

How I Installed My Own Slate Roof

and What I Learned — By Daniel Ernst

I'm in the process of designing and building my own residence, in North-Central Arkansas. To manage costs and learn various building trades, I am attempting to perform all of the labor myself (contain costs by not subcontracting jobs that I can learn to do myself). Below is a summary of my recent slate roof installation, showing costs, labor hours, methods, supplier information, etc., along with some editorial comments.

This forum [slateroofcentral.com] has been a wonderful source of information for my project. I'm hoping that somebody out there will find this review helpful. First, the facts:

Cape Style House — 9:12 Pitch. The roofing field dimension is 54' 5" X 20' 10" The roof has four items that break-up or penetrate the main gable roof: a front entry gable, two skylights, three DWV vent pipes, and a masonry chimney.

DATA: Roof Field Square Footage — 2,267; Ridge — 54' 5" (main) & 7' 8" (entry gable); Valley — 12' & 12' (entry gable); Decking — 2" X 6" Center Matched T&G Southern Yellow Pine; Underlayment — #30 Organic Felt; Fasteners — 1 1/2" 11 Gauge SS (304) Nails & SS Slate Hooks

COSTS: 2,240 Square Feet SYP T&G Decking = \$2,476.80; 26 Squares Vermont Royal Purple, Random Width = \$8,450.00; Slate Shipping, >1,400 miles = \$1,700.00; Stortz Slate Ripper, GT Pro Cutter, Stortz Euro Hammer = \$175.00; 58 lb. SS Nails, 2 lb. SS Hooks = \$316.00; 90 Sq. Ft. 20 oz. Copper Flashing = \$588.40; TopSlate Ventilated Ridge = \$962.50.

Total: \$14,668.70; Material Cost / Square = \$647.05

NON-LOCAL SUPPLIERS — Slate: Camara Slate Products, Inc.; Copper Ridge: Castle Metal Products; Tools, Fasteners: Joseph Jenkins, Inc.

LABOR — Slate Installation: 20 Days X 9 Hours = 180 Hours; Ridge/Chimney Flashing: 3 Days X 8 Hours = 24 Hours.

I completed the installation largely by myself. My wife helped set roof scaffolding, snap chalk lines, and cut the top course of slate. I spent twenty days installing the roof, three days installing the ridge metal and chimney flashing. This included sorting the slate, building, installing, and removing roof scaffolding, plus assorted other chores that come with the job.

BACKGROUND — I was interested in installing a natural roofing material, a durable roof. Research led me to consider three options: concrete tile, clay tile, and slate.

Concrete tile has the lowest price. We found a local supplier of the Monier® brand, who quoted \$98.00 per square + shipping. Concrete tile is the newest of the three options, having only been produced for the last 100 years. The concrete tiles have an absorption rate that ranges from 5% to 12%, depending on the tile and the manufacturer. For our climate this seemed problematic, due to the large number of freeze/thaw cycles we experience each winter. And although some manufacturers offer a 50 year "warranty," you can also find the same warranties from some asphalt shingle manufacturers. Simply put, it does not have the history of either vitrified clay tile or slate. (Note: Concrete tiles are either integrally colored or slurry coated. Although both will fade, looking washed out over the years, the slurry coated tiles have caused the most problems for homeowners.)

Clay tile prices are comparable with slate. We priced a standard Ludowici® interlocking tile at \$375.00 per square. Prices go up from there. Clay tiles have a tremendous history and heritage. Durability is excellent. Absorption rates are typically lower than the concrete tiles (Ludowici advertises less than 1%). Interlocking tiles are the most economical and popular today; however, they are less weatherproof than the shingle types (side lap is different). If you were to purchase a tile with the same headlap and sidelap as slate, the cost would be substantially higher, like more than \$500.00 per square.



Photos by Kopper Ernst

So concrete was unproven, sometimes problematic. Clay tiles had many advantages, but a tile with a standard 3" headlap and sidelap would cost substantially more than a historically proven slate. So we opted for slate, with both trepidation and delight. The cost of the roof was going to challenge our financial planning for the house, but we chose to invest in quality exterior components, with a view of life cycle costs.

Also, I need to mention that S1 quality slates typically have an absorption rate of less than 0.5%. This meshed well with our need for a freeze/thaw proof roofing material.

INSTALLATION

I had worked on asphalt, metal, and cedar shake roofs before. Slate was new. I used the Slate Roof Bible as a primary guide, the Jenkins Forum [slateroofcentral.com/messages] for answering questions that remained unanswered through my reading and internet research (see end for a list of resources).

Installing the slate is not complicated, at least no more than any other roofing material. But you have to take care at all transitions. It seemed to me that flashing roof transitions and penetrations was the most tedious and difficult part of the job.

Although not surprised at the amount of preparatory work, I spent half of my time getting ready to install slate, the other half actually installing. Sorting slate, hauling them up the roof, installing roof scaffolding, keeping the ratio of sizes correct, all took more time than the actual installation.

Roof Decking — I planned to install a board deck on the roof, so I investigated local suppliers. There are a number of small sawmills within a half-hour drive, but I was disappointed with my findings. Generally they wanted \$0.85 — \$0.90 per board foot, at least for 1" stock. Lengths were limited (8' or 9'), and widths were random.

I talked to my local building supplier and it happened that they had several bundles of 14' T&G 2" X 6" decking in stock. They wanted \$0.46 a lineal foot. So I could purchase a more uniform, stronger, easier to install material for about the same price as that found at local lumber mills. Plus, I would not have as much waste. It was a no brainer. Arkansas is a huge southern yellow pine lumber area, so I doubt you'll find such a deal, but it may be worth a look. \$1.10 per square foot for this quality decking was incredible!

Sorting — I sorted the slates into six different categories: heavies, mediums, lights, ultralights, uglies, and broken. Ultralights were those slates that felt too thin to be very durable. They were often a consistent 1/8" thick or less. When checking for cracks I would rap the face of the slate with my palm. Often I could feel the deflection of the slate when doing this to an "ultralight" slate. I attempted not to use the ultralights, except for the very last course.

Uglies were those slates that had horribly inconsistent faces. They were very thick on one end, very thin on another. When split, they did not have a smooth face, but a fractured appearance. Although I wasn't too concerned about the aesthetics of these slates, I was concerned about how they lay with adjacent slates. Many were too rough for installation.

I kept all salvageable broken slates to use for the last course. The rest I set aside for use as roadbase, interior tiles, crafts, etc.

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Random Width Size/Quantity Ratios — In order to keep myself from running out of any one particular size of slate, I first calculated a size/quantity ratio. To do this, I divided the individual size quantity by the total quantity of slates [eg. (673) 14" slates/4,480 total slates = 0.15]. I moved slate up onto the roof 100 at a time. So every 100 slates I would take 15 of the 14" size. From there I would attempt to use up the entire quantity before bringing additional slate up onto the roof. This didn't work out perfectly, especially since it didn't consider the number of broken and rejected slates. So mid-way through the installation I recalculated the ratio. This procedure kept me balanced throughout the installation.

Roof Scaffolding — I used five sets of roof scaffolding, starting at the third course of slate, stepping every six courses. I spanned the 54' roof line with three 18' 2" X 10" planks (installed with the help of my wife of course!). I supported each scaffolding step with seven roof jacks, one at the end of each plank, one in the middle of each plank. I built the roof jacks on-site with 2" X 4" lumber and plywood gussets. Although suitable only for my roof pitch, they saved a significant amount of money. I nailed the jacks to the roof deck using Walter Musson's method (sheet metal straps nailed to the bottom of the jack); this proved an excellent system. At no time did I ever step on the slate. I would sometimes balance my weight with a carefully placed foot, but I kept the larger portion of the weight on the roof scaffolding. In the final tally, I broke two installed slates with the roof jacks. I attributed this to "rocker" slates, those that didn't lay perfectly flat. This was caused by slates with a thicker top end, or those that were slightly cupped.

Tools — I used the Stortz European Style Slate Hammer, Stortz Slate Ripper, and GT Pro Slate Cutter. Although I don't have much for comparison, I liked all of them. They were solidly fabricated, had good balance, and worked very well for their intended purpose.

Wearing Knees Down Slowly — Midway into the North roof installation I chanced upon a miracle. My neighbor offered me use of his Skylift forklift (AKA boom forklift, telelifter, etc.) to move the slate onto the scaffolding. He brought it to my site, along with a 4' X 13' work platform that sat on the forks. This saved me quite a few trips up the ladder!

Rate of Installation — I averaged a little over one square per day, installed. On good days, with no roof obstructions or transitions, I could do two squares (six courses across the entire roof). I hit this mark on three separate days. Then again, installing the DWV vents or skylights or valleys slowed my down to less than a square a day. There was also a learning curve to overcome.

SUPPLIER REVIEW:

Camara Slate Products — We chose this company for their good reputation, the quality of their samples, and general service. It's a father and son operation, something that tends to give you a solid feeling about a business. They punch their slate, inspect it just prior to shipment. Their prices were competitive with other suppliers we contacted. To my knowledge Sean Camara fields most of the sales calls. He was personable, informative, and professional.

After finally making a color decision, we placed our order, sent a check for 50% of the order, and waited to hear about the shipping date. We had requested a shipment for the first or second week of January. The slate arrived on January 10th, in what appeared to be very good condition. I only found four broken slates at delivery. They sent a good mixture of 9", 10", 11", 12", 14", and 16" slates, with pallet numbers, sizes, and quantities listed for easy organization.

After making my way through several days of sorting and installing the slates my perspective changed. I came across quite a few cracked slates — often only noticeable by ringing the slates while sorting. I also encountered a fair share of ultralights and uglies. Here are the final figures: 4,480 delivered; 3,960 installed; 326 remaining; 196 broken/discarded.

Of the remaining slates, 276 are in the ultralight and ugly category. I have 50 left that I consider normal slates — to be used for replacements and repairs. So that's a 4.3% breakage rate (not factoring in the broken slates used for the last course) and a 6.2% reject rate. Most of the broken slates were in the 9" size, as were most of the ultralights and uglies. The 12" and 14" slates were the most consistent in thickness, face, and quality.

I'm not sure how to feel about the results. On one hand, Sean Camara stated that they generally see a 2% breakage rate. On the other hand, he and everybody else out there says to order 10% additional slate for breakage and "cutting loss" (I needed 60 cut slates for my open valley). Still, some suppliers even recommend ordering 15% extra, so what I experienced was certainly not out of the ballpark. I guess I was just expecting a few more replacement slates leftover for the next few decades . . .

Castle Metal Products — We chose this company for their ventilated ridge. The house design has a cathedral ceiling in the public area, upstairs bedrooms tucked into the roofline. So I was keen on using soffit/ridge venti-

lation (testing has shown this to be the most effective and efficient form of ventilation).

We requested literature, which came in a couple of weeks. The brochure was nicely illustrated, with facts and figures, and installation drawings. The system appeared to be as advertised. We asked for a reference, talked to a roofing company in Baltimore, MD (Ruff Roofers) who gave the system high marks. It is another family company (brothers) and we dealt with Gary Castle.

I was concerned about the flashing / transition at the back of the chimney, so I asked Gary if they could design a piece to go with the TopSlate product. He agreed this would not be a problem if I could solder the back-flashing. He was supposed to send a drawing, but didn't. The requested ship date came and went. We called to ask about the status of the drawing, only to find out that our order was built and ready to ship. That was unexpected, but fine. So we sent a check and the material shipped.

The package arrived in a damaged pallet; fortunately, the copper was not damaged. But they didn't include a receipt or any other documentation. On top of that, they didn't include the requested chimney backflashing or the drawing. I tried out the system, found that the straps they sent were too small (they sent 10:12 and 12:12 pitch end caps).

I called Gary, who said they would take care of it, no problem. He would call back with some information. No call. We waited several days, called, got the same story. It was ready to ship. We waited a week. No package. We called, found out that the secretary forgot to ship the box. She shipped it. Great! The package shows up. This time the straps are right, but the backflashing makes no sense — and there is NO drawing to show how the pieces are supposed to fit. I call Gary; he is out; he will call back. No call. Again. So I decided to fabricate my own transition flashing, be done with trying to communicate with CMP.

The documentation looked great before purchase. But, further investigation and application led me to conclude that it is inconsistent and contains errors.

The product concept is great. But the devil is in the details. I think that they build a very nice ridge, one without any exposed fasteners or potential leakage points. You pay a high price for their product, so you expect a solid system. But my experience was soured by their service and lax communication. My opinion is that the ventilation option was added as an afterthought. It could certainly be better integrated. Had I to do it over again, I would use the slate ridge, bib flashing method (as shown on slateroofcentral.com's how-to pages). I can certainly see why they recommend using gable vents. They are not problematic like ridges; they are old technology, thus proven; they are less costly.

Joseph Jenkins, Inc. — After determining that we would use slate for the roof, I ordered tools and fasteners from Jenkins' slate supply store. I used the phone method because I had several questions. They fielded my calls twice. They were accurate, professional, and informative. They repeated numbers for verification. They sent confirmation emails. The packages arrived on-site exactly when scheduled. There were no errors or issues.

I attempted to purchase nails straight through Swan Secure Products, having done so in the past. But to my surprise, they were more expensive than Jenkins — at least by the time I included shipping. So not only was the service good, but the prices were good.

Jenkins sent a complimentary copy of the Slate Roof Bible along with one of the orders. Although I already owned a copy, it turned out that my brother had recently purchased a house with a slate roof. So I sent that copy to him, for use in renovating and adding onto his house.

PROBLEMS — The entire process was a big learning experience, frustrating at times, rewarding at others. Along the way I came across a few issues that were difficult to resolve:

Valley flashing — Although both the SRB and the CDA (Copper Development Association) give excellent illustrations on the various valley flashing methods, neither one of them discusses the intersection of the two valleys. It would have been helpful to see some illustrations or pictures in some resource, book, internet page, etc. Of note, although not necessarily an easy job, the SRB gives excellent illustrations and pictures on chimney flashing — including the various options and penetrations points.

Copper Flashing Supplier — Perhaps a symptom of my location, but I

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had a difficult time finding 20 oz. tempered copper. I finally found a business that was willing to purchase and fabricate the necessary pieces, but the cost was higher than in other areas of the country. It turns out most businesses use 16 oz. soft copper for EVERYTHING. Do your homework on this topic, especially if you are not in a large slate roofing area.

Organic Felt — I've experienced this before, but the weather made it worse this time. Organic felt wrinkles horribly when it gets wet. All of those razor sharp chalk lines turn into a winding mess. I couldn't get it locally, but I would try the newer fiberglass felts. Supposedly they have similar permeability ratings, but lay flat and stay flat.

In any case, we now have a spanking new slate roof with shiny copper flashings. It is beautiful. None of this would have been possible without the resources developed by Joe Jenkins. I also have to thank several regular visitors to the Jenkins forum: Walter Musson, Peter Crawley, and Ron@Slateworks. My wife took photos of the process. 📷

RESOURCES

- josephjenkins.com
- http://www.copper.org/applications/architecture/arch_dhb/hand-book_table_of_contents.html
- www.buildingscience.com
- www.ornl.gov/sci/roofs+walls/
- www.camaraslate.com
- <http://www.castlemetalproducts.com/topslate.htm>

Daniel Ernst lives in his passive solar, owner-built home in North Central Arkansas. Currently he works at Julian and Sons Fine Woodworking as a craftsman and project coordinator. He welcomes serious inquiries and questions from other greenhorn slate roof installers. Email: djncu@artelco.com