



# Choose The Right Insulation

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*Now that you know all about R-value, consider which materials and application are most appropriate to your needs.*

By **Energy Circle Staff** - March 17th, 2009

## *Part A: The Goods*

As we've examined the range of insulation options available, it's become clear that homeowners have more factors to consider than ever. As with most enterprises, knowing what your priorities are will help you select the product and installation process that will give you the results you need.

- ***Where you need insulation:*** retrofitting an attic is a lot different than insulating unfinished walls in a new house, and may require a different type of insulation. Consider, too, if there is the possibility of moisture contact. Closed-cell foam will still be effective if it gets wet, while the R-values of cellulose or fiberglass will be compromised.
- ***Who will be doing the installation:*** some types of insulation are easier to install than others. You should hire a contractor to install spray-foam, for example.
- ***Where you live:*** how to insulate your home most effectively will depend on the climate you live in, in respect to ideal R-values and ROI of insulation types.

### ***Something to think about:***

The effectiveness and R-value of insulation can be compromised by both structural and environmental factors. The most common building materials: wood, steel, and aluminum, also conduct heat, which makes insulating around those structures critical. R-value also will be adversely impacted by moisture, and wet insulation can lead to a host of problems, including the introduction of insects and rot.

- *Sustainability and environmental impact:* if you're looking to make your house more "green," you might consider insulation made from recycled materials.
  - *Health and safety:* Some insulating materials contain toxic chemicals, some are all-natural, some are more fire-resistant than others. Take a look.
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**Common Insulation Types:** Consult this list before speaking with your contractor, and be sure that you are making the choice that makes sense for your home and your health.

**Batts and blankets:** Fiberglass batts and blankets are the most common type of insulation in U.S. homes, but not necessarily the best. Batts are pre-cut; blankets come in a big roll. Cotton batts or "blue-jean insulation" - a non-toxic alternative to fiberglass - are also available, if slightly hard to come by. The advantages and disadvantages below refer specifically to fiberglass batts and blankets, by far the most common.

- **Advantages:** Fire resistant, won't settle over time. Good for retrofitting an attic if there aren't a lot of obstructions; just lay it on top of the existing insulation, taking care not to leave gaps or skimp out around the eaves. Fiberglass is inexpensive (compared to cotton batts, spray-foam or rigid insulation), and is comparable to cellulose in terms of R-value.
  - **Disadvantages:** Can leave holes and gaps where air can circulate, reducing the R-value or where condensation can occur, and also reducing R-value. Fiberglass particles pose a health threat during installation. It takes around 10 times as much energy to produce fiberglass insulation as cellulose, so it's not especially friendly to the environment. You wouldn't be able to retrofit walls with batts without removing the drywall.
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**Loose-fill (cellulose insulation):** Can also be wet-sprayed (applied with a water-based adhesive).

- **Advantages:** Cellulose is made with up to 80% recycled material (shredded newspaper, mostly), it uses less energy than fiberglass to manufacture, it's non-toxic, inexpensive, more effective than batts at sealing air leaks as well as nooks and crannies, flows around wall studs to increase the R-value of the entire wall, and it's highly flame-retardant. It's also easy to retrofit walls with dry-fill cellulose by cutting a small hole (which will need to be patched, obviously) in

between each stud at the top of the wall and blowing in the insulation. You'll also want to remove a piece of drywall at the bottom of the wall to make sure the cellulose has made its way all the way down. Cellulose is also good for retrofitting attics; if it's distributed evenly you can be sure there are no gaps in the thermal barrier.

- **Disadvantages:** May absorb moisture, and can settle over time if not installed properly, both of which reduce its R-value. It's heavier than fiberglass, so it may cause ceilings to sag.
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#### **Spray-foam:**

- **Advantages:** Foam expands, so it seals up leaks and gaps better than either cellulose or batts. It's easy to install in tight spaces, and can be installed in wall cavities without removing the drywall. Note that there spray-foam comes in all shapes and sizes (and prices, R-values), but the two general categories are closed-cell and open-cell. Closed-cell foam has a higher R-value (about 6R per inch), but is more expensive than open-cell (which is about 3.5R per inch). For an equivalent R-value, open-cell will generally be less expensive. The high R-value-per-inch of closed-cell foam makes it a good choice if you have limited space; it also prevents moisture transmission better than just about any other insulating material.
  - **Disadvantages:** Foam is pricier than most other insulating materials to begin with, and it will need to be installed by a spray-foam contractor (no do-it-yourself option), raising the price even more. It also releases greenhouse gases during application (HCFC's or HFC's), so it's not the greenest option. Once installed, spray-foam is not a health hazard.
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#### **Reflective Insulation and Radiant Barriers:**

- **Advantages:** Reflective insulation and radiant barriers serve primarily to reflect radiant heat, but do little to prevent heat transfer through convection. They're highly useful in southern or warm climates where the main objective is to keep solar heat out of the building. They look like a big sheet of foil, and serve primarily to block solar heat, even though they're applied internally. Here's how: the sun heats the materials on a roof, for example. These materials, now hot, transfer heat through convection (heat moving through the material) and through radiation (heat emitted directly from material). The radiant barrier, which you

could install by laying it on top of existing attic insulation, or by attaching it to the underside of the rafters, blocks the radiant heat, reflects it back into roofing material and keeps it out of your living space.

- **Disadvantages:** Doesn't prevent convective heat transfer - so it won't keep the heat inside in the winter. Reflective insulation does include a thin layer of material to prevent heat transfer through convection, and so has a small R-value (a radiant barrier has no R-value). Reflective insulation and radiant barriers thus serve as a supplement to bulk insulation (i.e. cellulose, spray-foam or fiberglass batts), but will not suffice on their own, particularly in cool climates.
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#### **Rigid Panel Insulation:**

- **Advantages:** Rigid insulation has a high R-value per inch, so it's a practical solution for a high R-value where space is limited.
  - **Disadvantages:** They can't be retrofitted into existing walls without removing the drywall, and are susceptible to the same air-leakage problems as fiberglass batts and blankets. They need to be meticulously installed to limit gaps and air leaks, and they're slightly more expensive than alternatives.
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