



Frostproof Slab-on-Grade

Q. *We are faced with a site for a 1,400-square-foot, story-and-a-half house in a northern climate with a 6-foot frost depth. We propose to build the house on a slab-on-grade foundation, some of which will be near ledge. Does the footing for such a slab have to extend below the 6-foot frost depth, or can it float on gravel?*

A. *Carl Hagstrom responds:* This is a tough topic. The issue here, of course, is frost heave. When wet soil freezes, it expands, sometimes with enough force to lift and crack an

You don't want one part of the slab pinned to the ledge, while other areas float on the gravel bed. If you wind up blasting into the ledge to accomplish this, make sure you have a way to drain the blasted area. I had a house last year with a full foundation hole that we had to blast out of ledge. After we blasted the hole, it was clear we would have a swimming pool on our hands if groundwater or surface drainage ever found its way into the hole, which it inevitably would. So we also blasted a trench for the footing drain that led to daylight. I don't know what we would have done if we discovered this after the foundation had been poured, but I'd guess someone's made that mistake before.

The other basic approach is to build an insulated "shallow foundation" using rigid

otherwise well-designed, well-built foundation slab. Frost problems tend to be soil specific. Some soils tend to hold more water than others, and different soils expand and contract at different rates and to different degrees when wet. If you're unfamiliar with the soil characteristics where you are building, I would recommend first contacting a soils engineer to evaluate the site, then use this information to solicit construction recommendations from a structural engineer or knowledgeable foundation sub.

foam insulation that projects out from the perimeter of the slab. How this approach is done depends on whether the house is heated or not.

Describing the construction of any shallow foundation is a book in itself. J. Crandell at the National Association of Home Builders (NAHB) Research Center has done extensive research on this topic, which has been compiled in *Design Guide for a Shallow, Frost-Protected Foundation*. This book is available for \$20 from the NAHB Bookstore (800/223-2665); or, for more information, contact the NAHB Research Center directly (800/638-8556).

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To prevent frost heave, there are two general ways to handle a slab: Drain it or insulate it. One way is to drain beneath the slab, so there is no water in the soil to freeze. This could be challenging under a slab connected to ledge, since groundwater often follows the contour of ledge.

To adequately drain a slab, you need lots of compacted gravel below the slab, with sloping drains that lead to daylight. Gravel must be placed under the entire slab, extending below frost depth in an unheated building.

Which Plywood Floors?

Q. *Can painted plywood be used as both the subfloor and finish floor over 24-inch on-center joists? What thickness would the plywood need to be? Would I need two layers?*

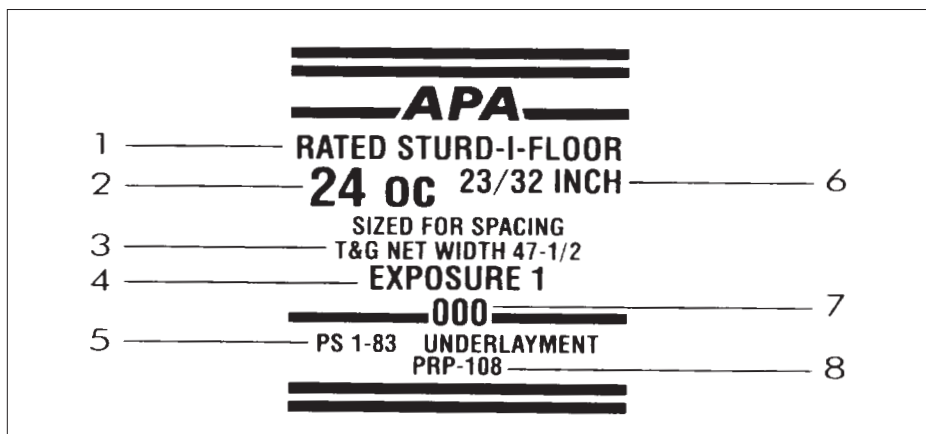
A. *Clayton DeKorne responds:* According to Tom Kositsky, a technical representative for the American Plywood Association, you would not need two layers of plywood for any structural purpose, as long as you use APA-trademarked Sturd-I-Floor panels with a 24-inch on-center span rating. (A complete explanation of the APA ratings, and guidelines for the use and installation of plywood, can be found in the APA's *Residential and Commercial Design and Construction Guide*. Single copies are available free from the APA, 7011 S. 19th St. W.,

Tacoma, WA 98466; 206/565-6600).

Sturd-I-Floor-rated panels are designed as combination subfloor and underlayment panels, usually intended to go under a carpet and pad. In general, a panel intended for use as “sub-floor” is designed as a structural member, with a span rating (such as 16, 20, or 24 inches on-center) that is clearly marked on the grade stamp (see illustration, above). For subfloor, the panel plies are sized (not too thin) and selected from wood species with sufficient strength in bending and deflection. By contrast, a panel specifically

exposed permanently to the exterior.

As a permanent floor, painted plywood would leave a lot to be desired. (I can hear the callbacks already.) For starters, it would be hard to keep the deck clean, dry, and smooth during new construction. Blown-in rain and snow, ground-in mud, loose nails, dropped lumber, scooted ladders, and drywall mud would leave the deck wet, dinged, scraped, smeared, and dirty — all of which would compromise the quality of the paint surface. In addition, Sturd-I-Floor panels typically have C-grade face veneers that have been patched and



APA Sturd-I-Floor plywood panels are a combination subfloor and underlayment. The grade stamp (above) indicates the APA panel name (1), span rating (2), panel type (3 — in this case, tongue-and-groove), exposure classification (4), a number that corresponds to a general product standard (5), thickness (6), the number that describes the mill where the panel was made (7), and a number designating the APA performance standard that the panel is designed to meet (8).

designated as “underlayment” has a concentrated core (few voids), so it can sustain impact loads (say, from a couch dropped by the movers) and point loads (the weight of a person wearing high-heeled shoes, for example). As a combination panel, Sturd-I-Floor is designed to meet the different strength requirements for both these applications.

All APA-rated plywood includes an exposure classification. “Exposure 1” panels are made with a waterproof glue, which will weather temporary conditions during construction, but should not be used where it will be

sanded. The patches can be wood plugs or synthetic plastic, which might take paint unevenly or would show visibly under the paint. Also, the C-grade face veneer, though sanded, can splinter — not a desirable effect for a finish floor.

If homeowners are aware of these limitations, of course, they are tolerable, especially if the intention is to have a painted-plywood floor temporarily, until they can afford another finished floor material. If you’re intending the plywood as a permanent floor, you might want to consider laying $\frac{3}{8}$ - or $\frac{1}{2}$ -inch A/C plywood. The A-grade face will hold paint longer and will have fewer patches. ■

Got a question about a building or renovation project? Send it to On the House, JLC, RR 2, Box 146, Richmond, VT 05477.

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