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ENERGYWISE Energy Saving Solutions from the UK Department of Biosystems and Agricultural Engineering

UK University of Kentucky College of Agriculture

SLAB INSULATION

Source: DOE Consumer Energy Information: EREC Reference Briefs

Slab-on-Grade Floors Provide an Inexpensive and Versative Foundation

Slab-on-grade floors are often the least expensive foundation system and can expedite the construction process. The foundation consists of a concrete slab poured over at least 4 inches of gravel and a layer of 10-mil polyethylene. Virtually any floor covering works well with a slab, although wood flooring systems may require installation of wooden furring strips prior to attaching the wood flooring material.

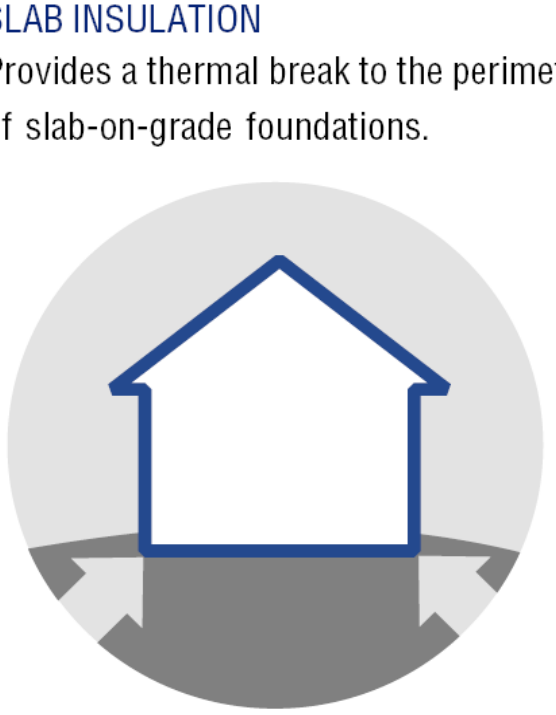
Homes use slab-on-grade floors in two ways: either as the bottom floor of a home or as the floor in a daylight basement—where the floor level is about even with outside earth. Areas with mild winters do not require a deep foundation. In these regions, slab-on-grade foundations may prove an ideal choice for flat lots.

Care must be taken in designing a home with a slab foundation to avoid a "squat" appearance. For example, porches are at grade level in houses with a slab foundation, rather than being elevated above the yard. The hard surface of the slab foundation may cause injuries, more frequent breakage of dropped objects, and tired feet unless it is covered with carpeting or other softer floor finishes. Use of slab foundations can also make it more difficult to install wiring, plumbing, and ductwork, so the design of these systems into the construction plans and process is essential.

Benefits of Insulating Slab-on-Grade Floors

Slabs lose energy primarily as a result of heat conducted outward and through the perimeter of the slab. In most sections of the country, insulating the exterior edge of the slab can reduce winter heating bills by 10 to 20 percent.

In climates with mild winters, slab insulation in a typical 1,800 square-foot home would save $50 to $60 annually. R-10 slab insulation for an 1,800 square-foot home would typically cost $300 to $600 to install. Thus, the insulation would pay for itself in 5 to 10 years.



The investment in slab insulation is also economical when it is part of the mortgage. An insulation cost of $450 would add about $38 to the annual mortgage. Since the insulation saves over $50 per year on energy bills, savings exceed the extra mortgage costs and the investment in slab insulation pays off from the beginning.

Slab insulation is important not only to save on energy bills, but also to improve comfort. Cold concrete slabs are one of the most notorious sources of discomfort in a home. Installing slab insulation around the perimeter of the slab will reduce heat loss and make the slab easier to heat. An insulated slab also provides thermal mass to store heat and moderates indoor temperatures.

SLAB INSULATION TECHNIQUES

Slab insulation can be installed following one of two basic techniques: installing rigid insulation directly against the exterior of the slab and footing or building a "contained" or "floating" slab with interior insulation. Whichever design is followed, the keys to an effective slab foundation are:

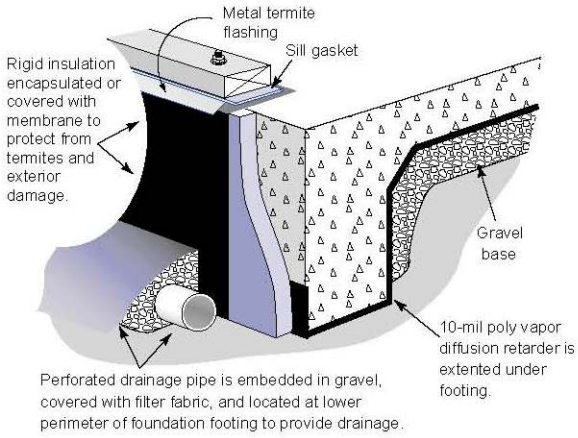
Moisture control—using a water-managed foundation system to drain rainwater and groundwater away from the foundation.

Airtight construction—sealing interfaces between the slab foundation and the exterior wall to reduce infiltration into the house.

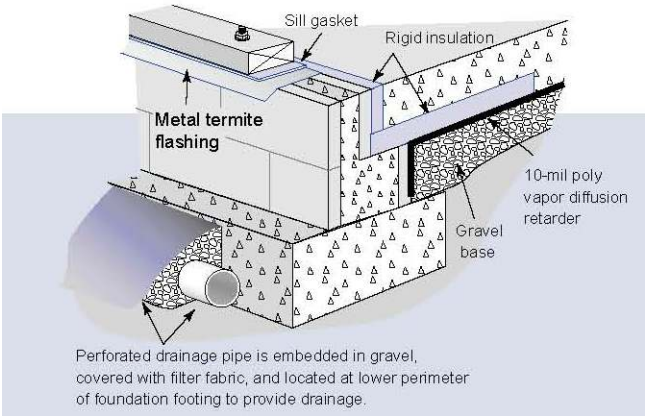
Complete insulation coverage—properly installing the correct insulation levels and making sure the insulation coverage is continuous and complete.

PERIMETER INSULATION— SLAB-ON-GRADE CONSTRUCTION

Provide good drainage away from the foundation and capillary breaks for a durable foundation. Perimeter insulation increases comfort in the living space.



FLOATING SLAB-ON-GRADE CONSTRUCTION



MOISTURE AND AIR LEAKAGE CONTROL

1. Keep all untreated wood materials away from the earth.
2. Install well-designed guttering and downspouts that are connected to a drainage system diverting rainwater completely away from the house.
3. Slope the earth away from the house for at least 5 feet at a minimum 5% grade (3 inches in 5 feet). Establish drainage swales as needed to direct rainwater around the house.
4. Add a sill gasket membrane between the slab and bottom plate to provide air sealing.
5. Install a protective membrane (such as rubberized roofing material or ice-dam protection membranes) to serve as a capillary break that reduces wicking of water up from the foundation. This membrane can also serve as a termite shield.
6. Install a foundation drain directly beside the bottom of the footing. The foundation drain assembly includes a filter fabric, gravel, and a perforated plastic drain pipe typically 4 inches in diameter. Locate the drain beside the footing, not on top, to avoid water flowing against the seam between the footing and the foundation wall and prevent wicking from a web footing through the stem wall.
7. Install a capillary break and moisture barrier under the slab floor, consisting of a layer of 10-mil polyethylene placed over at least 4 inches of gravel.

INSULATION

1. Review the plan for slab insulation with pest control and local building officials to ensure code compliance.
2. Select insulation levels in accordance with the International Energy Conservation Code (IECC) or use an Internet search term: "DOE Insulation Fact Sheet."
3. Install rigid insulation using one of the two general designs shown to achieve complete insulation coverage of the slab perimeter. Use only insulation approved for below-grade use.

The 2009 IECC slab insulation requirement for Kentucky is R-10, extending 2 feet downward and/or horizontally.