



**THERE ARE SEVERAL INSULATION OPTIONS TO KEEP YOUR TOES WARM— PLUS SAVE MONEY ON YOUR HEATING BILLS!**

**READ ON!**

There's nothing worse than cold floors. They rob your toes of heat, and when your feet are cold, your whole body feels uncomfortable. Adding insulation to your floor, basement walls or crawlspace can warm up your floors. This will not only lead to happier toes, but also a fatter pocketbook, since the insulation will reduce your heating costs.

In Montana's cold climate, the U.S. Department of Energy recommends insulating floors over unheated basements to an R-value of at least 19. R-value is the measure of an insulation material's ability to resist heat flow. It's measured per inch of material. For example, glass fiber batt or blanket insulation has an R-value of around 3.2 per inch. Putting about six inches of it on your crawl space or basement ceiling will achieve R-19.

If your basement is part of your living space, you'll want to instead insulate the basement walls to R-13. One option for walls is to install two inches of polystyrene rigid board insulation. Its R-value is about 5 per inch. Crawl space walls should be insulated to at least R-19.

### Basement/Crawl Space Types

How to insulate below the main floor of your house depends on how you use your basement or crawl space. Read through the options below:

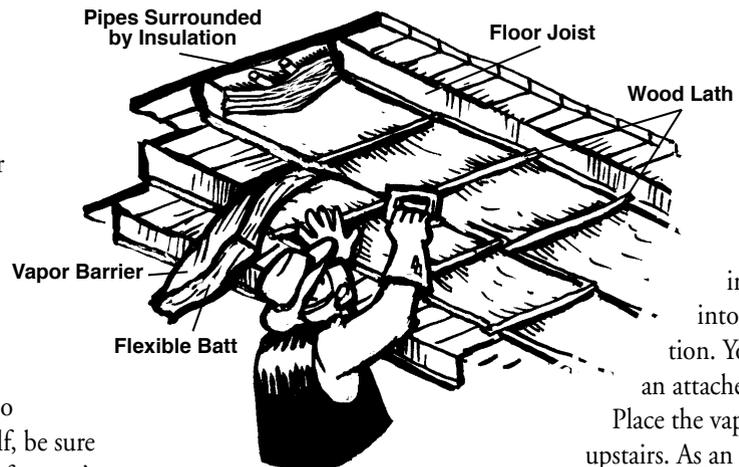
#### Unheated/Unfinished Basement.

If your basement is not part of your living space, it's not heated and it's unfinished, insulate the basement ceiling to keep the floor above it warm. Fiberglass batt insulation is well-suited for this job because it fits snugly between the basement ceiling joists and can be held in place by nailing or stapling thin wood strips, twine or fine wire across the joists.

This is a potential do-it-yourself project, though you may qualify for weatherization assistance if you are on a limited income. Contact your local utility and your local Human Resources Development Council for details. If you do install the insulation yourself, be sure to carefully follow the manufacturer's instructions and wear a respirator dust mask, work gloves and protective clothing.

Before adding insulation, all the air passageways between your living space and your basement should be sealed. Common leakage spots include the floor/wall perimeter and openings around pipes and wires. Conventional caulking or spray foam work fine, though special care should be taken around chimneys and plumbing stacks. For chimneys and flues, a three-inch clearance must be left between the insulation and these heat producing objects. Care should also be taken when insulating around old wiring—make sure the wiring is not exposed and electrical connection boxes are covered. Many old homes have a two-wire electrical system referred to as "knob and tube wiring." This type of wiring should not be covered. You should also weatherstrip the basement access door, treating it as you would a door to the outside.

Moisture can also cause problems by traveling right down through the floor. There it may condense, wetting the insulation and eventually leading to mold growth and



**Basement or crawl space ceiling insulation held by wood lath strips. Be sure to install the vapor barrier against the upstairs living space.**

possibly structural problems. To head off this potential problem, it's important to first place a vapor barrier into the joist cavities before the insulation. You can purchase batt insulation with an attached kraft paper or foil vapor barrier.

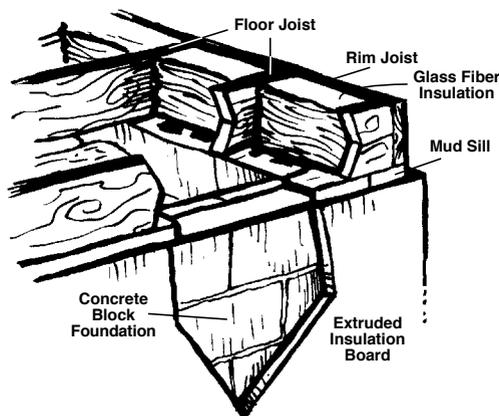
Place the vapor barrier on the floor closest to the upstairs. As an alternative, you could first staple in a sheet of polyethylene plastic and then add insulation.

Because insulating the ceiling makes your basement colder, it is more important than ever to insulate all heating ducts, water pipes and water heaters located down there. Also insulate at the rim joists where the basement ceiling intersects with the exterior wall. And finally, if the basement has a dirt floor, cover it with a thick (6 mil.) polyethylene plastic sheet. To assure a continuous moisture barrier, lap sheets by at least 12 inches and extend the sheet six inches up the walls.

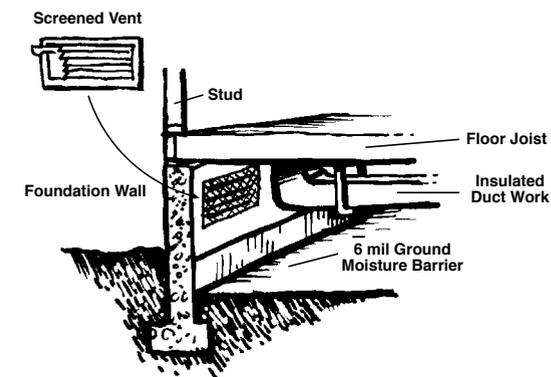
**Unheated Crawl Space.** This situation mostly calls for a repeat of the steps outlined above for insulating basement ceilings. The main difference between the two is the need for ventilation in a crawl space. If the space is slightly damp and a vapor barrier is not installed, one square foot of vent area is required for every 150 square feet of crawl space area. You need a minimum of four vents installed, and they must be on opposing walls to achieve cross ventilation. If the space is bone dry, you only need half that much ventilation (1:300). If a vapor barrier is installed in this dry crawl space, you need only one square foot of vent area for every 1,500 square feet of crawl space area.

**Heated Basement.** If your basement is part of your living area, you'll want to insulate its walls, not the ceiling. These walls are usually made of brick, concrete, cinder block or stone—materials with very poor R-values. You lose a lot of heat through them unless they're insulated.

These walls can be insulated from the inside or outside. Regardless, the job requires the expertise of a professional. Improperly insulated basement walls can damage a home's foundation.



**Insulating an exterior foundation wall with extruded polystyrene insulation board and glass fiber tucked along the rim joist.**



**Insulated crawl spaces should be vented. Place a moisture barrier on the ground. Pipes and duct work should also be insulated.**

Before insulating, the weatherization crew will first check for moisture problems and correct any that are located. They will also seal any cracks in the foundation wall with caulking.

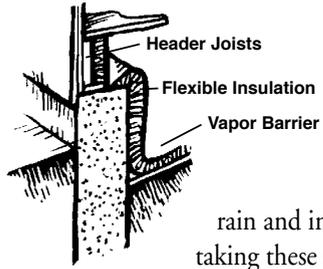
Rigid board insulation is commonly used on both interior and exterior basement walls, especially in cold climates. Because it can be glued directly to the wall surface, it effectively guards against moisture problems. Another interior option is to put up wooden stud framing and install batt insulation between the cavities, followed by a vapor barrier and then paneling or drywall.

If rigid board insulation is added to the outside of the wall, "extruded" polystyrene is recommended. The weatherization crew must first excavate around the



**INTERIOR BASEMENT WALLS CAN BE FURRED OUT WITH 2x4 STUDS AND INSULATED WITH GLASS FIBER, OR THE SPACE CAN BE FILLED WITH EXTRUDED POLYSTYRENE.**

perimeter of the house—to a depth of at least two feet below grade. Once excavated, a few coats of waterproofing asphalt coating should be applied to the foundation before the insulation is added. The insulation is next set against the foundation wall and covered with fiberboard, metal or a stucco-like finish to protect it from the sun,



**Insulate the foundation walls of a heated crawl space.**

rain and impact damage. After taking these steps, the excavated area should be carefully backfilled to prevent damage to the insulation.

**Heated Crawl Space.** If you want to take extra precautions against freezing pipes, you may want to have your crawl space walls insulated to R-19. Your options are similar to those discussed above for insulating basement walls. However, hanging glass fiber batt insulation against the inside walls is the most common do-it-yourself way to insulate crawl space walls.

**Slab Foundation.** Your house may not have a basement or a crawl space; it may instead sit on a concrete slab foundation. To keep your floors warmer in this situation, have the perimeter of the slab insulated with extruded polystyrene. Like adding insulation to the outside of a basement foundation, the perimeter of the slab foundation will have to be excavated to place the rigid board insulation against the concrete.

How's that for options? So many different ways to keep your toes warm! Talk with a professional to find out which one would work best for you.

**For More Information**

To learn more about insulation in general, obtain a copy of Power Bill's Insulation Choices brochure. Brochures are available on insulating your walls and attic and on other energy conservation topics as well. For additional information, contact your local utility, the Human Resources Development Council, the tribal weatherization office, or the MSU Extension office in your county.

**FOR THE HRDC OR TRIBAL WEATHERIZATION OFFICE NEAREST YOU, CALL 1-800-332-2272.**



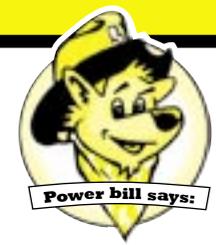
**MONTANA**  
Department of Public Health & Human Services  
**MONTANA WEATHERIZATION ASSISTANCE PROGRAM FOR LOW-INCOME FAMILIES**

**M**  
**MONTANA STATE UNIVERSITY**  
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**KEEP YOUR TOES WARM BY INSTALLING FLOOR AND FOUNDATION INSULATION**

