



Insulating your home

 **PowerHouse.**
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ENERGY.**

Is your family warm and cozy during the winter, or do you have to bundle up indoors even though the thermostat is cranked up? Do you swelter as your air conditioner works overtime? If your home doesn't have adequate insulation, your hard-earned energy dollars could be disappearing into thin air.

Good insulation is an integral part of an energy-efficient home, and we want you to get the most value from your energy. In this brochure, you'll find great tips on:

- Understanding R-value
- Assessing your home's insulation
- Choosing the right type of insulation
- Deciding whether to do it yourself or hire a professional



Understanding R-value

Insulation is rated by its R-value. This is a measure of its thermal resistance, or how well it holds back warm or cool air – the higher the R-value, the better. Bare concrete foundation walls are about R-1, while attic insulation in newly built Midwestern homes usually measures about R-44.

R-value is proportional to the insulation's thickness, but it also depends on the type of material and its density. The more air pockets an insulating product has, the higher the R-value. For example, R-38 attic insulation may be 14 inches of fiberglass batts, 12 inches of rock wool or 10 inches of cellulose.

	Cellulose	Fiberglass	Rock wool
R-value per inch	3.2 - 3.8	2.2 - 2.7	3.0 - 3.3
Inches needed for R-38	10 - 12	14 - 17	11.5 - 13



How much insulation do you have?

The answer varies, depending on the age of your home, the way it was constructed and what kind of heating system you have. To find out how much insulation you currently have you'll need a flashlight, a ruler and a screwdriver.



Checking your insulation:

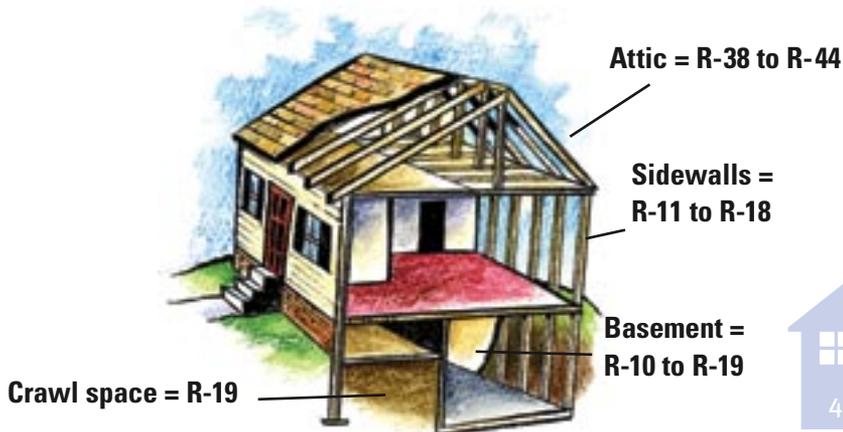
- The first stop is the attic. Measure the depth of the insulation on your attic floor.
- Remove the cover plate from an electrical outlet or light switch on an exterior wall (be sure to shut off power at the service panel first). Shine the flashlight behind the junction or switch box to check for sidewall insulation. If you can't see behind the box, remove a corner of the baseboard in a hidden area, such as a closet or behind a door. You may be able to see insulation poking out the bottom.
- Go to your basement and check the rim joist – this is the long, thick board running the length of your house that attaches to the floor joists. You should see insulation poking out of the pockets between each floor joist.
- If you have a finished basement, remove an outlet cover to check for sidewall insulation – here it may be thick foam sheets instead of fiberglass.

How much insulation do you need?

Different areas of your home require different R-values of insulation. The illustration shows the minimum levels you should have and the amount recommended for newly built homes.

While it's unlikely that an existing home can be upgraded to new-home standards, any added insulation will help reduce energy costs. The best place to start is the attic – you'll get the greatest impact by adding insulation here. If you upgrade your attic insulation from three inches to 12 inches, you could save up to 20 percent on your heating costs!

If you heat your home with electricity, proper attic insulation is even more crucial, because electric heat is costlier and less energy efficient than natural gas. The U.S. Department of Energy recommends R-49 attic insulation for homes with electric resistance (baseboard) heating.



How much insulation do you need? - continued

Improving sidewall insulation in an existing home is more difficult, but it can help lower your energy costs by about 10 percent. For existing homes, loose-fill insulation is blown into wall cavities through holes cut under the exterior siding. It's more labor intensive and therefore more expensive, but it may be a cost-effective option if you have a very small attic space.

Both, basement and foundation insulation can decrease heating costs by 10 percent. If you have a crawlspace, insulating the walls in the area can help you save another five percent.

Not only will good insulation lower your energy bills, it can also increase your home's value, decrease maintenance costs and reduce outside noise pollution.

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Types of insulation

The right insulation for your home depends on where it will be used and what type you already have. Your contractor or retailer can help you choose the best option for your needs:

- Fiberglass is the most common type of insulation. It's made from molten glass spun into microfibers. It's pink, yellow or white and comes in the form of batts or rolled blankets.
- Rock wool is literally made from rock – it's manufactured similar to fiberglass, but with molten rock instead of glass. The gray or brown fibers come in batts or blankets, or as shredded loose-fill.
- Cellulose is made from recycled paper, such as newsprint or cardboard, shredded into small bits of white or gray fiber. It's treated with chemicals to make it fire- and insect-resistant, and is applied as loose-fill or wet-sprayed through a machine.
- Synthetic insulation, usually polystyrene foam, is commonly used in rigid boards for insulating basements, cathedral ceilings or sidewalls. Polyurethane is manufactured as an expanding foam (the same synthetic material found in small aerosol cans); when applied, it expands up two to four times its original size, filling even the smallest nooks and crannies.



Do-it-yourself or hire a professional?

The experts on home improvement shows make it look easy, but installing insulation in an existing home can be messy, tiring and, if you don't plan carefully, as expensive as hiring a professional. Here are a few guidelines to help you decide if you need to call a professional:

Hire an insulation contractor if:

- Your home currently has little or no insulation, especially in the attic. Starting from scratch is a big job that leaves many opportunities for mistakes; hiring a professional will ensure the best return on your insulation investment.
- Structural changes are involved.
- The area is difficult to reach and move around in.
- You own an older home [pre-1930] with original wiring. Some older homes still have a now-obsolete electrical system called “knob-and-tube” wiring that can be dangerous if handled improperly. An electrician must upgrade the wiring before insulation can be installed because of the fire risk.



- Existing insulation is wet or improperly installed. Moisture-laden insulation is worthless and must be removed.
- Your attic has no ventilation.
- You have respiratory problems or are claustrophobic.
- You're a home-improvement novice. The manufacturer's instructions may contain terminology and procedures you're not familiar with.

You can do it yourself if:

- You've identified the type and amount of attic insulation you currently have.
- You can purchase the additional insulation from a reputable dealer with a knowledgeable staff.
- You've successfully tackled other home improvement projects.
- The area is accessible and easy to maneuver in, and has few obstructions.
- No structural changes are involved.
- The existing insulation is dry and properly installed.
- Your roof is in good shape. It's a waste of time and money to install insulation under a leaky roof (or in a wet basement).
- You're including vapor barriers and good attic ventilation in your plans.



Do-it-yourself or hire? - continued

Before embarking on any insulation project, do your homework first. Read magazine articles, look for books at the library or search for information on the Internet, and talk with neighbors who've had insulation installed in houses similar to yours.

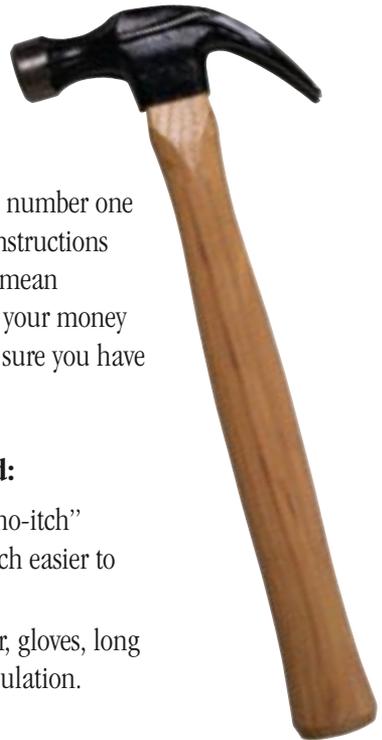
No matter which route you go, take the time to tighten up your home by doing some simple weatherizing. No amount of insulation will prevent air from leaking in and out of holes and cracks around your windows, doors and foundation. Look for our brochure on "Weatherizing Your Home" for easy ways to get your home ready for new insulation.

Tips for do-it-yourselfers

If you've decided to install insulation yourself, our number one recommendation is to follow the manufacturer's instructions exactly. Skipping steps and taking shortcuts could mean significant reductions in R-value – and a waste of your money and effort. Allow yourself plenty of time and make sure you have enough materials to complete the job.

Here are a few more tips to keep in mind:

- If you choose fiberglass insulation, the new "no-itch" products are worth the extra cost. They're much easier to handle and safer to work with.
- Always wear goggles, a dust mask or respirator, gloves, long sleeves and long pants when working with insulation.



- Don't open the package until you're ready to install the insulation – both loose-fill and batts/blankets are highly compressed inside the packaging and will expand to at least twice the size when opened.
- You don't have to use the same type of insulation you currently have. You can add loose-fill on top of batts or blankets, and vice-versa. Just keep in mind that some compression of the bottom layer will occur, reducing the R-value slightly.
- Be very careful moving around in your attic. Watch out for overhead rafters, and walk only on floor joists or sturdy floor boards. If you try to walk between floor joists, your foot could come right through the ceiling below. If you have room, lay a plywood panel across floor joists to walk or kneel on.
- Avoid disturbing existing insulation, especially loose-fill. Moving it around can create gaps where air can leak through.
- When installing additional batts or blankets, install the second layer at right angles to the first.
- If you're adding loose-fill insulation, it's imperative to distribute it evenly across the area. Any gaps, holes or inconsistencies in depth will decrease the R-value.



Tips - continued

- Never lay insulation over recessed light fixtures, ceiling fans or ventilation fans. If you're using loose-fill insulation, use sheet metal to create barriers around the openings. Keep all insulation at least three inches away from chimney and gas flue pipes.
- Make sure to allow for adequate ventilation. Never cover attic vents, and leave at least one inch of airflow between the insulation and the roof.
- Remove and replace any wet or damaged existing insulation. Have leaky roofs repaired before installing attic insulation, and make sure basement areas are adequately waterproofed.
- Don't forget to insulate and weatherstrip the attic opening.



Hiring an insulation contractor



Professionally installed insulation does cost more, but it's usually worth it in the long run. The work will be guaranteed, and you'll be sure that you're getting the most R-value for your money.

The best way to find a qualified insulation professional is to ask family, friends and neighbors who have recently hired contractors. You can also call local home builders to ask which companies they prefer to work with.

As with any other professional home contractor, ask for estimates from several companies, and get a firm bid before signing a contract. Make sure the contractor you choose is licensed and insured. Each company might suggest a different type of insulation, but the recommendations for R-value should be consistent. Be wary of those who claim they can get more R-value per inch than other contractors – it just isn't possible.



Hiring a contractor - continued

Here are some good questions to ask potential insulation contractors:

- What type of insulation do you recommend for my home?
- Will a vapor barrier be used and where will it be used?
- What R-value should we try to achieve?
- What type of vapor barriers will be used?
- Do you plan for proper ventilation?
- Do you install attic vents?
- How long will the job take?
- Are you insured against accidents and property damage?
- Are you completely familiar with local building codes?
- What kind of guarantee can you offer?



Remodeling or building a new home

If you're building a new home or adding on to an existing home, your contractor should recommend 2x6 construction. Costing only a few cents more per foot, the extra two inches of depth allows for thicker R-19 sidewall insulation; the cost difference can be paid back in energy savings in as little as two years!



If you choose conventional 2x4 construction, some builders may suggest using five-inch R-19 insulation in the stud walls, but the logic behind this idea is flawed. When the thicker insulation is compressed into the smaller space, it can reduce the insulating value to as low as R-10 or 11 – the same R-value provided by the less expensive three-inch thick insulation.

Remodeling or building - continued

Building a new home is a great time to look into expanding foam insulation. This new technique provides not only excellent insulating value, but also an air-tight seal around every obstruction, including electrical outlets and switches. The foam is sprayed onto the attic floor and between the wall studs; the excess is scraped off and used to insulate between the floor joists in your foundation.

Vapor barriers

As you plan your insulating project, keep in mind that it's also important to maintain a healthy balance of air and moisture movement throughout your home. That means making sure that your attic and sidewall insulation includes a vapor barrier and that your attic is properly ventilated.

Ironically, the more insulated and air-tight your house is, the more prone to moisture damage it becomes. During cold weather, water vapor from the warm air inside travels through unsealed holes and cracks and condenses on cooler surfaces, including exterior walls, the underside of the roof and within insulation. This condensation can rot wood framing, blister paint, ruin insulation and damage the roof.



Vapor barriers installed between insulation and interior surfaces can help prevent this problem. Batts or blankets often come with attached vapor barriers, usually made of coated kraft paper or foil-backed paper. When using unfaced batts or blankets, loose-fill or foam insulation, you can add polyethylene sheeting (four or six millimeters thick).



If you're installing insulation yourself, remember these guidelines when using a vapor barrier:

- Always place the vapor barrier toward the warm side of the insulated area – facing downward on the attic floor or the interior side of a wall cavity.
- When adding a second layer of insulation to an attic, do not add a second vapor barrier – this can trap moisture inside the bottom layer of insulation. Use loose-fill or unfaced batts or blankets; if only faced batts are available, cut the facing every few inches to allow moisture to evaporate.
- If the vapor barrier tears during installation, tape it tightly.
- If you have a crawlspace, add a polyethylene vapor barrier on the floor of the area to reduce condensation from ground moisture.

Ventilation

It may seem like attic vents defeat the purpose of insulation, but they're a vital part of keeping fresh air circulating throughout your home. An unventilated (or under-ventilated) attic can trap heat in the summer months, raising the indoor temperature by several degrees and putting a strain on your air conditioner. During the winter, warmer air trapped in the attic can condense under the roof, causing ice dams that can lead to serious roof damage.

Attic vents can be positioned in several ways, as the illustrations show. New homes built in the Midwest usually have a combination of continuous ridge and soffit vents.

Never cover attic vents with insulation. If your home has no attic vents, be sure to add several before installing new or additional insulation – your contractor or retailer can advise you on what's best for your situation.



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