

Brick Floors

How a New Mexico pro lays a brick floor without mortar or string lines



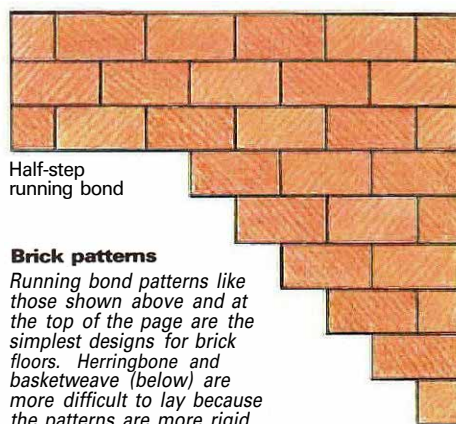
by Douglas Ring

Brick floors are common in adobe houses here in New Mexico. The deep-red earth tones typical of bricks and their slightly erratic dimensions fit right in with adobe houses. But these aren't the only structures in which I lay brick floors. Some clients want them because they make good heat sinks in passive-solar homes or good radiators in buildings with buried hot-water radiant-heating systems. Still other clients want them because of their looks. After all, one of the most popular sheet-vinyl patterns imitates the look of a brick floor, and the installed cost for the two materials is roughly the same—about \$2 a square foot. I do point out to my clients that the two materials wear at different rates. A vinyl floor will probably need replacing in 20 years. But after 20 years the corners which stood a bit high in a new brick floor will be nicely rounded, and if it's been properly finished it will have a patina like a well-used banister. In heavy traffic areas maybe $\frac{1}{16}$ in. will be worn away, leaving another 14 centuries of wear in those places—give or take a century or two.

Choosing the bricks—The phone book will tell you where bricks can be had in your area, and I strongly suggest that you visit each yard to assess the quality and price of the available bricks. Check the bricks for chipped corners and variations in dimensions. Up to 5% chipped corners is typical. If their dimensions fluctuate by more than $\frac{1}{16}$ in., you'll be spending an inordinate amount of time fitting them together.

We are fortunate to have a local factory (Kinney Brick Co., 100 Prosperity Ave. S.E., Albuquerque, N. Mex. 87102) that makes an inexpensive (\$17 each) low-fire brick suitable for interior use. Most of the brick manufacturers make their pavers (bricks without holes) for exterior use, which means the bricks have to be fired at higher temperatures. This makes them resistant to water so they won't spall when they are exposed to a rain followed by a freeze. Not surprisingly, high-fire bricks are more expensive than their low-fire counterparts because it takes

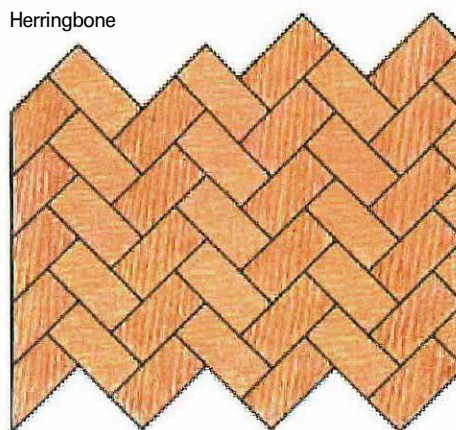
Douglas Ring is a licensed contractor in Albuquerque, N. Mex.



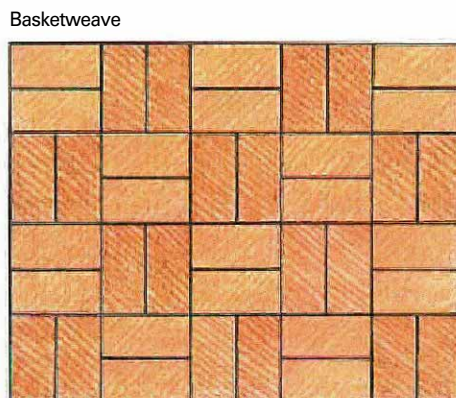
Half-step running bond

Brick patterns

Running bond patterns like those shown above and at the top of the page are the simplest designs for brick floors. Herringbone and basketweave (below) are more difficult to lay because the patterns are more rigid.



Herringbone



Basketweave

more time and gas to cook them. Around here, you can count on spending \$.30 to \$.50 apiece for high-fire bricks.

The brick you choose should have a smooth surface (roughness is a maintenance problem) and a pleasing color. Dark bricks will absorb more energy from the sun when they are used for solar gain. My favorites are light red or orange, and I keep in mind that the color will darken a little when the bricks are sealed.

Your supplier can tell you how many bricks you will need if you can tell him how many square feet you want to cover. If you want to calculate this number yourself, figure that to cover 1 sq. ft. it takes 4.5 bricks that are 4 in. by 8 in., or 5.2 of the $3\frac{5}{8}$ -in. by $7\frac{5}{8}$ -in. bricks. I add 5% to the total to allow for waste, and slightly more for a herringbone pattern. These figures are for bricks that are laid tightly together, without mortar joints between them.

I don't use mortar in my floors for several reasons. Mortar is messy and time-consuming to install, and it will permanently stain porous bricks. It doesn't strengthen the floor, and the mortar joints are slightly lower than the bricks, which makes grooves that collect dirt.

Every brickyard I've ever dealt with delivers their products. The trick is to have them deposit the bricks as close to the job as possible. The bulk of the work involved in laying a brick floor is moving the bricks.

A sand setting bed—Most of the brick floors I lay are atop concrete slabs. On top of the slab I screed a layer of sand, which can be made more level than the slab usually is, as well as accommodate the slight irregularities in brick thickness. The bricks I use are $2\frac{1}{4}$ in. thick, and I allow about $\frac{1}{2}$ in. of sand between the bricks and the slab as a setting bed. This makes the distance from finished floor level to the slab $2\frac{3}{4}$ in. Of course, the slab can be more than $\frac{1}{2}$ in. below the bricks, but that means you'll have to move that much more sand around to level your setting bed.

If I'm setting a floor over raw earth, I either remove or compact any soil that has been disturbed, and I fill in any craters with sand. Con-

versely, if grade is too high I'll take out soil until I'm about 3 in. below finished floor height. Here in New Mexico, moisture coming through the floor isn't a big problem, so we don't have to worry about elaborate drainage systems and moisture barriers under the floor unless the house is cut into a hill. Elsewhere, I expect these precautions would be critical.

Before I start bringing in the sand, I determine the finish-floor height from adjacent floors, door-sills or other fixed landmarks. Where possible, I snap chalklines on walls around the perimeter of the room to indicate the level of the finished floor. Then I add enough sand to bring it to the appropriate level below this line. The line is a big help in making sure that the floor is nice and level where it meets the baseboard. For the middle of the room, I rely on a hand level.

Sand is cheap, but it is also heavy. If I need a lot of it, I have it delivered along with the bricks. If I need more sand I know that I can carry enough to cover 200 sq. ft., 1 in. deep, in my pickup. That equals about $\frac{3}{4}$ ton.

Screeds and tongs—The best time to lay a brick floor is after the walls of the house have been painted—it isn't easy to remove paint from bricks. Once I've got the sand distributed around the room, I screed it level with the help of metal shelf brackets. These brackets are the kind that are U-shaped in section, with slots to accept the shelf standards. I lay a pair of the brackets in the sand and adjust them to the desired elevation with a level. Then I drag a straight board across two of these level and parallel brackets (photo top). I usually screed about a 4-ft. to 5-ft. wide path across the room in the direction the rows of bricks will run. Screeding done, I remove the brackets from the sand. They occupy so little space that I don't have to add any sand to fill in the grooves. I just smooth them over.

For every 100 sq. ft. of floor you lay, you will have to move about a ton of bricks. The tool you should have for this is a pair of brick tongs. These are like ice tongs only instead of a sharpened point to pierce the ice, they have a metal plate to grip a short row of bricks (photo top). The time they will save you moving only 500 bricks (100 sq. ft) will pay for them. If you have a great distance to move the bricks, a flat wheelbarrow is useful. You can make one of these by replacing the bucket of a regular wheelbarrow with two pieces of plywood. The flat wheelbarrow makes it easier to use the brick tongs to load and unload it.

To shape the odd-size bricks at the end of the runs you will need a 4-in. brick chisel and a 4-lb. sledge with a short handle. To position the bricks you will need a rubber mallet.

Running bond pattern—For beginners, I recommend some variation of the running-bond pattern (drawings, top of facing page). But just because this is an easy pattern to lay down doesn't mean that it isn't attractive. I've been laying brick floors full time for six years now, and this is still the pattern I use most. My favorite is the running bond based on fourths. I call it quarter-step running bond. This means that the ends of the bricks are staggered by a distance



Ring uses metal shelf brackets as screeds to level the sand bed (left). He adjusts each one to the desired height, then uses them to support a straightedge dragged across their tops to level the sand. The brackets are then removed, and the sand is smoothed over. Note the brick tongs being used by a helper. They are well worth the expense if you've got a lot of bricks to carry about.

The herringbone floor shown below intersects the wall and the neighboring course of bricks at a 45° angle, which makes it a floor with a lot of meticulously cut bricks. To make the bevels for the starter course, Ring lops the corners off a batch of bricks and then uses the corners to fill in the triangular voids.



equal to one-quarter of their length. The effect of this arrangement is subtle. It creates a repeating zigzag pattern that I think is more complex and interesting than the standard running-bond pattern based on halves. It's also possible to introduce another geometric pattern into a field of running bond, as shown in the bottom photo.

Most brick floors are oriented so the long dimensions of the bricks are perpendicular to the longest walls in the room. This is to avoid the frustration of trying to make long rows of bricks parallel to the walls. Variations in the bricks make perfectly parallel rows hard to achieve.

Assuming you use the quarter-step pattern, you will need equal numbers of bricks cut into quarters and halves and three-quarters for starter bricks. One brick can provide quarter-length and three-quarter-length starters for a row. The cuts don't have to be perfect because a baseboard will cover up any cuts right next to the wall. If you don't have a baseboard, make sure that the top edge of the brick is a crisp cut (see the sidebar on the facing page). It doesn't matter what the cut looks like below the surface.

Begin laying a brick floor by placing the starter courses in the corner of a room on a screeded bed of sand, as shown below. These starter pieces are the beginning of a quarter-step running-bond floor. The bottom photo shows how you can highlight a geometric pattern in a field of bricks by using bricks of different colors.



Setting the bricks—Cut a variety of starter pieces and begin to set them on a screeded setting bed in the corner of a room (photo below left). Don't worry too much about getting the size of the pieces exact. This is a handmade floor, and I think it's a waste of time to try and make it look like printed linoleum. First put a whole brick in the corner and tap it gently with the rubber mallet straight down—about $\frac{1}{8}$ in. to $\frac{1}{4}$ in. Then put a $\frac{3}{4}$ -length brick next to it, followed by a $\frac{1}{2}$ -length brick and then a $\frac{1}{4}$ -length brick. Then the sequence starts again. Do not tap the small pieces hard or they will sink too far. As you add more bricks to these rows, slide them straight down against their neighbors so that sand is not trapped between the bricks.

Keep adding rows of bricks, several rows at a time, screeding more sand when you run out of a flat place to lay them. When you finish laying all the bricks you can fit into the room, you will have two adjacent wall edges finished, and two walls with cuts still to be made. Do the cuts now. Waiting to do these cuts at the end of the entire job is like waiting until the end of dinner to eat your lima beans.

Aesthetics and adjustments—Before you tap each brick into place, make sure it doesn't have any unsightly nicks in it. If it does, turn it over or put it aside for cutting. You will have to use your judgment about what sort of defect is acceptable, as almost all bricks are a little flawed. I often save the worst ones for the parts of the kitchen that I know will be covered by cabinets.

As you lay the bricks, try to have a sense of what is level. Think of something like a calm ocean. If you try to level each brick with an instrument, the job will be tedious. If the sand is level, approximately the same amount of tapping will be sufficient for each brick. If you have to pound to get the brick even with its neighbor, chances are the floor is heading downhill. If this is happening, tuck some sand under the last brick with your fingers, fill any hole with a small handful of sand and continue. Have a level on hand but don't be a slave to it. Adobe building tradition in the Southwest encourages a handmade look, and a brick floor fits right into this sensibility. A more formal house wants a flatter floor, especially in the dining room. But how a brick fits with its neighbor is more important than whether or not one end of the room is $\frac{1}{4}$ in. higher than the other.

Not only can you tip a brick accidentally, you can also tip them on purpose. You can use this to advantage to change levels from one room to another to compensate for misplaced door sills, or even to make ramps instead of steps.

The straightness of the rows of bricks is another matter for individual interpretation. Most bricklayers want to get out the string and follow the straight line to ensure parallel lines. This is okay, and you will certainly achieve straighter rows of bricks by using a string line. But this is not required, once you realize that straight does not necessarily mean better. Most brick floors curve a little because of variations in the bricks and the walls. It adds to the charm.

Often you can curve the lines of bricks to good advantage. I've done floors in rectangular

rooms where I started the bricks in one corner and went to the opposite corner with a gentle S-curve. Then I filled in the rest of the floor, maintaining the gentle curves. On a floor like this, keep the curves smooth and large. Tight curves make bigger spaces between the bricks.

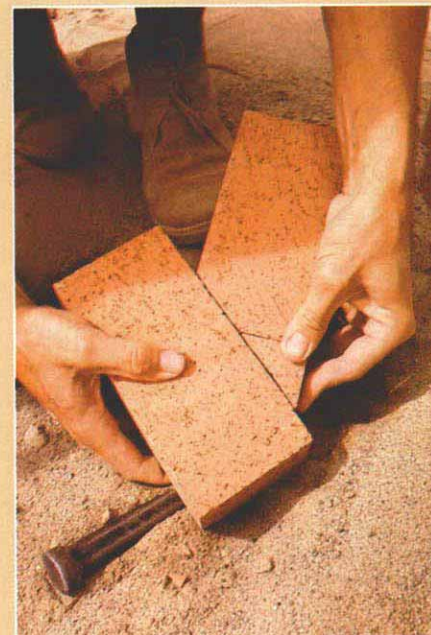
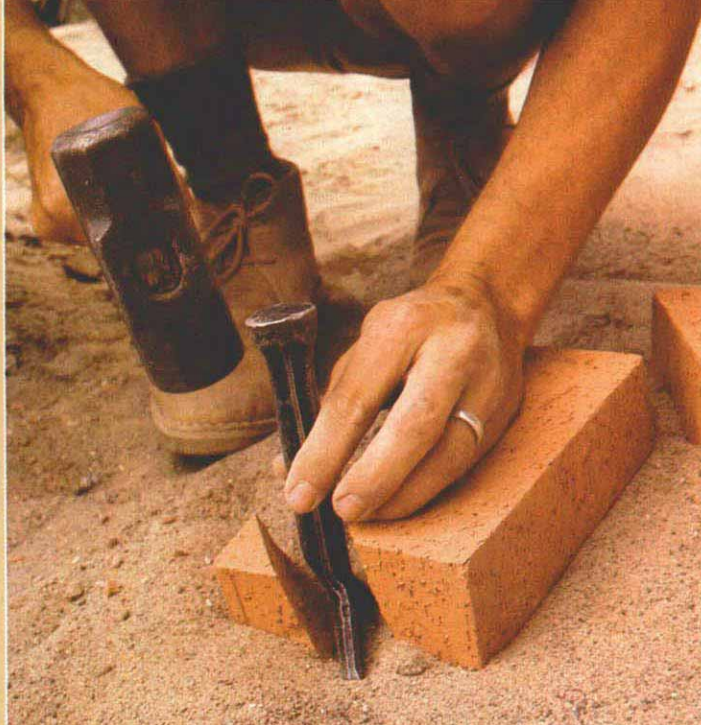
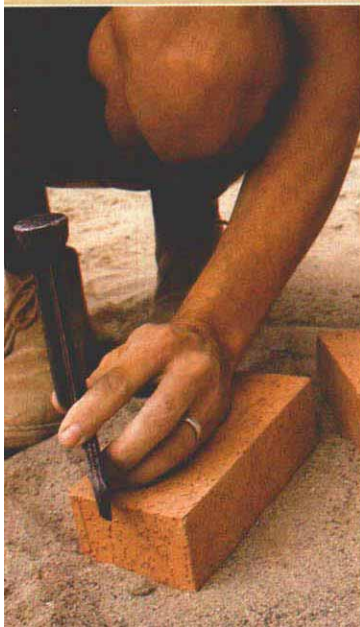
There is no rule that you must use the same pattern throughout a single house. In the bottom photo on the previous page, you can see where the pattern changes from quarter-step running bond to herringbone. Basketweave and herringbone are traditional patterns for brick paving that are more difficult than the running bond because the bricks are locked together in two directions. While both basketweave and herringbone patterns arrange bricks perpendicular to one another, herringbone is particularly challenging because of all the 45° cuts involved at walls or other courses of bricks.

Finishing and maintenance—When the last bricks are in place, straighten any rows that you find offensively crooked by twisting a trowel in the cracks, or by replacing oversized bricks. This is also the time to lift any bricks that are too low. Using two trowels to pinch a brick from the sides, lift it out, and add a bit of sand to the bed to make it flush with its neighbors.

Once you've made the necessary adjustments, sweep fine sand into the cracks between the bricks—an average-sized room will take about three or four shovelfuls. This is an exciting part of the job. The sand filters into the cracks as though the floor were a giant hourglass, locking the bricks tightly in place.

The floor is now basically complete. Interior floors should be sealed to resist staining. Standard practice has been to coat brick floors with liquid plastics, but my experience with refinishing floors has brought me to the conclusion that it is best to seal the bricks with something that penetrates deeper than plastic. This way you walk on the brick itself, which is almost indestructible, instead of on a thin layer of plastic. I mix my own sealer for this purpose (Ring Brick Floor Sealer, available from Ring Brick Floors, 2631 Los Padillas S.W., Albuquerque, N. Mex. 87105). One gallon costs \$15, plus \$5 handling, plus UPS shipping, and complete instructions for use are on the can. The mixture consists of about 80% linseed oil, along with thinners to help it penetrate and some additives to help it dry. This concoction penetrates the bricks to a depth of about $\frac{1}{4}$ in.

For normal maintenance, wash the floor with a mixture of water and vinegar—about $\frac{1}{4}$ cup vinegar per gallon of water. Don't use soap because it can leave a residue. Give it regular sweepings with a large dust mop sprayed with a conditioner like Velva-Sheen or Conquer-Dust (available at janitorial-supply stores). The dust-mop conditioner will keep the floor from looking dull but will not build up like wax. Liquid wax is a curse upon brick floors. It builds up and gets milky and dark. For a slightly higher shine, use Indian Sand Treewax (available at hardware stores). It is a brick-colored paste wax that will not turn milky or yellow. It won't build up because it is too hard to apply. Dust-mop maintenance is the same regardless of finish. □



The bevel on the tip of the brick chisel should be on the waste side of the cut, and the shank of the chisel should be tilted slightly away from the workpiece. In this position, it will create a clean edge and an undercut in the finished piece. Here Ring uses the removed portion, inverted and trimmed, to complete the angled face for a starter course in a herringbone floor.

Cutting bricks with a chisel

The fastest and most practical way to cut a large number of bricks is with a 4-lb. hammer and brick chisel. For what it would cost you to rent a diamond saw for one day you can waste about 100 bricks, and by the time you have cut 100 bricks you will be pretty good at making pieces. I make the larger pieces first so if I break the piece that I am making, I can make smaller pieces from the fragments.

If you are new to cutting bricks, start by making half-bricks. Put a brick on a small pile of sand so that it has a solid support. This will keep the brick from breaking from the bottom up because of a lumpy seat.

You don't have to measure for the cutline. Just place the chisel in the middle of the brick, perpendicular to its length, and whack it hard with the hammer. Watch what you are doing—mistakes can be painful. When you have mastered this (halves are easy), try one-third/two-thirds and one-quarter/three-quarters. The brick will break slightly away from the bevel of the chisel, making the piece on the flat side of the chisel more suitable for use in a floor. This undercut piece is less likely to have outcroppings protruding beyond the plane of the top edge. Since only the top edge will show, it doesn't matter what the rest of

the brick looks like as long as it doesn't stick out.

Bricks like to break across smaller cross sections and nearer to their middles, so rather than make a 45° cut all the way across a brick to start a herringbone course, I just take off a corner, as shown in the photos above. I use the triangular piece that I have

removed from the brick to complete my 45° bevel.

If the triangle comes out with excess brick on the underside, I trim it by chiseling it from the bottom, and I direct my blows so the pieces break off short of the top.

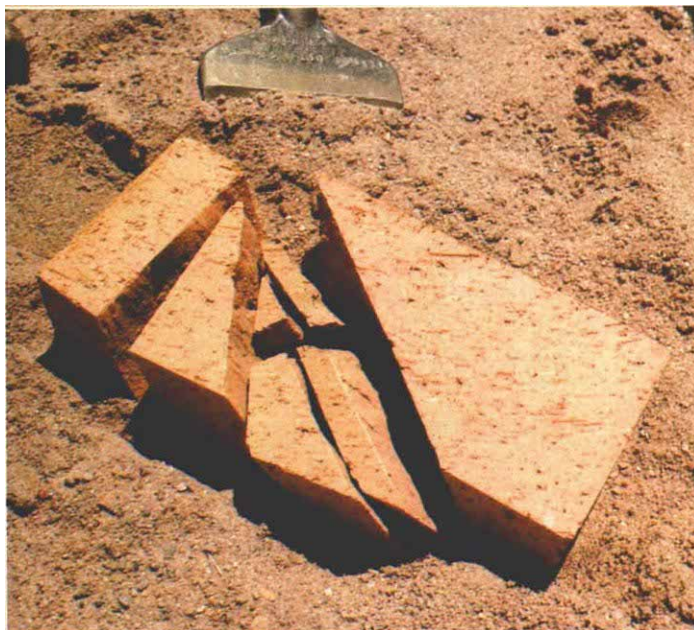
When you get to the end of a run of herringbone, you will often

need a long beveled piece to fill in the remaining gap (photo below). After much trial and error I have arrived at a sequence of cuts that will usually get me this piece.

First I cut the brick to near its finished length, which reduces its mass at the crucial area of the cut—the tip. I leave it about ¼ in. long, because it often chips a bit at the corner. The second cut should go right to the tip and can be slanted back to start paring down the remainder. Too much angle here will lose you your point. The third cut trims away more brick. The fourth cut is on the finished line, with the flat of the chisel always toward the piece you want. The final cut is one sharp blow to cleave away the remaining fragment near the point.

For cuts the full length of a brick, don't hit the chisel hard enough to break the brick through the first time. Whack it on both ends with increasing firmness until it breaks. You can even hit it on the end to start it cracking the way you want. If ten blows have not opened it up, hit it harder. If the piece you want is the length of the brick and less than 1½ in. wide, it is better to use two short pieces. An extra joint in the floor or even an extra row of joints is "authentic."

—D. R.



To cut a brick with a long beveled edge, begin by shortening the brick to about ¼ in. longer than the finished length. The second and third cuts remove the bulk of the remaining waste. The fourth cut makes a finished edge along the desired line, but because the cut is longer than the blade of the chisel, a fragment usually protrudes near the point. The fifth cut removes this protrusion, resulting in the beveled brick shown above.