Installing Slate Roofs and Avoiding Common Mistakes

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As a slate roof consultant, I travel around the United States looking at slate roofs, both old and new. Some are very old and just need inspected and evaluated; others are brand new — and leak. I am currently involved in numerous slate roof litigations as an expert witness — mostly residential structures with roof work ranging in cost from $20,000 to $350,000. I see the same mistakes repeated on new slate roofs, and they're hurting the long-term prospects of the American slate roofing industry. Here are the top ten mistakes that I have been seeing, in no particular order.

1. Lack of information:

The contractors (as well as property owners) have not done their homework. The contractor proceeds with the project without making much effort to do appropriate research. A simple search on the internet can yield a wealth of information about slate roofs, sources of correct tools, materials, supplies and installation techniques (slateroofcentral.com, for example). The contractor should educate himself about types of slates, producers and suppliers, available stock and delivery times, slate production methods and techniques, slate-working tools, fasteners, repair techniques, and of course, installation techniques (the Slate Roof Bible, 2nd edition, is a good source of information, available from josephjenkins.com).

Example: The contractor installs the starter slates with the back facing down instead of the back facing up, cuts the slates with a diamond saw rather than a slate cutter or a hammer and stake, and installs replacement slates with copper straps or face-nails. These are a few of the many tell-tale signs that the contractor is inexperienced and possibly getting in over his head.

[For more information about contractor errors, headlap, and starter courses, go to traditionalroofing.com]

2. All slate is not the same:

You wouldn't buy a car without looking at different models and checking their track record — and cars only last ten years and are cheaper than slate roofs! A slate roof is an investment in the future of your structure. It will reasonably last 150 years if designed and installed correctly. There are many different types of slate with differing

characteristics, colors, sizes, thicknesses, shapes, sources, mineral make-up, production styles and longevities. Why buy a foreign slate with no track record when you can buy a domestic slate with a century and a half of historical performance?

Example 1: The client wants a "black Spanish slate" roof. The contractor orders 120 squares of "black Spanish slate" from a supplier. The supplier is not a quarrier or producer. The slate arrives at the job site on pallets, but half of the pallets are labeled Spanish slate and the other half have no labels. The slates are all black and look similar. The supplier insists that all the slates are "Spanish black." The contractor installs the slates on the roof, but the slate looks funny. The pallets contain two different types of slates, both are Spanish black, but they are from different quarries and therefore show different shades of black. The client can't stand the way her new slate roof looks. The job is halted, lawyers are called and the headaches begin.

Example 2: The client wants a graduated slate roof. A graduation scheme is agreed upon, ranging from 1" thick, 24" long slates at the eaves to 3/16" thick, 12" long slates at the ridge. The slates in between gradually reduce in length and thickness from the bottom to the top. The 16" long slates in the field of the roof should have a thickness range from 3/8" to 1/2," but the contractor does not check the slates upon delivery to the job site. In fact, the 16" long slates that were delivered range in thickness from 1/2" to 3/4". The contractor installs the slates without noticing this discrepancy. The owner does not like the bumpy look of the roof. Payment is withheld when the job is finished and lawsuits start to fly.

[Sources of slate can be found at slateroofers.org.]

3. The contract documents are deficient:

Every detail about the slate roof installation should be included in the contract documents — type, size and origin of the slate; type, length and gauge of the nails; type and installation style of underlayment; type and size of cant strip; amount of headlap; flashing specifications and details; number of squares of slates to be installed; slate installation style, and many other details such as clean-up information, permits, insurance information, warranty, payment schedule, what to do with salvaged materials, etc. All should be clearly spelled out in the contract documents. If not, both the client and the contractor are asking for problems.

4. Lack of headlap:

Headlap is the amount of overlap each roof slate has with the slates two courses below. The generally accepted industry standard for slate headlap is 3" although this can vary somewhat and should be increased when the slope is decreased. This fundamental detail of any successful slate roof installation is hard to overlook, but it is ignored by some roofing contractors. Lack of adequate headlap spells disaster for a slate roof. I have seen new roofs with inadequate headlap (i.e. less than 2"), no headlap at all, and even negative headlap.

Example: A facilities director for a major institution hired a roofing contractor to install four large slate roofs. They're all high roofs and were not examined closely by the director, but the fourth had a flat roof alongside it that allowed close inspection of the slate, especially on the gable edge where the headlap can be clearly seen. The headlap was only one inch and in some places there was no headlap or even negative headlap. This is a nightmare scenario.

Example 2: A roofing contractor removes and reinstalls an existing slate roof. (This act alone should raise red flags as it suggests that the contractor didn't know what he was doing in the first place. If there is a problem with an existing slate roof, the problem should be dealt with, not the entire roof removed.) The contractor replaces the slates, but does so in such a manner that the starter course now only has 1.25" headlap. The remainder of the roof has 2" of headlap. Although the 2" headlap will work on a steep slope slate roof in most cases, the lack of headlap on the starter course is a serious error. All of the water runs over the drip edge where adequate starter course headlap is very important.

Example 3: A roofing contractor removes a large existing slate roof because of a leak in a valley (when he should have instead only replaced the valley). He replaces the entire roof with the original slate, installing it with no headlap at all, instead placing 30 pound felt between the courses of slate so they won't leak. Twenty years later, the entire roof has to be removed and re-installed correctly at tremendous cost.

[Read an article about headlap at http://www.traditionalroofing.com/TR6_headlap.html.]

5. Bad flashing work:

There are two things that keep water from penetrating a slate roof: the slates and the flashings. Not only must the flashing metal be of adequate type and gauge, but it must be installed correctly. This is not rocket science, but it does require some training and/or experience in order to be done correctly and to be leak proof. Properly installed flashing will not leak.

If a contractor relies heavily on peel and stick underlayment beneath his flashing, he is sending the message that he thinks the flashing is going to leak and the underlayment will hide the leak long enough for him to get away with shoddy work. Properly installed flashings are not dependent upon underlayment.

There are two basic methods for installing leak-proof flashings: 1) folding and overlapping and 2) soldering. Folded flashings can be used on positive slopes and they don't require soldering. Soldered flashings are required when the slope is too low to allow for control of water flow direction by gravity so waterproof sealing (solder) is needed. Soldered flashings can also be used as a matter of style, but one must remember that when installing soldered flashings, unlike folded flashings, the soldered flashings

must be installed with expansion and contraction in mind (i.e. with cleats and/or expansion joints) to prevent strain on the solder joints.

One of the most common flashing mistakes on slate roofs involves chimneys — the corners are not flashed correctly. Chimney corner flashings must be either folded correctly (i.e. to prevent water from entering the corner from the roof surface *and* from the chimney surface), or the corners must be soldered. Also, contractors will overlap flashings incorrectly with negative overlap, allowing water to run into the flashing. They will also use incompatible metals — mixing steel with copper, for example, such as when using copper rivets that have steel shanks.

Example: A copper built-in gutter system is installed on a new slate roof. The 10' gutter sections are lapped, but not riveted. They should have been lapped approximately 1.5", riveted every inch along the lap edge prior to soldering, and cleated to the roof decking. These gutters are not riveted at all, are poorly soldered and the necessary expansion joints are not integrated into the gutter system. The solder joints soon pop open and the gutters leak like a sieve.

[There are step-by-step chimney flashing instructions in the Slate Roof Bible, 2nd edition, available at josephjenkins.com, amazon.com, and many other sources.]

6. No consultant was used on the job:

As a consultant, I am called on after the work has been completed and the roof has failed — this is a mistake. Professional advice should be obtained before the roof is installed and even before the structure is built, if possible. However, not all slate roof installations require a consultant. Property owners can educate themselves for very little money by simply reading a book or periodical about slate roofs and asking questions on the roofing message boards on the internet.

Example: A home owner buys a house with an existing slate roof. Rather than have the roof professionally assessed and evaluated by an experienced slate roofer, the client relies on their handyman for an opinion. He instructs them to remove the entire roof and reinstall it. In the meantime, it's a beautiful Vermont, graduated unfading green slate roof — at 80 years old about halfway through its life. The owner trusts the handy man; he removes the slate, then he can't figure out how to put it back together. Now a slate roofing professional is called, only to inform the home owner that her roof has been destroyed.

[A good slate roofing message board is at http://www.slateroofcentral.com/messages/]

7. Contractors walking on the slate:

This is one of the worst problems with new slate roof installations. Roof slate is not to be walked on — period. It is not a floor that is being installed — it is a roof. The roof must be properly staged so the roofers are working off roof ladders and roof scaffolds. If the

contractors are walking all over the slate roof during installation, it's because they don't know what they're doing and the property owner will have headaches later when the slates start falling off. Good slaters know how to install slate, and they won't walk on a slate roof unless it's a last resort in an unusual circumstance. Slates made for floors are laid flat on the floor when installed. These can be walked upon after they have been securely adhered to the solid floor surface. Slates laid on a roof overlap other slates — none lie flat. These cannot be walked on without risking damaging them.

Example: A ten year old slate roof is shedding slates at an alarming rate. The slates are a good quality Vermont material, but a hundred slates have already broken and fallen out on this large residential roof. The contractor who installed the roof does not answer his phone and seems to be out of business. A professional slater is called to make the repairs. It is obvious to the slater that the slates were damaged by foot traffic during installation leaving many cracked slates on the roof. These shedding slates are not only causing the homeowner headaches, but are also contributing to roof leakage and causing an overhead falling object hazard.

[Source of ladder hooks and roof scaffold brackets:
http://josephjenkins.com/store/home.php]

8. Poor sheathing materials:

The roof decking must last as long as the slate. A good roof deck should last the life of two slate roofs, or about 200 to 300 years. In any case, a roof decking material under slate must have a known longevity of at least 150 years. Materials that have been tried and proven for this purpose include lumber boards and battens from 3/4" to 1.5" thick, rough-sawn, planed, or tongue-in-grooved from a variety of species of wood.

Plywood, laminated woods and particle boards are sub-standard roof decking materials for slate roofs and should be avoided. Yes, you can install slate on laminated or glued decking materials, but a compromise on longevity is likely to be the result. If a slate roof is to be built to last, the roof deck should be solid boards, not glued sheets of wood. It is not uncommon to replace a century old slate roof with new slates nailed right into the original board deck. No laminated wood has ever shown this degree of longevity. Yet, some roofing contractors will demand plywood roof decks with almost a maniacal insistence. If you're going to install a roofing material like slate that has an expected life span on one or two centuries, the roof deck must be able to support the overlying stone for that period of time, at least.

9. Emphasis on underlayment:

This is a red herring. If a slate roof leaks, it's because it was installed improperly, not because of underlayment or lack of it. Properly installed slate roofs need no underlayment. The main purpose of the underlayment is to keep the water out of the building until the slate and flashings are installed. After that, if you could magically yank the underlayment out from under the slate, it wouldn't make a bit of difference in the

functioning capabilities of the roof. Secondary purposes for underlayment include providing a good surface for chalk lines during installation, providing a minimal layer of insulation, and providing a cushion for when the slates are laid in place during installation.

Barn slate roofs in the United States — and there were many thousands and still are quite a few, mostly a century old or older — were installed without any underlayment whatsoever. This is true for some institutional buildings as well. Most of the older homes in the U.S. were installed with a standard single layer of 30 lb. felt under the slate. These homes are so old now that the felt has deteriorated to dust, but the roofs function fine. If the slates and flashings are intact, the roof will not leak, underlayment or no underlayment, even in a sustained driving rain. This is a proven fact, not a theory.

If a contractor or architect is insisting upon a beefed-up underlayment under a new slate roof installation, it means they believe the new roof may leak and that the underlayment will delay the entry of the water into the building long enough for the contractor to get his money and get out of there. This is flawed logic and reveals a gross misunderstanding of slate roofs. Architects sometimes confuse slate roofs with ceramic tile roofs. Although tile roofs may require a substantial underlayment, slate roofs, properly installed, do not.

Underlayment does, however, provide a margin of waterproofing in the event a slate roof is damaged by wind, tree-fall, or other unusual circumstance. An acceptable slate roof installation today still typically utilizes a single layer of 30 lb. felt underlayment, doubled (half-lapped) when the need for a heavier underlayment is required (such as when a roof must be left exposed for a period of time before the slates are installed).

What about ice-damming? Increase the slate headlap along the eaves to prevent ice-damming, but do not rely on what's underneath the slate to keep the roof from leaking. If the slate and flashings are installed correctly, the roof will not leak even during ice-dam conditions. That is the proven beauty of slate roofs.

10. Inexperienced roofing contractors:

It is an unfortunate fact that some contractors cannot be trusted to give sound and honest advice or information. This issue is exacerbated by property owners who don't get competing bids before initiating a contract; who don't educate themselves about the nature of the work prior to hiring a contractor; and who don't insist upon a detailed, coherent and comprehensive contract document.

Example: A state historical property requires reroofing with slate. It is the policy of the state to "award" the contract to the lowest bidder. The low bidder gets the job and proceeds to install the entire roof with a uniform length and width slate, but with a 1/4 sidelap. The overlying slates side-butt joints should be at the center of the slates beneath them; instead these side-butts are 1/4 of the way laterally from the edge of the underlying slates, rather than in the middle. This puts the butt joints right over the nail heads, thereby ensuring roof leakage. Unbelievable, but it was what the roofing contractor was

used to doing — installing asphalt shingles by cutting off a half tab of the shingle before starting the next course. This technique may work for asphalt, but it's a nightmare when done with slate. No one caught this glaring mistake although it was visible from a hundred feet away.

The examples given above are all actual cases. Bad slate roof installations are seriously harming the slate roofing industry today. One major effort that is now being made to try to screen contractors for slate roofing purposes is the Slate Roofing Contractors Association of North America. This new organization lists contractor members on two websites: slateroofers.org and slateroofcentral.com. Included with the listing is a Contractor Profile which reveals details about the contracting firm that the average consumer may want to know. This and other organizations such as the National Slate Association, the NRCA, the National Slate Technology Center and union shops, all can provide much needed opportunities for training and education — they should all be supported and their services utilized. Continuing education is as important to roofing contractors as it is to anyone.

Slate roofs, made of rock, are true "green" roofs. Their longevity is phenomenal and they could truly be called the "roofs of the future." Why? Because, when properly installed, they will function with grace and beauty far into the future, long after other roofs have faded into oblivion. It's worth taking the time to learn how to properly install these architectural gems.

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