Many lumber yards and rental businesses rent small insulation-blowing machines to their customers. If a customer is handy and doesn't mind getting dirty, he or she can install the insulation.

Advise customers to seal air leaks in the attic are sealed before installing attic insulation.



## Retrofit Wall Insulation

Many older homes were built with little or no wall insulation. Since a home's wall cavities are out of sight, it's hard to know how much insulation they contain. But if a customer's home is more than 30 years old, it's worth the effort to find out. One of the best ways is to remove the cover plate of an electrical outlet (be sure to turn the power off first). Use a flashlight to peer around the electrical box into the wall cavity. Another trick is to drill an

inspection hole in an inconspicuous place such as a closet. The wall cavity should be completely filled with insulation.

Wall insulation is usually blown into the wall cavities of existing homes through holes in the interior or exterior wall surfaces of the exterior walls. Loose-fill insulation should be installed at sufficient density to avoid settling. The best insulation contractors ensure high density throughout the wall by blowing insulation through a tube that is inserted into the wall cavity, rather than through a nozzle that merely penetrates the cavity.

Customers planning to install new siding or to paint the interior or exterior have a good opportunity to blow insulation into uninsulated or partially insulated wall cavities at the same time. During painting or siding replacement, customers can reduce or even eliminate the cost of patching the holes need to install cavity insulation.

Insulating foam sheets can also be attached to walls if the old siding is removed and before a home is re-sided, adding valuable extra thermal resistance.

