



Frost-Heave Headaches

—NEB Staff Report

In cold climates, foundation insulation is clearly a good investment, even if the basement is not fully heated. But it's not clear which is better: interior or exterior insulation.

Some prefer exterior insulation because it allows you to have a continuous layer of insulation over the band joist and sill area. Exterior insulation, however, has its pitfalls. The outside of a foundation is a rough environment for the relatively soft plastic foams that are used. The foam must be protected during backfilling, and the exposed areas must be protected permanently from sunlight (ultraviolet degradation), lawn mowers, and stray baseballs. The covering, such as stucco, must be both durable and attractive.

And Then There's Frost

And then there's frost. The house pictured here was completed two

though the builder described the soil as "pretty sandy. It perked well." Granular fill was used only at the footing. Has the foam below grade also been moved around by the frost action? We don't know.

What is the solution? One approach is to leave the foundation uninsulated. In uninsulated foundations, heat lost through the wall thaws the soil next to the foundation and eliminates any frost adhesion. Frozen soil farther away from the foundation can heave unimpeded. Of course, this approach prevents frost heaves but wastes a lot of energy.

A better way is to use granular backfill (bank-run gravel or coarse sand) all or most of the way to finish grade next to the foundation. This cannot heave or adhere to the insulation. But if you take this tack, you must provide positive drainage below grade, or the snowmelt and



Frost heaving buckled the fiberglass facing on this basement insulation. The cure: non-frost-susceptible backfill, or switch to interior insulation.

years ago in China, Maine. During the first winter, the covering on the foundation insulation—a fiberglass sheeting called Insulgard—heaved upward and buckled outward one to two inches (see photo), leaving a rather unsightly detail.

The Insulgard, which is made for this application, was two feet wide and went 12 to 18 inches below grade. The material flattened out a little in the summer, and heaved again the second winter. Had the foundation coating been better adhered to the foam, the foam itself might have buckled or torn. In this case, the Insulgard was glued to the foam and the foam was glued to the foundation.

So why the problem?

With an insulated foundation, the outside surface of the foundation remains cold. Frozen soil next to the foundation grips the surface—in this case, the Insulgard. If the soil heaves, it tries to drag the foundation covering up with it. The gripping and lifting force of frozen soil is considerable—it can, for example, pick up a telephone pole.

In the Maine house, the area next to the foundation had been backfilled with soil from the excavation that apparently was frost-susceptible, even

rain that drain into the gravel are likely to drain into the basement.

Wide overhangs (or gutters in milder climates), good grading, and other ways to keep water away from the foundation will also help. Soil that is kept dry can't heave.

A surefire solution is to frame up the basement walls and put good old fiberglass between—and perhaps behind—the studs. It's not perfect, but it makes sense, particularly if you're planning to finish the interior.

A final note: The builder of this house used the exact same detail on the garage with no problems. The Insulgard stayed put and looks fine. If anything, the soil around the garage should have heaved *more*, since the building (and soil) was not heated at all. Did the soil around the garage have more insulating snow cover than around the house (which would reduce the frost depth)? Less water from surface drainage and roof runoff? Was the soil less frost-susceptible?

We can't answer these questions based on our conversations with the owner. But since all of these variables—except the snow cover—can be controlled, you're better off controlling them than leaving frost problems to chance. ■