

# SLATE ROOFING

*EST. 500,000,000 BC*



*Beauty, durability, presence, and stature*

*Understanding the history of slate roofing,  
types of roofing slate available, and  
the installation practice.*

# Natural Slate Deposits

**S**late is a microcrystalline, fine-grained metamorphic rock formed over millions of years of heat and pressure. The rock is harvested from the ground, split into uniform pieces, and then hung on the roof. There are no additives to the slate—100% natural stone.

Your slate roof will last over a 100 years, it is fireproof, and adds an aesthetic beauty that is unmatched.

For hundreds of years slate roofs have been installed in an overlapping system. This method of installation provides the roof with an added layer of protection and a physical density.

*The role of the roof* cannot be understated. It shelters a building's interiors and its occupants from the forces of nature, protects vital utility systems, and helps to define the exterior's aesthetic. The roof's necessity has bred its ubiquity and, by extension, fostered a strong market for roofing materials ranging in performance and physical characteristics.

*Architect Magazine*

**Slate tiles are not simply a decorative feature but a roof system. A triple overlapping system that has been designed to protect a structure while standing the ultimate test of time.**

## History of Slate

Understanding the history of most building materials may seem unnecessary as new materials are being developed replacing obsolete ones, yet natural slate is the exception. For thousands of years, natural slate has been used in construction processes. Structures with slate roofs dating back to the Roman times are still standing in the hills of Spain. These structures have been protected by slate and will continue to be for generations to come.

Slate was sent to the New World in ships to be used by the first settlers as tablets and roofing for their structures. In the newly formed United States, the building boom motivated the settlers and elected officials to build structures that would last. With the increased supply of slate from England and Europe, port cities up and down the east coast began to install natural slate roofs. The slate protected the structures from the sea air and the severe storms of the Atlantic.

During the eighteenth century, several rich slate deposits were discovered in Virginia, Vermont, New York, and Pennsylvania. It was during the 19th century that commercial availability of slate was developed in the roofing industry.

Production of slate peaked in the early 1900s. In the 1950s new alternative materials became available emulating the look of slate yet without the longevity, durability, and aesthetic appeal.

At the peak of production in the 1920s the majority of slate came from Pennsylvania, the softer stone was easier to produce into roofing slates. The gray or black slate from Pennsylvania is no longer commercially available for roofing slate.

Today natural slate is widely available and growing in popularity. With today's global appetite for the material, slate is shipped around the world, protecting structures, preserving history, and make sure that new buildings make history.

SLATE SOLD BY PRODUCERS IN THE UNITED STATES, 1929, BY STATES AND USES

State	Operators	Roofing		Mill stock		Other uses (value)	Total value
		Squares (100 square feet)	Value	Squarefeet	Value		
1929							
Arkansas.....	1					*	*
California.....	2					*	*
Georgia.....	1					*	*
Maine.....	2	3,720	\$ 38,316	702,740	\$ 613,996	\$ 1,315	\$ 653,627
Maryland.....	3	*	*				214,770
New Jersey.....	1	*	*				*
New York.....	22	14,670	204,362			634,169	838,531
Pennsylvania.....	38	251,880	1,967,428	8,011,080	2,473,838	356,934	4,798,200
Vermont.....	51	151,810	2,214,869	1,222,660	614,311	875,714	3,704,894
Virginia.....	6	35,460	434,628			*	*
Undistributed†.....		4,580	61,163			754,135	1,035,156
	127	462,120	\$4,920,766	9,936,480	\$3,702,145	\$2,622,267	\$11,245,178

\* Included under "Undistributed."  
† Includes output of States entered as (\*) above.



# How slate is processed

Regardless of the origin of the slate, each roofing slate tile is processed in a similar manner.

Slate is either sawn or blasted to remove it from the ground.



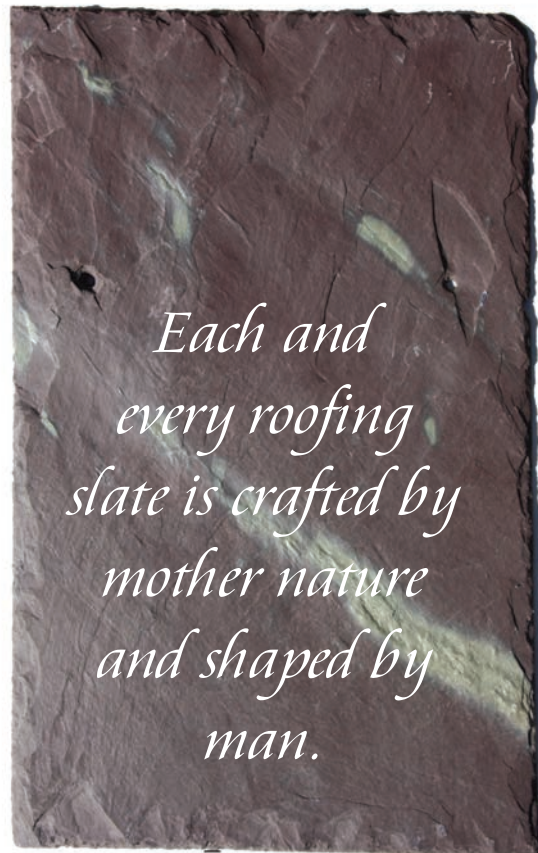
The large blocks are cut down to size in a rectangular format.



The blocks are kept wet to aid in splitting the slate.



The blocks of slate are hand split with a hammer and chisel. Tiles with imperfections are culled out and used for crushed stone. The tiles are sorted by thickness and size. These slates are now called chips before the edges are trimmed to a specific size and holes are punched in the slate.



Slates are packaged at the factory, taking care to make sure that the slates are vertically stacked and packed tight to avoid breakage in transportation. Slates are packaged in crates for overseas transport or pallets for domestic use.

*Slate is a roof made of simply rock; all natural, with a proven track record.*



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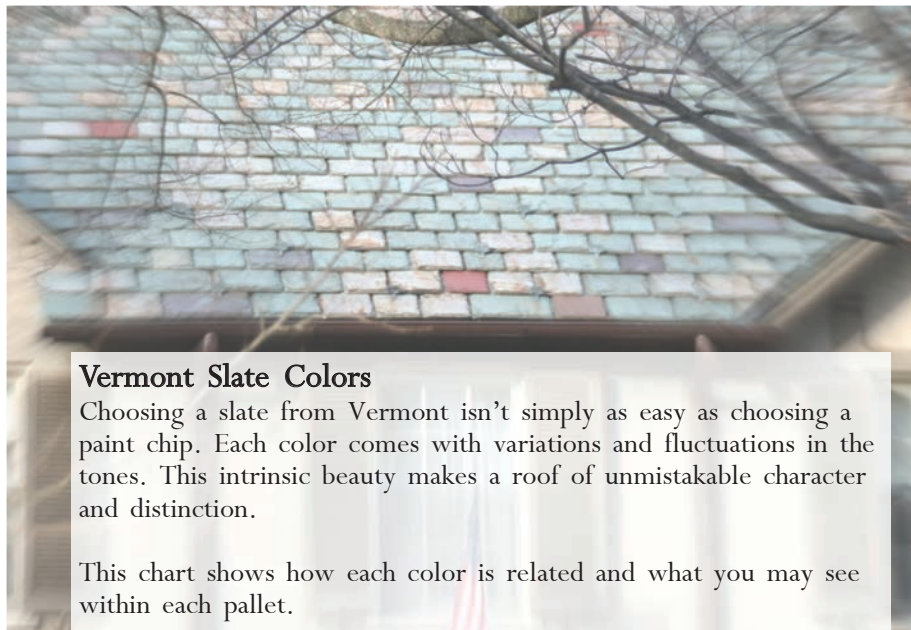


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# Natural Slate from the Vermont Valley



Vermont produces some of the world's most uniquely colored slates, from the delicate green and gray tones to the regal purples and red. These slates adorn some of the most prominent buildings at Universities, Churches, State Houses, and thousands of private residences around the world.



## Vermont Slate Colors

Choosing a slate from Vermont isn't simply as easy as choosing a paint chip. Each color comes with variations and fluctuations in the tones. This intrinsic beauty makes a roof of unmistakable character and distinction.

This chart shows how each color is related and what you may see within each pallet.

- Vermont Black
- Vermont Gray
- Unfading Gray
  - ↳ Dark Unfading Gray
  - ↳ Unfading Gray Green
- Unfading Purple
  - ↳ Mottled Purple
  - ↳ Unfading Green
- Unfading Green
  - ↳ Unfading Gray
- Semi-Weathering Gray/Green
  - ↳ Semi-Weathering Gray
  - ↳ Variegated Purple
  - ↳ Unfading Green
- Unfading Red
  - ↳ Unfading Purple

## Understanding Unfading and Semi-Weathering Slate

**Unfading Vermont Slate** is available in Gray, Green, Purple, and Red. These slates will hold their initial color with slight coloration changes of less than 10%. Purple and Red slate will experience the least amount of change.

**Semi-Weathering Slate** is available in Gray, Gray/ Green, Black, and Purple. Each quarry will weather anywhere from 10% to 90% depending on the deposit of stone.

## Slate Thickness

Every slate is hand split with a hammer and chisel, thicknesses WILL VARY.

Each of these ranges is target sizing, some variation may occur.

Standard thickness 1/4-3/8" (@900-1100 lbs. per sq.)

Heavy 3/8-1/2" (@1400-1600 lbs. per sq.)

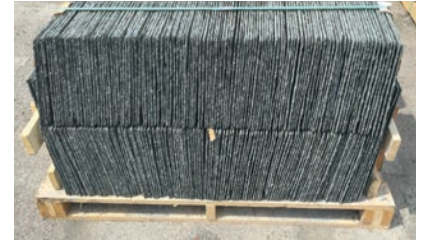
Extra Heavy 1/2"+ (@1900-2500 lbs. per sq.)





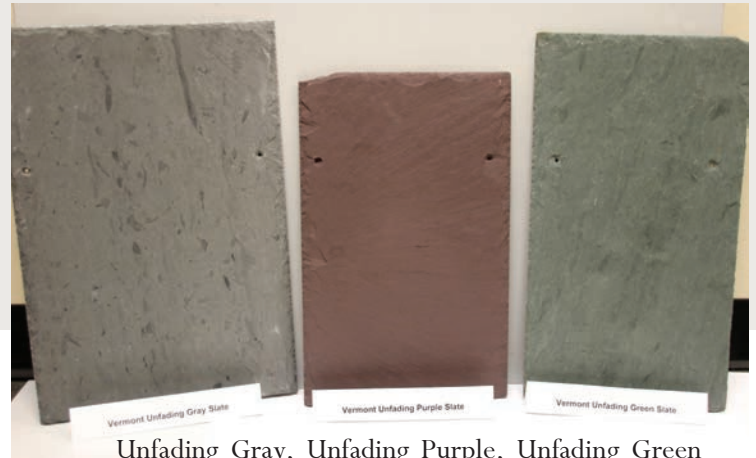
# Vermont Unfading Green

Vermont Unfading Green is one of the most abundant slates of the Vermont slate valley. This stone adorns such structures as the Pentagon, many prestigious universities, and numerous private residences. The subtle tone of the slate varies only slightly.



# Vermont Unfading Gray

Vermont Unfading Gray slate is a medium gray color with markings of darker tones. This slate is often blended with Unfading Green to create variation to the roof.



Unfading Gray, Unfading Purple, Unfading Green

# Vermont Unfading Purple

Purple is commonly associated with royalty, the color least often found in nature, and a roof of un-paralleled performance. The tones of the purple will vary with lighter and darker variations and the natural blaze of green.



All slates will vary in tone and color richness.





## Vermont Black

Vermont Black is noted for its linear patterns that run throughout the slate vein. This semi-weathering slate ages subtly with tones of buffs. Also known as Vermont Gray Black.

**Left photo**– This black slate varies in shades providing a roof with a tonal blend.

**Right photo**– Up close the undertones of the buffs can be seen.



## Vermont Semi-Weathering Gray/Green

*(Also known as Sea Green or Semi-Weathering Green)*

Initially out of the ground the material is a medium gray green color, yet over the first 6 months the slate weathers to tones of buffs, grays, and tans. Weathering will vary between 10-90%. Color variation in this material will run from greens to grays.



## Vermont Semi-Weathering Gray or Vermont Gray

A medium gray with black markings when first extracted from the ground, this slate is often combined with slate blends for a warm color blend of roofing slate material.



**Left photo:** This barn, dating to 1890, still stands because of the protection of the natural Vermont Gray Slate.

**Right photo:** Vermont Semi-Weathering Gray after weathering.



## Vermont Mottled Purple

Vermont mottled purple is the subtle tone of purple accented with the natural green blends. This slate is often used within a slate blend, yet on its own the slate comes alive with sophisticated tone.

**Left photo**— The small size of the slate truly enhance the natural blend of the stone.

**Right photo**— On a larger size format, the slate forms a blend all of its own.



## Vermont Variegated Purple (Semi-Weathering)

Similar in color to Mottled Purple, with green markings, yet a small percentage of the slates will weather to tones on buff and tans.

## Vermont Unfading Red

One of the most rare colors of slate in the Vermont Valley, red slate is usually reserved for accent tiles in a slate blend, yet at times it can be used for a full roof.



## Vermont Blends

Slate blends combines colors in patterns and in random occurrences to create a roof that is truly one of a kind.

These roofs have been equated to a perfectly planned garden, balanced in tone, texture, and balanced with the overall aesthetics of the structure.



# Unfading Black Spanish Slate

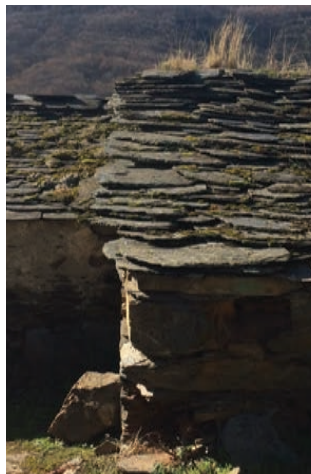
Unfading black slate is the most common color for natural roofing slate. Natural deposit of the unfading black material are found in Virginia, Spain, Canada, and Asia. One of the largest of these deposits is found in Northern Spain.

The deposit of Spanish slate has been locally quarried for several hundred years. Slate was used on low slope buildings in an unstructured format as a roofing material. This stone has helped protect these buildings and the history they embody.

Today's modern industrialization of the industry has helped to produce a slate supply of tremendous commercial availability with a consistency in production.

This material covers prominent structures throughout the world, and will continue to protect our history for generations to come.

*9 out of every 10 slates  
in the world are installed  
with Spanish Slate.*







Spanish slate (on the left side addition) matches up well with the existing Buckingham, Virginia original slate that was installed in the 1950s.



## *Buckingham, Virginia slate*

This deposit of natural slate was discovered in the late 1700s. The rich dark blue black tone, hard density, and large deposit of slate made it an ideal roofing product. In the 1800s as the roofing material was quarried, it was put on bateaus and poled up the James River to Lynchburg where it would then be moved by rail.



Today the same excellent roofing material is produced in limited quantities.



# Slate Details

Slate doesn't simply have to be installed in a traditional manner. Often slate is installed in patterns, intentionally broken edges, and carefully planned accents.



Shadow lines are formed with doubling the layers of the slate.



Slate can be custom cut to form the diamond, scallop, or hexagon accents.

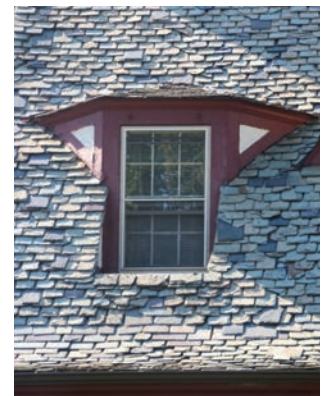


## Slate Size

There are over 60 standard sizes of roofing slates available with numerous thicknesses. Some roofs will combine several sizes of slate on a graduated slate roof. Other roofs may combine the thicker slate with thinner slate to truly create a textured unique roof.



Standard US thickness is 1/4"-3/8", slate is available in thicknesses up to 3/4". 3/8"-1/2" Vermont Blend pictured above.



When selecting the slate size for a specific project, remember to consider proportion and scale— larger slates are not always the best choice. Above the look of a small slate next to the larger format slates create two distinct appearances.



# Addressing Slate Hips and Ridges

There are several ways to treat hips and ridges on a slate roof. Understanding these treatments can provide unique visual characteristics to the roof. These are a few of the most common treatments.

Please visit our websites for other roof line details



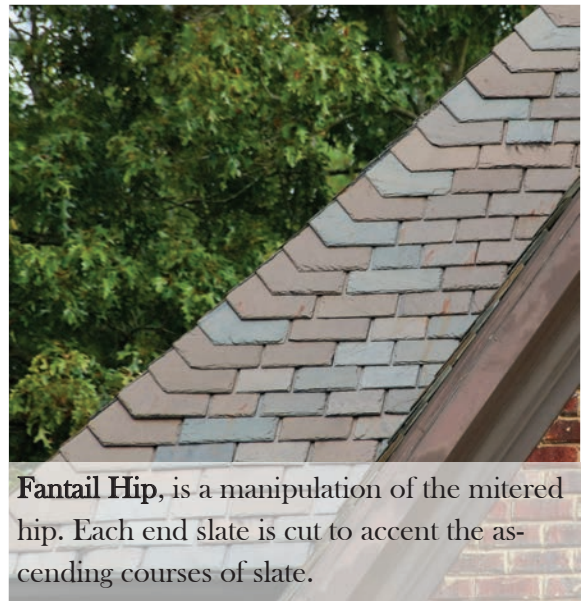
**Mitered Hip**, allows each course of slate to terminate to a tight joint at the edge of the plane. This joint should be as tight as possible. This hip technique is also used for angles that may be great than 90 degrees.



**Saddle Hip**, one of the most commonly used hip treatment involves running an additional row of slate over the hip creating a protruding course of slate. Slates are often counter-flashed between each individual slate with copper.



**Metal Trim Hip**, slate hips may also be addressed with metal trim creating a sleek sharp edge.



**Fantail Hip**, is a manipulation of the mitered hip. Each end slate is cut to accent the ascending courses of slate.



**Saddle Ridge**, is installed in the same way as a saddled hip with an additional course of slate that overlaps the field slates.



**Comb Ridge**, the final course of slate is taken up to the peak of the roof. This treatment may accompany a mitered hip.



# Slate Roof Examples

Slate roof blends of greens, grays, blacks, and purples are an alternative to monochromatic roof. Each blend can never be duplicated creating its own work of art.

Turrets are a common roofline detail that will set a home apart in notability. Individual slates are tapered to create the perfect layout.

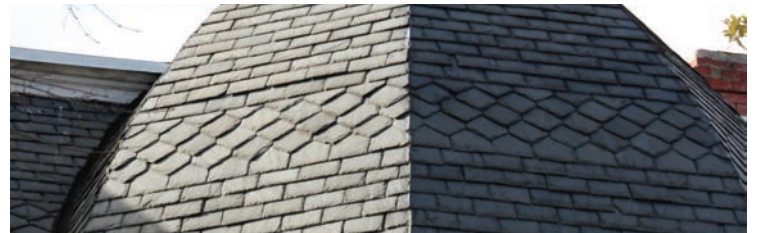


Vermont Purple can be used as a single stand alone color or it can be used in a blend to create a subtle roof unlike any other combination.

**Above left** the purple is used as an accent slate to break apart the tones of the unfading green.

**Above right** the purple is mixed with Semi-Weathering Gray Green and Variegated Purple.





This roof is a Vermont Slate Blend of Semi Weathering Gray, Vermont Black, and Unfading Gray. The roof produces a cohesive blend of analogous tones.



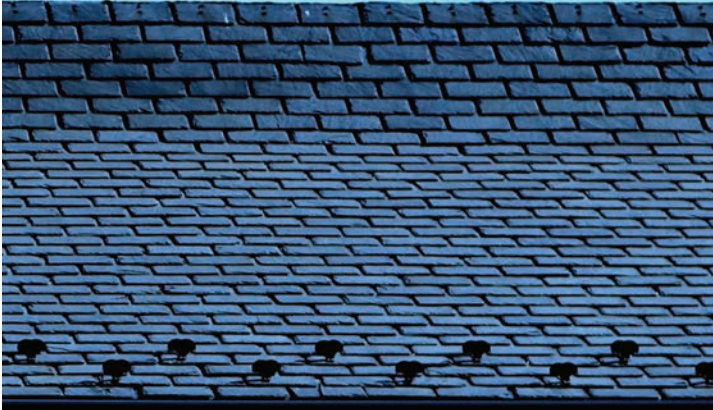
**The Vermont Black** tone is a lighter tone than the rich dark blacks of Spain and Virginia. The Vermont Black (or Vermont Gray Black) will weather slightly to warm tones of buff accented in the grays and natural blacks.



## Single Size *verses* Random Installation

With most slate installations the lengths of the slate will be consistent across the roof (except for graduated and staggered), yet the variations can come with the widths of the slate. In a single size installation each field slate will be the same size, creating an implied line as each alternating course of keyways will line-up.

### Single Size Installation



In a random width slate roofs, the length of all the slates are the same but the widths vary. At least 3 different width will be utilized on the roof. Keyways will be separated by at least 3" from the course above to protect the roof from leaks.

### Random Width Installation

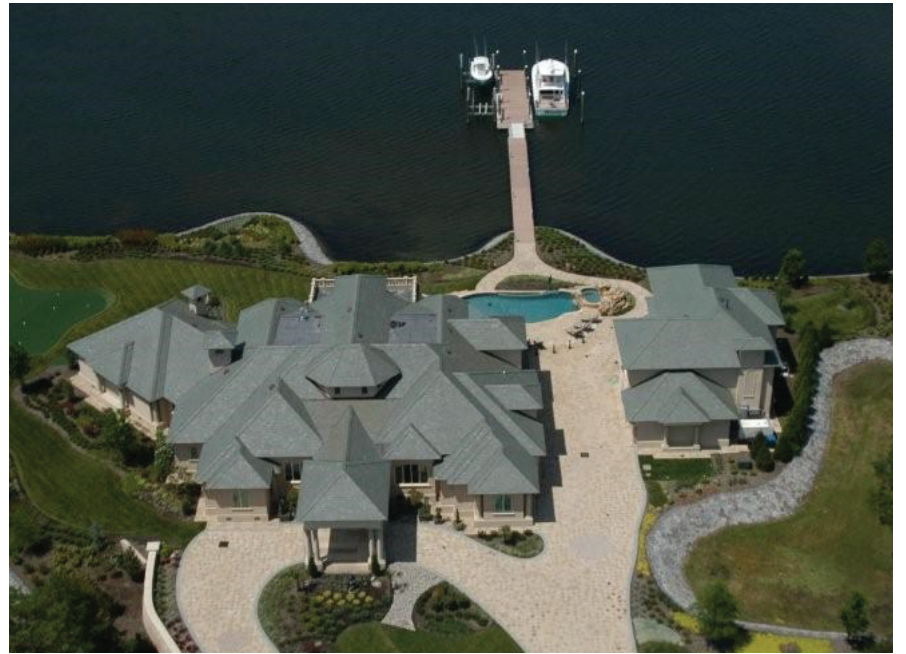


Slate siding is often used in Europe. It can be installed in a similar fashion as roofing slate. Noted for its longevity, maintenance free cladding, and Class A fire rating; slate is a natural choice.



Staggered installation.





*The beauty of slate:  
590 million years in  
the making.*

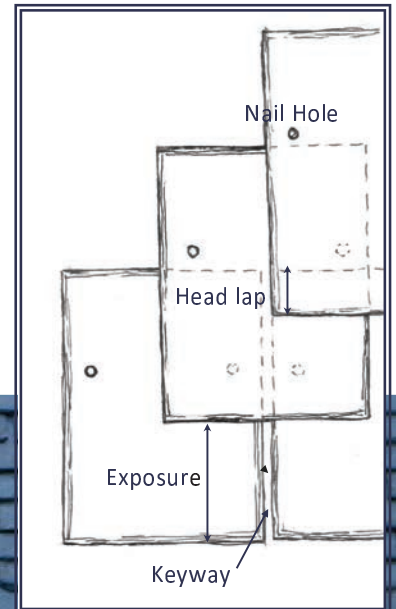
Creating a sample board of actual size slate tiles is one of the best investments before purchasing a slate roof. This sample board was created for the architect and building owner to make sure the color, texture, and thickness matched the adjacent building.



# Installing Natural Slate Roofing

Slate has been installed with a unique triple overlapping system for hundreds of years. This system relies on two copper or stainless nails or a hook installation system. Each roofing tile overlaps the one below allowing for a double layer of protection across the entire roof. The headlap is one of the most fundamental aspects of a slate roof providing the triple overlapping region of slate. The size of the headlap is based on the pitch of the roof.

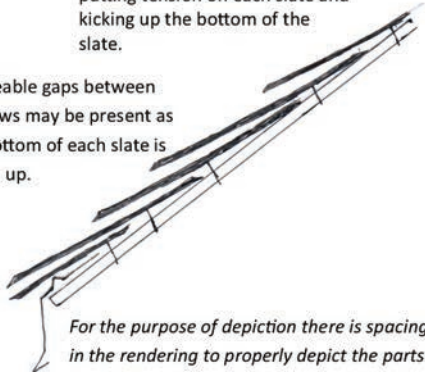
This time tested system has been protecting structures for centuries.



## Overnailed Slate

Nails are hammered down putting tension on each slate and kicking up the bottom of the slate.

Noticeable gaps between the rows may be present as the bottom of each slate is kicked up.



## Properly Installed Slate

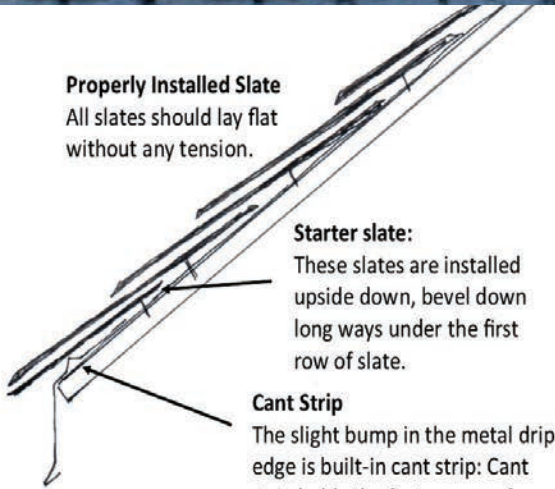
All slates should lay flat without any tension.

### Starter slate:

These slates are installed upside down, bevel down long ways under the first row of slate.

### Cant Strip

The slight bump in the metal drip edge is built-in cant strip: Cant strip holds the first course of slate up to put it in line with the rest of the field

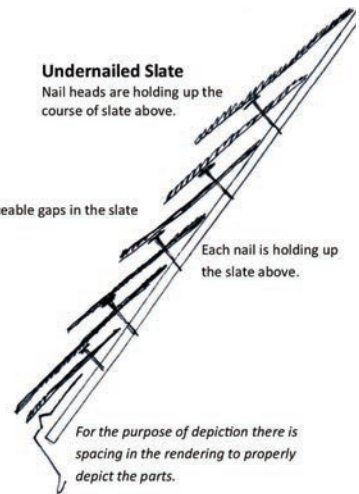


## Undernailed Slate

Nail heads are holding up the course of slate above.

Noticeable gaps in the slate

Each nail is holding up the slate above.



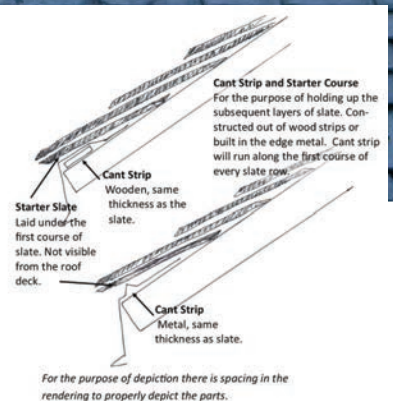
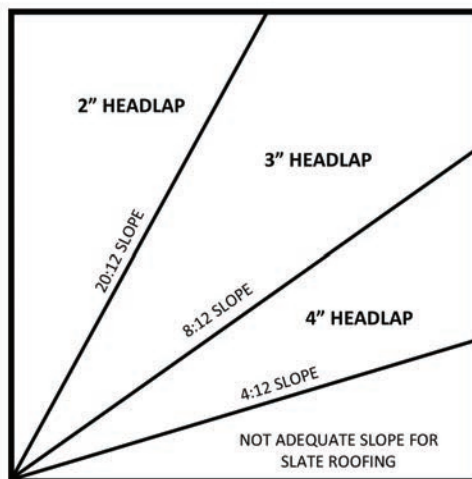
## Things to Consider

**Underlayment**— consider high temp underlayments across the roof, ice and water underlayments in the valleys and eaves.

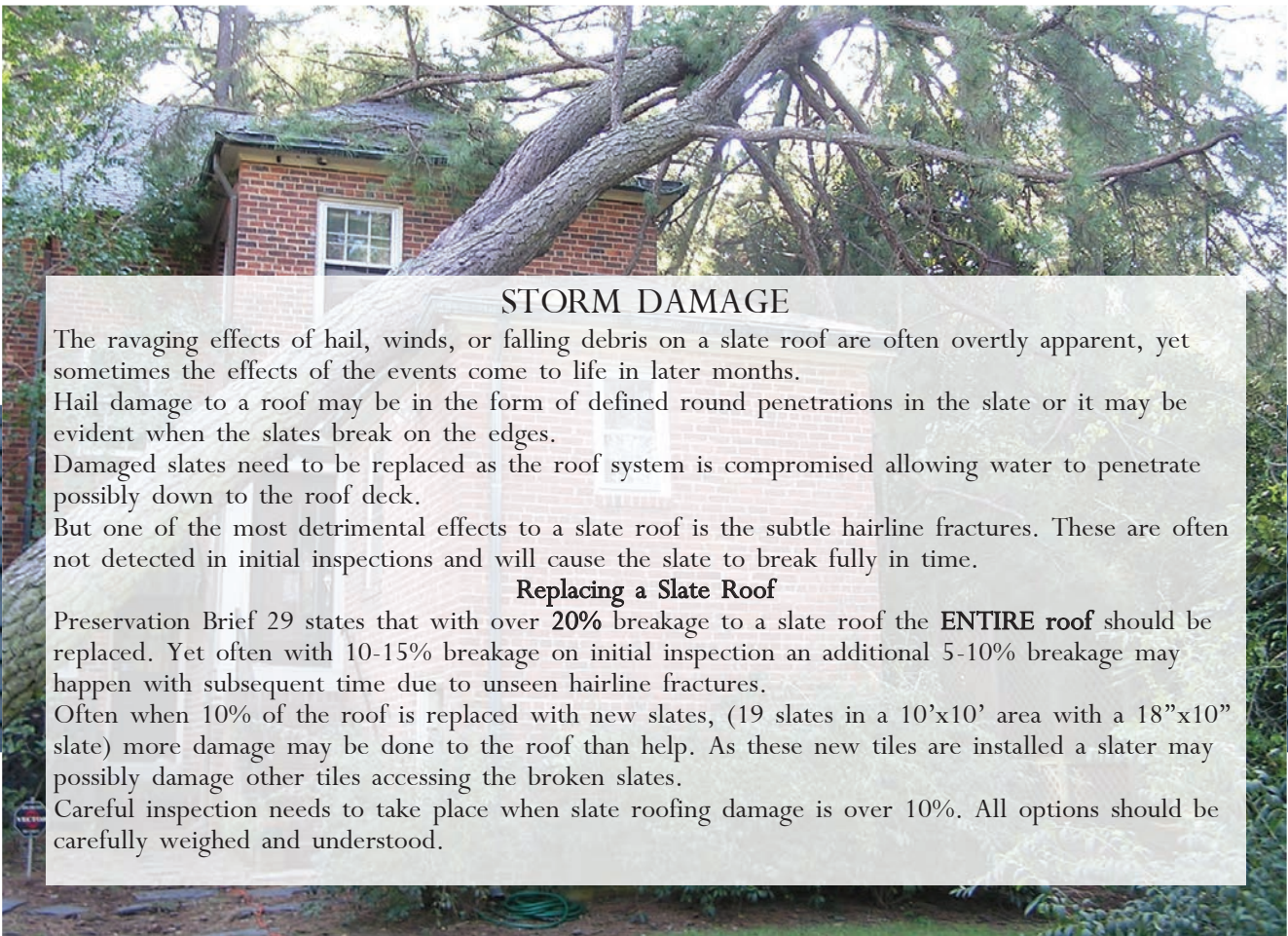
**Slope of the roof**— adjustment of headlap and the pieces per square accordingly.

**Weight** per square. Standard thickness is 1/4-3/8" in the United States weighing @900-1100 lbs per sq. Slate is available in 3/16"-1/4" from Spain with less weight.

**Competent Installer**— there are numerous resources on installation practices and techniques. Call our office for more information.







## STORM DAMAGE

The ravaging effects of hail, winds, or falling debris on a slate roof are often overtly apparent, yet sometimes the effects of the events come to life in later months.

Hail damage to a roof may be in the form of defined round penetrations in the slate or it may be evident when the slates break on the edges.

Damaged slates need to be replaced as the roof system is compromised allowing water to penetrate possibly down to the roof deck.

But one of the most detrimental effects to a slate roof is the subtle hairline fractures. These are often not detected in initial inspections and will cause the slate to break fully in time.

### Replacing a Slate Roof

Preservation Brief 29 states that with over **20%** breakage to a slate roof the **ENTIRE** roof should be replaced. Yet often with 10-15% breakage on initial inspection an additional 5-10% breakage may happen with subsequent time due to unseen hairline fractures.

Often when 10% of the roof is replaced with new slates, (19 slates in a 10'x10' area with a 18"x10" slate) more damage may be done to the roof than help. As these new tiles are installed a slater may possibly damage other tiles accessing the broken slates.

Careful inspection needs to take place when slate roofing damage is over 10%. All options should be carefully weighed and understood.

## Historic Tax Credits

*The Federal Historic Preservation Tax Incentives program encourages private sector investment in the rehabilitation and re-use of historic buildings. It creates jobs and is one of the nation's most successful and cost-effective community revitalization programs. It has leveraged over \$84 billion in private investment to preserve 42,293 historic properties since 1976. The National Park Service and the Internal Revenue Service administer the program in partnership with State Historic Preservation Offices.*

<https://www.nps.gov/tps/>

Preservation Brief 29 specifically discusses the importance of Natural Roofing Slate.



# Ordering Natural Roofing Slate

Slate should not be chosen on color alone. There are several other factors that need to be considered when choosing natural roofing slate.

- **Timing**– Many slate products in multiple sizes are in inventory especially in quantities under 100 squares. But for larger jobs, order early to ensure there isn't a delay in production.
- **Color**– Often slate roofs are chosen for the color alone, yet it should be one factor in choosing the right slate.
- **Size**– Slate sizes range from 10" to 26" in length. Slate proportion should be in relation to the size of the structure and the details on the roof.
- **Random verse Single Size**– A random (or multiple width) slate roof may provide a more unstructured appearance than a single size width roof.
- **Cost**– Although slate may be more expensive than some common roofing products, the cost over the lifetime of the roof is often less.



**Snow guards** can help prevent falling snow from a roof and should be considered in cooler climates.

Type of Slate	Average Breaking Load (lbs.)	Water Absorption (%)	Depth of Softening (inches)
<b>ASTM– C406-10 Specification S1</b>	<b>575 min.</b>	<b>0.25 max</b>	<b>0.002 max</b>
<i>Unfading Black, Spanish</i>	975	.07	0.000
<i>Buckingham, Virginia</i>	815	.02	0.000
<i>Unfading Vermont Green</i>	1025	.03	0.001
<i>Unfading Vermont Purple</i>	1110	.05	0.001
<i>Unfading Vermont Gray</i>	1270	.04	0.000
<i>Unfading Mottled Vermont Purple</i>	1025	.03	0.000
<i>Vermont Semi-Weathering Gray Green</i>	810	.03	0.001
<i>Vermont Black Semi-Weathering</i>	1145	0.02	0.001

## ASTM– C406-10

**Breaking Load**– The sample slate is put under a defined amount of increasing pressure until the slate ruptures.

**Water absorption**– A sample of slate is weighed, then it is soaked in water for a fixed period of time, dried, and re-weighed. The weights are proportioned.

**Depth of Softening**– A slate sample is treated with acid to determine the acid penetration depth into the slate.

<b>Commercially Available Roofing Slate</b>	<b>Pricing</b>	<b>Availability</b>	<b>Stocked Material</b>
Vermont Unfading Red	\$\$\$\$\$\$	Very Limited	Custom produced
Vermont Unfading Purple	\$\$\$\$\$	Limited Production	Limited Stock
Vermont Black	\$\$\$\$	High Production	Stocked
Vermont Unfading Gray	\$\$\$\$	Moderate Production	Stocked
Vermont Unfading Green	\$\$\$	High Production	Stocked
Vermont Mottled Purple	\$\$\$	Moderate Production	Limited Stock
Vermont Semi-Weathering Gray	\$\$	High Production	Stocked
Vermont Semi-Weathering Green	\$\$	High Production	Stocked
Spanish, Unfading Black	\$\$\$	Extremely High Production	Stocked in the USA
Buckingham, Virginia Unfading Black	\$\$\$\$\$	Limited Production	Limited Stock

*Slate size is also a determining factor in the cost of roofing slate.*

<b>Length</b>	<b>Random Width</b>	<b>Single Size Width</b>
12"	\$	\$\$\$\$
14"	\$\$	\$\$\$
16"	\$\$	\$\$\$
18"	\$\$\$	\$\$\$
20"	\$\$\$\$	\$\$\$\$
22"	\$\$\$\$	\$\$\$\$
24"	\$\$\$\$\$	\$\$\$\$\$

<b>Size of slate in inches</b>	<b>Pieces per Square</b>	<b>Exposure with 3" headlap</b>	<b>Size of slate in inches</b>	<b>Pieces per Square</b>	<b>Exposure with 3" headlap</b>
24x14	98	10 ½"	16x10	221	6 ½"
24x12	114	10 ½"	16x9	246	6 ½"
22x12	126	9 ½"	16x8	277	6 ½"
22x11	138	9 ½"	14x12	219	5 ½"
20x12	141	8 ½"	14x11	240	5 ½"
20x11	154	8 ½"	14x10	261	5 ½"
20x10	170	8 ½"	14x9	291	5 ½"
18x12	160	7 ½"	14x8	327	5 ½"
18x11	175	7 ½"	14x7	374	5 ½"
18x10	192	7 ½"	12x10	320	4 ½"
18x9	213	7 ½"	12x9	356	4 ½"
16x12	185	6 ½"	12x8	400	4 ½"



*Slate roofing lasts well over 100 years, so we have one chance in a lifetime to sell you the roof that will be protecting your structure for generations to come.*

*Committed to providing quality slate, accurate lead times, and excellent customer service.*

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