PRACTICAL FOUNDATION

Waterproofing

by Don Jackson

Air-gap membranes have been used in Europe and Canada for years. Manufacturers claim that combined with a good footing drain the membrane provides dry, odor-free basement living space. I recently had the opportunity to install one of these products on a new foundation in northern Vermont. The membrane, called Delta-MS, is made by Cosella Dörken, a German company with North American offices in Ontario (888/433-5824).

The membrane is a 6-mm-thick (24-mil) high-density polyethylene (HDPE) with a matrix of round dimples, about 5/8 inch in diameter, vacuum-formed into the sheet (see Figure 1, next page). The dimples are installed against the foundation and cause the membrane to stand off the concrete by about 5/16 inch, leaving an air space between the membrane and the concrete (thus the generic name, air-gap membrane). The idea is simple: Moisture in the concrete foundation wall is able to "breathe" into the air space, where it can condense on the back of the membrane and run between the dimples down to the foundation drain. And because HDPE is impervious to water, any moisture in the soil will be stopped on the outside and will likewise fall to the foundation drain.

A properly installed perimeter drain combined with an air-gap membrane should result in a dry basement

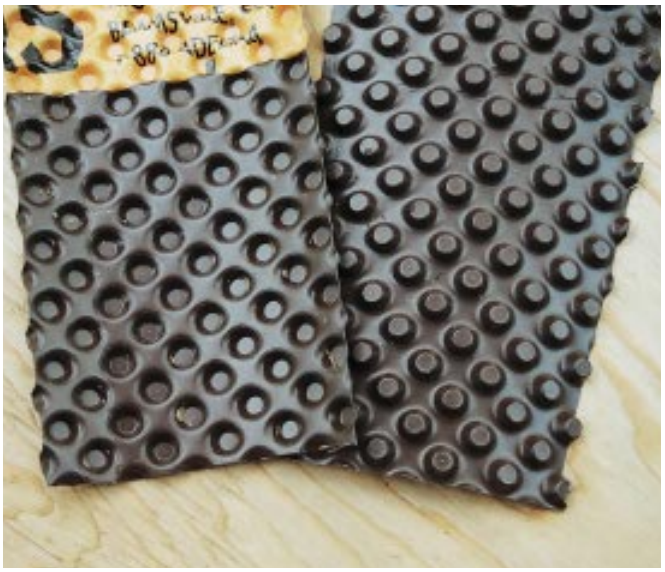

Figure 1. The Delta-MS membrane has dimples that hold it away from the wall, leaving an air space for the unhydrated water in the concrete to evaporate.

Figure 2. The membrane is available in several heights. Everything you need to know about installation is conveniently printed on the back of the wrapper (below).

The membrane is designed to handle any foundation and finished grade level. It comes in 65-foot-long rolls in a variety of heights, from 3 feet 3 inches to 9 feet 9 inches (Figure 2). The membrane is intended to be brought to within an inch or two of finished grade, and should last indefinitely as long as it's below grade and protected from UV-exposure.

Installation Process

We were working with a stepped foundation, so we used three different size rolls. Whenever a roll is too tall, it's easy enough to cut the entire roll or a portion of it with a circular saw or recip saw.

An 8-foot-tall roll weighs a little more than 60 pounds and is easily handled by one person. I worked with another carpenter, Rob Purvee, installing the material. One of us would roll out the membrane along the top of the footing, smoothing out wrinkles and stretching it tight. The other would follow, making the attachment to the wall, using small plastic plugs that are part of the system. The plugs nest in the dimples and have a hole in the center to receive a concrete nail.

Attachment. An instructional video from the manufacturer shows workers nailing the membrane to the concrete with hammers. I guess this might work okay in green concrete, but it made my elbow ache just watching it. We were up against concrete that had cured for a month, so we used a Ramset TrakFast, a gas-fueled nailer like the Paslode Impulse, available from ITW Ramset/Red Head (630/350-0370). Though the gun is a little heavy at 9.5 pounds, I can't imagine doing this job any other way. The TrakFast holds four strips of ten nails at a time. It never misfired, and one fuel cell took us through the entire job. Ramset makes a special nosepiece for the gun that holds the plastic plugs in place as the gun is fired (Figure 3). We were somewhat prone to dropping the plugs on the ground before we could get them nested into a dimple, but they're cheap, and it was no big deal to grab another one from the pouch.

Figure 3. Ramset's cordless TrakFast nailer works great for installing air-gap membranes. A special nosepiece (left) holds the plastic plugs (above) that fit into the dimples in the membrane.

Fast Installation

The day we installed the material was the same day the excavator was scheduled to install the footing drain and backfill the foundation. We started work at 6:00 a.m. and had no problem keeping in front of the other work. The sound of the skid steer dumping gravel in the trench around the corner was good motivation, but the pace was never frantic.

We installed 188 linear feet of the membrane in around three hours. This included nailing a staggered double row of plugs 16 inches on-center along the top, caulking the overlaps between sheets, and shooting in a few extra plugs at corners and overlaps.

At joints, the manufacturer recommends a 6-inch overlap (Figure 4). Laps are quick: First you squirt a heavy bead of sealant on the underlying piece, then nest the overlying piece into the dimples of the bottom sheet. A vertical row of plugs 8 to 10 inches on-center completes the lap.

With the membrane installed, we got out of the way while the excavator finished laying the foundation drain, gravel, and filter fabric. He then backfilled the trench to within a few feet of the top of the wall, leaving the top

Figure 4. At joints, the dimples of the overlapping membrane nest in the dimples of the bottom sheet. A butyl caulk provides a seal.

Figure 5. A plastic termination strip gets nailed along the flat tab at the top of the membrane (at right in photo). Where the flat tab gets cut off, as at this step-down, the cut edge is protected by a 2-inch-wide molding strip.

Figure 6. Similar to Delta-MS, the System Platon air-gap membrane can also be installed with the TrakFast.

foot of the membrane exposed. We worked around the foundation perimeter using the TrakFast to nail off the Delta-MS's plastic termination strip along the top edge of the membrane (Figure 5).

Next, the instructions call for laying a heavy bead of sealant behind the top edge of the membrane just above the termination strip. The sealant helps to fill any gaps left along the top of the wall behind the termination strip, preventing soil from getting behind the membrane once the finish grading is done. Wherever the membrane was cut around windows or at elevation drops, we used a plastic molding strip to finish off the cut edge. The molding covers the dimpled cut edge, again keeping dirt out.

Another Product Option

Around the time we were to install the Delta-MS, I learned of a similar membrane called System Platon, manufactured by Big O Inc., also in Ontario (800/265-7622), and was able to obtain a couple of rolls of that product to examine (Figure 6). The System Platon membrane has half as many dimples as the Delta-MS, but is otherwise similar and seems just as easy to install. Ramset also makes a TrakFast nosepiece for the System Platon plugs. The System Platon calls for washered fasteners along the top edge instead of a termination strip. I thought the Delta's termination strip might do a better job of keeping dirt out than the washered fasteners, but I have no evidence of this. Other than that, there seems to be no great difference between the two products.

How Air-Gap Membranes Work

I can't vouch for the manufacturers' claims of dry, mold-free basements, but from the limited experience I had installing it, the product has a lot to recommend it. For starters, the cost is reasonable. At around 35 to 40 cents per square foot, the material cost is about the same as the cost of spray-on dampproofing, which is the standard foundation treatment for new construction here in northern New England. Add in eight man-hours or so of labor, and the

total cost is still much less than the cost of a bituminous foundation waterproofing system.

The air-gap membrane has two major advantages over spray-on dampproofing. Dampproofing provides a thin coating, so if a crack opens up in the concrete, the dampproof "skin" is cracked as well. The air-gap membrane is independent of the concrete, so the surface cracks typical of curing concrete make no difference. This also makes the membrane a good slip sheet for frost protection.

Dampproofing also seals the pores of the concrete, which prevents the water in the curing concrete from evaporating to the outside. According to concrete expert Brent Anderson (see "Concrete Basics," 6/00), concrete will give up as much as 15 gallons of water per yard over three years after placement. With an air-gap membrane, that water has a chance to evaporate to the outside.

What I liked best about the air-gap membrane is the built-in tolerance. It's not meant to provide a watertight seal: If water happens to get behind the membrane, it has a way to get out. The membrane is plenty tough, but it is possible to puncture it during installation. Although a big tear would need to be patched (with more membrane, some sealant, and a few nails), an occasional small hole is not a problem. Any water that gets in will get out.

The concept depends, of course, on a reliable footing drain to daylight, which every foundation should have in any case (Figure 7). It's common in this area to add an extra foot or two of gravel next to the foundation wall above the drain to ensure that groundwater has an easy path to the drain. With the air-gap membrane in place, however, the extra stone didn't seem necessary.

If this looks like a product you might want to try, give the manufacturers a call and request a sample of the material and installation instructions, including the video. And let us here at *JLC* know what you think.

Figure 7. For the air-gap membrane to work properly, there must be a working foundation drain (top, left) to carry off any water that condenses and runs down the back of the membrane. The riser that the worker is covering with his hand (top, right) later received a flush tube (above) for cleaning the drain where it exits toward daylight.

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