

Well, you've gone through a season where you have paid the highest heating bills in your life. The bad news is, heating costs will continue to go up. The good news is you can reduce your bills by adding insulation.

Now comes the dilemma. There are numerous types of insulation but which one is best for you. Is one type better than another? Which salesperson is telling the truth? How much do you need and will you really save money? What does R-value mean?

To start with, R-value equates to the insulation value of insulation itself. It's Resistance to heat or cold, therefore the "R". The higher the R-value the more effective the insulation is at saving you money on your heating and cooling costs.

Each type of insulation has its own individual R-value (see chart). The R-value not only varies between types of insulation, but manufacturers as well.

Up to, and including the 1950's, heating costs were relatively inexpensive so houses were built with little or no insulation. As the price of heating our houses increased, we started adding insulation. At first, just a few inches of perhaps a mineral wool, cotton, shredded paper or vermiculite was added.

Utility bills rose and so did the need for more insulation. In the late 1970's and early 1990's, the government, and the utility companies gave incentives to add insulation bringing the R-value up to R-19.

For decades R-19 was the standard for this part of the country. In the mid 1990's, local codes required that new construction have a minimum of R-30 insulation. That code is still in effect but remember it is a minimum code. Builders will give you additional

insulation (R-38 to R-49) for an extra cost. It is an upgrade that is well worth it. Cellulose and fiberglass are the two most common insulations in use today, with foams starting to get a foothold. For that reason we concentrated on those three types of insulation for this article. We asked three local families to call at least 3 different insulation contractors in the area to get bids and relate their experiences with our readers. All but 1 of the companies uses a brand of cellulose. Only one company in our study installed fiberglass and that company was considerably higher priced than the others.

Due to the rising utility costs, there are record setting demands for insulation. Most, if not all licensed contractors we surveyed are backed up for a minimum of 30 days.

Another minor contributing factor to the backlog is a 10% tax credit of up to \$500.00 for energy efficient improvements. You should check with your accountant on what that means to you and if you qualify. The tax credit is insignificant in light of the energy (read that as money) you will save by increasing your insulation.

### **Fiberglass:**

Everyone has heard of fiberglass insulation, but what is it really?

Fiberglass is spun fibers that are generally made from molten glass. It comes in rolls, batts, or loose fill. Rolls are cut-to-fit between 16 or 24-inch framing spaces. Rolls are usually 70-feet in length, while batts are cut to 48 or 93-inch sections for easier handling. They both come with or without a vapor barrier (which, in essence is only a retarder). The retarder is known as facing. It can be foil or Kraft paper adhered to one

side of the insulation. Batts and rolls come in 3 1/2, 5 1/2 and 9-inch thicknesses, which equate to various R-values.

Loose-fill fiberglass is exactly what it says, 'loose fill' and it is designed to be blown into walls and ceilings and are known to have a higher R-value than batts and rolls because it is actually the air trapped between and around the fibers that are doing the insulating. Loose-fill has more trapped air unless you purchase high-density batts, which have a higher R-value per inch. Higher density batts or rolls should definitely be considered by anyone installing a cathedral ceiling.

Fiberglass itself is considered non-combustible. If it has a vapor retarder, the Kraft paper should never be left exposed since it is combustible.

Up to October of 2001, there were rumors that the fibers were carcinogenic. At that time, the World Health Organization's International Agency for Research on Cancer (IARC; [www.iarc.fr](http://www.iarc.fr)) lowered the hazard classification of fiberglass, rock wool and slag wool fibers from a group 2B (possibly carcinogenic to humans) to a group-3 class, which basically stated it was not a carcinogenic to humans.

### **Cellulose:**

Cellulose is a recycled product, the majority of which is derived from wood pulp, lumber products and old newspapers. It is chemically treated with borate chemicals and sometimes ammonium sulfate. The chemicals provide a fire retardant to the newspaper, as well as make insulation resistant to mold and insects.

Cellulose is an excellent product with a higher R-value per inch than fiberglass, yet costs about the same. This product is blown-in rather than laid out. It is a job usually done by professional insulation installers, but some home centers and tool rental companies rent the equipment for do-it-yourselfers. Cellulose has an R-value of 3.6 to 3.9-per inch.

For those of you that are thinking ecologically green, trees are not cut down to make cellulose. It is a by-product of the industry.

### **Spray Foam Insulation:**

In the 1970's and early 1980's there was a spray-in-place foam insulation known as Urea-Formaldehyde (UFFI). It was generally only installed in wall cavities. The problem with UFFI was that it off-gassed formaldehyde. At the time, there was hysteria about the product causing health issues, that later were found to be quite exaggerated. Nevertheless, the stigma remained for over a decade with regard to foam insulation.

Today's foams are made from an oil-derived chemical called polyisocyanate. They also come from urethane resins, which are made from soybeans and sugar cane. They do not contain any formaldehyde.

The R-value of the product is excellent, but the major advantage is air sealing.

There are two kinds of foam, open and closed-cell. Both are 2-part compounds mixed at the nozzle by the installer as it is being blown in. They both begin to expand

immediately. A big advantage is its ability to fill in every void. It is an excellent product for walls, crawlspaces, cathedral ceilings and attics with furnaces in them.

In our area of the country most builders, architects and inspectors subscribe to the "cold roof theory", Where we insulate the ceilings and ventilate the attic area. There is a second alternative called "hot roof theory", where products like Icynene spray-in-place insulation is applied to the underside of the entire roof structure and all vents are sealed.

### **Doing it yourself:**

If you want to install fiberglass batts or rolls yourself, here's how:

Measure the length times the width of your house to determine how many square feet of insulation you will need.

If your existing insulation comes up to or above the ceiling joists then you will be laying the new insulation perpendicular to the joists.

If you look in the attic and find any insulation that looks like silver-gray or gold-brown kernels about the size of pencil erasers, leave immediately. That insulation is called Vermiculite and it's known to contain asbestos. Asbestos is a carcinogenic and should only be removed by a licensed and approved asbestos abatement company.

When installing the fiberglass, wear a long sleeved shirt, gloves, eye protection, a hardhat, and respirator.

If you are initially installing the insulation over existing insulation, use only un-faced insulation. Un-faced insulation has no paper or foil that could trap moisture between the layers of insulation. A vapor barrier is only installed against the ceiling itself and the attic. It is always applied toward the warm ceiling in our areas of the country.

A vapor barrier is not necessary. As a matter of fact most homes are built without using them in the attic. If you have one you can have 1 free square foot area of attic ventilation for every 300 square feet of attic space. Without one the rule is 1/150 of ventilation.

Make sure all air leaks from the house are sealed, filled or caulked. Check around chimneys, pipe chases and exhaust vents. If you have ductwork in your attic properly seal and tape all joints in the ducts.

Install cardboard or rigid foam baffles between the rafters so the new insulation, as well as any existing insulation will not block the soffit vents under the eaves.

If you have recessed lights in the ceiling below, do not cover them with insulation unless they are stamped on the interior "IC-Rated" (That means "insulation contact"). If they are stamped, then the insulation can be laid over them. It's actually better to build 3-foot square drywall boxes around them and insulate the boxes. That way the internal thermal switch in the fixture will not turn off the light, as it gets hot.

If your recessed lights are older, or not IC-Rated, it's best to replace them with newer, more efficient and safer ones.

If you have a whole-house fan, make a box to cover and insulate it in the winter. Save a piece of insulation to put on top of your attic scuttle door.

Side Bar

***Determining the Amount of Insulation You Will Need***

To find out how much insulation you have and how much you will need, you will need to look in your attic. Take a flashlight and tape measure.

Carefully open the attic access, preferably while wearing a dust mask. Some homes have pull-down attic stairways, but most have small access openings known as scuttles. They will be in the ceiling of a room, hallway or closet.

See what type of insulation you have and measure its thickness. If you are unsure of the type or types, remove a small sample and place it in a zip lock bag. Take the sample to a home center or insulation company and they should be able to tell you what you have.

Compare the insulation and depth by following the chart and add the difference to bring your R-value up to 49-R.

### Free Press Study:

For this article, three families each called four insulation companies. This was a blind study with each company pricing the same amount of square feet at each individual residence. They were all bringing the insulation up to an R-value 49.

We gave our volunteers 3 companies that we picked at random and asked each homeowner to call at least 1 additional company of their choice.

The interesting things about the study, is the way the quotes came in from the contractors. One would think that possibly one company would be consistently more expensive than their competitors, but that did not happen. While company "A" for example was the least expensive on one job, they were third highest on another. There was absolutely no consistency in their pricing of any of the quotes. It seems the pricing depends on the time of day, or mood of the salesperson. One of our volunteers felt they were "being sized-up" to determine how much they could afford.

Each of our volunteers experienced problems with salespeople not returning calls, showing up late, acting lazy or to quote one homeowner, "he was kind of goofy".

The good news is that you can shop around for the best price. The bad news is, we can't help you because no one company was consistently less expensive.

More bad news, you'll have to deal with salespeople in your home. One gracious volunteer called one of our listed companies 10 times. The salesman only returned four



of those calls. You, of course, would not tolerate that kind of incompetence and unprofessionalism.

**What you need to ask and do:**

- ❑ How long they have been in business.
- ❑ Are they licensed and insured. If the installer falls through your ceiling and injures himself, are they insured for the injuries as well as your damage?
- ❑ You need to see copies of their license and certificate of insurance.
- ❑ Check with the Better Business Bureau.
- ❑ You want a written estimate.
- ❑ Never pay all the money up front. Pay a small amount or up to 10% max with the balance upon completion.
- ❑ Remember, any contract signed in your home, whether it states it or not, allows you to cancel and get a full refund if they are notified before midnight on the third business day after you sign the agreement.

**How to verify if the job was done properly:**

Of course you feel you hired a qualified and reputable contractor, but they are only as good as the installer who is doing the job at the time he is doing your job.

You or someone you trust may want to go into the attic after the job is completed. Here are a few things to check:

- a) Measure the depth of the insulation. Is it what you were quoted?
- b) Did the company install baffles along the eaves?

- c) Did they install shields around all recessed lights?
- d) Is the insulation blown up to and in contact with the roof sheathing? It is all right for small amounts of overblown insulation to cling to the sheathing, but if the insulation is packed up to the underside of the boards then the roofs sub-structure will prematurely rot.

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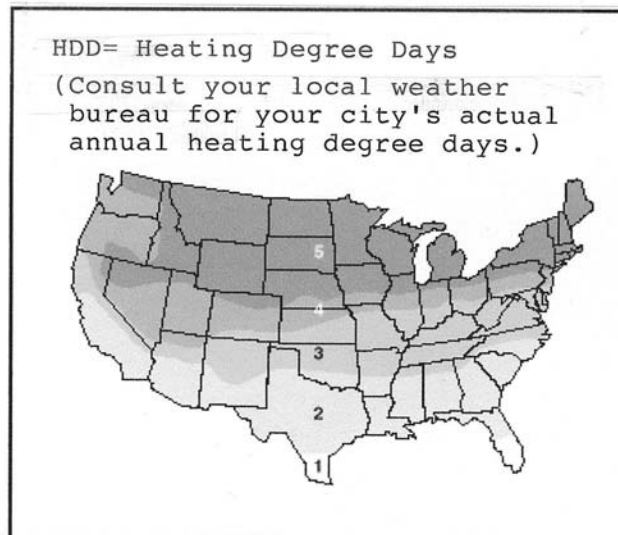
Determining R-values

Determine the kind of insulation you have from Table 1, and circle it on Table 2 (below). Then, multiply the thickness of your insulation by the "R-value per inch". This will give you the total R-value of your existing insulation.

Evaluating the R-value of insulation previously installed in existing homes (includes effect of age and settling)	
INSULATION TYPE	R-VALUE PER INCH OF THICKNESS
Fiber glass blanket or batt	2.9 to 3.8 (use 3.2)
High performance fiber glass blanket or batt	3.7 to 4.3 (use 3.8)
Loose-fill fiber glass	2.3 to 2.7 (use 2.5)
Loose-fill rock wool	2.7 to 3.0 (use 2.8)
Loose-fill cellulose	3.4 to 3.7 (use 3.5)
Perlite or vermiculite	2.4 to 3.7 (use 2.7)
Expanded polystyrene board	3.6 to 4 (use 3.8)
Extruded polystyrene board	4.5 to 5 (use 4.8)
Polyisocyanurate board, unfaced	5.6 to 6.3 (use 5.8)
Polyisocyanurate board, foil-faced	7
Spray polyurethane foam	5.6 to 6.3 (use 5.9)

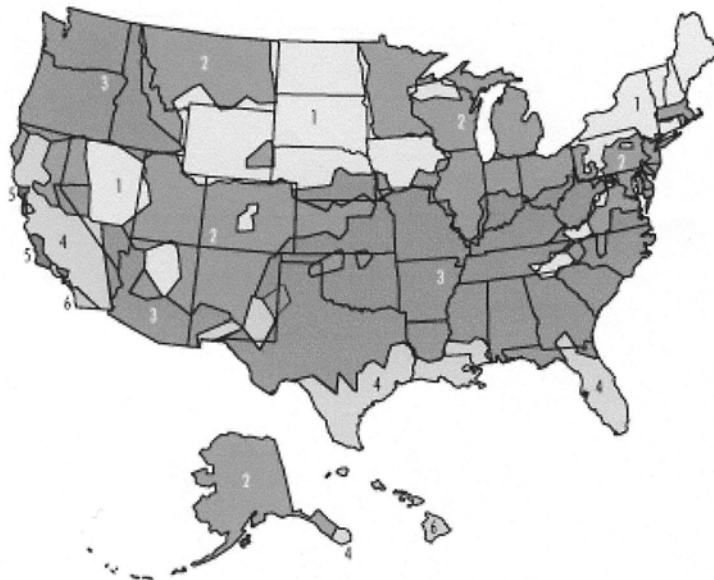
The next step is to compare the R-value of your insulation with the recommended R-values. Below is a quick table of recommended R-values by geographical area:

CEILING INSULATION R-VALUES *	
HDD Zone	Ceiling R-value
1 (0-500)	R-19
2 (501-3,000)	R-30
3 (3,001-5,000)	R-38
4 (5,001-6,000)	R-38
5 (6,001-10,000)	R-49



**U.S. Department of Energy  
Recommended\* Total R-Values for  
New Houses in Six Climate Zones  
How Much Insulation Does My  
Home Need?**

For insulation recommendations tailored to your home, visit the [DOE Zip Code Insulation Calculator](#).



\* These recommendations are cost-effective levels of insulation based on the best available information on local fuel and materials costs and weather conditions. Consequently, the levels may differ from current local building codes. In addition, the apparent fragmentation of the recommendations is an artifact of these data and should not be considered absolute minimum requirements.

Department of Energy Chart

Zone	Gas	Heat pump	Fuel oil	Electric furnace	Ceiling		Wall (A)	Floor	Crawl space (B)	Slab edge	Basement	
					Attic	Cathedral					Interior	Exterior
1	✓	✓	✓		R-49	R-38	R-18	R-25	R-19	R-8	R-11	R-10
1				✓	R-49	R-60	R-28	R-25	R-19	R-8	R-19	R-15
2	✓	✓	✓		R-49	R-38	R-18	R-25	R-19	R-8	R-11	R-10
2				✓	R-49	R-38	R-22	R-25	R-19	R-8	R-19	R-15
3	✓	✓	✓	✓	R-49	R-38	R-18	R-25	R-19	R-8	R-11	R-10
4	✓	✓	✓		R-38	R-38	R-13	R-13	R-19	R-4	R-11	R-4
4				✓	R-49	R-38	R-18	R-25	R-19	R-8	R-11	R-10
5	✓				R-38	R-30	R-13	R-11	R-13	R-4	R-11	R-4
5		✓	✓		R-38	R-38	R-13	R-13	R-19	R-4	R-11	R-4
5				✓	R-49	R-38	R-18	R-25	R-19	R-8	R-11	R-10
6	✓				R-22	R-22	R-11	R-11	R-11	(C)	R-11	R-4
6		✓	✓		R-38	R-30	R-13	R-11	R-13	R-4	R-11	R-4
6				✓	R-49	R-38	R-18	R-25	R-19	R-8	R-11	R-10

A. R-18, R-22, and R-28 exterior wall systems can be achieved by either cavity insulation or cavity insulation with insulating sheathing.

For 2 in. x 4 in. walls, use either 3 1/2 in. thick R-15 or 3 1/2 in. thick R-13 fiber glass insulation with insulating sheathing.

For 2 in. x 6 in. walls, use either 5 1/2 in. thick R-21 or 6 1/4 in. thick R-19 fiber glass insulation.

B. Insulate crawl space walls only if the crawl space is dry all year, the floor above is not insulated, and all ventilation to the crawl space is blocked.

A vapor retarder (e.g., 4- or 6-mil polyethylene film) should be installed on the ground to reduce moisture migration into the crawl space.

C. No slab edge insulation is recommended.