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When Both a Vapor Retarder and an Under-Slab Void Are Required

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By Liz O'Sullivan

Most design professionals understand the importance of using a vapor retarder below a concrete slab-on-grade to deter water vapor from migrating into the building through the slab, and damaging moisture-sensitive floor finishes and equipment.

What about sites for which the geotechnical engineer has recommended an under-slab void? Some may question whether a vapor retarder is necessary, since that void between the soil and the concrete slab may deter the passage of vapor into the building. However, the reason that void is prescribed is often because of the swell potential of the soil, and if that soil swells to its full potential, it could end up in contact with the concrete slab, making transfer of moisture much more likely, unless there's a vapor retarder between them.

For situations where moisture migration through the slab is unacceptable, the American Concrete Institute recommends that the concrete be placed directly on the vapor retarder. A logical conclusion to draw is that the vapor retarder should remain in direct contact with the underside of the slab.

In a typical slab-on-grade placed on non-expansive soils, the vapor retarder usually remains sandwiched between the soil and the slab, in contact with the slab. This is also the as-placed situation in a slab placed on void forms. But when the under-slab void forms degrade, and create the prescribed void, what happens to the vapor retarder? It depends on the type of product specified.

For the vapor retarder to remain in continuous contact with the underside of the slab, the vapor retarder must actually bond to the underside of the slab.

Products that do not bond to the concrete will sag away from the slab, which should not be a problem if the vapor retarder remains intact. But if that membrane has been punctured and left unrepaired, which could happen either during construction or during settling of the finished building, the potential exists for water vapor to continuously infiltrate into the space between the slab and the vapor retarder. This vapor can condense into liquid water under the slab, above the vapor retarder, and travel laterally under the slab, ultimately allowing migration of moisture into the building from many under-slab locations. One small tear could translate into a big breach of the integrity of the membrane.

Vapor retarder products that bond to the concrete will remain in direct contact with the underside of the slab, even after the void forms degrade. If this type of product has been punctured and left unrepaired, the integrity of the membrane will be compromised only at the puncture location; this would be the only place allowing passage of vapor

through the slab. In a situation with an under-slab void, in the event of a breach of the vapor retarder, a product that is bonded to the underside of the slab will allow much less moisture migration through the slab.

During product selection, narrow down vapor retarder options to those with low permeance (less than 0.1 perm). Then, further narrow down the options to those with good puncture resistance and tensile strength (meeting or exceeding ASTM E 1745, Class A). Then, for situations with under-slab void forms, best practice would be to narrow down vapor retarder options further, to those which bond with the slab. "Peel adhesion to concrete" is tested according to ASTM D903. At this time, there are two under-slab vapor retarder products that have been tested for adhesion to concrete: Barrier-Bac VBC-350 Composite, by Inteplast Group, and Florprufe 120 by W.R. Grace & Co.

If liquid water is present on the site, of course, waterproofing is necessary. Although similar in some ways, under-slab waterproofing situations are outside the scope of this article.

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Rob Jenkins' business name has been corrected in the article above. It's now J/P Solutions LLC.

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If this article is Greek to you, but you want to learn more about the background, read my blog post on the issue. It takes a step back, and explains why we need vapor retarders, and why we need under-slab voids, without getting into the complications of situations in which we need both!
Paste this link into your browser:
http://blog.specificationsdenver.com/2010/12/10/need-under-slab-vapor-retarder-and-under-slab-void.aspx

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