



Foundation Cracking

by Henry Spies

Q. I am working on a lakeshore cottage in northern Wisconsin. The structure was built in the '30s. Upon removing the downstairs flooring, I found severe cracking in the original footing foundation along the wall (see photo at right). Any suggestions on solving the problem would be appreciated. Along with repairing the foundation, I plan to pour a slab over the existing soil, which may influence your recommendations.—S.B., Fairbanks, Ak.

A. The cracking shown in your photo almost certainly was caused by frost heave since the cabin was used only in the summer. Frost heave is minimized by keeping the soil as dry as possible. Therefore, installing a better drainage system should help. Since you will be pouring a new slab against the foundation at that point, I would also suggest that you clean the foundation in that area as well as possible. This will produce a good bond between the old concrete and the new slab. Also, add two or three #4 rebars in that section of the slab edge to minimize differential movement.

Coming south for the winter?

Insulating Log-Home Foundations

Q. I am investigating building log homes. The problem is that I have not found a good method of putting two inches of extruded polystyrene on the foundation without either offsetting the logs enough to compromise structural rigidity or having a bulging, unsightly foundation. What do you recommend?—F.G., Milan, N.H.

A. I think you should use a metal flashing (aluminum, copper, or zinc) that sits on top of the foundation and extends over the insulation on the outside of the foundation. This should give a straight line and a reasonably neat appearance. Even though the extruded polystyrene is waterproof, the flashing should be used to reduce the amount of water getting behind it. The logs definitely should not be offset enough to cover the top of two-inch insulation. An alternate method would be to taper the top of the insulation to one inch and offset the logs that much, but the flashing is preferable.

Climate Concerns

Q. New England is known for its moisture—hot, sticky summers; wet, snowball-making snow; rainy springs. Considering that moisture levels are high both inside and out, condensation within walls is likely. But what about the arid Midwest? Since Colorado snow is dry powder, can I assume that a large vapor-pressure difference would occur between interior and exterior? And how



Cracked foundation linked to frost heave. Recommendation: Before repairing, improve the drainage.

would this affect moisture condensation in that region?—B.S., Lowell, Mass.

A. This response comes from the not-so-arid Midwest: I'll match the hot, humid weather of St. Louis against anything New England has to offer, and spot you a gallon of sweat. And Colorado isn't really in the Midwest, it is 900 miles from here.

Anyway, outdoor conditions do have a big effect on moisture damage to houses. Only recently have researchers begun to put evaporation back into their condensation predictions. Many homes thought to be threatened by condensation have been saved by evaporation.

I found a good example of that a few weeks ago when inspecting an attic. The roof sheathing on the north-facing slope had turned black with mildew from condensation. The sheathing on the south slope was as bright as new—except where it was shaded by a large fireplace chimney, which was just as black as the north side. Obviously, the sun striking the south slope had re-evaporated the moisture before it could do any damage.

In comparing Colorado to Boston, you can't ignore the difference in barometric pressure due to altitude. The dew point of an air sample at a given relative humidity in Denver will be about seven degrees lower than the same air sample at sea level. The reduced density of air at higher altitudes also affects heat-loss calculations. For a given number of degree-days, the heat loss is reduced about 4 percent per thousand feet of altitude because the thinner air does not conduct heat as readily. This is one reason that solar houses work so well in Fort Collins, Colo., and Albuquerque, N.M.

At a 7,000-foot altitude, the heat loss is at least 28 percent less than at sea level, and the reduced thickness of the air blanket (and absence of smog, at least in Fort Collins) increases the solar intensity several times. Unfortunately, most solar calculations credit the reduced fuel consumption to the solar effects rather than the decreased air

density—one more reason why solar designs cannot be moved geographically.

As for the role of temperature and humidity in snow formation, check with a skier, an Eskimo, or read Dr. Nakaya's book *Snow Crystals, Natural and Artificial* (Harvard University Press, 1964).

Pressure-Treated Wood Foundations

Q. When building a pressure-treated wood foundation, the recommended procedure calls for heavy poly to be placed outside the pressure-treated plywood. If one insulates the pressure-treated 2x8s with six inches of fiberglass, should a second poly vapor barrier be applied on the inside before the Sheetrock is placed?—P.C., Caribou, Me.

A. Yes. If there is to be a good vapor barrier on the cold side (the plywood is a vapor barrier in itself, in addition to the poly), it is doubly important that there be an unbroken vapor barrier on the inside. While the vapor carried by moving air is more important, vapor transfer by diffusion is still a factor, especially in a closed cavity such as this.

Shingling Over Shingles

Q. I would appreciate advice on how to reshingle a Cape Cod-style house with predipped, white cedar shingles. I especially want to know how to deal with the molding around the windows and doors, as I plan to shingle over the present shingles.—J.S., Beverly, Mass.

A. Any time you apply a new layer of siding over the old, there is a problem with finishing around the openings. With aluminum, steel, or vinyl siding, "J" strips are used, but they should not be used with wood shingles because they will hold water against the ends of the shingles. The best advice I can give is to change your plans, tear off the old shingles, and do the job the way it should be done.

Insulation Retrofit

Q. Are there any problems with blowing fiberglass insulation into old frame houses without vapor barriers, in Massachusetts?—J.B., New Haven, Conn.

A. Normally, no, as long as there are no moisture problems before the insulation is added. Most old houses were decorated with oil-based paints during their history, which provides a partial vapor retarder, and the siding is seldom less permeable than the interior finish. The house should be checked for signs of moisture problems before accepting the job, and the correction of them should be part of the contract. For example, any insulator who retrofits a house with an uncovered soil surface beneath it is asking for trouble—and usually gets it. ■

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