JANUARY 2023

Technical Bulletin #9

NATIONAL SLATE ASSOCIATION

Technical Bulletin No. 9: Common Myths About Slate Roofing

INTRODUCTION

Slate shingles are a natural product with exceptional durability and aesthetic beauty. They have been in use in North America for over 400 years. During this time, certain myths have developed around the product. The purpose of this *Technical Bulletin* is to address some of the more common myths with factual information.

Myth No. 1: Slate Lasts Forever

While exceptional durability is a characteristic of slate shingles, with some slates having an expected service life of over 200 years, the fact is slate is like all other natural and human-made materials in that they must, according to the laws of thermodynamics, transition from a state of order to disorder, from high entropy to low entropy. That is, all things deteriorate over time.

The service life of slate shingles depends largely on the geology of the slate - its mineral composition and the heat and pressure it was subjected to during its formation - a process known as metamorphism. Using past history as a guide, it is known that different roofing slates have different expected service lives depending on the geographic region from which they derive (Figure 1). These expected service lives, assuming all other things associated with the roofs on which the shingles are installed are equal, can be summarized as shown in Table 1.[1]

Of course, all other things are never equal, and factors such as roof slope and orientation, the presence of shade trees, runoff from low-slope roof areas located above the slate, geographic location of the installation, foot traffic, the quality of the original installation, and maintenance activities, all impact the longevity of the roof system. As such,

Table 1

SLATE DISTRICT	ESTIMATED SERVICE LIFE
Monson District (Piscataquis County, Maine)	150 years +/-
New York/Vermont District (Washington County, NY/Rutland County, VT)	125 years +/-
Pennsylvania Soft-Vein District (aka Pennsylvania Black; Lehigh and Northampton Counties, PA):	60 years or more
Pennsylvania Hard-Vein District[2] (aka Chapman; Northampton County, PA)	100 years +/-
Peach Bottom District[2] (York County, PA /Harford County, MD)	at least 200 years
Buckingham District (Buckingham and Fluvanna Counties, VA)	175 years or more
North Country Black (Glendyne Quarry, Saint-Marc-du-Lac-Long, Quebec, Canada)	100 years +/-

Figure 1: 120-year old New York red slate roof in Lawrence, Kansas

severe weather (e.g., hurricanes), falling tree limbs, or inexperienced contractors walking on the roof or using the roof as a working platform.

▪ In the roof's later years, slate breakage can be expected to gradually increase as the shingles begin to delaminate and lose strength.

the estimated service lives given above should be used as a guide in the design of new slate roofs and the selection of accessory materials (e.g., flashings, underlayments, slating nails) with commensurate service lives.

Myth No. 2: No Maintenance Required

Implicit in the myth that slate lasts forever is that a slate roof does not have to be maintained. Again, not true. Like all roofs, slate roofs do require some maintenance. The level of maintenance needed typically varies depending on whether the roof is in the early, middle, or late stage of its service life:

▪ Early on (within the first year or two) incipient cracks stemming from installation of the slate shingles on the roof will reveal themselves and some, minimal amount of breakage can be expected. (See also Myth No. 4, below.)

▪ During the middle years of a slate roof's expected service life, very little maintenance is typically required, except perhaps for that associated with particularly

One of the beauties of a slate roof, however, is that repair is a relatively straight forward process, wherein a damaged slate can be easily removed using a tool called a "ripper" and a new, matching, slate shingle inserted in its place.

Myth No. 3: Slate Fines Found in Gutters is an Indication of Poor-Quality Slate

Slate fines - tiny pieces of slate ranging in size from that of a pin head to a small button - typically appear in gutter troughs within the first several months of a slate roof's

Figure 2: Slate fines and fragments present on the roof prior to the final sweeping-down. Some of these will invariably remain on the roof and gradually get washed down into the gutters with each passing rain.

installation. Slate fines result from trimming, cutting, and nail punching operations that occur during fabrication at the quarry and during installation on the roof (Figure 2). The slate fines cling to the surface of the slates, and some will remain no matter how well the slates are swept as the means of temporary roof access (typically brackets and planks) is broken down and removed from the roof at the end of the slating process. Fines remaining on the roof after completion will gradually be washed downslope and into the gutters with each passing rainfall.[3] This is typical of all slate roofs, regardless of slate type and is not an indicator of slate quality or durability.

Myth No. 4: A Few Broken Slates One Year After Installation is an Indication of Poor Workmanship

As discussed in Myth No. 1, it is not unusual for broken slates to occur a year or two after installation. Cracks can occur in the slate shingles as slaters trim, punch, install, and walk on the slate during the construction process. Many of the cracked slates are identified as the slaters break down their means of access and are replaced with new, matching slates. Some cracks, however, are too fine to be identified, or are located in the concealed portion of the slate shingles. It is these few slates that can break and slide out of position early in the roof's service life.[4] Many designers specify that the contractor who installed the roof is to return to the project site after a year or two to address these few broken slates.

The quantity of broken slates occurring within the first years of service due to insipient cracks is typically quite small on a well installed roof; on the order of one-tenth of one percent (.1%). For example, on a roof measuring 10 squares (1,000 square feet) in area, between 1 and 5 broken slates might be expected, depending on the size of the slate installed. (The quantity cited is size-dependent because the number of slates in a square varies based on slate size; from 98 per square for 24" x 14" slates to 533 per square for 12" x 6" slates, assuming a standard 3" headlap.) Generally, the steeper the roof slope, the fewer the number of broken slates. This is due, at least in part, to the fact that steeper roofs experience less foot traffic during construction.

It is worth noting, as well, that replacement slate shingles matching the color and size of those to be replaced are generally readily available and can be obtained from active quarries or salvage companies. Manufactured synthetic shingle products, on the other hand, often have been discontinued, or manufacturers have gone out of business, making procurement of matching replacement synthetic shingles difficult and often impossible to locate.

Myth No. 5: Attic Stock Will Break-Down Quickly Because it is Not Exposed to the Weather

While it is true a) that blocks of slate are more difficult to split into shingles when they lose their quarry sap (inherent moisture within the stone) and quarries make every effort to prevent this from happening, and b) hot-cold cycling can result in the transformation of certain impurities contained within some slates into gypsum, thereby resulting in an expansion in volume and delamination over long periods of time, it is not true that slates stored indoors become more brittle and/or less durable.[5] Fifty to 100-year old slate shingles stored in attics tend to ring as true as the day they were placed there when sounded with one's knuckles or a slate hammer. Protection from the weather - both wet-dry cycling and the extremes of hot-cold cycling - certainly plays a role in maintaining the integrity of slate stored indoors.

Myth No. 6: There are No Slate Roofing Contractors Anymore

A shortage of construction workers has confronted the building trades in general since at least the turn of the twenty-first century as older workers retire and fewer young people enter the field, preferring less physically demanding work opportunities. While there are fewer slaters in the field today than 25-years ago, the trade is not dead (Figure 3). One only need look as far as the National Slate Association's website for a list of slate roofing contractors by state. Certainly, many others exist. It is important to verify the experience and reputation of those purporting to have expertise in slate roofing by checking professional references, memberships in trade associations, articles written, business licenses, general liability and workers compensation insurance, and recent similar projects. In addition, there is a movement within the construction industry to attract and train the next generation of roofing mechanics and provide them with viable career paths. Efforts include those by the National Roofing Contractors Association (e.g., its ProCertification Program, which NSA is helping to develop), SkillsUSA, various preservation trade schools, union labor apprenticeship programs, and the Slate Roofing Contractors Association's hands-on training courses.

Figure 3: Slate roof installation in progress.

Myth No. 7: Slate Roofs are Too Heavy

Slate roofs are heavy. The weight of a slate roof, of course, depends on the thickness of the slate. Quarter-inch thick slate weights approximately 935 pounds per square (per 100 square feet of roof area), or 9.35 pounds per square foot (psf), when laid with a standard 3" headlap. Half-inch thick slate weighs approximately 18.70 psf.[6] At these weights, the loads can be too great for standard post World War II construction. At the very least, if a structure never had a slate roof, a licensed structural engineer should evaluate the roof framing and associated load paths to determine if a slate roof is feasible, or whether supplemental framing or other modifications are needed.

So-called "lightweight" slate roofing first appeared in the U.S. in the early part of the twentieth century. These systems reduced the overlap of the shingles from a 3" headlap to a simple lap, thereby allowing for a reduction in the size (length) of each shingle and a consequent reduction in weight. The lack of headlap was accommodated by interweaving felt paper in with each course of slate. Such systems failed fairly quickly as the felt paper interlayment rapidly degraded with exposure to the weather and ultraviolet (UV) light from the sun, especially in the bond lines between slates.

More modern lightweight slate roofing systems address the issue in a manner similar to the early systems. They are proprietary in nature, but typically employ high density polyethylene (HDPE) as the interlayment between courses of slate. Thus far, with 10 to 15 years of in-service experience, the interlayments have performed well, although some of the systems have suffered from other issues, since resolved, such as use of inferior imported slate. Manufacturers report a reduction in weight of from 40 to 50 percent compared to a traditionally installed slate roof.

Myth No. 8: Natural Roofing Slate is No Longer Available

Although there has been a consolidation in the number of commercial slate quarries and a number of quarries and slate types are in transition at the time of this writing (Fall 2022), S_1 North American natural slate shingles[7] are very much available in a wide variety of colors and all standard sizes. Slate from the Buckingham district of Virginia, the Vermont/New York district, and the Glendyne quarry of Canada, representing the full range of historical colors – black, green, gray, purple, red, mottled purple and green, strata gray – are in full production and readily available in the marketplace. What's more, the deposits in these dis-

tricts are so vast that the supply of natural slate is ensured for centuries to come. In addition, the Penn Bid Bed quarry of Slatington, Pennsylvania, is under new ownership and readying to gear up operations, and it is only a matter of time before unfading clear purple is once again available as the quarries in Vermont and New York continue to work their beds. As always, custom sizes and blends are also readily available.

In addition to new natural slate, there is an active, abundant market for reclaimed natural slate shingles. The service life of natural slate is so long that the pinnacle of sustainability – salvage and reuse – is a common occurrence. Reclaimed natural slate of all types and colors is available for new construction, where, for example, it may be desirable for the roof of an addition to match that of an existing, adjoining roof, and for repair work, where replacement slates match not only the type, color, and weathering characteristics of the original slate, but their patina as well. Reclaimed slate is even available for natural slate shingles whose production ceased many decades ago, such as Pennsylvania's Peach Bottom and Chapman (aka Hard-Vein) slates and Maine's Monson slate.

A list of NSA member quarries, distributors, and proprietors of reclaimed natural slate is available on NSA's website, slateassociation.org.

Endnotes

[1] There are, of course, exceptions to the estimated service lives of slates from the various regions. In the Monson, Maine, district, for example, there were two or three quarries in Brownville that produced roofing slate with an expected service life of only 75 to 85 years, as compared to the higher quality slate produced by the other 14 or 15 quarries in the Monson District which produced slate shingles having an expected service life of 150 years. Similarly, in the Soft-Vein District of Pennsylvania, whereas most quarries produced slate shingles with an expected service life of about 60 years, Cathedral Gray, an unfading medium gray slate with an occasional olive tint, is known to have had a service life of 100 years or more.

[2] District currently inactive.

[3] A similar occurrence is associated with the granules on asphalt shingle roofs.

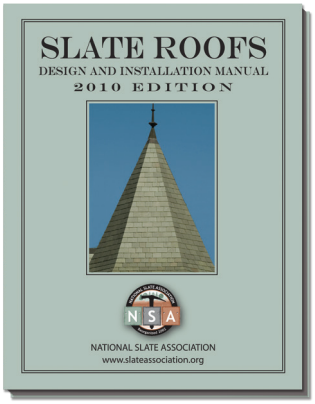
[4] Note that cracked slates stemming from the fabrication process at the quarry and subsequent shipping and handling as the slate is brought up to the roof are typically culled prior to installation as each slate is sounded (tapped with the slate hammer) to reveal the presence of hidden cracks.

[5] Typically, by the time a slate shingle is installed on a roof it has lost all of its quarry sap.

[6] This compares to the typical weight of other roofing products as follows: asphalt shingles 2 to 4.5 psf, depending on the style of the shingle; clay tile 6 to 15 psf; metal .7 to 1.5 psf depending on the type of metal and configuration; and, wood (Western Red Cedar) shingles 2 to 6.5 psf, depending on size and whether they are dry or wet.

[7] "S_1" refers to the highest grade of natural roofing slate in compliance with ASTM C406, Standard Specification for Roofing Slate, with an expected service life of 75 years or more.

For more information on slate roofing, please see *Slate Roofs: Design and Installation Manual,* 2010 Edition, available at www.slateassociation.org



For more information about The National Slate Association, visit **www.slateassociation.org**

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Published by the National Slate Association