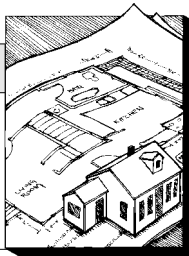


The Right Tile For the Job

by Gordon Tully



American Olean



Tiles in bathrooms should be impervious to water (absorb less than 0.5% water by weight) and non-slippery.

I can't recall a job in which the tilework has not caused trouble. One reason is obvious: you create a skin of rigid material, with thousands of tiny joints, over a wood structure which swells, deflects, twists, and warps; and then you subject it to concentrated streams of very hot water and steam (in a shower) or spill various forms of grease and abrasive materials on it (in a kitchen), which you then grind in with your feet.

The other reason is that homeowners are extremely irrational about tile. They like what they like, and only a few skeptics among them can be made to understand that, just because a tile is available or appears in a magazine photo, does not mean that it works in their situation. For example, let me quote some product literature for a popular floor tile. The printed sheet begins with a description of its charming irregularity, then informs us that:

Chipping on edges, pop-outs and warpage are characteristic of this tile. There are size variations in both width and thickness. This fact should be pointed out to the installer so he can use a wide enough grout joint to adjust to the size variation. No returns will be accepted on tiles which have pop-ups, cracks or warpage as these are not considered defects in this tile...

Translate this into a caution about an automobile, and you have something a step or two down from a Yugo. Yet the homeowner who swoons over this imported trash tile probably drives a Lexus.

What to Look For in Tile

Here are some of the properties to look for in tile:

Water absorption. Tiles are classified according to the amount of

water they absorb by weight:

- Impervious: less than 0.5%
- Vitreous: from 0.5% to 3%
- Semi-vitreous: 3% to 7%
- Non-vitreous: over 7%

Obviously, you don't want to use a highly absorptive tile in a wet situation, such as in a shower or on a countertop, or on a kitchen or entry floor.

Slipperiness. Tiles are tested, both wet and dry, to establish a *friction coefficient*. The higher the coefficient, the less slippery the tile. There is no number agreed upon to represent a slip-resistant tile. At least one manufacturer, American Olean, suggests 0.5 as a minimum. However, all American Olean products measure at least 0.5, yet they caution that at least one is slippery when wet! I suggest a higher number for floor use, such as 0.6 or 0.7.

Strength. Tiles are tested for strength. An unsupported piece is tested until it breaks, and the force required is listed. The range is enormous. American Olean tiles, for example, range from 96 to 940 pounds per tile.

You want a strong tile to withstand heavy traffic. Also, if you are using a large tile on a flexible substrate (for instance, a 12x12-inch tile over a normal wood deck on joists at 16-inch centers), you need a strong tile that won't break when it flexes. Conversely, if you are using a weak tile on a flexible substrate, keep the tiles as small as possible, so they won't flex.

Stain resistance. There is no separate test for stain resistance. American Olean suggests that highly impervious tiles tend to resist stains best. While it is true that you can seal tile, the sealing material wears off and has to be renewed periodically. Also, most sealants make the tile more slippery, and some (wax, for example) will show water stains.

Types of Tile

There are endless types of tile, but some common ones in use are these:

Terra cotta. For residential use, terra cotta is typically a light sandy or pinkish color. (The popular Mexican glazed tile — the "Yugo" mentioned above — is terra cotta.) These tiles are typically soft and porous. They can, however, be made quite strong.

Terra cotta comes glazed or unglazed. Glazing, which is incorporated into the manufacturing process, makes a tile less porous and more impervious, and gives the surface a slight sheen. It also makes it

more slippery. Some tiles benefit from glazing more than others. Terra cotta, because it is so porous, needs glazing or an equivalent treatment. Unglazed terra cotta floor tile must be sealed with boiled linseed oil and waxed periodically. Oiled and waxed terra cotta floors with very wide joints seem to be the rage these days, especially down South.

Quarry tile. These popular flooring tiles are most commonly square or rectangular, but you can get hexagons and octagons. They are usually dark brown or reddish in color, although gray, tan, and dark blue are also available. They are never less than 4 inches on a side, and usually run 6 or 12 inches, and between 1/2 inch and 3/4 inch thick.

Quarry tile is, to quote American Olean's literature, "made from carefully graded shale and fireclays extruded to produce a strong, hard, semi-vitreous body. Noted for its durability and high slip resistance, quarry tile is generally considered stain-resistant, but not stainproof." Quarry tile is unglazed and usually has a friction coefficient of about 0.6 to 0.9.

Quarry tile makes an ideal flooring material, and needs no finish. But since it can absorb grease, I do not usually put it on residential kitchen floors. You could do so and then apply a sealer, but it would make the tile more slippery. Also, the tile would need periodic resealing, which probably wouldn't get done until the tile was already stained. It makes a great floor tile for bathrooms, entries, and mudrooms, however.

Ceramic tile. When used specifically, and not as a general term for all tile, "ceramic" covers a wide variety of tiles, generally in the vitreous to non-vitreous range. Water absorption is typically low, but can be as high as 22%. Sizes range from 1 3/8-inch squares to 12x12-inch pavers. Strengths range from 96 to 940 pounds per tile.

Ceramic tiles are the workhorse tiles. You see them everywhere, but mainly on bathroom walls and kitchen counters. Generally, I don't use ordinary ceramic tile on floors, but there are exceptions — I might use ceramic tiles with higher than average friction coefficients, for example, and low absorptivity. Both those factors should be a priority when spec'ing tile for use in a wet location.

Porcelain ceramic tile. American Olean says "Porcelain ceramic mosaics have a fine-grained tile body with color throughout the tile. They are impervious, with less than 0.5% absorption, stainproof, dentproof, and frostproof." Most are quite strong, with strengths ranging from 250 to 500 pounds per tile. Most also have good friction coefficients even when wet, ranging from 0.6 to 0.7.

Because they are so impervious,

they stand up even without glazing. Unglazed ceramic mosaic tiles are the only choice for shower floors or swimming pool aprons; and they are the best choice, along with quarry tile, for any other floor which might get wet.

Glazed porcelain pavers that are both thin and strong are available in sizes up to 12x12 inches. You often find these big porcelain tiles in the lobbies of new office buildings, because they are strong, easy to lay, and come in nice colors. I suspect they will become less popular after a few people brain themselves by slipping on them in wet weather. Use them with caution, and only in water-free places.

Supporting Tile

One client, after listening to my plea not to put large, weak tile on a wood floor, still wanted to do exactly that. So the question shifted: How do you stiffen the tile when the floor is weak?

Large tiles on the floor, unless they are strong, must be laid on a very stiff foundation. If you know where the tile is going before you build, you can drop the joists enough to make a two-inch grout bed, which can be reinforced to spread loads and minimize deflection. Another, probably easier way is to design the floor with deeper, more closely spaced joists, to reduce deflection in the subfloor.

If you have to thin-set tile on an existing wood floor, go underneath and tightly fit 3/4-inch plywood panels between the joists, glued and nailed flat to the underside of the subfloor, and cross-brace the dickens out of the joists. You don't want that floor to flex.

Unless a wall tile will never be stressed by impact or water (for example, a wainscot in a dining room), it should be applied over cementitious backer board, not over gypsum board.

Shower Pans

Copper shower pans almost always leak — it only takes one little nail, stepped on once before the shower is installed, to create an unfixable leak. Use resilient membranes, such as Noble Seal.

Follow T.C.A. Standards

As a final recommendation, always follow the Tile Council of America (T.C.A.) standards for detailing and setting tile. These are published in the superb "Handbook for Ceramic Tile Installation," which you can find in Sweet's Catalog, section 09300, or buy one for \$1.75 (this includes postage) from T.C.A., PO Box 326, Princeton, NJ 08542. ■

Gordon Tully is an architect practicing in Cambridge, Mass. He also teaches at the Harvard Graduate School of Design.