Why You Need Membranes Under Ceramic Tile

To protect a tile job from water and building movement, think membranes!

by STEVE THOMPSON

In the past five years, tile has become quite popular in New England and with that popularity has come a host of installation problems. Aside from sloppy workmanship, the two major problems we see stem from expansion and contraction of substrates and the lack of waterproofing.

In more temperate parts of the country, frost heaves and seasonal building movement are less of a problem. But here in New England, those forces can wreck a tile job quickly. To minimize these problems, we rely heavily on membranes.

Membranes have always been part of the tile trade. The ancient Egyptians used melted lumps of crude oil or asphalt to waterproof surfaces covered with tile. And for thousands of years, different forms of asphalt have been used successfully to back up the typical mortar-bed installation.

In today's market, little tile work goes down over a mortar bed. With installation costs climbing plus a dwindling supply of "mud" men, most tiles today are set using the thin-bed approach.

Partly due to the lack of adequate testing and tryout, the thin-bed method earned a bad name for itself in the 1950s and 60s. But today, all the major tile organizations are publicizing specifications for this fast-track approach. This is due, in large part, to the achievements made by manufacturers in the field of membranes.

In our business, we rely on two basic types of membranes: the old standby of asphalt and felt paper, and the newer chlorinated polyethylene (CPE). Most major tile outlets now carry some type of membrane and each has its merits, limitations, and method of installation. Let me explain why a membrane should be a part of your installation.

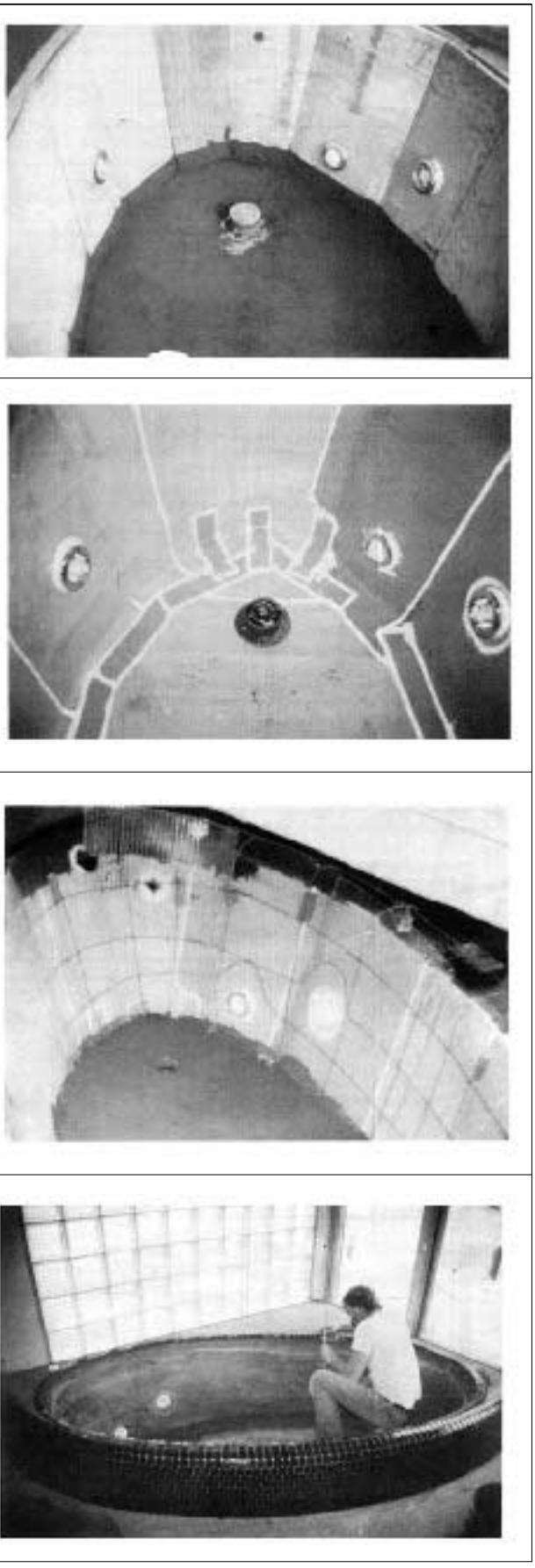
First of all, there is the problem of waterproofing. Unlike in the past, the vast majority of tiles today find their way into the bathroom, where we find water splashing over everything.

Tile itself may be waterproof and is usually not harmed by water. But the grout surrounding the tiles can be penetrated easily if it cracks (even a hairline), or if it is installed "thin" (not packed into the joint). Then there are the inevitable cracks in corners and around plumbing fixtures (tubs and preformed shower pans). Once through the tiles, water is free to penetrate the substructure and start causing trouble.

Moisture-resistant drywall was one attempt to solve the water-penetration problem, but did not prove up to the task. Now, the makers of such boards tell you not to use them under tile. A mortar-bed job does not fare much better in holding water at bay. Water can get through cracks into the wood structure behind.

The other major area of concern is expansion and contraction of the substrate. This is usually caused by seasonal movement in the house or sometimes by water leaking into the wood structure causing it to swell. Tile floors, thin-set over plywood underlayments, are the usual victims of building movement. The problem is that tile and cementitious beds (whether they be floated mortar or manufactured tile-backer boards) have a relatively small rate of expansion and contraction compared to lumber products.

Fortunately the problems of water penetration and building movement can often be solved with a single component: an isolation membrane installed



(1) The sunken tub starts with a braced plywood form on a concrete-slab base. Patches of CPE membrane are sealed to the jets with butyl caulk where they enter the tub. (2) Pieces of membrane cover the entire tub surface and all seams are lapped and sealed with butyl. (3) Galvanized metal lath is attached to a steel armature (9-gauge gal. wire) inside the tub. (4) The tub gets a heavy mortar bed and tiles are finally thin-set to the mortar bed.

between the tile and the substrate. Any isolation membrane will help, but like everything else in life, all membranes are not created equal. Let's begin with the simplest.

One-part membranes are not really membranes in the true sense, but rather liquid coatings that are poured, brushed, or trowelled on (see product listing at end of article). These do a fair job of waterproofing the surfaces on which they are applied, but cannot be relied on as a complete water barrier. With enough substrate movement, these materials can eventually pull apart at a joint or crack in a corner, allowing water to penetrate. Consequently, one-part membranes might be good for a floor that gets occasional spills, but not for a shower stall.

The ability of one-part membranes to bridge gaps can be strengthened substantially by adding a layer of fiberglass or polyester fabric and then a second coat.

Two-part membranes are designed to use such a reinforcing fabric. The fiberglass or polyester is bedded into the liquid and then covered with one or more additional coats. The reinforcing fabric can be lapped up or around corners and prevents the liquid portion of the membrane from breaking after it has cured. We are currently using this type of membrane, on a spot basis, to cover cracks in large concrete slabs before applying tile.

CPE membranes come in sheet form on rolls of different widths, lengths, and thicknesses. We prefer this membrane for a number of reasons: the biggest one right now is that our company has been using it for over ten years with excellent results. There are two types—one used as a water barrier on walls, floors, and countertops (Nobleseal T/S) and the other as a water container in shower pans and sunken tubs (Chloraloy 240).

Nobleseal T/S (T/S stands for thin-set) has the advantage of a layer of spun polyester fiber bonded to each side of the sheet. The fibers help the membrane bond to the thin-set and give the material added strength. The membrane is bonded to the substrate (wood, concrete, drywall, metal, cement backer board) with a compatible thin-set mortar and the tiles are then thin-set to the top of the sheet. We make an effective, long-lasting waterproof connection to the plumbing fixtures with butyl caulk.

In addition to waterproofing, the layer of CPE between the two layers of polyester can absorb movement. It will "give" enough to let the substrate move underneath the tiles without disturbing them. Testing on the product has shown more than 1/4 inch of substrate movement per 8-foot run of tile with no damage to tiles or grout. The membrane has proven very effective in eliminating grout-line cracks when it is lapped from a countertop onto the backsplash wall. On large surface areas (generally bigger than 15 feet across) expansion joints in the tile work are critical.

You can use Nobleseal T/S over any substrate that's stiff enough to hold tile (follow the specs of the Tile Council of America or the American National Standards Institute). We typically use T/S on countertops and floors, and on tub-enclosure and shower walls in premium jobs. While specifically designed for thin-set use, we sometimes use T/S with floated mortar beds. Depending on the application, the membrane can go above or below the mortar bed. In either case, it is bonded to the mortar bed with thin-set.

The membrane used as a container (Chloraloy 240) is a 40-mil-thick sheet of CPE. While not having all the same properties as the T/S, it has been the most effective and economical alternative to hot-mopped or metallic pans. Hot-mopped pans are hazardous to deal with, can support a limited amount of weight, and can dry out and crack. Metallic pans are expensive, a pain to fit and are usually destroyed by electrolysis around the drain within several months. A pan made of Chloraloy can be built on-site and attached to framing with staples and to masonry with butyl caulk.

Asphalt gum, the cold-patch stuff used with roof flashing, can make a reliable membrane when used with 15- or 30-pound asphalt-impregnated felt. We use this type of membrane as waterproofing behind mortar beds or cement backer boards. It functions as an isolation membrane and as waterproofing. Also, by lapping the felt over the lip of the tub or shower pan, it can form an effective watershed. And when lapped up a wall from a floor, it can keep water from leaking in and damaging subfloors.

This kind of membrane is simple to apply. Comb out a thin layer of asphalt gum with a notched trowel (1/8-inch or less) and cover with the felt paper, smoothing out the air pockets and giving corners nice tight creases. Then cover it with your wire mesh and mortar or with cement backer board. For a premium job, you can then add a CPE membrane before tiling.

Membranes may seem like an extravagant expense, but over time they are cheap insurance for your pocket and your reputation. ■

Sources of Materials

Tile backer boards: Wonder Board: Modulars Inc., P.O. Box 216, Hamilton, OH 45012; 513/868-7300. Durock: United States Gypsum, 101 S. Wacker Drive, Chicago, IL 60606; 312/321-4000. Laticrete EP: Laticrete Int., 1 Laticrete Park North, Bethany, CT 06525; 800/243-4788.

One-part membranes: Tile Tite: Applied Polymers of America, Inc., P.O. Box 1832, Clifton, NJ 07015; 201/473-4640.

Two-part membranes: Laticrete 301/335; Laticrete 9235. Laticrete, Int. (see address above).

ICPE membranes: Nobleseal T/S, Chloraloy 240: The Noble Co., P.O. Box 332, Grand Haven MI 49417; 616/842-7844.

Asphalt membranes: Commonly available as cold-applied asphalt or plastic roof cement. Use material with the consistency of tile mastic, not the thin, paint-on variety. Also, choose the fibered type if available to increase crack resistance.

Latex or acrylic thin-sets: Laticrete Int. (see address above). H.B. Fuller Co., 315 S. Hicks Rd., Palatine, IL 60067; 800/323-7407. Mapei Corp., 1350 Lively Blvd., Elk Grove Village, IL 60007; 800/992-6273.

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