



Slate Flooring Installation

Your Guide to an Amazing Floor

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Forward:

My college degree is in Geology - the science that deals with the physical attributes and structure of our planet. Here I am on a required field trip to the magnificent Southwest in the summer of 1972. Ignore the long hair. Rocks, soil, members of the fairer sex and all the other wonders of mountains, canyons and valleys are what I focused my attention on in those formative years of my life. To get a geology degree in those days, one had to complete numerous field trips. I saw many different rocks at that time, slate being one. Slate is a metamorphic rock that starts its life as layers of mud or silt. In sedimentary rock, we call this shale. But when you heat and pressurize shale for thousands or millions of years, the chemical structure changes and the rock becomes more dense and crystalline. It gets hard, very hard.



Not only does slate get hard, it becomes beautiful. Imagine a rock that's relatively smooth that comes in a regal red, coal black, creamy purple, sea green, steel gray and any number of mottled mixtures of these colors. It's no wonder that slate has been the flooring material of choice in many exclusive houses and resorts around the world. It's drop dead gorgeous, and it's long lasting.

I'm about to share with you the methods I've discovered over the years that lead to slate-flooring installations that last. Talk to any tile setter and you'll probably get different tips as craftsmanship tends to be an individual science rather than one accepted method. Each installer seems to have their own quirks. I can assure you that if you follow my directions, you'll end up with a magnificent floor that many will admire for generations.



Just as time has been somewhat kind to me except for a diminishing amount of hair, slate will also stand the test of time in your home. Let's get to work.

Tim Carter - Founder, AsktheBuilder.com

Chapter One: Tools You'll Need

Installing slate requires any number of hand and power tools. I'll describe those that you'll find me using. If you don't own them, you can buy them. I've listed the most basic tools you can get by with as well as the deluxe ones that will often give better results, and allow you to work faster.

BASIC TOOLS:

Tape Measure: You need to measure the actual slate layout so you can chalk lines. Any tape measure will do, just be sure you can read accurate measurements and then transfer them to the floor.

Chalk Line: It's vital that you create any number of straight lines on the floor to follow. Chalk lines do this quickly. You may want to preserve them by spraying them with urethane that comes in an aerosol can.

Square-Notched Trowel: This hand tool is what is used to spread the thinset mortar evenly on the floor. They come in different sizes where the square notches are varying widths and heights. I've had the best luck in the past with one that has 3/8-inch wide and high notches. When using these tools, you hold them at a 45-degree angle to the floor. If you hold them where the angle is far less, the height of the thinset being applied is not 3/8-inches high.

Stiff 3 or 4-inch Putty Knife: I use this tool to hand mix the thinset in a five-gallon bucket. I also use it to spoon out the thinset onto the floor. Beware flexible knives as you would use for drywall. If you apply too much pressure while mixing the thinset, you can snap the tool. That's the voice of experience talking.

Abrasive Blade: If you have an old circular saw, use this blade to cut the slate. You can't cut slate with a regular tile cutter. You must cut through the slate as you would a piece of lumber. There are two methods: dry cutting by using an abrasive wheel on a grinder or a circular saw. The other method - the one I prefer - is to use a diamond wet saw. Look for that in the optional tools section. Dry-cutting abrasive blades are my least favorite as they are dangerous and they create lots of dust. All cutting has to be done

wearing safety goggles and a dust mask if you use an abrasive blade. They are tough to work with.

Rubber Float: This is the handy tool you use to apply the sanded grout to the joints between the pieces of slate. Don't buy a cheap one. This is a mission-critical tool.

Grout Sponge: You will need several of these. Make sure the sponges have the rounded edges and corners. Never use a sponge that has squared edges. These can dig grout out of the joints.

OPTIONAL TOOLS:

Mixing Paddle: This tool fits into a drill. It's the thing to use if you have to mix lots of thinset on a job. Be sure to hose it off well after you mix each batch of the thinset. If you don't, the thinset will cake on the blades. Then if you allow the thinset to harden, you have to chip it off the tool.

One-Half-Inch Drill: Use a corded or cordless drill to power the mixing paddle. It's the only way to do the job unless you like carpal tunnel syndrome from gripping the stiff mixing knife.

Diamond Wet Saw: This is my weapon of choice when cutting slate, L-cuts on tile or other tough cuts you need to make on any tile work. These saws are very expensive if you're thinking of buying one. You can rent them, but try to do all of your cutting at once. This often is unrealistic, but you can leave out all the pieces that need to be cut and install them at the end of the job. I've done that once or twice when I didn't have easy access to a wet saw when I needed it.

Chapter Two: Different Slate Patterns

The first step in this project is determining where to start laying the first piece of slate. It's a very important decision as all the other pieces of slate flooring radiate out from this cornerstone piece. This means the first piece of slate needs to be square to the primary wall(s) in the room or hallway.

Different Patterns

Slate flooring comes primarily in two different patterns. The first one resembles regular ceramic tile in that each piece of slate is just a square. There are different sized squares, and a great interior designer will match these up with the size of the room being worked on. You may be able to find slate in 6-inch x 6-inch squares all the way up to 18-inch x 18-inch squares.

Smaller sized slate is used in smaller rooms. For example, if I were doing a small 5-foot by 8-foot bathroom, I would use the 6 x 6 slate tiles. But if you were doing a room that was 25 feet by 20 feet, I would use large pieces of slate such as the 18 x 18-inch squares. Scale is everything as any good interior designer will tell you.

But keep in mind that as you move up in size, your floor needs to be very flat or in the same plane. This doesn't mean level. Flat means that the surface has no small humps or low spots in it. Large pieces of slate or tile that are laid on bumpy or irregular surfaces have a great tendency to crack and delaminate from the adhesive or thinset. When the bottom of a large slate contacts a hump in the floor, it often doesn't make contact with the glue or thinset on the sides of the hump. Void spaces under slate or tiles create tension when you step on these places. Tension is the enemy of slate or tile causing it to crack.

Random Ashlar

Random ashlar pattern in slate or tile is a series of different square and rectangular pieces that combine to make a repeating pattern. When you look at a floor with this pattern, your brain thinks that the slate was just randomly laid. Nothing could be further from the truth.

The advantage of using random ashlar is that it produces a more classic look, and it allows you to disguise rooms that might



be out of square. When you work with just regular square pieces of slate or tile, an out-of-square wall will reveal itself as you begin to cut the pieces of slate or tile into trapezoids and eventually triangles.

Look at the slate in the above photo. That is a set of slate that makes up one complete random ashlar pattern. See the yellow dots? Can you see how the next set would interlock here? That long rectangle of slate at the right would fit perfectly into the gap where you see the yellow dot in the void space at the left.

Then look at the edge of the pattern right in front of where I'm kneeling. See that ragged edge? Then look across and see how the slate edge matches? Those two large rectangle pieces that are sticking out at the bottom of the photo are a perfect mate for the void space to the left of my left hand in the photo. Each set of slate interlocks with the next set on all sides and edges yet looks irregular and random when the entire floor is finished.

You can see this same pattern on the box that contains each pattern set. On the ones I used, the size of each piece is clearly called out in the pattern on the box. Note that the



pattern on the box matches what you see me laying out on the floor. The only difference is that I have my pattern upside down with respect to what you see on the box.

Most slate used for flooring is about 1/4-inch thick. There are pieces that come in each box that are slightly thicker and thinner, but when the

slate is laid and grouted, these odd pieces tend to give the floor more character.

Chapter Three: Subfloor Requirements

You can install slate over wood floors made from wood floor joists. In fact, every slate floor I walked on early in my career in older homes was installed on a wood subfloor.

In very old homes, ones built before 1900 and up to the 1960's, the slate was almost always laid on a cement bed that was poured in between and just over the top of the floor joists. The carpenters would prep the floor by chiseling the tops of the joists to an edge much like a knife. They would then add 1x6s in between the floor joists to make a dropped area about 2-inches thick. This prevented the wet concrete mortar mix from falling to the next level below.

The cement mortar was tooled by the tile setter with a straight edge so the surface was flat. The slate was then cemented to this cured mortar. What made the slate crack-free for decades was the stability of the cement mortar and the strength of the floor joists. Rarely would you feel any spring if you jumped up and down on these floors. You need stiff floors just like this if you're going to install slate on a wood floor.

The slate floor in my sun room meets this requirement. I have 2x12 floor joists made from #1 Southern Yellow Pine. This is a very strong species of lumber. The span of the joists is a little under 16 feet, and the joist spacing is 16 inches on center. On top of the joists I installed 3/4-inch Douglas Fir seven-ply plywood. Then on top of that I screwed 3/8-inch four-ply plywood. Believe me, that makes one stiff floor.

If you decide to install slate over plywood as I have, you might want to do something I did. Years ago, when I was a much younger tile setter, I had a failure on a tile floor I installed over this same plywood base. The moisture from the thinset adhesive caused the plywood to swell and buckle. This caused some of the tiles to pop up. It was a mess.

In my sunroom, I decided to experiment. You can see me in the photo applying a coat of clear urethane to the plywood underlayment. This urethane prevented the plywood from buckling. It worked well for me. Many professional tile setters scoff at this method, but I can tell you it works. If you decide to bond slate or tile to a plywood subfloor, you better make sure the wood-floor system is dry and stable. I'll speak more to this in just a few moments, so continue to read.

Other Underlayments

If you decide to install slate over a wood floor, you can delete the second layer of plywood I used and go with thin sheets of cement board or other gypsum-based underlayments. Recently, I used the gypsum underlayment made by Georgia Pacific in two bathrooms. I screwed it to the 3/4-inch Douglas-Fir plywood and then installed granite tile over it. So far the gypsum underlayment has done a superb job.

If you're building new or remodeling, always take the time to calculate the heights of the finished floors. In my house, all of the finished floor surfaces are flush. This is very important to me. To achieve this, you must think about the subfloor requirements, the thickness of the underlayments and the thickness of the finished floor. Skip this important step and you might end up with unsightly thresholds at flooring transitions.



Concrete slabs

You can install slate flooring directly to concrete slabs. You do so with thinset. But be aware that if the concrete is new and has yet to shrink, there could be ugly cracking. If you can specify the concrete before its poured, insist on welded-wire mesh in the slab or better yet #4 rebar (1/2-inch diameter) placed on two-foot centers both directions in the center of the concrete. This steel prevents the concrete from pulling apart or offsetting in height if a crack should form. This means the finished floor above will look splendid for years.

Crack-Isolation Fabric

To virtually eliminate cracks in your new slate floor whether it's on wood or concrete, you should consider using a crack-isolation fabric. These products allow the slate to remain stable while the subfloor below moves. New concrete shrinks 1/16th inch for every ten feet of length. Wood shrinkage can be even more extreme in rare cases. Imagine a new home that was framed in the rain. The lumber can take months to dry out.

There are any number of crack-isolation products, but I recommend one that doesn't have a roll-back memory. This means when you roll the membrane or fabric out it stays flat. That's important.

USG makes one called *Durock Tile Membrane*.

The Noble Company makes one called *NobleSeal TS*.

There are others as well. If you don't want to buy them online, you will almost always find them at a specialty store that just sells tile, slate or other flooring products. The bottom line is that crack-isolation products are great and should be seriously considered in new construction or room additions.

In my case, I didn't use one because I knew my wood subfloor system was totally stable. This particular room in my home sat unfinished for several years after I built my home. Yes, there was an unfinished room or two - the bane of every builder who builds his own home.

In my situation, the wood floor joists and all of the plywood had been down for several years. The wood was dry and completely stable. I wasn't worried at all about shrinkage. The only thing I was worried about was swelling which is why I coated the floor with urethane. To this day, the slate floor in that room is perfect. There are no cracked slate tiles and the grout joints are also crack-free.

Chapter Four: Layout and Planning

It's time to lay slate. But before you do, you must stop and think about the layout. Most importantly, where will you end? How will you get out of the room? That often-overlooked step controls where you start. You often start laying slate at the point farthest away from where you exit the room. In my sunroom I had two options as there are two doorways into the room. I chose to exit out of the narrower of the two openings.

I built my house and took great pains to ensure the foundation was perfectly square. This extra work pays off later in finish work. I knew that the sunroom was square meaning I had right triangles in each of the corners of the room. You can't always count on that. You can check to see if a room is square by reading this [past column](#) of mine. Take the measurements I discuss in the column coming along a wall as you exit any corner. Go to any corner and start the measurements, then check the diagonal measurement that connects the two points.

It's important that you have the slate pattern's straight lines parallel with the most visible wall. This can sometimes be a hallway, so pay attention to this. Keep in mind that furniture in a room, especially which touches up on a wall, will hide slate or tile that is out of square. Use furniture placement to your advantage.

Measure the Pattern

You can see me starting the layout process by measuring the pattern width. Before I did this, I had to create the pattern following the illustration on the box of slate. The critical part of this step is to ensure that the pattern itself is square. In my case, I started laying the slate tiles on the floor along a straight seam in the plywood flooring. The line of the pattern



I chose was the one across from me where you see the end of the tape measure. Three of the five tiles in the pattern align on that line, the only two being the 9 x 9 slates that overhang the seam in the plywood.

Once you start to lay them out, the slate naturally fit together nicely. All you have to do is maintain the spacing between the slate. That often works out to a 3/8-inch joint.

When the dry layout is complete, you measure across it. In my case, the measurement was 29 and 5/8 inches. Each piece of slate is modular meaning the dimension across the slate PLUS one joint equals an even dimension. In my case what the slate box calls out as a 6 x 9 slates is actually a piece of slate that measures 5 and 5/8 inches by 8 and 5/8 inches. You can see if you add one joint (3/8 inch) on two edges you would indeed have 6 x 9 inches.

The Base Line

When you're installing slate or floor tile, you need to keep in mind your reach. And by this I mean your comfortable reach without being off balance. Mine is about three feet when I'm kneeling. You'll be kneeling when you're installing your slate or tile.

My slate pattern is a rectangle. Across the narrow dimension, we know it's 29 and 5/8 inches. Since I don't want to install the slate tight to the drywall, I decided to snap a chalk line 30 inches away and parallel to the outside wall. This critical line is often called a **base line** as the entire pattern builds off this. Double check your measurements, and make sure you will be parallel with the most visible wall.



I use the chalk line to create this base line. Furthermore, I then snap a series of lines parallel with this one to keep my pattern in alignment. In my case, these lines would be 30 inches from each other as that accounts for the grout joint between each group of patterns. **Do NOT assume your pattern will work out to the same dimensions as mine.** You MUST do a dry layout of your slate to see what it works out to be.

I will often quickly spray my chalk lines with clear urethane from an aerosol can to preserve them. Without this protection they will disappear or get smudged as you kneel on them and scuff them with the tips of your shoes.

The Center Line

The base line keeps the one edge of the pattern in alignment. To make sure the slate pattern doesn't drift across the floor I snap another line that keeps the short edge of the pattern square. This is done before you set in place your first set of slate so you can ensure the slate pieces die into the corner with no or minimal waste. In my case, my pattern was 48-inches long **taking into consideration the grout joint that is created between each pattern set.**

I snapped a new chalk line that was perfectly square to the base line, and this chalk line was 48 inches from the corner. Since my room was perfectly square, this line was parallel with the other exterior wall. You can see this center line in the photo after I had quite a bit of slate installed. I had to enhance the line with an orange graphic line as the real one in the photo was



just too faint for you to see. The dashed orange line is the **center line** that's covered by the slate in place. The other chalk line that's in the photo is the second chalk line that is parallel with the original **base line**. The base line is already covered with slate in this photo.

You should chalk parallel lines to the center line as you should with the base line. These lines will keep the slate patterns true. If you start to trust your eye thinking that you can keep the alignment, **you will make a mistake**. Imagine just being off 1/16th inch with each joint. Pretty soon you'll be off an inch or more.

You've got the floor laid out now. It's time to mix the thinset.

Chapter Five: The Adhesive of Choice

Many years ago, I did a tile job in a restaurant. I was pretty young and wet behind the ears. I discovered on this job the limitations of organic mastic adhesive. Mastic adhesive is a gooey material that has the consistency of cream cheese or cool cake icing. It's a popular adhesive used to install bathroom wall tile and sometimes bathroom floor tile.

I used this to install a small 4x4 quarry tile in the kitchen of the restaurant thinking it would do well. It did on 99 percent of the floor, even though it was the **WRONG** adhesive to use. It failed miserably under a large cooking vat that had legs. The concentrated weight of the vat on the singular tiles caused them to crack. Why? Because the mastic didn't provide a solid foundation under the tiles. The mastic moved when the vat was placed on the tile. This downward movement created tension in the tile and they cracked.

Had I used thinset, this wouldn't have happened. Thinset is really nothing more than cement mortar. It's a dry powder commonly made with Portland cement and fine silica sand, and comes in a bag. When mixed with water, this material resembles bricklayer's mortar, which makes perfect sense as they are nearly identical. Bricklayer's mortar, though, almost always contains hydrated lime as well as Portland cement.

When the thinset dries and cures, it becomes a thin layer of artificial stone or rock. The Portland cement powder, once mixed with water, turns into a crystal matrix that bonds to just about anything it touches, including smooth

glass. It's an amazing adhesive, and because it becomes solid once dry, it makes a



perfect adhesive for use on floors. Had I used thinset in that restaurant, there would have been no cracked tile.

Mixing Thinset

You can mix small amounts of thinset by hand with a stiff putty knife. You just add water in small amounts to the dry powder. You're looking for a pourable consistency much like cake batter. If you've ever mixed that before, you know it pours slowly out of the mixing bowl. Do the same with thinset.

If you have to mix large amounts of thinset, you will wear yourself out doing it by hand. It's best to use a paddle mixer attached to a powerful drill. I rarely would mix more than one and one-half gallons at a time in a five-gallon bucket. **You want to only mix as much thinset as you can spread and cover with slate or tile in 45 - 60 minutes.**

It's critical that you spread the thinset and cover it with slate within a few minutes. Once you expose the thinset to air or a breeze, it develops a skin over it as the surface of the thinset starts to dry. If you lay a piece of slate on thinset that has developed a skin, the bond will be poor or non-existent. Spread only enough thinset on the floor as you can cover in ten minutes or less. If you're working in an arid environment with really low humidity, the skinning can happen in as few as five minutes.

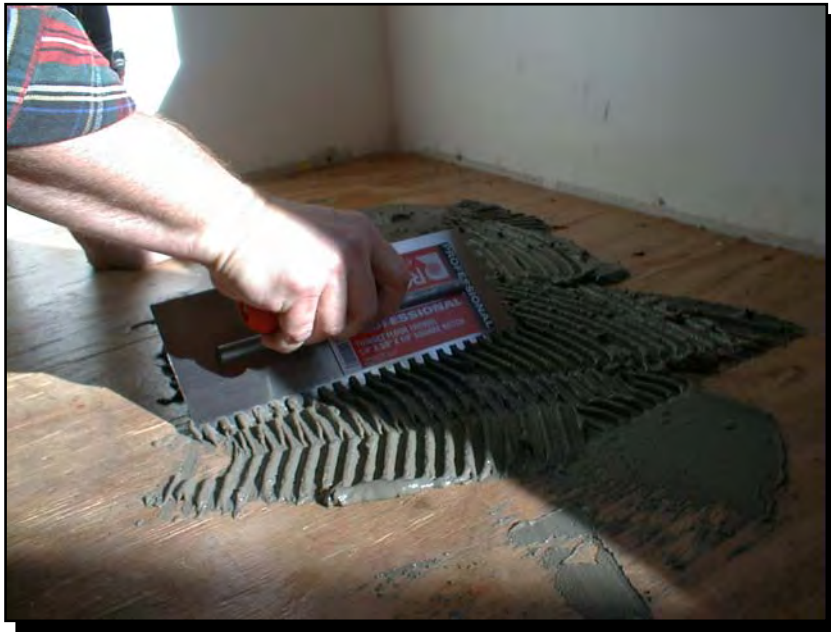
Never add additional water to thinset that has started to get hard in the bucket. This will weaken the thinset creating the potential for poor bonding. This is another reason why I only want to mix small amounts at one time. You want fresh thinset to ensure the bond with the subfloor and slate is as strong as can be.

I prefer to mix thinset with cold water. The colder, the better. Doing this will slow the **hydration chemical reaction** that causes the thinset to go from the liquid state to the solid state in a matter of hours. If, for some reason, you want to accelerate the time it takes for the thinset to get hard, use hot water. But realize this **doesn't accelerate the curing** time of the thinset. Using hot water doesn't mean you can put the floor into service quicker.

Spreading Thinset

You use a notched trowel to spread thinset. This tool creates a corduroy pattern of adhesive on the floor. The notches in the trowel create evenly spaced ribs of thinset. Most slate producers recommend using a notched trowel that creates ribs 3/8-inches tall with a 3/8-inch space or gap between each rib.

It takes quite a bit of practice to be able to apply and spread thinset without making a mess. It also takes practice to ensure you're not leaving too much thinset on the floor. You have to constantly think about the angle you hold the trowel. If the trowel angle gets



too low, you will end up not putting enough thinset down. Instead of the ribs being 3/8-inch high, they may only be 1/4-inch tall. You may think that's not a big deal, but it is.

You also have to take your time as you work close to the chalk lines. Don't spread the thinset across the lines as they will disappear under the

dark gray adhesive. Keep a bucket of warm water on hand as no matter how hard you try, thinset will get on your hands. You want clean hands so you don't transfer thinset to the face of the slate or tile.

Read the instructions on the bag of thinset. **Follow them**, especially with respect to the cure time. Often the instructions will say not to walk on the floor for 24 hours and not to grout the floor for 48 hours. Keep in mind these times usually assume the temperature in the room is 65 F or above. Cool temperatures will slow the curing of the thinset meaning you will have to wait longer to get on the floor.

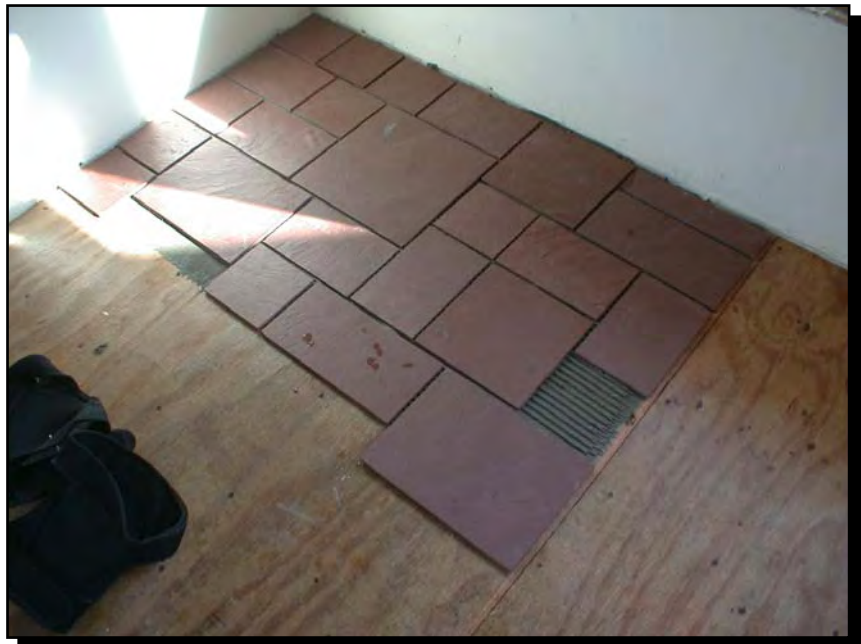
Chapter Six: Laying Slate – Take Your Time

I know, I know, you're itching to lay some slate. That's all the glory. Everyone usually wants to jump in and do the glory work so you can see results. Everything so far has been boring. You want to install that first piece of slate. I've been there - I know how good it feels to do that.

You've done the layout and you're thinking of mixing your thinset adhesive. I'd say it's time to install the slate. Hopefully you've staged all the slate in the room or have it nearby so you don't get exhausted carrying it to the floor area as you need it. Get that slate nearby before you mix the thinset.

Another time-saving thing you want to do is to precut as many of the slate as possible before you start to mix and spread the thinset. Remember, once you add water to the thinset, it's like a timer counting down until a bomb explodes. You can't stop the thinset from setting up unless you can refrigerate it. That's not usually possible and who wants to do that anyway? You want to install slate, not slow down the process.

In my pattern, there are two 6 x 9-inch pieces in the pattern that are side by side and project beyond the plane of the drywall. This happens all the way down the wall. In my case, I took all of those pieces and precut them to 6x6 pieces so I didn't have to cut anything except for where the first row of patterns touched up against the wall at my dining room.

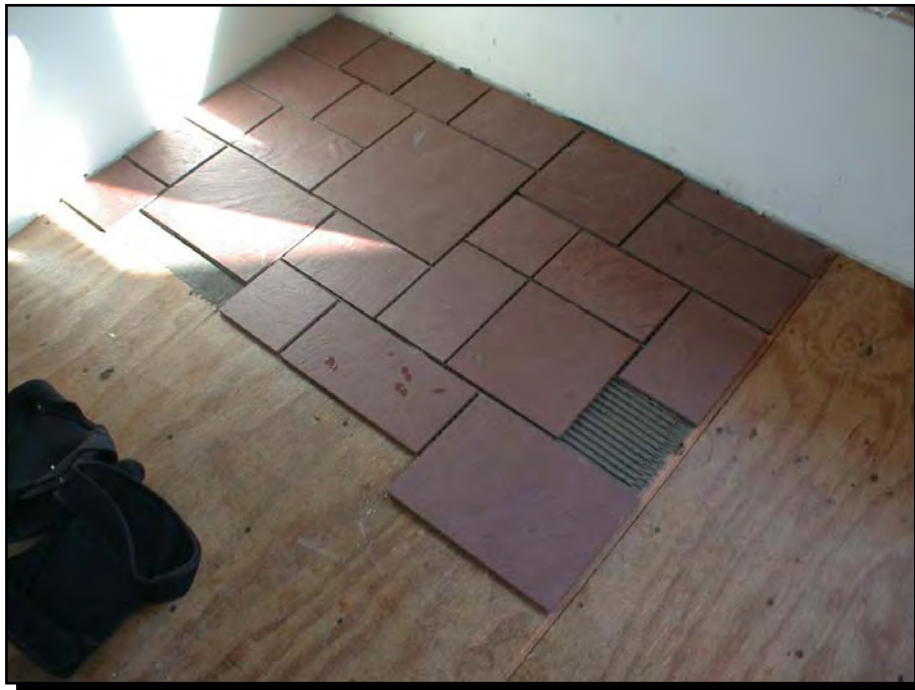


You can see those cut slate in the photo. Look up in the corner and you will see three 6 x 6 slate next to one another. The one in the top corner is one from the box. The two to the right of that one used to be 6 x 9 and were cut by me. You may think it's odd to see three of the same size slate next to one another. Once all the slate is in and grouted, you will never see that. Precutting slate allows you to install the slate like a machine. You can install it very quickly with nothing stopping you.

Look closely at the bottom center of the photo and you can see the chalk line coming off the corner of the large slate. You can see the chalk line continue past the thinset and along the other slate going towards the drywall. You have to keep the edge of the slate right on the line.

Excess Thinset

I've repeated the photo here again to point out another important thing you need to do. Since the slate is being installed along straight lines and the edge of the slate pattern is not straight because of the odd-shaped pieces of slate, you sometimes have thinset spread where you don't need it immediately and then you may not have some where



the slate crosses a chalked line.

In this photo, you can see two places where there is no slate covering the thinset. The location at the left I've already scraped the thinset off the floor as there is no way I'll be installing slate there anytime soon. In my situation, I'm

moving left to right in the photo, not top to bottom along the wall to the left.

This is why I left the thinset in the void space in the right of the photo. The instant I set the camera down after taking this photo, I was spreading thinset to the right of the pattern getting ready to install the next box of slate. I was working fast enough that the thinset wasn't close to skinning over.

Watch the Joints

As you are laying slate or tile, watch the thinset in the joints. You need to make sure the thinset doesn't ooze up too much to where it would be higher than the top of the grout. This is usually not a problem, but it's something you need to be aware of as you work.

You also need to pay attention to your spacing. If you purchased high-quality slate, the pieces that make up each pattern should fit together nicely. There should be consistent spacing between all pieces of slate. You will discover that for the pieces to interlock, you have to maintain the spacing. It's not that hard to do, but the pattern can wander if you don't snap all of the secondary chalk lines that I mentioned earlier.

Warm Water and a Sponge

You may not think you need water until you start to grout. That's true if you are super human. I find it necessary to have a bucket of clean, warm water on hand to wash thinset off my fingers, hand, lower arms and the slate as I work. No matter how hard I try to stay clean, I always get some on me.



NEVER pour thinset into your drain lines. When you have to rinse the buckets, tools, sponges, etc., always dump the water outdoors. The sand and cement in the thinset can and will clog your plumbing lines. If you're on a septic system, the cement will wreak havoc in your leach field if it makes it there.

The Art of Installing the Slate

You may wonder if there is a trick to installing each individual piece of slate. The answer is yes and no. I have always positioned the piece directly above where I want it to go and let it drop. The slate is suspended maybe one-half inch above the wet thinset. Here's what I **don't** do:

- Set one edge down and then drop the rest like a drawbridge. This can cause the slate to be slightly tilted with the first edge being lower than the rest.
- Twist the piece of slate once it's in position. This can squeeze too much thinset out from under the slate.
- Push down on each slate hard after it's installed. This also can squeeze too much thinset out from the slate.

If the bottom of the slate is clean and dust-free, and the thinset is fresh with a wet look, then the slate will bond readily with the thinset. I've yet to ever have a piece of slate I've installed come loose using the drop and then making the tiny adjustment to get it into position.

Chapter Seven: Cutting Slate – Use a Saw

Cutting slate is much different than cutting ceramic tile. Standard ceramic tile can be scored with a small diamond or carbide blade and snapped. High-quality tile and a sharp cutter will produce amazingly smooth edges on the cut ceramic tile.

But you can't do that with slate. The bedding properties of the silt that make up the slate don't allow the slate to snap along a straight line. It reacts like a piece of wood. Imagine scoring a 2x4 with a razor knife and then trying to bend it along that line. The wood would splinter. The same thing happens with a piece of slate, only it shatters.

If you're a roofer that deals with slate, you know you can trim it, but this is a little different than producing cuts with very straight lines. To get professional cuts in slate used indoors on floors or countertops, you better count on sawing it.

Types of Saws

You can cut slate by hand if you have a low budget and lots of time. There are two types of blades you can buy that will fit into a standard hacksaw frame. These blades have small amounts of carbide grit and/or diamonds embedded on a thin steel blade or a steel rod. The rod-saw blade is useful in cutting curves. The straight blade is best for cutting straight lines.

You can also use an electric grinder that has an abrasive blade attached to it. Grinders are frequently used by tile setters. They're an efficient tool, but create clouds of dust. Use this tool outdoors, and be sure to wear safety goggles and a dust mask.

If you don't want to buy a grinder and have an older circular saw, you can sacrifice it to the cause. I say sacrifice because the dust from cutting slate will rapidly wear the moving parts in a circular saw such as the armature, and bearings. You can easily buy abrasive blades that fit circular saws. The method of cutting that I've found that works best is a plunge cut. You start the saw, retract the blade guard and drop the spinning blade onto the piece of slate. This isn't the safest method, but it works.

If you want to use the circular saw as you do to cut a piece of wood, then set the blade depth so that the abrasive blade is just cutting one-eighth inch deeper than the thickness of the slate.

My saw of choice is a diamond wet saw. This saw makes quick work of cutting straight lines in slate. You can also make L-shaped cuts with this saw. Curves are possible, but you have to do it by making many parallel cuts into the curve at a roughly 90-degree angle. If you're cutting curves in your slate, you have a special installation no doubt. The vast majority of cuts in slate or tile are straight lines.

When using a wet saw, you need to be careful about cutting too fast where you apply too much stress to the blade. The blades for these saws are made from diamonds, and thus are somewhat expensive. It's also important to ensure there is a constant stream of



water flooding the edge of the blade. This water cools the blade thus increasing the cutting life of the blade. The water also eliminates dust. This allows you to use the saw indoors so long as you contain any water that may drip or spray away from the saw.

To make cuts inside a piece of slate where an object passes through the slate such as a plumbing pipe or any other thing, you can make square or rectangular holes inside the entire piece of slate. You do this by plunge cutting. This means you drop the saw blade down into the slate making sure the blade stops cutting at the end of each line. This is hard to do with the diamond wet saw. A grinder is the best tool for this task with a circular saw being the alternate tool.

Precutting Pieces

I've already touched on the advantage of precutting pieces when possible. Don't underestimate the power of this trick. But at the same time, precutting too many pieces can be a mistake. You need to be absolutely sure that you have the correct measurements and size.

When cutting pieces that fit against a wall and the baseboard trim is not nailed to the wall, be sure you don't cut the slate tight to the wall. Always leave a gap for any possible expansion. I prefer to leave a one-quarter-inch gap as most baseboard trims are at least one-half inch thick so they will hide the gap.

If you make a mistake and cut a piece too short by say the width of the grout joint, you may be able to use the piece. At the end of the day when the floor is grouted no one will pick out that error against a wall. A piece of furniture may even cover it. Remember that when the slate is totally installed and grouted, people look at the entire area, not focusing on individual slates. Well most people - I happen to be one of those nuts that looks for stuff like this when I go into houses.

Door-Jamb Issues

In both remodel jobs and new-construction jobs, I often see cutting mistakes at door jambs. Homeowners or rookie installers try to make the weird cuts in a piece of slate that mirror the jamb, the doorstop trim and the door molding trim.

In new construction this happens if the builder allows the carpenter to do his finish work before the floors are installed. This is a mistake. The hardwood floors and slate floors need to be installed BEFORE any doors, baseboard or other trim that touches the floor is installed. This makes for a much cleaner look.

In remodeling situations the doors, jambs and baseboard are almost always in place and not scheduled for removal. You can butt the slate up against the baseboards and cover small cut gaps with toe-strip trim. But when you get to the door-trim molding and the jamb, you have a problem.

This problem can be solved with a special offset saw. These hand saws are made to sit on a piece of wood that's the thickness of the slate and the layer of thinset. The saw blade rides on this piece of wood and cuts away the trim and jamb so that you can slide the slate under the trim and jamb after the cut is complete. Hardwood-flooring installers and professional tile setters have these saws.

Chapter Eight: Grouting Slate – Skills and Magic

The slate is all down, you've let it set for at least 24 hours, preferably 48 hours, and it's time to grout. You've really worked hard so far, but I'm afraid to tell you now is when the real work starts. Make a mistake at this stage, and you will ruin all you've worked so hard for. Grouting the slate takes skill and patience. I can teach you the skill aspect in these next pages, but the patience part is all you.

Slate is much harder to grout than ceramic tile because of the cleft nature of the surface of the slate. Of course this texture, along with the colors of slate, is what makes it so beautiful. The cleft texture was actually created when the silt was deposited millions of years ago. The layers resemble those you sometimes see in fine pastries or dinner rolls.

These stepped layers trap the grout. If you don't remove all the grout from the face of the slate as you work, you ruin the texture of the slate making it appear featureless and dull. This task is especially challenging if you're working with a dark grout on a dark slate.

Salvation Tip:

If you're a rookie grouter, then you must make up a test panel of slate. Take some of your scrap slate at the end of the job and thinset them to a scrap piece of underlayment. I suggest a piece about 2 feet by 2 feet, maybe slightly larger. You are going to grout half of this at first and allow it to dry. If the results are great, move on to the floor. But if your grout job is poor, continue to refine your skills on this and other test panels.

Type of Grout

The joints between the slate tiles are almost always 3/8 of an inch wide or maybe slightly smaller. Joints this large mandate that you must use sanded grout to fill the joints. Sanded grout is simply regular wall grout with fine silica sand blended into the grout. The grains of sand are very fine, but highly necessary.

The sand performs two tasks. It prevents cracks in the grout as it dries and cures. If you were to use regular wall grout with no sand, you would see all sorts of cracks in the grout once it dried and cured.

The sand also makes the grout incredibly strong and durable. The silica sand is basically pure quartz, one of the most durable minerals you can find. Quartz is very hard, and wears like iron. The quartz sand in the grout basically creates a miniature concrete mix in between each piece of slate. This is often overlooked as many people forget that concrete is just a mixture of rock, sand, Portland cement and water. Sanded grout is the exact same thing except the rock in the mixture is the quartz sand. We all know how durable concrete is that's mixed correctly and allowed to cure. This is why sanded grout will hold up to every bit of abuse you and your family can dish out.

Grout-Release Agents

Before you start mixing grout, you have a job to do. **I beg you to apply a grout-release agent.** These are clear liquids that block the bonding of the grout to the top surface of the slate. Because slate doesn't have a glazed surface, grout will stick to the micro-texture of the slate readily. If this happens, you will have a nightmare on your hands.

In this photo, you can see me applying the clear liquid release agent to the top surface of the slate. Remember, before you do this you **MUST** allow the thinset to cure 24 to 48 hours. If you walk, kneel or twist your feet/knees on an individual piece of slate, you



can break the bond with the thinset. Once the slate is grouted, it is much stronger and resistant to this damage as the grout interlocks all the pieces of slate into one giant slab.

The grout-release agent is easy to work with and dries pretty quickly. You can almost always grout within an hour or two of applying it.

WARNING:

Proceed to Grout at **Your Own Peril** if you Fail to Apply this Necessary Liquid.

Mixing the Sanded Grout

I've never had a problem mixing sanded grout by hand. It's not nearly as sticky as the thinset, so swishing it around in an older five-gallon bucket with a stiff 3-inch putty knife is not a chore.

CAUTION:

I urge you **NOT** to use any bonding agents with your grout. They aren't necessary and can create huge issues with colored grout. Every time I've used a bonding agent, the colored grout dried mottled with uneven coloration.

In this photo, you can see a small amount of grout mixed. I did this so you can get an idea of its consistency once it's mixed. You can see the lump of wet grout in the center of the bucket. It's fairly stiff and has little slump. If you mix the grout to where it's pourable or will flow slowly from the bucket, you added too much water. **Water is a vital ingredient when mixing grout, but too much water when mixing, finishing or cleaning the grout will ruin it.**



I frequently get distress emails from people who wonder why the grout they or a professional installed crumbles and turns to dust weeks after the job is finished. The most common reason is **too much water** was introduced to the grout as it was being finished. Remember that the Portland cement in the grout is what gives it its strength.

Adding too much water dilutes the cement in the grout. It's no wonder the grout is weak when this happens. Only mix about one gallon of grout at a time.

Applying and Spreading the Grout

Once the grout is mixed, you can start to spread it. This is indeed a messy job, but somewhat fun. You will be sore at the end of the process, as you're bending over on your knees. Be sure to use kneepads or a kneeling cushion or pad that's commonly used by gardeners.



In this photo, you can see I scooped out a glob of grout from the bucket. A 4-inch drywall taping knife is a great tool to use for this purpose. The grout you see in this photo is just about enough to fill the grout lines that are visible in the photo. You only want to apply as much grout as you can spread in an area

about 2 feet by 2 feet square. You can always scoop more grout from the bucket, so there's no need to make a huge pile in one spot and move it around.

The next step is to use the rubber float to distribute the grout to the joints. Dip the float in some water to get the rubber blade wet. This simple trick will help the float glide over the rough slate.

In this photo, you can see the approximate angle you hold the rubber float to the face of the grout. It's between a 45 and 30-degree angle. Note that the long edge of the float blade is also at a 45-degree angle to the grout joints between the pieces of slate. This is very important. Make sure that you scrape the float across the joints at this angle. Doing this prevents the edge of the float from dropping down into a grout joint and thus removing grout from the joint.



You want the top of the grout at each joint to be flush with

the top of the slate on either side of the joint. This will not always be easy as some slate can be thicker than others. You'll see how the rubber float controls this fairly well as you glide it across the slate.

Note in the photo how almost all of the excess grout has been removed from the slate. **There is grout residue in the texture of the slate**, but this will be removed with a sponge. The rubber float isn't capable of removing any more grout than this from slate. When working with glazed ceramic tile, the float will get virtually all of the grout from the surface of the tile so long as you apply moderate to heavy pressure as you scrape the float along the surface of the slate.

How Much to Grout at Once

One danger area is putting too much grout onto the slate at once. In other words, filling a large area of the slate without cleaning off the residue from the face of the slate. There is no magic number here. It depends on the humidity of the air, the temperature in the room and how quickly your grout is setting up or getting hard. If you put on too

much grout and haven't cleaned the slate perfectly, the grout can and will harden on the face of the slate. **This is death on a jagged stick - your worst nightmare.**



You can see in this photo that about 10 - 12 square feet has been grouted. Of that, about 4 square feet has been cleaned of the grout residue. The finished slate that's been grouted and cleaned is in the left side of the photo.

What's really important is to grout only what you can comfortably reach as you clean the joints. Avoid

stretching way out where you're off balance. You can see that I've only grouted a space about 2-feet wide from where the wall is to where the grout ends. This is a comfortable reaching distance for many.

And now for the **most critical** aspect of grouting and installing slate:

Removing the Grout Residue from the Slate.

If you **make a mistake** here, you **will ruin the grout** and all of your hard work. It's time to go to Chapter Nine.

Chapter Nine: Removing the Grout Residue

Grouting is really a two-step process. You apply it and fill the joints between the slate, but then you must remove the excess residue that's on the face of the slate. I get at least one email a week from a person who made a mission-critical mistake and left too much residue on either slate or ceramic tile. They discover, after it's too late, that it's nearly impossible to remove the grout. The other emails I get are from the people who wonder why their grout is crumbling. Both of these common mistakes happen at this phase of the job. You can see why it's so very important that you do this part correctly.

Practice Panel

If you've never grouted slate before, I BEG you to follow the Salvation Tip in the last chapter. In it I suggested that you make up a test panel of slate and attempt to grout it. Many will not heed this advice as they are impatient. But I'm hoping that by now I've thoroughly scared the beegeebbers out of you. I want you to think you will fail at this point.

What I really want is for you to grout and CLEAN off a test panel successfully. When you see how hard it really is, you will want to perfect this step before trying to grout your floor. **The common mistake that's made is that you actually think the slate looks good and is free of residue when in fact it's not.**

This illusion happens when you're sponging off the slate. The wet slate looks fantastic, but in reality there is a great possibility there is some grout on the slate. You only discover this **AFTER** the grout has dried. You'll see a grout haze on the slate. This haze often comes off glazed ceramic tile with an old towel. **It will NOT come off slate that easily.**

I've reproduced a photo (next page) from the last chapter to illustrate this point. In it you can see an extreme example of grout haze. This is actually a fantastic photo to illustrate the point. In the photo you can't tell, but I've already started the removal of the grout over all the slate. The first pass of the sponging technique is complete. The grout lines are perfectly smooth and all excess grout has been removed from the slate at the left of the photo. You can still see massive amounts of grout haze on the slate to the right.

But believe me, you can continue to rinse the slate in the right of the photo and there's a good chance it will dry with a haze. The slate in the left of the photo is perfect. **Those slate tiles are DRY for the most part.** Look closely at the photo and you will see a few wet patches. You can see a small amount of haze on the bottom and right edges of the larger square slate. I



left that on for the purpose of the photo. But note how the color of the slate in the upper left is the same as the slate at the bottom which has yet to be grouted. They appear the same.

Clean Water - and Lots of It

The first secret to removing grout residue is that you need vast amounts of clean water. Perhaps hundreds and hundreds of gallons of water. The photos in this eBook were taken in my Sun Room. It measures 15 x 15 feet. I didn't keep track, but I'll estimate that I used at least 50 to 100 five-gallon buckets of water to rinse off the grout residue. Remember, the dirty water is ALWAYS dumped outdoors and NEVER into a drain line. At this stage of the job it's really helpful if you have an assistant who is in charge of bringing you the clean water and taking away the dirty grout-filled water.

The Right Sponge

To get the best results when grouting, you must use the right sponge. The ones I've had the best results with are synthetic, are about 5 by 7 inches in size and about 2-inches thick. They have rounded corners and slightly rounded edges. NEVER use a sponge that has square corners or any square or 90-degree edge. These rounded sponges are easy to find. I see them at the home centers, and you will get the BEST ones from stores that just sell ceramic tile to professionals. That's where I have found the highest-

quality sponges over the years - at specialty tile stores. I urge you to purchase two or three of them at once.

Also be aware these sponges often come in different sizes. If you have small hands, get the smaller size. These smaller sponges give you much better control when you're trying to remove the grout haze from tight corners.

When to First Use the Sponge

Before you even put the sponge on the slate and grout for the first time, you must make sure the grout is stiff enough for you to begin. This is the tricky part and why it's so important at first NOT to grout too much slate. If you're a rookie, don't underestimate the amount of time it will take to clean the slate of the grout residue. It can take easily one minute, perhaps two PER square foot of slate for an experienced craftsman! That means if you grout just 15 square feet, you - as a rookie - may spend 30 minutes getting it perfect. If you have grouted say 45 square feet of slate, by the time you get to the last section, the grout will be too hard to finish!

The perfect time to start to do the first coarse screeding is when the grout in the joints is firm enough that with moderate pressure from your finger it imprints **no more than one-sixteenth inch**. You want the grout to be quite firm but NOT rock hard. Once again, this transition from a plastic mass in the bucket to rock hard in the joint can happen in 30 minutes, 90 minutes or even hours depending upon the air temperature, humidity, wind conditions on the floor, the temperature of the grout, etc. **This is why it's so critical to test your skills on a test panel of slate so you can see how long it takes for the grout to get hard.**

Using the Sponge

Using the grout sponge is an art. I can tell you now that you should wear rubber gloves. I always forget to do this. At the end of the day, my hands are raw from the water and the extreme alkalinity of the fresh Portland cement from the grout. You'll be miserable if you don't protect your skin.

Removing the grout haze is a **multi-step process**. The first phase is what I call the coarse screeding. This is where you are trying to smooth the grout joints to make them

look smooth and uniform. To achieve this, you rub the sponge in circular motions across the slate. This knocks off any high spots that you may have missed with the rubber float.

I talked earlier about water. **Anytime you're using the sponge on the slate or grout, you MUST make sure you have squeezed all the water possible from the sponge. This is imperative.** You can see me doing that in the photo. Your hands will get very sore from this repeated task, but don't allow that to leave water in the sponge.



When you're doing this first phase of striking the joints, it's not so important to change the water frequently. The first time you rinse the sponge after rubbing it on the slate, you immediately soil an entire bucket of fresh water.



In this photo, you can clearly see that the grout haze is still going to be thick on the slate. In fact, there is still considerable grit from the silica sand on the face of each of the slate. That will be removed in the second step.

It helps to frequently **rinse the sponge** in this

first stage to deposit as much grout and silica sand in the bucket as possible. The sponge will foul quickly with grout and sand as you rub it in circular motions around on the slate. You want to swirl the sponge in small circles about 10 to 12 inches in diameter, while moving the sponge around the slate. Imagine your arm is a low-speed buffing machine you see custodians use to polish commercial or institutional terrazzo and vinyl-tile floors.

The Second Step

Once you have rubbed down the section of slate you've grouted with the sponge to finish the coarse screeding, it's time to get a majority of the grout haze off the slate without harming the actual grout joint. You may have to take a small break to allow the grout in the joints to harden, but if you're careful this isn't necessary.

The second step is far more tedious. You now have to get the grout residue out of the textured areas on the face of the slate. This requires you to rinse the sponge very frequently and to be working with great light. You need to be in the zone and at the top of your game here. Fatigue is your mortal enemy at this point.

I take the sponge and squeeze every drop of water I can from it. I then compress it quite a bit in my hand and stroke it across each slate pulling it parallel with a grout joint and at the same time not allowing the sponge to touch the grout joint. You can usually get within a quarter inch of the grout joint doing this. You can only make one pass with the sponge. It's possible to rotate the sponge in your hand to reveal a clean side, but two cleaning strokes are all you usually get before you must rinse the sponge. If you try to make two passes with the same face of the sponge, you don't really remove any grout.

Your goal at this point, and it takes repeated passes with the sponge, is to make the face of the slate appear exactly as it did before you started to grout. You'll discover this is not easy to do, nor does it happen quickly. Once again, you'll gain enormous respect for the skill required to do this when you practice on your PRACTICE PANEL.

Here's the photo again that's your goal. You **MUST** have each slate look exactly like slate that has yet to be grouted. It's possible to have perfectly clean slate with NO HAZE on it.

See the large 12 x 12 slate in the left side of the photo that's 95 percent clean? I have put a green dot on it. This is what you want. You can see just to the right of it a 6 x 6 slate that has the dark gray haze all over it. The difference is night and day between the two but realize this entire section of slate WAS GROUTED at the same time. I didn't just do the



small patch that's clean and then do the part that's still got the haze on it. It's possible and mandatory that you get your slate as clean as you see mine in the photo. In fact, it's non-negotiable.

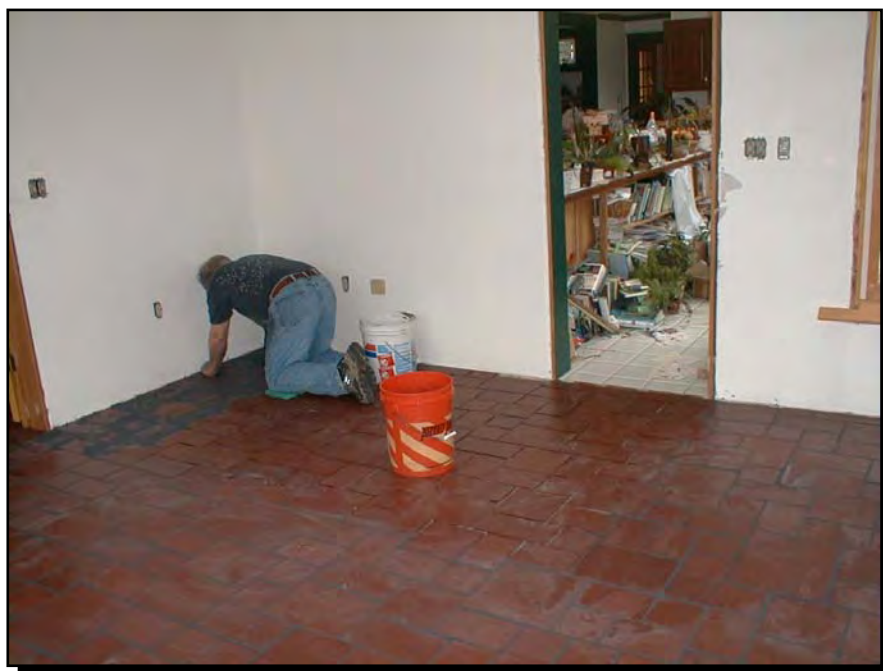
Step Three - The Light Touch

The photo above is a perfect time to discuss the final step and trick to get the grout haze off the slate. Look again at the large 12 x 12 slate that is in the upper-left corner. On purpose for the photo I left that half-inch wide line of grout haze so I could explain the next step. You can also see a slight amount of haze on the lower bottom edge of this piece of slate, but not nearly as much as the right edge.

The way you remove this last remaining haze is totally different than the way you got most of it from the slate. You take a perfectly clean sponge that has had all water squeezed from it. Do not compress it in your hand, just hold it fairly lightly. In the example photo above you would glide the edge of the sponge LIGHTLY across the slate at a 90-degree angle pulling the grout residue TOWARDS a slate that's yet to be cleaned or is partially clean.

It's really important that you don't put pressure on the sponge as it crosses over the grout line itself. You want to be lifting the sponge off the slate as it crosses the grout line just as an airplane takes off from a runway. This motion takes practice. I doubt you'll get it perfect the first time. But it works. You **MUST** use a clean surface of the sponge with each stroke. You can't double swipe. If you try this, you just smear grout on the clean areas at the center of the slate.

Very Light Haze



Until you become an expert at lifting the sponge at the precise moment, you may smear a little grout onto a slate that's already perfectly clean. Don't freak out or get frustrated. Within a short amount of time the grout in the joints will be getting pretty hard and you will be able to come

back and wipe the grout from the slate. It's imperative that if you do smear some grout on a clean slate, use the technique in Step Two to get all but a small amount off. This step is where you take the sponge and slide it parallel with the grout joint staying as close as possible to the joint but not touching it.

The Last Cleaning

If you've done everything right so far, the slate will look amazing. It's clean with maybe a slight trace of grout at some of the edges of the grout joints. You can get those clean the next day. It's time to take a break for 24 hours.

After this amount of time, the grout should be very hard. You should be able to take a sponge and rub across a joint and not make an impression on the grout at all. You may

get a small amount of pigment from the grout on the sponge. This is normal. At this time you can go around and clean up the last remaining traces of grout from the slate.

If there are stubborn spots, use a Dobie Scouring Pad to clean the grout from the slate. These plastic dish-cleaning pads are perfect for slate. They don't hurt the cleft face of the slate at all, but will readily get off light amounts of grout haze.

Chapter Ten: Sealing the Slate

For all intents and purposes you're done! Hooray and congratulations! But some people want to seal the slate and the grout with a wet-look sealer. Others like the dull natural appearance of the slate. The only way for you to determine what you want is to try a wet-look sealer on your TEST panel. Remember the test panel we've talked about?

Kathy wanted the wet look on our red slate floor. It's easy to apply with a cotton rag that's in good shape. DON'T use an old towel or some other rag that's falling apart and shedding fibers. The fibers will get attached to the slate permanently. You can brush on some sealers. This is perhaps the best method.



There are invisible sealers that will not change the appearance of the slate. Once again, TEST these on the test panel before you commit yourself to applying them to the floor.

READ the instructions on the label of the sealers and follow them to the letter. Be sure you have waited the amount of time they say to wait to ensure the grout is cured and the floor is ready for the sealer. Some sealers MUST be put on with very light coats. Don't ever think that more is better. Test, test and test again on your test panel.

Congratulations on your completed project! **Send me some high-resolution photos of your job with comments and I'll give you any other eBook of mine for FREE. Be sure to remind me about the free eBook!**

Tim Carter

Acknowledgements:

Until you spend the time writing a book, an eBook or any document that's over 5,000 words, you have no idea how much work it is, and how much help you need to make it come to life.

This Slate-Flooring eBook is no different. I had tons of help from my wife Kathy not only picking out the slate and helping with the job, but also her unending patience with me. She would never mention it in public, but she waited way too many years for this room to be finished.

My oldest daughter Meghan and my videographer Brent Walter helped install the slate floor as well. Meghan was instrumental in pushing me to complete the Sun Room as a Christmas present for Kathy.

I want to thank Roger Henthorn, my virtual assistant and life-long friend, for his editing and technical assistance that made it possible for you to obtain this document. Thanks are also due to Ms. Victoria Bradley for her precision editing of the manuscript. These efforts enable me to write from my heart and in such a way that you can understand just how to improve your home with a new slate floor.

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