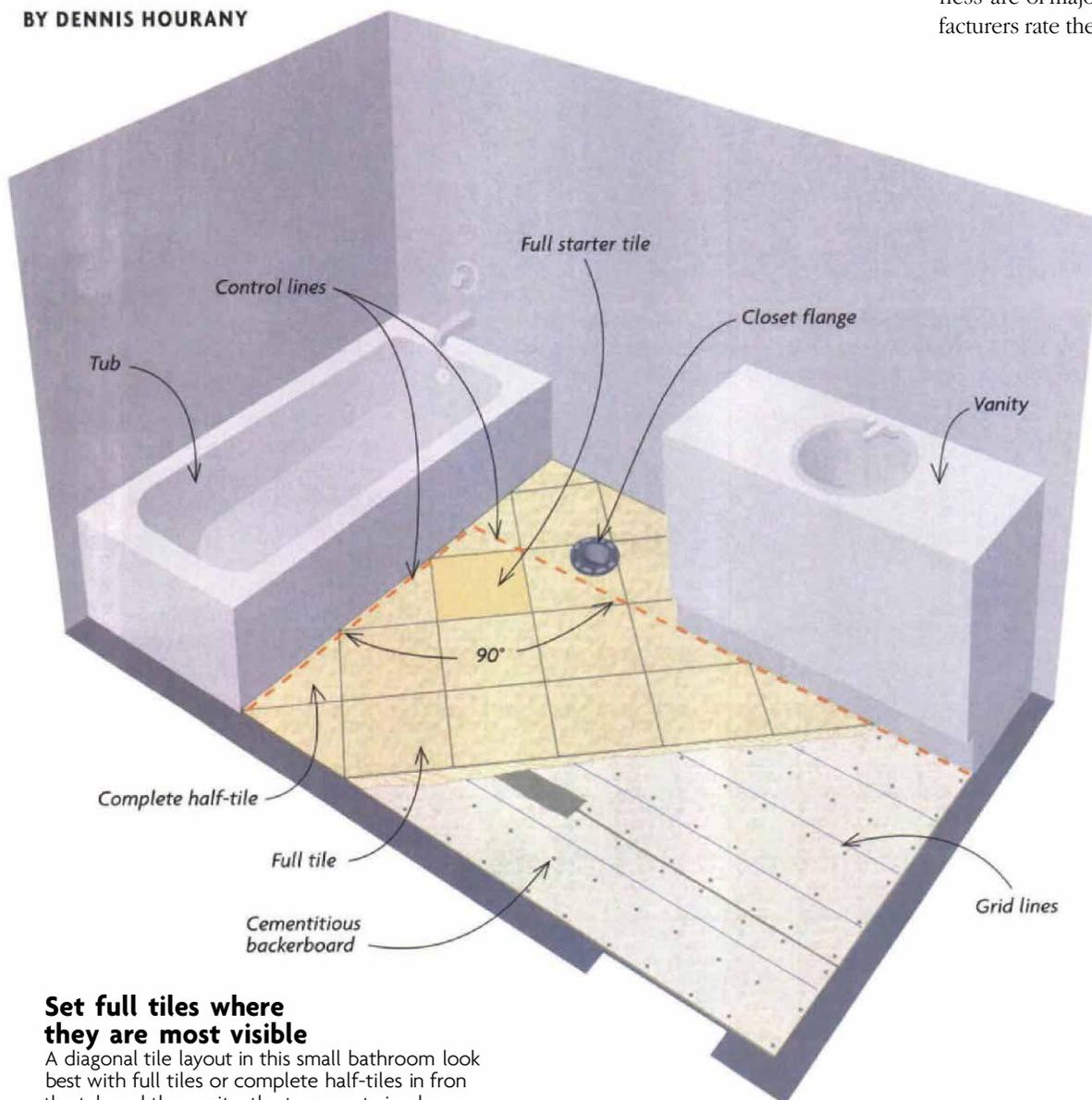


Tiling a Bathroom Floor

Cementitious backerboard speeds up the job, but start with a subfloor that is firm and flat

BY DENNIS HOURANY



Set full tiles where they are most visible

A diagonal tile layout in this small bathroom look best with full tiles or complete half-tiles in front of the tub and the vanity, the two most visual areas in the room. Using these references, two control lines at a 90° angle are the starting point for an attractive grid. Grid lines taken from the control lines also can

If anything can beat ceramic tile for a bathroom floor, I'd like to know what it is. Durable and nearly impervious to water damage, tile also is adaptable to just about any architectural style. The ceramic-tile industry now offers an incredible variety of tile, as well as reliable materials for setting it. If tile is more expensive than some other floor coverings, it can last as long as the house with little upkeep.

True enough, but a tile floor can be a nightmare if it is not laid out and installed carefully on a well-prepared subfloor. One of the key early considerations is the substrate on which the tile will be installed. Floating a mortar bed at least 1¼ in. thick used to be the only choice. Now we can use quick-to-install cementitious backerboard.

As for the tile itself, durability and smoothness are of major concern. Most tile manufacturers rate their tiles for durability by clas-



1

Is the floor stiff enough?

A dial indicator attached to a length of iron pipe is one way to check whether there is too much deflection in the subfloor. A bouncy subfloor will result in cracked tile or grout.

sifying them as either residential, commercial, light industrial or industrial. For a bathroom at home, the residential grade is just fine. Smoothness is rated on a numerical scale measuring the coefficient of friction, or COF. Even though the roughness scale goes all the way to 9, I've found that a rating of 0.6 provides good slip resistance. Just keep in mind, though, that the COF goes down when the tile is wet. If you don't find the COF specified on the tile box, you can call the manufacturer for the information.

Make sure the subfloor is flat

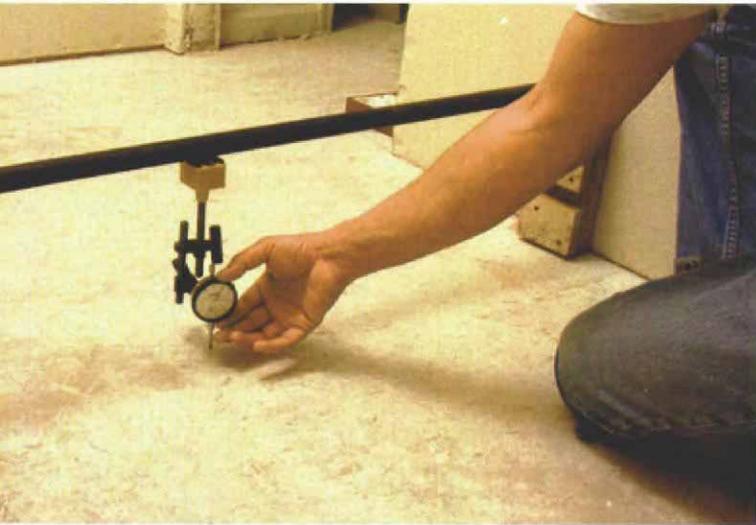
Setting tile on an inadequate subfloor is begging for trouble. The subfloor should meet deflection criteria set by the Tile Council of America (P. O. Box 1787, Clemson, SC 29633; 864-646-8453; www.tileusa.com)—in other words, it can't have too much bounce. If it does, chances are good the tile

will lose its bond with the backerboard, or at least that grout joints between the tiles will crack. The Tile Council allows a maximum deflection of $\frac{1}{360}$ of the span, or the span in inches divided by 360. For example, if you have a span of 48 in., the most sag the subfloor can show under a load is 0.13 in., or roughly $\frac{1}{8}$ in. Although the Tile Council calls for a minimum $\frac{3}{8}$ -in. exterior-grade plywood subfloor, houses where we set tile often have subfloors of $\frac{7}{8}$ -in. oriented strand board, and we haven't had any problems. Minimum joist spacing is 16 in. o. c.

I can sense whether there is too much bounce simply by walking around on a floor. That's after setting hundreds of tile floors. When I started, though, I measured the deflection with a length of iron pipe and a dial indicator just to make sure (photo 1). If there's too much deflection, don't go any farther without fixing the problem.

The subfloor also must be flat. Here, the maximum amount of leeway is $\frac{1}{8}$ in. in 10 ft. That means if you were to lay a straightedge on the subfloor, you should not be able to see a hump or a dip that exceeds $\frac{1}{8}$ in. A wavy floor can be corrected. One way is to use a leveling compound over the wood subfloor before the backerboard is installed. You can also put the backerboard down first and then use a leveling compound that bonds to it.

In either case, the application is the same. Using a straightedge, pull some leveling compound across the low spots to fill them in. You may need to use more than one applica-



2

Clean-cutting backerboard. The author uses HardiBacker, a $\frac{1}{4}$ -in. cementitious backerboard, as a tile substrate. Scored on one side with a carbide tool, the board will snap cleanly with no back cut.



3

Glue for the backerboard. The author uses a type-I mastic to bond the backerboard to the oriented strand board subfloor. An acrylic-modified thinset mortar also could be used.

4

Nail it down. Galvanized roofing nails $\frac{1}{4}$ in. long should be driven 6 in. o. c. to install the backerboard. Set nail heads flush with the surface.

tion. Leveling compounds are typically available from tile suppliers.

When installing backerboard, don't forget to leave an expansion gap

Cementitious backerboard is made by several manufacturers, and it is readily available. We use 1/4-in. HardiBacker (James Hardie Interior Products; 800-942-7343). Sheets come in several sizes. I like this product a lot more than the backerboard with fiberglass mesh on each side. HardiBacker cuts cleanly and easily (photo 2, p. 87), and it's simple to fasten to the subfloor. The 1/4-in. thickness makes it easy to keep the tile at the right height, without framing a recess into the floor or having an awkward lip where the tile meets another floor surface. However, if you need to raise the level of the floor to meet an adjoining surface, you could use 1/2-in. cement board.

I cut and lay out all the floor's backerboard before nailing any down. When it's laid out, joints should be staggered, and edges should overlap subfloor joints. It is imperative that you leave a 1/8-in. expansion gap between sheets and a 1/4-in. gap at perimeter walls or other restraining surfaces, such as cabinets.

Most manufacturers require that the backerboard be bonded to the subfloor with an adhesive, and we use type-I mastic. You can use thinset adhesive. But the mastic works just as well in this application, and it's faster and easier to apply (check with the backerboard manufacturer before deciding what to use). Whatever the adhesive, put it down evenly with the notched trowel recommended by the manufacturer, and don't apply any more adhesive than can be covered with backerboard before it skins over (photo 3, p. 87). I use

1 1/4-in. galvanized roofing nails driven into the backerboard every 6 in. (photo 4, p. 87). Nail heads should be flush with the backerboard, and if the floor is anything but tiny, you'll find a pneumatic nailer is a big help. We don't use screws because HardiBacker does not require them and because they are much slower to install.

Set control lines for laying the tile, and cut the odd ducks now

When beginning a layout, I start by checking that walls are square and parallel. If you find things are seriously out of whack and will cause many small tiles or unsightly cuts, you may consider installing the tile on a diagonal. That's what I did here, although the reason was to add a little interest to the floor, not because the room was out of



5

Cut crucial tiles while the floor is dry. Before applying thinset to the backerboard, the author lays out the floor and cuts tiles to go around obstructions, such as this closet flange.



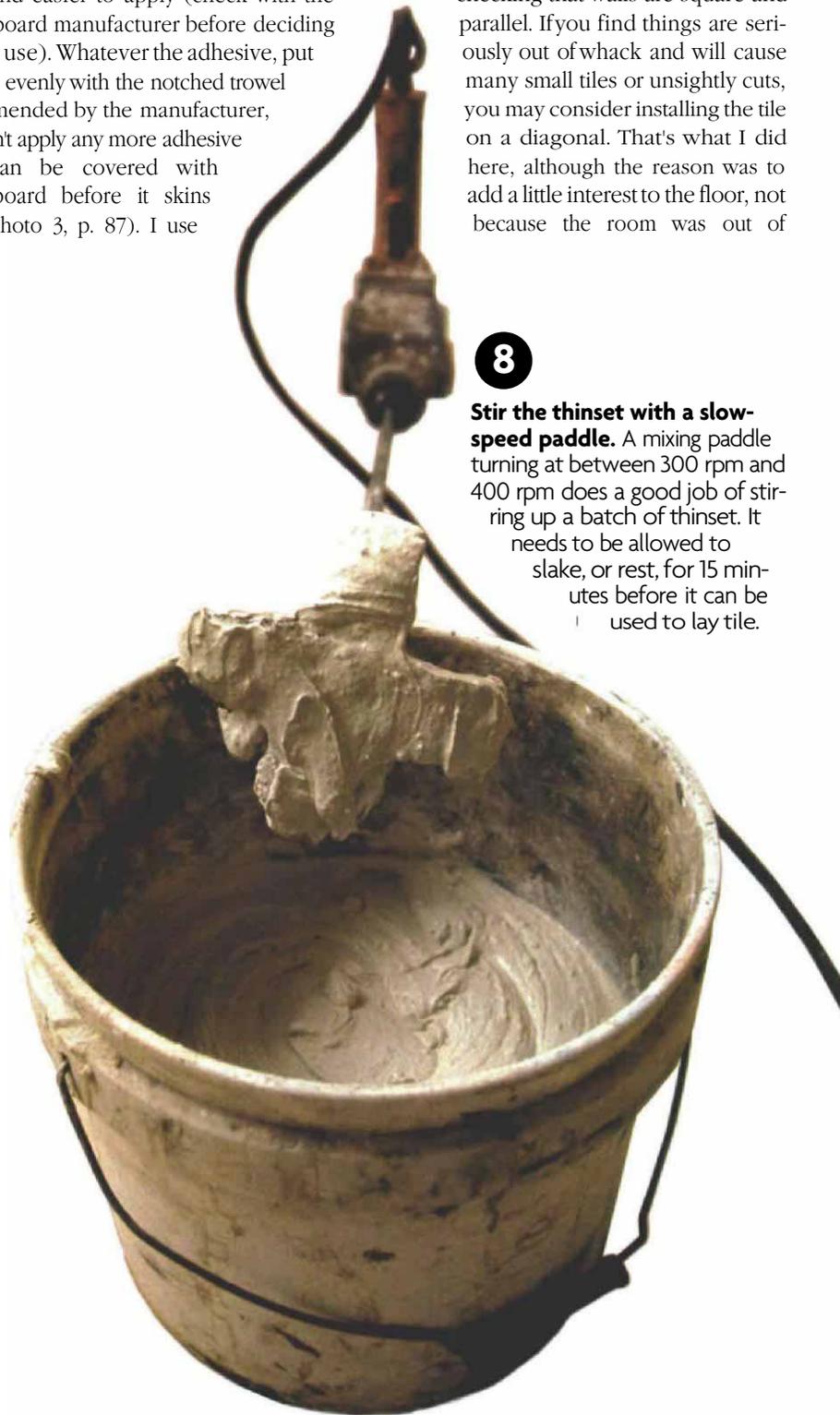
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A wet saw works best. A tile saw is the most versatile tool for cutting tile. Curved cuts start with a series of straight cuts to the layout line.



7

Nippers finish the job. After the author makes a rough curved cut with a wet saw, he removes the waste with tile nippers.



8

Stir the thinset with a slow-speed paddle. A mixing paddle turning at between 300 rpm and 400 rpm does a good job of stirring up a batch of thinset. It needs to be allowed to slake, or rest, for 15 minutes before it can be used to lay tile.

square. Diagonal layouts also have the effect of making a narrow room appear wider.

Most every room has obvious focal points where full tiles should go. I establish two control lines, 90° to each other, and orient them so that they correspond with the room's focal points. For example, in the small bathroom I'm tiling here, the two critical points are in front of the vanity and in front of the bathtub; I plan on using full tiles (or complete half-tiles) in these areas (drawing p. 86). Cut tiles will go where they are less obvious. In general, I try to avoid cutting tiles to less than half their original size—they just look unsightly.

After you've determined the basic layout and the control lines, you can snap grid lines that will guide you as you set the tile. Plastic spacers will keep your grout lines a consistent width. But don't count on them entirely to keep the layout straight because tiles vary

somewhat in size. Follow the layout lines, no matter what, for straight grout lines.

I think it's a good idea to cut some tile in advance while the floor is still free of adhesive. I don't cut all of them, just those around the closet flange or other oddly shaped spaces (photo 5, facing page). Once you get to a point where full field tiles (or cut tiles of a uniform size) will be used, cutting and fitting them in advance isn't necessary. To cut tile, I use a tile saw and a pair of nippers (photos 6 and 7, facing page). You could use a tile board, which works by scoring and snapping tile much as you would cut a piece of glass (these tools also are called snap cutters). One disadvantage of a tile board, though, is that it can't cut *L* and *U* shapes. You can use a grinder with a diamond blade or a jigsaw with a Carborundum blade to cut tile. However, it's more difficult, and the cuts are not as clean.

You can't go any further without mixing up a batch of thinset mortar, which is used to bridge the seams in the backerboard and to glue down the tile. I use acrylic-modified thinset no matter what the substrate. It provides a better bond, offers more flexibility and stays usable in the bucket longer. Some kinds of tile require different thinset additives, so be sure



9
Tape seams now to avoid cracks later. Fiberglass-mesh tape bedded in a thin layer of thinset spans the gap between adjoining sheets of backerboard. Skipping the tape can cause cracks to develop later.



11
Bed the tile in thinset mortar. When you're setting tile, plastic spacers will keep grout joints uniform in width, but following control lines is a better guarantee that grout lines will be straight.



10
Apply an even layer of thinset. The author uses a notched trowel to spread acrylic-modified thinset for the tile, taking care not to obscure layout lines.



12
Check the thinset. After setting a few tiles, lift one up to make sure they have enough thinset. Large tiles such as this one may need to be back-buttered to get full coverage.

to consult your supplier to make sure that you have the right kind.

Preparing thinset requires precision

When mixing thinset, follow the directions on the bag to the letter. One requirement is that the mixture slake, or rest, in the bucket for 15 minutes after the initial mix. Then mix it again before use. Occasional stirring may help to keep the thinset workable, but don't add any more acrylic admix or water much after the second mixing. We use a ½-in. drill to turn a mixing paddle at between 300 rpm and 400 rpm (photo 8, p. 88).

Taping the joints between pieces of backer-board helps to prevent cracks later. We use fiberglass mesh tape 2 in. wide, bedding it in a layer of thinset (photo 9, p. 89). Make sure that seams between sheets are completely filled. After you apply the first layer of adhesive and tape, you'll need to put down another

layer of thinset over the tape with the flat side of a margin trowel, holding it at a 45° angle and pressing the tape firmly into the thinset. If you tile the floor in the same day, you can tape as you go so that you won't walk or kneel in wet adhesive. But if you wait overnight, make sure not to leave any lumps of thinset at the seams.

When applying the thinset to the backer-board for the tile, use the notched side and hold the trowel at 45° to the floor so that an even amount of adhesive is applied and no air is trapped (photo 10, p. 89). What you want is 100% coverage of both the backer-board and the back of the tile, with about ⅜ in. of thinset between the two surfaces. Large tiles may have uneven backs, which will require you to back-butter the surface with the flat side of a trowel. Place the tile on the thinset with a slight twisting movement to help embed the tile fully (photo 11, p. 89).

It's also a good idea to pull a tile off the floor near the start of the job to make sure you're using enough thinset. If the back of the tile is not fully covered, you'll know to adjust your technique or trowel or both (photo 12, p. 89), assuming the thinset has been mixed properly. Look on the label of the bag the thinset comes in for the proper notch size.

If, after a while, the thinset becomes too stiff or if tile doesn't readily stick to it, throw it away and mix a fresh batch. Before the thinset dries completely, you should clean the excess from the joints (photo 13, below). If you don't, the grout may be too thin, or it will hydrate unevenly, two conditions that make a weak grout line.

For a high-strength job, don't overwater the grout

Grouting can make or break the tile job. A common mistake is adding too much water

Does a tile look off? Take it out and reset it

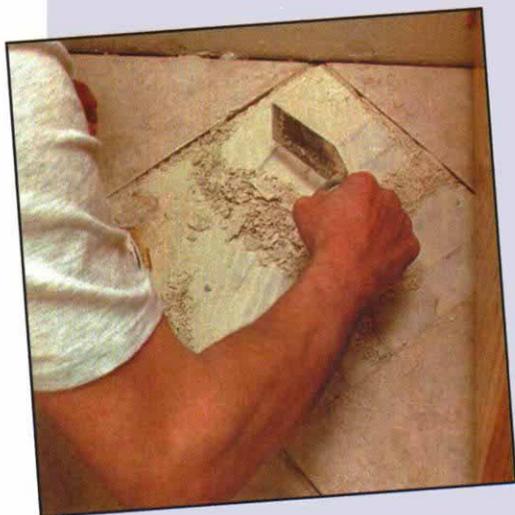
A day after setting the tile in this bathroom floor, I returned to apply the grout—and staring me right in the face was the corner of one tile that had sunk below its neighbors. Although the toilet would have camouflaged the problem, it was better to fix it before going any further.

Pulling a tile is not a big deal, providing you get to it before the thinset adhesive has had a chance to cure fully. In this case, the acrylic-modified thinset had been applied the previous afternoon, and it was still green.

Using a hammer and a steel bar, I was able to jar the tile loose without too much trouble and without breaking the tile. After scraping the semicured thinset off the back of the tile and the floor (photo left), I applied

fresh thinset to both surfaces and rebedded the tile. This time, I was careful to keep the tile flush with the those around it. This repair didn't take more than a few minutes, and as soon as the tile was reset, I grouted the entire floor. You never would have known anything was amiss.

—D. H.



13

Clean out the excess thinset. A margin trowel is a perfect tool for removing thinset that has oozed into the grout joint. If grout doesn't get all the way into the joint, the resulting bond will be weak.



14

Grout mix should be stiff. Holding a grout trowel at a 45° angle, the author works a stiff grout mix into joints between tiles. Excess grout should be troweled off as you go.



or admix when mixing the grout, which causes discoloration and a weaker mix. Another is using too much water when cleaning excess grout off the tile, which also can cause it to discolor. A third common error is using a high-speed mixer for the grout, which traps air in it and makes it weak.

Add only enough water to the grout powder to make it workable. Follow the manufacturer's recommended ratio of water to grout. Ideally, the grout should be a little difficult to spread into the joints. If you're not going to mix the grout by hand, use a mixing paddle, the same type you would use for mixing thin-set, and a slow-speed drill. After mixing, allow the grout to slake for 15 minutes and then remix it. At this point, you may add liquid or powder to adjust the consistency. As you work, remixing the grout

occasionally will help to keep it workable, but do not add more liquid.

Use a rubber grout trowel to spread the grout diagonally, holding the trowel at a 45° angle (photo 14, facing page). Grout King makes the best grout trowel I know (Diamond Tough Tools; 888-595-5995; cost: about \$13). It's worth buying one even if you use it only once.

With all the joints filled and excess grout re-

moved with the trowel, let the grout sit until it begins to firm and you see a dry film on the tile. Then it's time to begin cleaning the tile. You'll need at least two good hydro sponges (sold at tile-supply stores) and a large bucket of clean, cool water. After wetting and wringing out the sponge, wipe the surface to get even grout joints. Then, with a rinsed sponge, use one side of the sponge for one wipe in a diagonal direction (photo 15, below). After using both sides of the sponge, wring it out (photo 16, below). Change the water frequently to avoid spreading dirty water on the tile. You may have to make several passes until all the residue is gone.

After the floor dries, you will see a film on the tile surface. This film can be polished off, but wait a bit until the grout is firmly set. □

Dennis Hourany owns Elite Tile in Walnut Creek, California. Photos by Scott Gibson.



15

When a film appears, start cleaning. Not long after grout has been applied, a hazy film appears on the tile. That's a signal to start wiping the floor with a clean, damp sponge. Keep the pressure light.



16

This sponge needs a dunk. After a single light pass across the floor, this sponge has picked up plenty of excess grout. The author flips the sponge over, makes another light pass and then rinses out the sponge.