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Insulating crawl space walls and basement walls

Lloyd Walker[1]

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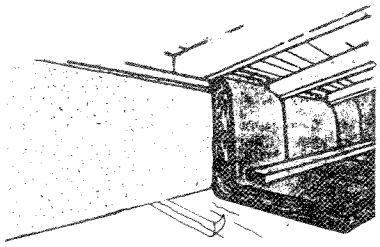
Quick Facts

- If a house sits on top of a crawl space that can be tightly sealed off from the outside air in the winter, the cheapest and best place to insulate it is around the outside walls and on the adjacent ground inside the space.
- Batt or blanket insulation should be used to insulate the walls and perimeter of a crawl space.
- A plastic vapor barrier should be installed on the earth in the crawl space.
- Even with a plastic vapor barrier, air in the crawl space will be damp, causing wet insulation that will be ineffective and wet joists that may rot, unless the area is ventilated properly.
- Basement walls should be insulated in the area that is above ground as well as about two feet below the ground.
- Glass fiber insulation can be added between furring strips before the walls are finished.
- Before insulation is added to basement walls, any cause of dampness should be eliminated.
- Safety precautions, such as wearing gloves and a mask when working with insulation, providing adequate lighting and ventilation, and keeping wires off wet ground, should be carefully followed.

If a house (or part of it) sits on top of a crawl space that can be tightly sealed off from the outside air in the winter, the cheapest and best place to insulate it is around the outside walls and on the adjacent ground inside the space.



Insulating Crawl Space Walls

Batt or blanket insulation should be installed around the walls and perimeter of a crawl space. A plastic vapor barrier should be placed down on the earth in the crawl space.

If the crawl space presents access or working space problems, the homeowner may want to consider having a contractor do the work. The contractor probably will follow a method similar to the do-it-yourself method described below. But if the contractor suggests something different, have both methods priced and choose the better one.

Tools needed—hammer and nails, heavy-duty shears or linoleum knife, temporary lighting, portable fan or blower to provide ventilation, tape measure, and duct or masking tape—2 inches (5 centimeters) wide.

Materials needed—R-11 (3″-3½″ blankets of rock wool or glass fiber without a vapor barrier; six mil polyethylene plastic to lay on earth for vapor barrier; ½″ x 1½″ (1.3 x 3.8 cm) stock for nailing strips at the sill and at the band joist.

Determine the area to be insulated by measuring the length and average height of the wall to be insulated. Add 3′ (.9 meter) to the height (for perimeter insulation) and multiply the two to find total insulation area.

(length) x (height + 3′) = area

_____ x _____ + 3′ = _____

Determine the area to be covered by the vapor barrier by finding the area of the crawl space.

(length) x (width) = area

_____ x _____ = _____

It may be easier to divide the crawl space into several rectangles and add them.

(length) x (width) = _____

_____ x _____ = _____

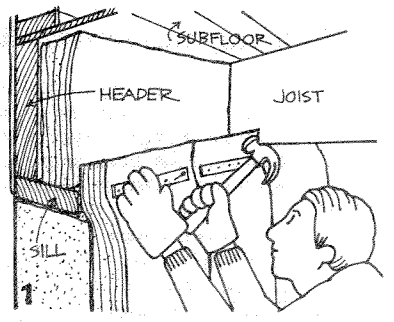
_____ x _____ = _____

_____ x _____ = _____

To determine the total length of nailing strips required, figure the total length of wall to be insulated.

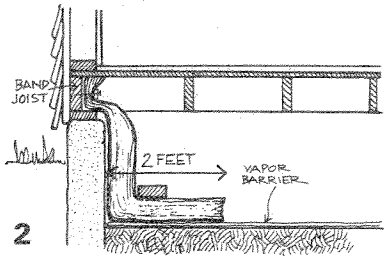
Installation

Where the joists run at right angles to the wall, press short pieces of insulation against the header; they should fit snugly. Then install the wall and perimeter insulation by nailing the top of each strip to the sill using the ½″ x 1½″ (1.3 x 3.8 cm) nailers. Make sure the batts fit snugly against each other, and that you cut them long enough to cover 2 feet (.6 m) of floor as shown in the next drawing.



1

Where the joists run parallel to the wall, you don't need the short pieces of insulation; just install the wall and perimeter insulation by nailing the top of each strip to the band joist, using the ½″ x 1½″ (1.3 x 3.8 cm) nailers.



2

When all batts have been installed, lay down the polyethylene vapor barrier, tucking it under the batts all the way to the foundation wall. Tape the joints of the vapor barrier or lap them at least 6″ (15 cm). Finally lay 2′ x 4′ (.6 x 1.2 m) lumber along the wall on top of the batts to weight the batts in place. (Rocks work well, too.) Plan the work to minimize stepping or crawling on the vapor barrier.

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[1]Lloyd Walker, CSU research associate, agricultural engineering; fact sheet adapted from "In the Bank ... or up the Chimney," U.S. Department of Housing and Urban Development (revised 7/1/84)

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Safety Precautions

Several safety precautions should be considered when working with glass fiber or rock wool insulation. Gloves and a breathing mask should be worn to prevent contact with insulation particles. The material should be kept wrapped until ready for use.

Other safety precautions that should be observed when working in close or cramped spaces are to provide adequate temporary lighting, provide adequate ventilation, keep lights and all wires off wet ground.

Ventilating the Crawl Space

Even with a plastic vapor barrier on the floor, the air in a crawl space will be too damp if fresh air dosn't get in there from time to time. This will mean that the new insulation will be wet and won't keep the house as warm as it should. It also will mean that wooden members that hold up the house will be wet and will rot. Proper ventilation will prevent both of these problems.

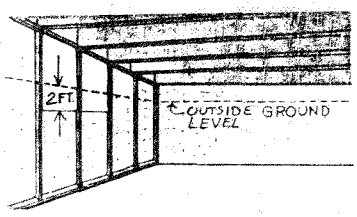
If the crawl space is part of a forced-air heating system (in other words, if air from the furnace moves through it), seal the crawl space as tightly as possible—the air moving through it from the furnace is enough ventilation in winter. If there are crawl space vents, keep them shut in winter, open in summer. If there are no vents, run the blower on the furnace 3 or 4 times during the summer to keep the air in the crawl space from getting too damp.

All other crawl spaces should have vents in them that can be opened in summer (to clear out the damp air), and closed **tightly** in winter to make the most of the new insulation. A cover for them can be made and used in winter. (Note: The furnace may get its combusion air from the crawl space; if so, some of the vents should be left open.)

Insulating Basement Walls

If you have a basement that is used as a living or work space and that has air outlets, radiators or baseboard units to heat it, it will pay to add a layer of insulation to the inside of the wall. The areas that need to be insulated are those that are above the ground down to about two feet (.6 meter) below the ground.

The homeowner should install studs along the walls to be insulated. Blanket insulation of glass fiber or mineral wool or rigid based insulation of extruded polystyrene or urethane can be added between the furring strips and the walls finished with wallboard or paneling.



Tools needed—saw, hammer and nails, heavy-duty staple gun or hammer and tacks, tape measure, linoleum knife or heavy-duty shears, level, small sledge hammer and masonry nails.

Materials needed—R-7 (2"-2½") batt or blanket insulation of glass fiber or rock wool with a vapor barrier (Polyethylene may be purchased if batts or blankets do not have a vapor barrier) or 2" rigid board insulation (no vapor barrier is necessary with rigid board insulation); 2" x 3" (5 x 8 cm) studs for use with batts or blankets, or 2" x 2" studs for use with rigid board insulation; wallboard or paneling; waterproof paint if necessary.

To determine how many square feet of insulation is needed, find the average height above the ground of the walls that are to be insulated and add two feet (.6 m). Then measure the length of the walls to be insulated. Multiply the two figures to get the total.

(height) x (length) = area

_____ x _____ = _____

Find the linear feet of studs needed by multiplying the length of the walls to be insulated by 6.

(6) x (length) = (linear feet)

6 x _____ = _____

The area of wall covering equals the basement wall height times the length of wall to be finished.

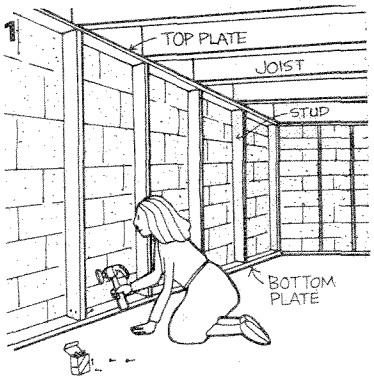
(height) x (length) = area

_____ x _____ = _____

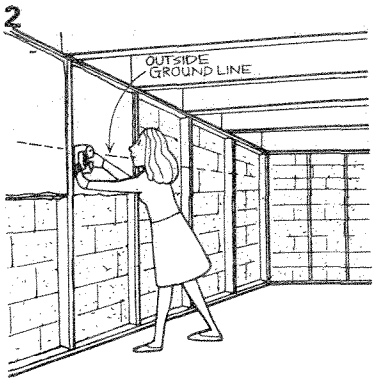
Installation

Before insulation is installed on a basement wall, the homeowner should check to see whether moisture is coming through the basement walls from the ground outside. If it is and the walls are damp, the cause of the dampness should be eliminated to prevent the insulation from becoming wet and ineffective.

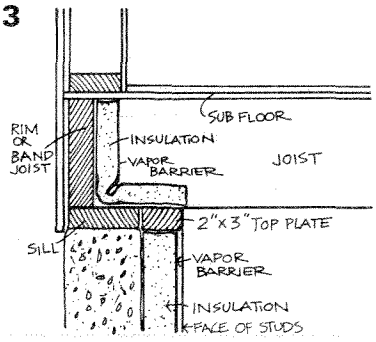
1 **Nail the bottom plate to the floor at the base of the wall with a hammer and concrete nails. Install studs 16 or 24 inches (40 or 60 cm) apart after the top plate is nailed to the joists above. (Where the wall runs parallel to the joists, nail the top plate to the tops of the studs, and fasten the studs to the wall).**



2 **Cut blankets into sections long enough to extend from the top plate to 2 feet (.6 m) below the ground line. Staple them into place between the studs, with the vapor barrier towards the living space. Note: In mountainous regions there will be added benefit to installing the insulation the full height of the wall.**



3 **Install another small piece of insulation above the furring and against the sill to insulate the sill and band joist.**



4 **Install finish wall board or panelling over insulation and furring.**