



## Steps in the Home Energy Series

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**Attic Insulation**

### Attic and ceiling insulation

Warm air naturally rises, so the attic or roof area of your home should be your first priority for insulation. Insulation reduces the outward flow of heat, keeping it inside your home longer and taking some of the burden off your heating system and reducing utility costs. In Missouri's winter climate, insulating existing attics to an R-value of at least 49 is recommended. R-value is the measure of an insulation material's ability to resist heat flow and is measured per inch of material. For example, fiberglass batt or blanket insulation has an R-value of around 3.2 per inch, and the R-value of loose-fill cellulose is about 3.7 per inch.

Both of these insulation types are commonly used to insulate attics. Twelve inches of the fiberglass batt insulation achieves R-38, and about 10½ inches of cellulose will achieve the same R-value.

### Attic and roof types

How your attic should be insulated depends on how your roof is built. Here are some common attic and roof types:

#### Unfinished attic

In these homes, the attic is not part of the living space. You can often access the attic via a ladder through a hatch usually located in a hallway or closet ceiling. Unfinished attics are generally the easiest to insulate; insulation goes between the framing joists of the attic floor, which is also your living area's ceiling. Capable do-it-yourselfers can tackle this job with advice from a professional. Rolls of fiberglass or loose-fill cellulose have been the insulation of choice for most do-it-yourself jobs. This guide primarily deals with steps you can take to add insulation to your unfinished attic.

#### Finished attic

Some of these attics are living spaces, so insulation should be placed in the exterior walls (called kneewalls), the entire ceiling and the outer floor areas as those not part of the living space. Call an experienced professional for this job because it often requires the use of several insulation products and special insulation-blowing equipment.

#### Flat, vaulted or cathedral ceilings

These types of ceilings do not have attics above them, and therefore little or no space to add insulation. If there is space, the insulation must be blown in or placed between the interior ceiling and the exterior roof. These construction types should be well-ventilated and sealed to prevent moisture problems. They, too, usually require the expertise of an insulation contractor.

### Adding insulation to your unfinished attic

These are steps you or an insulation contractor should take to insulate your unfinished attic.



Photo credit: Department of Energy

## Be an attic detective

Go up into your attic with a flashlight and a dust mask to investigate. Construct a makeshift walkway by laying boards on top of the joists because the ceiling below will not support your weight. Measure the amount of insulation present and determine its type — it is most likely mineral or rock wool, fiberglass or cellulose fiber. If you are unsure if it is Vermiculite, you can take a sample to your local extension office or building materials supplier. If there is already dry and evenly spread insulation in this area, you can leave it alone and add more insulation on top if needed.

You can lay glass or cotton fiber batt insulation over existing loose-fill, or vice versa. As a rule of thumb when adding more insulation, stay with the same type and weight of insulation. Heavier insulation will pack down your existing insulation and ultimately reduce the R-value of what was already in place. Ensure that the new insulation doesn't have a vapor barrier, which would trap moisture inside the old insulation. If the existing insulation is or has been wet, find and correct the moisture problem. It could be a leaky roof, or it might be caused by air leaking up from living spaces. When warm air from your house rises into the attic, it carries large amounts of moisture. When moisture hits the cold surfaces of your attic, it can condense and cause a number of problems including mold growth and damage to drywall and other building materials.

To control moisture, also make sure bathroom and kitchen vents are not vented directly into the attic. They should be vented through the roof or wall.

## Electrical

Check all wiring and electrical junction boxes to ensure wiring is not exposed and boxes are covered. Many old homes have a two-wire system referred to as knob and tube wiring. This type of wiring should not be covered with insulation. When in doubt, have a licensed electrician inspect and upgrade your wiring.

## CAUTION

If you find Vermiculite insulation in your attic, do not proceed. Vermiculite may contain asbestos, so always have it tested by a professional testing service or contractor before continuing (<http://www2.epa.gov/asbestos>).



## Seal air leaks

Insulating won't save you much money or keep you much warmer unless you seal the air (and moisture) passageways between living spaces and the attic. Common air leakage spots include the tops of interior and exterior walls, around pipes and heating ducts, light fixtures and wires. Conventional caulking methods are adequate, though special care should be taken around plumbing stacks and high-temperature flues and chimneys. You should also weatherstrip the attic hatch door, treating it as you would a door to the outside.

## Install a vapor barrier

Moisture can also cause problems by traveling directly through the ceiling and into the insulation. To ward off a potential moisture problem in an attic being insulated for the first time, lay down a vapor barrier, such as a sheet of polyethylene plastic, on the attic floor before pouring or blowing in loose-fill insulation. Or you can purchase batt insulation with a kraft paper or foil vapor barrier attached. Install this type of vapor barrier closest to your living space.

If there is already insulation in your attic with no vapor barrier under it, you can paint your ceilings with vapor barrier paint. This is especially helpful in high-moisture rooms such as kitchens, bathrooms and utility rooms. If some insulation already exists, new insulation should not have a vapor barrier. Preferably, the new insulation should be unfaced, or manufactured without a barrier attached. If unfaced insulation is unavailable, use the vapor-barrier type but remove the barrier or slash openings in it with a knife.

## Ensure adequate ventilation

Proper ventilation is key to effectively insulating your attic. It lets your attic breathe, ridding it of moisture in the winter and keeping it cooler in summer. If you install a vapor barrier, you need 1 square foot of free vent area for every 300 square feet of attic floor area. Without a



A combination of ridge and eave vents creates natural convection current, keeping your attic cool and moisture-free.

vapor barrier, you need twice the ventilation. For example, you would need 1 square foot of vent space for every 150 square feet of floor.

Vents should be located on opposite ends of the attic, with some near the top and others near the bottom to allow for good cross-ventilation. Speak to a contractor about which types of vents would be best for your attic.

### **Installation**

Now you are ready to either roll out the batts or pour in the loose-fill insulation. You might want to use some of both, putting batts between the rafters in the straight-aways and loose-fill insulation in the nooks and crannies. Buy batts wide enough to just fit between the attic framing. Fill the joist spaces first, then roll out a second layer on top, perpendicular to the first. Place the batts as close together as possible. If you opt for loose-fill insulation, pour it in and level it with a rake or a board. If you plan to add loose-fill above the height of the joists,

attach wooden sticks to the joists to serve as depth markers.

As you add insulation, it is important to not block any combustion air supply source or any ventilation openings, especially in the eaves. Ventilation chutes, or baffles, should be installed during the insulation job to prevent vents from being blocked off. Also, keep insulation 3 inches away from recessed light fixtures, chimneys, fan motors and flues to reduce fire danger. Do this by surrounding the objects with a sheet-metal barrier. Also, extend the barrier 4 inches above the finished insulation level. In the rare instance that you have a water heater, furnace or knob and tube wiring in your attic, consult a professional for information on insulating around these obstacles.

Whatever insulation type you choose, follow the manufacturer's directions carefully and do not unwrap the insulation until it is in the attic. Wear a respirator dust mask, work gloves and protective clothing while you're spending time in a dusty space. It is a dirty job, but one well worth doing.



Bathroom and kitchen vents should be vented through the roof — not into the attic.



