

## Understanding Substrates and Surface Preparation

Floor, wall, and mosaic tiles must be installed over a structurally sound substrate that is clean, smooth, dry and free of moisture/grease/wax/chemicals. Concrete, cement board, plywood, and drywall are examples of common and acceptable substrates. Any damaged, loose or uneven areas must be repaired, patched and leveled. Remove any moldings, trim, appliances, etc., which could interfere with installation. Door jambs may be undercut for tile to slip under. When prepared correctly, these materials allow for proper mechanical bonding with the adhesive mortar materials. Thinset, mastic, and epoxy are all examples of common tile mortars. Carefully read and follow all instructions from the mortar manufacturer prior to installation.

## Determining the Tile Layout

The ultimate goal when determining a layout is to minimize the amount of cut tiles across the entire installation. This requires careful planning prior to mixing the mortar and setting the tiles.

For floor tile installations, begin by marking the center point of all four walls. Use chalk snap lines to mark the center points of opposite walls and their intersection in the middle of room. Be sure that the lines are perfectly square at 90 degrees to one another. Place a row of loose tiles (no mortar) along a center line in both directions leaving spaces for uniform grout joints. Use tile spacers to achieve a consistent distance. If this initial layout results in awkward or small tile cuts at the base of the wall, adjust your chalk line and snap it again. Once satisfied with the layout, begin snapping additional chalk lines parallel to the original two. These will serve as a visual guide throughout the installation.

For wall tile installations, determine the height and width of the installation area. Use a carpenter's (or bubble) level to mark an initial horizontal and vertical line in the center of the installation. Since gravity won't allow the tiles to be laid out across the installation area, create a "jury stick" tool out of straight 1"x2" lumber to help visualize the tiles across the wall. Lay a horizontal row of tiles on the floor and mark the placement of the tiles on the wood following the pattern you plan to use. Remember to insert spacers between each tile. If the wall tiles used are not square, repeat this process to make a jury stick for vertical wall tile placement.

## Working with Mortar

Select the correct adhesive mortar for the substrate. Carefully follow all instructions and precautions on the mortar packaging. Mix just enough mortar in the bucket for 30 minutes of installation to avoid premature curing. Spread a 1/4" coat of mortar on the substrate using the flat side of the trowel recommended on the packaging. Cover an area approximately 2'x3' on the floor, or 1'x2' on the wall. Next, use the notched side of trowel to comb the adhesive into standing ridges by holding the

trowel at a 45-degree angle. This removes excess adhesive resulting in a uniform, ridged setting bed. Do not spread more mortar on the substrate than you can set tile in within 15 minutes.

## Setting the Tile in Mortar

Variation in shading is an inherent characteristic of tile. Mix the tiles from several cartons prior to setting to avoid dramatic shifts in color tone from one area to the next. Begin installing tiles in the center of the room, one chalk line section at a time. Finish each grid before moving on to the next. Place the first tile in the corner of the grid near the previous section and work outward. Do not slide tiles into place. Insert tile spacers as each tile is set and leave them in place until the mortar has cured. Place perimeter tiles last and leave a 1/4" gap between the tile and wall. Long linear tiles should never be set in a grid or running bond pattern. There should be no more than a 33% overlap between adjacent pieces. The grout joint should be expanded larger than a typical 1/8". If the field tile exceeds 15" in length in any dimension, spread a thin layer of mortar directly onto the back using the flat edge of the trowel prior to pressing into the mortar bed. This technique is called "back buttering" the tile and it ensures a complete bond. When the tiles in each chalk line grid are set, tap them down to ensure a proper bond and level plane. Remove excess mortar from open grout joints with a putty knife. Do not grout or walk on the tile until the mortar has completely cured (usually after 24 hours).

## Making Tile Cuts

Carefully measure tiles to be cut and mark with a pencil or felt-tip pen. Make straight or diagonal cuts with a tile score and cut tool or a wet saw. Make curved cuts with a tile nipper by chipping away small pieces at a time. Full-length curved cuts should be made with a rod saw. Smooth all sharp edges by hand using a silicon-carbide stone.

## Applying Grout to the Joints

Once the mortar has cured, carefully read and follow all instructions and precautions on the grout packaging. Mix just enough to fill the joints in an area that can be completed in less than 30 minutes. Remove all tile spacers and spread the grout across the tile surface. Apply pressure down into the joints with a silicon grout float tilted at a 45-degree angle. Remove excess grout from the tile surface immediately by tilting the grout float about 90-degrees and scraping it diagonally across the tile. Wait 20 minutes for the grout to begin to set then use a damp sponge to clean the excess from the surface and smooth the grout joints. Rinse the sponge often and change water in the bucket as it begins to turn cloudy. Let the grout dry until a haze forms on tile surface, then polish the tile with a soft damp cloth. Rinse again with a sponge and clean water. The grout should be completely cured within 24 hours of finishing the last step. Do not apply sealers to the tile or grout for at least two weeks, and only in accordance with manufacturer's recommendations.