

TRADITIONAL ROOFING

Dedicated to preserving the skills and knowledge of the traditional roofing trades

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GRADUATED SLATE ROOFS

TRADITIONAL ROOFS FROM HISTORIC ROOTS

by Joseph Jenkins

Not all slate is created equal. Being a natural stone mined from the Earth, slate comes in many types with many different characteristics.

In the old days, when roofing slate was wrestled from quarry holes and mines using hand tools and beasts of burden, the splitting of roofing shingles from rock was an arduous and exacting art. Many slate deposits contained very hard, rough textured stone that could not be split into uniform, thin sheets. For the sake of efficiency, the stone was split into the largest slate shingles possible, creating a supply of coarse shingles that varied considerably in size—some larger, some smaller. In order to make good use of all these slates, a certain style of roofing was developed—*graduated* slate roofs.

In this style of roofing, the largest slates, sometimes massive, are installed at the bottom of the roof. This allows for the heavier weight of these large stones, perhaps 30 inches long, to be borne by the wall of the building. It also relieves the roofer of having to carry the heaviest slates, which may weigh 200 pounds, to the top of the roof. Furthermore, the bottom of the roof is exposed to more water than any other part of the roof, and heavier slates are more apt to withstand the excess erosion and weathering.

As the roof installer progresses up the roof, smaller and smaller slates are used until the slates near the top may be only 12" long. The result is a roof that "graduates" in size from large at the bottom to small at the top, yielding an architectural style that is both unique and pleasing to the eye. Traditional graduated roofs also utilize *random width* slates. There are still many of these roofs in good condition scattered throughout the United States, yet the art of installing graduated slate roofs is a dwindling one. This issue of *Traditional Roofing* focuses on this art and is intended to preserve and revive knowledge and interest in graduated slate roofs.

A BIT OF HISTORY

A good place to look at the history of graduated slate roofs is in Scotland, England and Wales. Scottish slate tends to be a rugged, coarse, and extremely durable rock. Unable to split large, uniformly thick slates from the raw material available in Scotland, the Scots created a distinctive roofing style with a rough texture in keeping with the stone architecture so characteristic of Scotland's traditional



Traditional Scottish Slate Roof, Edinburgh, Scotland

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buildings. This graduated slating style was also popular in England and Wales for the same reason—it allowed for the efficient use of the stone.

Each country had its own peculiarities, however. Scottish slate, for example, was “head nailed,” with a single nail hole at the top center of the shingle, nailed into solid wood decking referred to as “sarking” (as opposed to slating lath). Although slating lath was popular in Wales and England, Scottish slates could often be so coarse and random in lengths, widths and thicknesses that a solid wood deck was needed in order to facilitate the nailing of the shingles. Scottish slates are also “shouldered”—their top corners are knocked off, a practice still in use today in much of Europe. [When a newly split shingle has a broken corner in the US, it's rejected. In Europe the other corner is simply chipped off and the slate is used. The top corners are never visible anyway and it doesn't matter functionally whether they're cut off or not.] Because the Scottish slates were nailed at their top, there was the risk of gale winds lifting the bottom of the slates and blowing them off the roof. The Scots, however, utilized rather thick slates, the weight of which more than compensated for the weakening effect of head nailing. An interesting characteristic of Scottish slate roofs is that the slates can be swiveled on the single nail, to one side or another, in order to clear the way for replacing a slate underneath. This is aided by the shouldering of the slate. Slate rippers are rarely needed.

The English and Welsh also utilized a head nailing technique involving the use of a wooden dowel instead of an iron nail. A dowel was driven through a hole in the top center of the slate, which was then hung over a thin hardwood lath strip hand split from a log. This practice eventually gave way to what is called “center nailing,” a nailing style used in the US today in which the slates are nailed with two nails, one on each side, situated about 1/3 of the way down from the top of the shingle. The center nailed slates were then nailed to sawn lath strips, perhaps an inch thick. This method of fastening slates is still prevalent in the UK today, and only differs from standard US techniques in that a solid Scottish style board deck is preferred in the US rather than lath strips. Incidentally, graduated slate roofs are known as “diminishing course” roofs in the UK, while uniform slate roofing is known there as “tally” roofing.

SOME SPECIFICS

On one of my trips to Wales researching slate, I happened to meet a young slater who was installing a slate roof (photo on page 212 of the *Slate Roof Bible*). I found it interesting that there were several steps involved in the slate installation that we here in the US almost never encounter. For one, the roofer was obligated to “hole” each slate, as no nail holes are punched in the slate at the quarry as is typically done in the US. This is a carry-over of the days when graduated slate roofs were the norm, and nail holes had to be punched on site after the proper lap had been deter-

mined for each course. The position of the holes in the slate was particularly critical as the British prefer to install the slates on lath, or 1x2 strips spaced to allow for the nailing of each course, leaving little room for error. Sawn lath strips developed from the practice of using hand split lath, as mentioned earlier, and continues to this day as much from tradition as from a lack of lumber resources in England and Wales. But another practice that surprised me was the sorting of the slate by thickness prior to installation. This was a roof of uniform sized slates—not a graduated slate roof. Yet, the roofer, according to custom, sorted the slates before carrying them up onto the roof, the thicknesses being termed “very heavies,” “heavies,” “mediums,” and “lights.” The very heavies were installed at the bottom of the roof, and so on until the lights finished off the top. I found the variance in thicknesses to be minimal, yet the roofer carried on a custom that began with the graduated roofs of old: sorting prior to installing.

Today, the sorting of the slate prior to and during installation is critical to the creation of a graduated slate roof. It requires careful advance planning for the job to be well done. The number of courses required on the roof must be determined beforehand, and the number and degree of graduations, both in thickness and length, must also be part of the planning of the roof installation. There is no one correct formula for this. Diminishing lengths can occur with each course, or they can occur only with every several courses. In any case, once the particular formula for your particular roof job has been determined, then the correctly sized slates can be ordered from the quarry. For illustration, I measured the graduations of three separate old roofs chosen at random, and have listed the data in this article.

It must be strongly emphasized that graduated slate roofs typically utilize slates of varying lengths, varying thicknesses, and random *widths*. The installation of slates with random widths is an art in itself, as adequate *sidelaps* must be carefully maintained. That is to say that the side-butts of each slate should be spaced a minimum of three inches laterally from any side-butt above or below. If the side-butts are spaced too closely to each other, the roof could leak. A sloppy roofer will install random width slates with close side-butts. A master roofer will not.

Furthermore, when a slate course graduates from one length to a shorter one, a transitional row may be necessary in order to maintain a standard three-inch headlap. Otherwise, when a two inch length decrease occurs from one course to the next, a five inch headlap may occur. This is not necessarily a problem as long as the slates with the excess headlap lay well on the roof, but it can be a problem with the roof scaffold staging and the use of standard three inch slate hooks to replace slates left out to accommodate the staging (see *Slate Roof Installation Hint* on the back page).

Finally, a graduated slate roof can be made a work of art by mixing in a variety of slate colors. A common color scheme involve a variety of Vermont slates, including purples, unfading greens, sea greens, grays, and perhaps

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Vermont black and/or New York red. The percentage of each color must be determined before the slate is ordered, and with a variety of lengths and widths to also consider, careful pre-planning is a necessity in order to ensure a successful job. Some suggested color combinations by Rising and Nelson Slate Co. (Middle Granville, NY; Ph: 518-642-3333) include: #1) 70% semi-weathering gray green with 30% variegated purple; 2) 50% semi-weathering gray green and 50% variegated purple; 3) 60% unfading mottled green and gray with 40% unfading green; #4) 50% semi weathering gray green with 20% variegated purple, 20% unfading green, and 10% Vermont gray black; 5) 70% unfading green and 30% unfading mottled green and purple.

For a first-hand account of one slater's experience with a graduated roof installation, read the article by Barry Smith on page 4 of this issue of *Traditional Roofing*. ☒

THREE EXAMPLES OF GRADUATED SLATE ROOFS

It's obvious that the sizes of slates and number of graduations is entirely a matter of style and/or personal taste.



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SLATE RIPPERS, SLATE CUTTERS, SLATE HAMMERS, LADDER HOOKS, SLATER'S STAKES, COPPER NAILS, SOLDER BARS, SNOW GUARDS, SNOW RAILS, SOLDER IRONS, SLATE HOOKS, STAINLESS NAILS, COPPER RIVETS, SLATE ROOF BIBLE, TOOL SETS, CHICKEN LADDERS.

SLATE VALLEY MUSEUM

17 Water Street, Granville, NY 12832
(518) 642-1417



The Slate Valley Museum, located on Vermont's border, documents the history of the slate industry in New York and Vermont and its cultural heritages.

OPEN TUESDAY, THURSDAY AND FRIDAY 1 TO 5 P.M.
SATURDAY 10 A.M. TO 4 P.M.

Beau and Liz Heath Residence; Grove City, PA; 30' rafter, 3" headlaps; VT slates. Unusual graduated slate roof with uniform standard thickness slate.

# courses	length of slate
[Top of Roof]	
13	16"
11	18"
9	20"
6	22"
5	24"
[Bottom of roof]	

This 90 year old roof has five slate lengths which graduate in 2" increments according to an apparently random scheme. The slates on this roof are nearly uniform in thickness (1/4")

Ketler House; Grove City, PA; 3" headlaps; VT slates

# courses	length of slate
[Top of Roof]	
etc.	
1	27"
1	28"
1	29"
1	30"
[Bottom of roof]	

This century roof graduates one inch per course from bottom to top. The bottom slates are 1" thick, the top slates are 3/16" thick.

Ketler Garage, 25' 8" from drip edge to ridge; 39 courses; 3" headlaps; VT slates

# courses	length of slate
[Top of Roof]	
9	13"
1	14"
6	18"
3	17"
5	16"
3	19"
3	20"
3	21"
3	22"
3	24"
[Bottom of roof]	

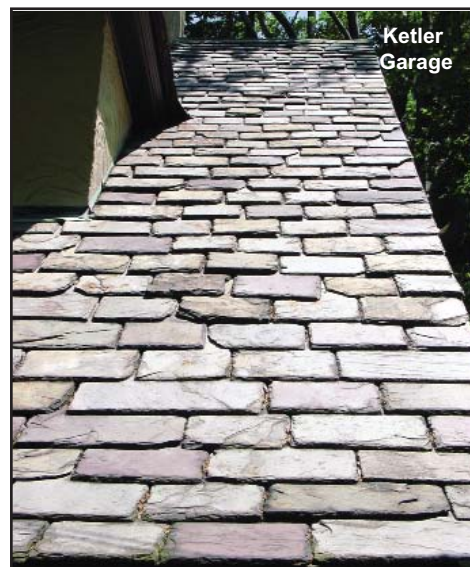
This century roof graduates randomly from bottom to top. The bottom slates are 1" thick, the top slates are 3/16" thick.



Heath House



Ketler House



Ketler Garage