SRCA SEMINAR SERIES

***

NATURAL QUARRIED ROOFING SLATE

Basic Installation

The World's Finest Roof

Slate Roofing Contractors Association of North America, Inc.

SlateRoofers.org

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Ph: 814-786-7015

SLATE ROOF INSTALLATION

SLATE ROOF INSTALLATION

- The Slate Roofing Contractors Association of North America, Inc. is a 501c6 International Trade Association and an AIA Continuing Education Provider.

- The SRCA has published slate roof installation guidelines in both English and Spanish, and slate roof repair and restoration guidelines in English. These are available for free public download at SlateRoofers.org.

Download our guidelines.

What is Slate?

- “Slate is a naturally occurring, fine-grained, metamorphic rock able to be split into tough, thin sheets for roofing, flooring, cladding, and other structural purposes.”
- It is a natural rock with exceptional splitting characteristics.

SLATE ROOF INSTALLATION

Roofing slate is readily available.

SLATE ROOF INSTALLATION

Vermont and NY Red Slate

SLATE ROOF
INSTALLATION

Welsh Purple Slate

SLATE ROOF INSTALLATION

Welsh Black Slate

SLATE ROOF INSTALLATION

NY Red Slate

SLATE ROOF INSTALLATION

Mixed Vermont Slate

SLATE ROOF INSTALLATION

Virginia Buckingham Slate

SLATE ROOF INSTALLATION

Argentina Slate

SLATE ROOF
INSTALLATION

Canadian Slate

SLATE ROOF INSTALLATION

Chinese Green Slate

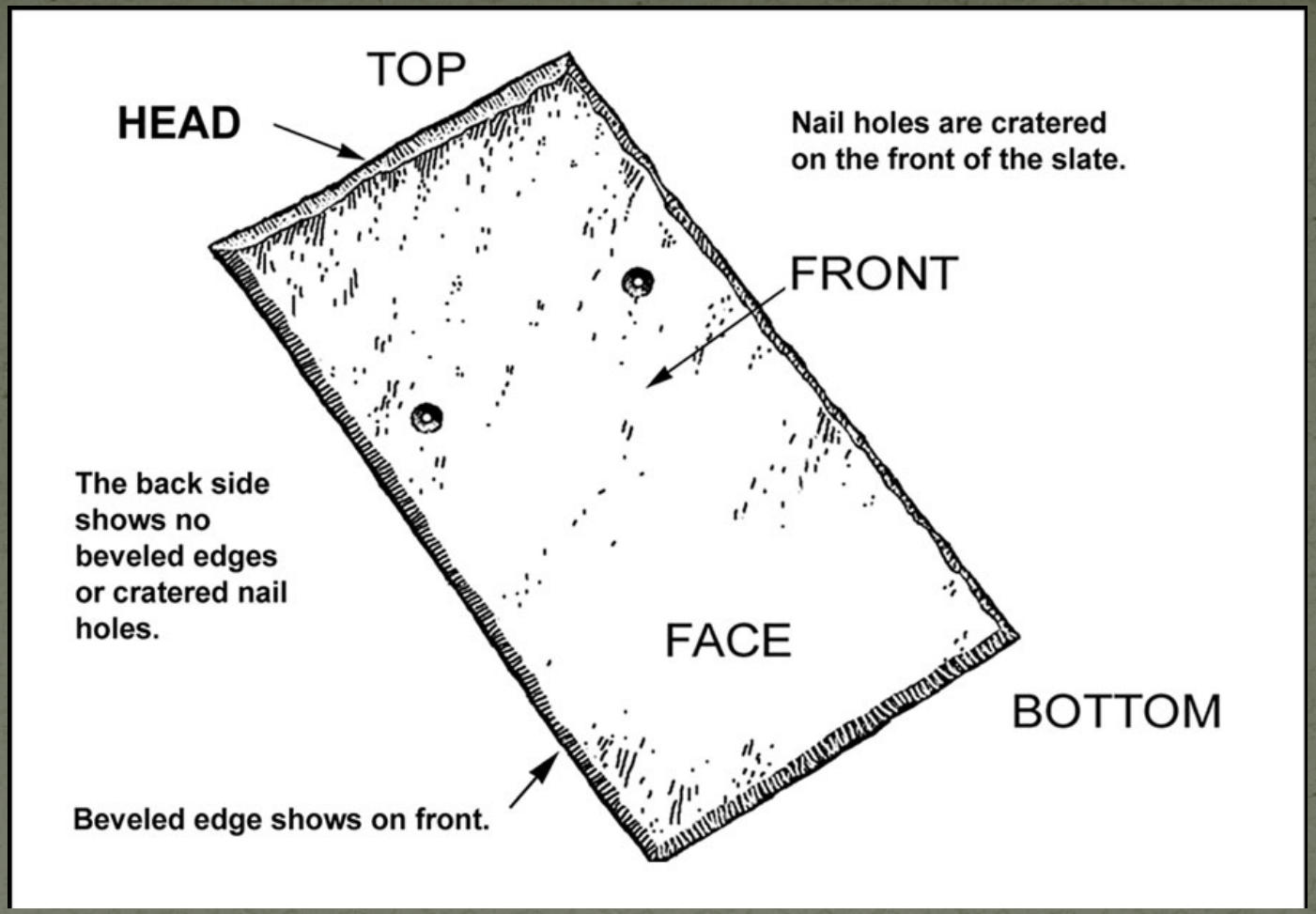
SLATE ROOF
INSTALLATION

Chinese Black Slate

SLATE ROOF
INSTALLATION

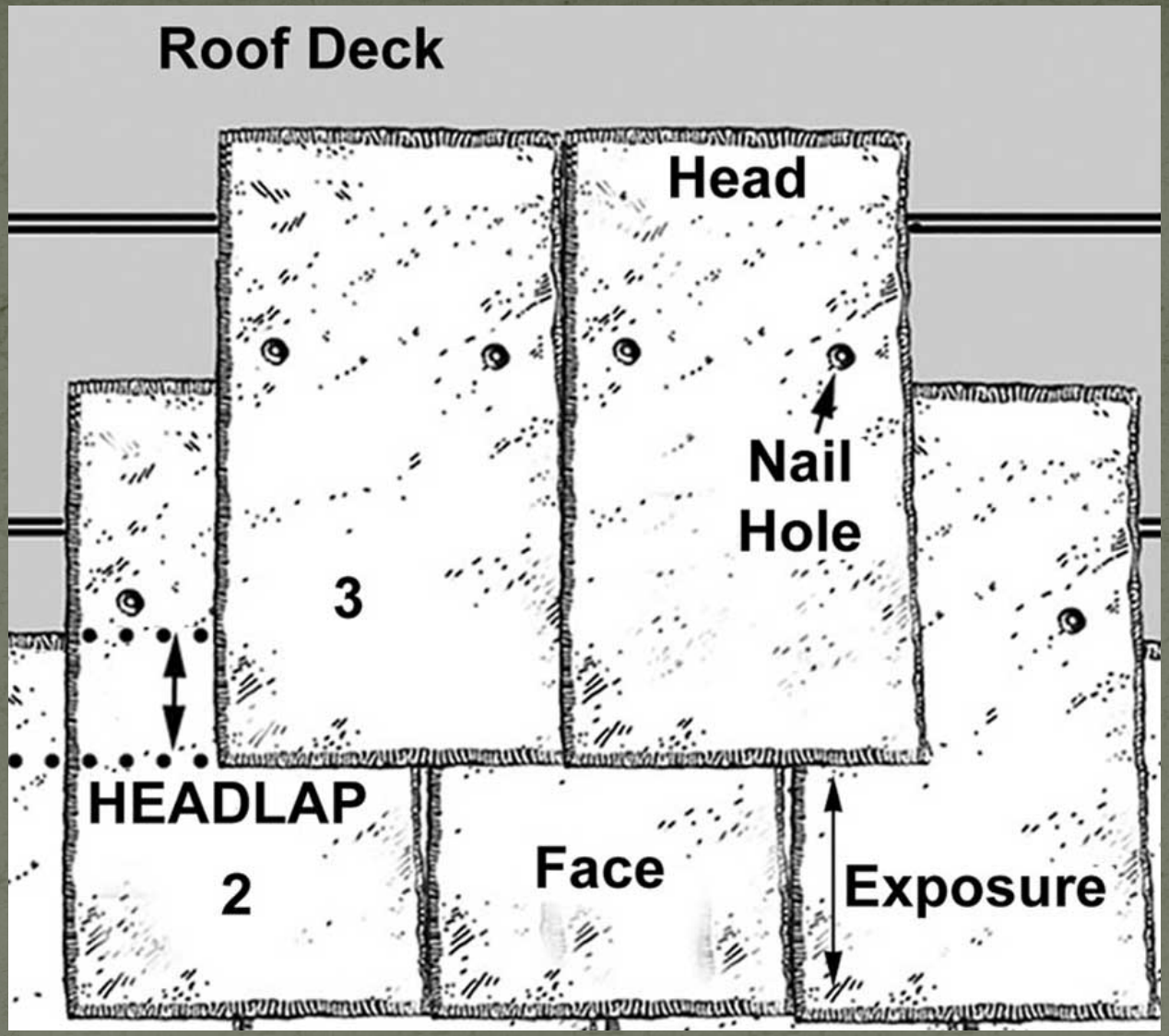
SLATE ROOF INSTALLATION

Spanish Slate



Slate Parts: front, back, top, bottom.

SLATE ROOF INSTALLATION



SLATE ROOF INSTALLATION

Slate Parts: Head, face.

INSTALLATION STYLES

Slate is an extremely versatile roofing material.

SLATE ROOF INSTALLATION

SLATE ROOF INSTALLATION

- 1. STANDARD: all of the slates are the same length and width, although these can include slates of differing colors and shapes
- 2. RANDOM WIDTH: the slates are the same length, but differing widths
- 3. TEXTURAL: thicknesses, textures, colors, lengths, widths and types of slate may be blended for architectural effect

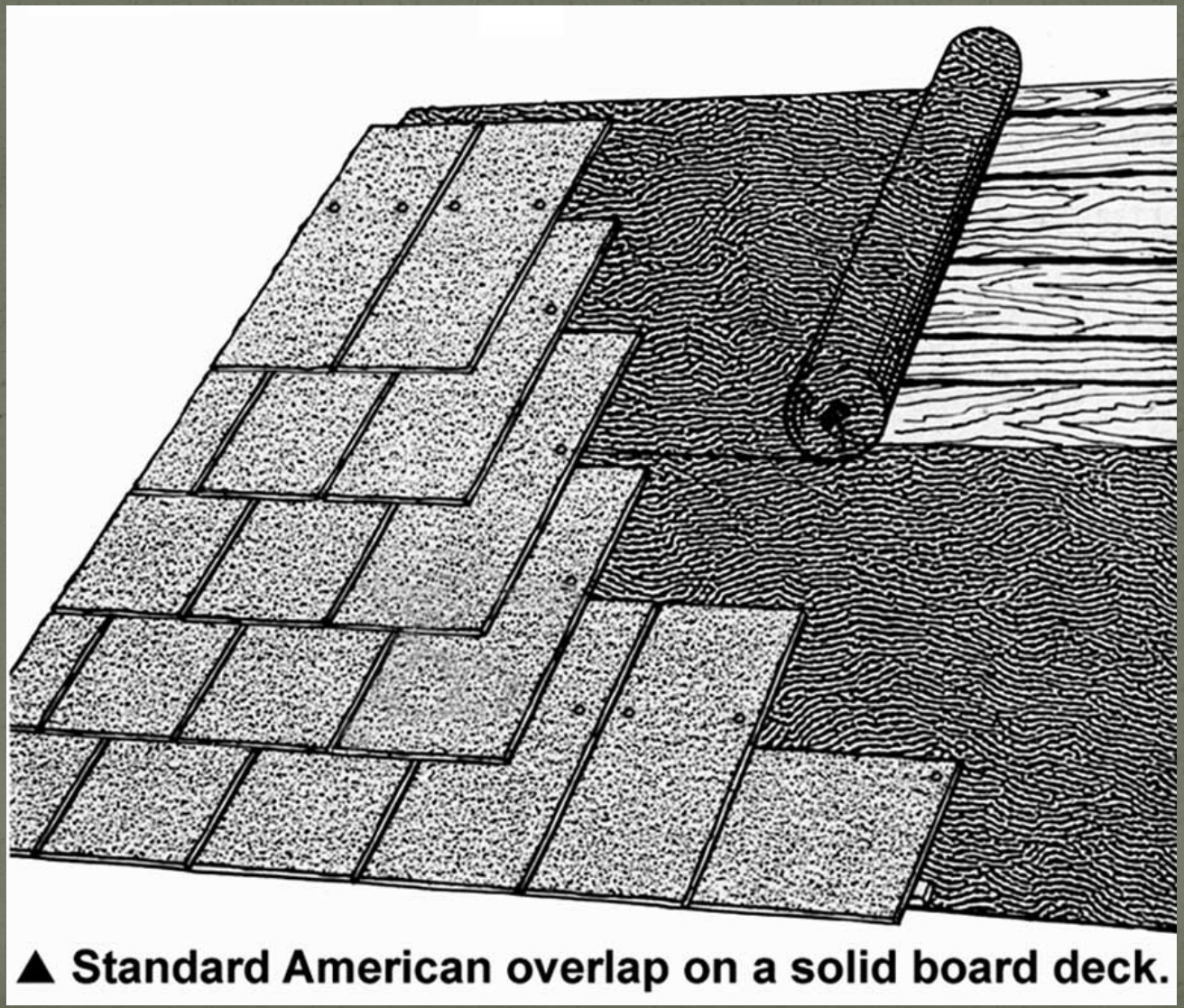
SLATE ROOF INSTALLATION

- 4. GRADUATED: thicker or longer slates are installed near the eaves and the slates gradually decrease in size as they near the top of the roof.
- 5. STAGGERED BUTT: slates of varying lengths are installed in such a manner that the exposed butts are staggered.
- 6. RAGGED BUTT: same as staggered butt except butt ends have irregular cuts.

SLATE ROOF INSTALLATION

Slating Styles

Standard Slating



▲ Standard American overlap on a solid board deck.

SLATE ROOF INSTALLATION

Graduated Slating

SLATE ROOF INSTALLATION

Textural Slating

SLATE ROOF INSTALLATION

Mixed lengths, widths, types, ages.

SLATE ROOF INSTALLATION

NAILS AND FASTENERS

SLATE ROOF INSTALLATION

- Slates should be fastened with a minimum of two roofing nails fastened above the head of the underlying slate as far from the center of the slate as is practical.
- Larger, heavier slates may need four nails per slate.
- Screws should not be used when fastening slates because they cannot be removed with a slate ripper during repairs and maintenance.

SLATE ROOF INSTALLATION

Note that the nails are positioned above the underlying slates and do not penetrate them.

- Slates overlapping sheet metal should have the nails placed to not puncture the metal.
- Exposed nail heads are not permissible except where unavoidable.
- Any exposed nail heads should be sealed with gaskets or high-quality caulk/sealants.
- The application of slate dust to cover exposed sealants is recommended.

NAILS

Recommended nail lengths:

(twice the thickness of the slate plus one inch)

3/16"-1/4" thick slates are to be fastened with 1.5" nails.

3/8" thick slates are to be fastened with 1.75" nails.

1/2" thick slates are to be fastened with 2" nails.

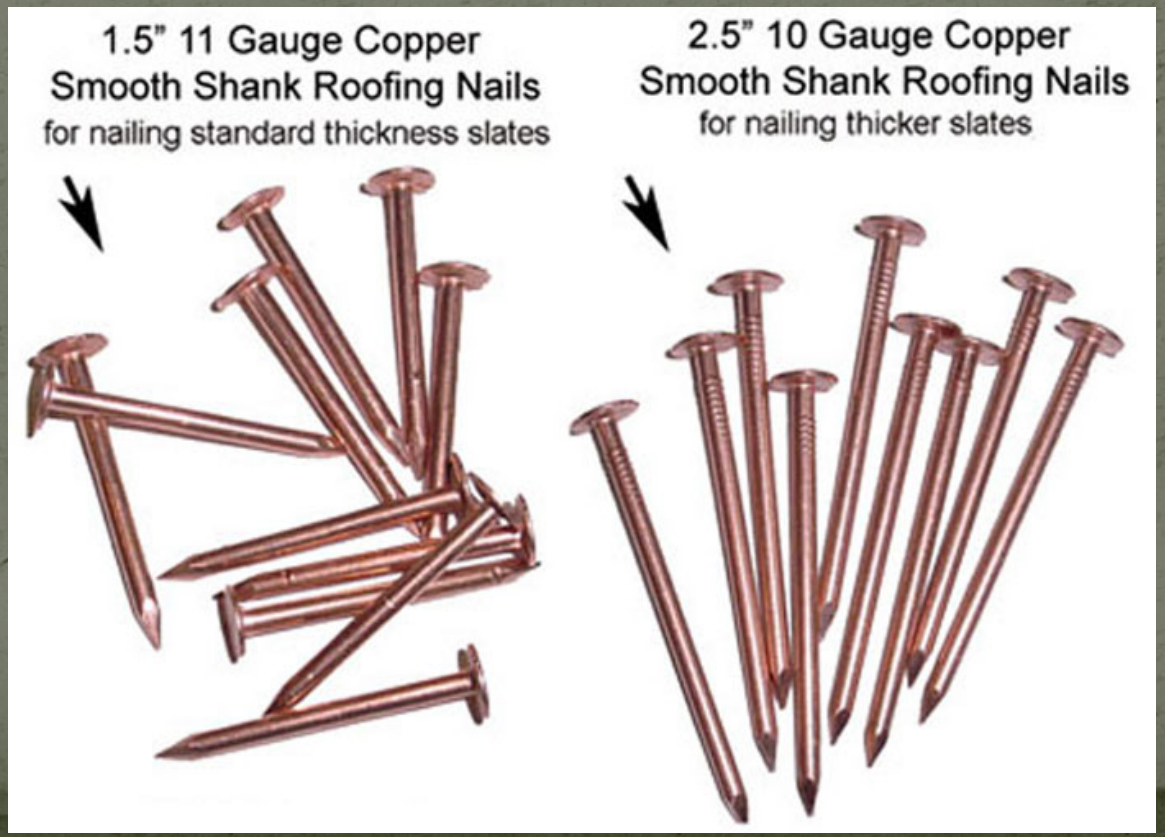
3/4" thick slates are to be fastened with 2.5" nails.

1" thick slates are to be fastened with 3" nails.

SLATE ROOF INSTALLATION

SLATE ROOF INSTALLATION

Roofing slates are installed with smooth-shank nails, not ring-shank. Smooth shank nails can be removed for repairs when needed. Ring shank nails tend to break off.



SLATE ROOF INSTALLATION

These nails are too long. The 1/2 " decking is also inadequate.

The long nails break out the back of the wood substrate, effectively reducing the holding power of the nail.

SLATE ROOF INSTALLATION

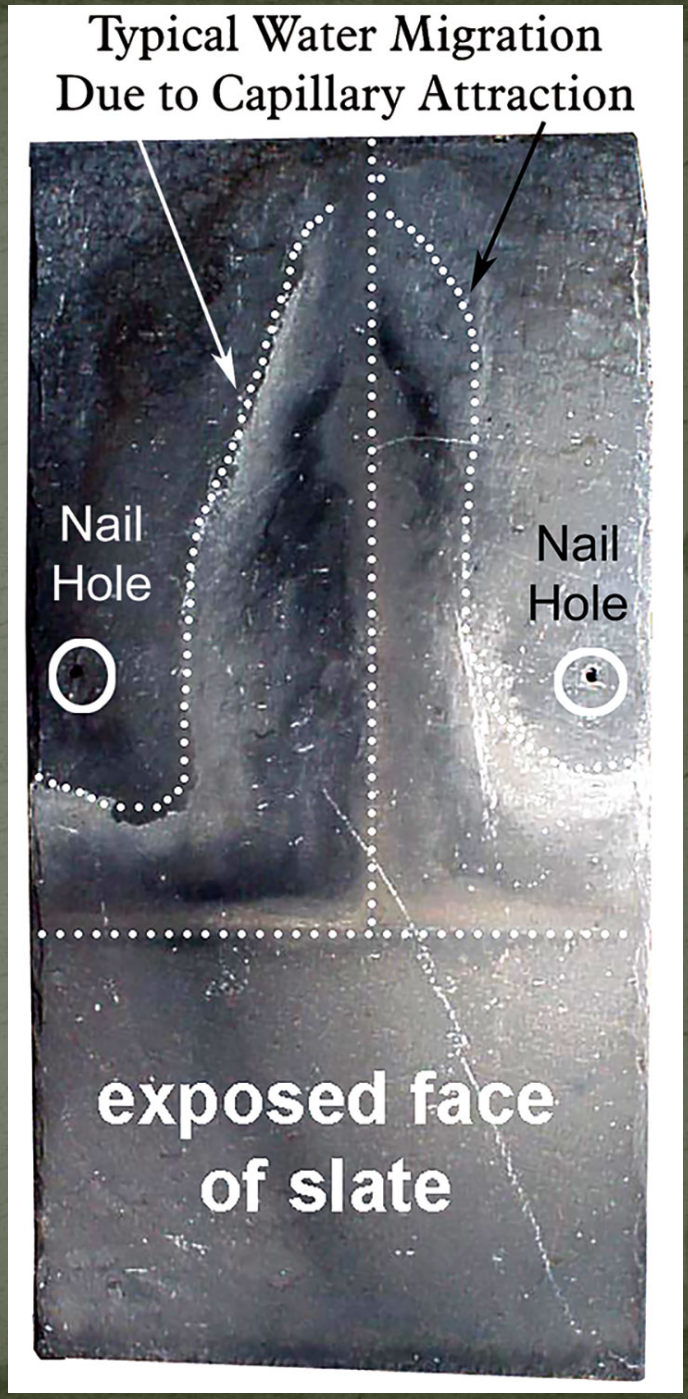
Nail Holes in Slate:
Should be countersunk.

Nail holes should not be more than 1.5 inches from the outer edge of the slates.

SLATE ROOF INSTALLATION

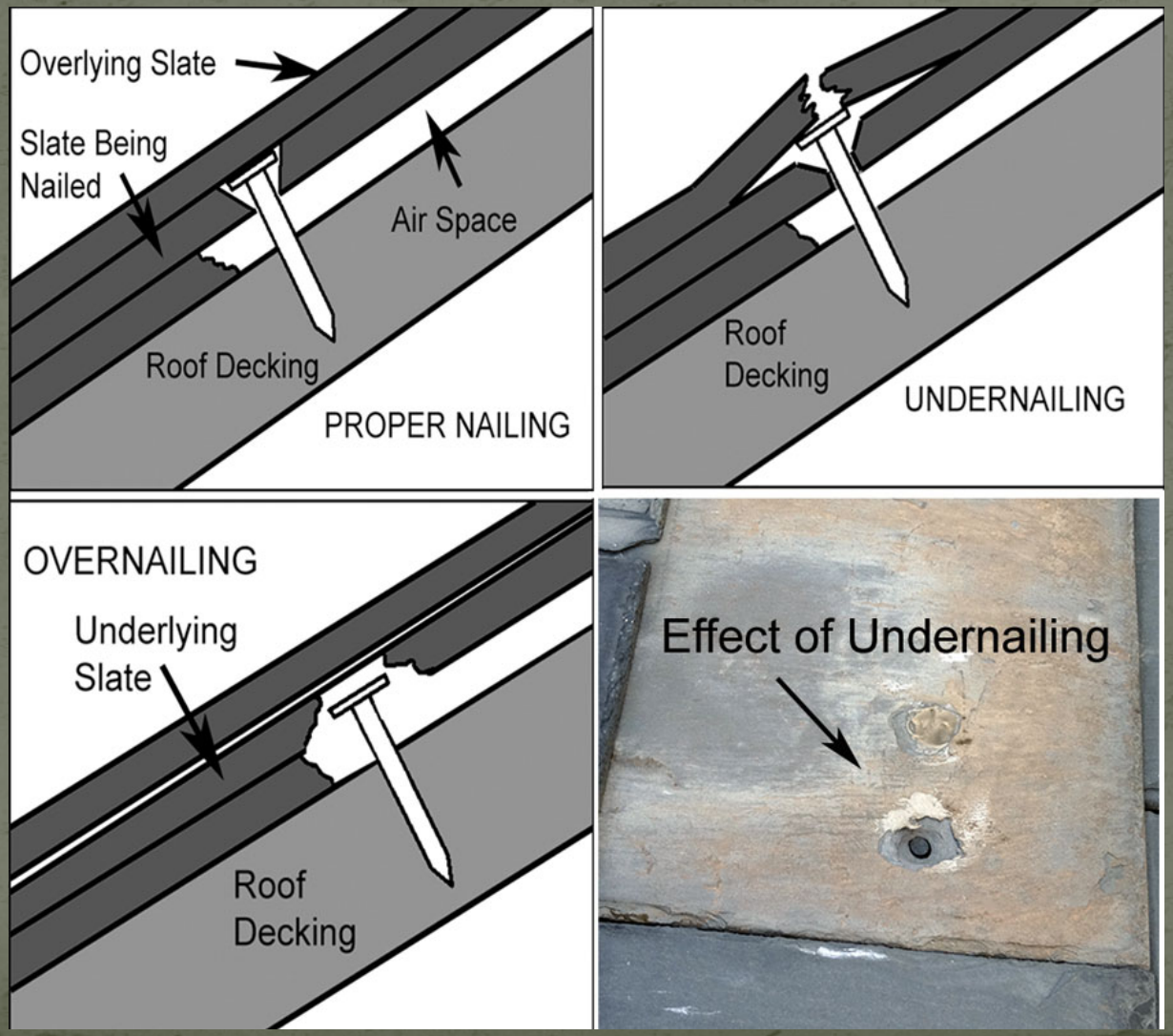
The nails need to be kept away from the center of the slate to avoid water penetration by capillary attraction.

If a nail hole is broken out, punch a new one ABOVE it, NOT closer to the center.



SLATE ROOF INSTALLATION

Nail heads should sit inside the nail hole crater. Drilled holes don't have a crater unless countersunk.



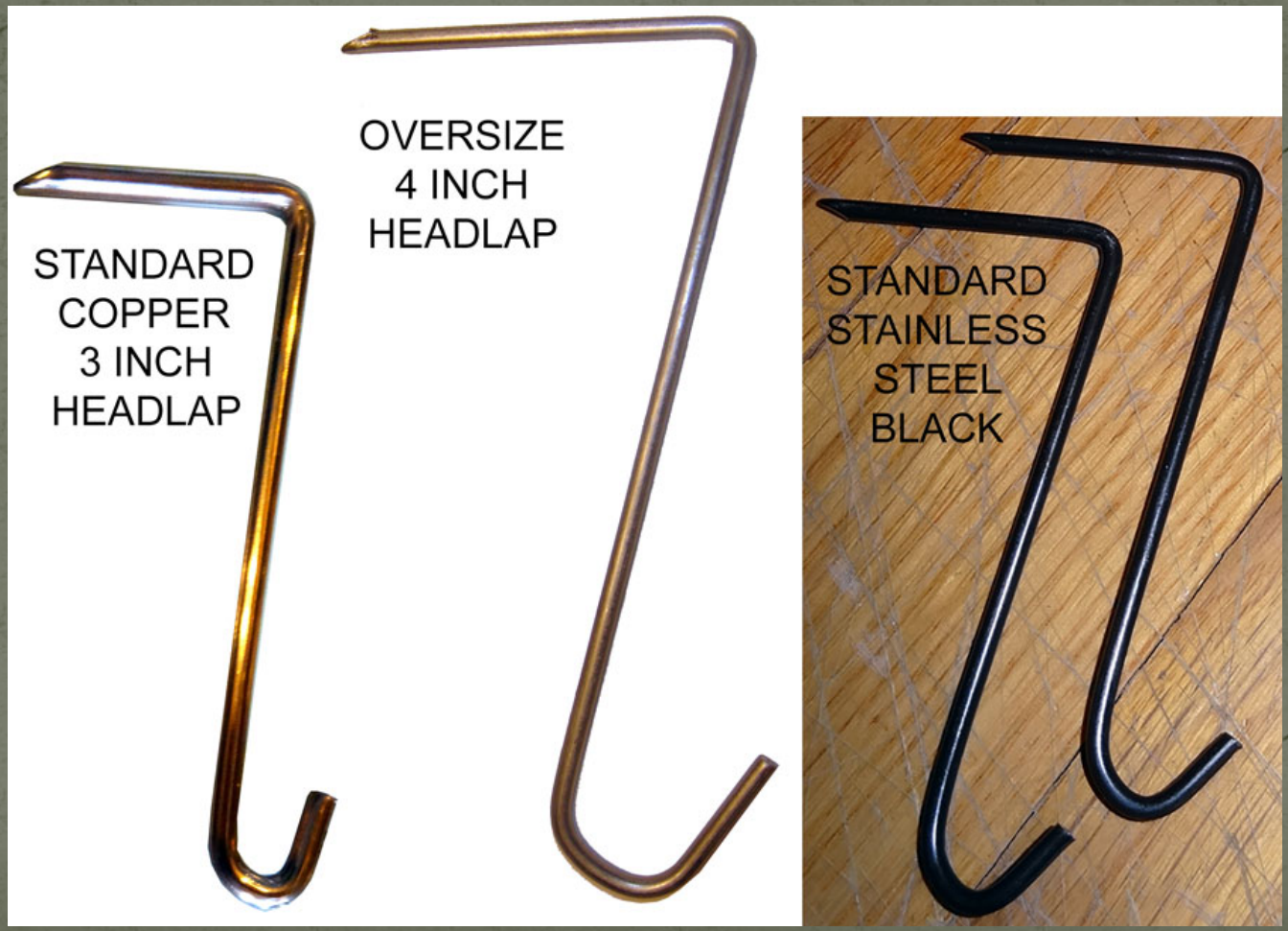
SLATE ROOF INSTALLATION

- Punch new nail holes above the old ones, when needed.
- Don’t bed slates in mastic.
- Always install the roof so it can be taken apart and repaired, when needed, over its 100+ year lifetime.

SLATE ROOF INSTALLATION

SLATE HOOKS

Different sizes and types of slate hooks are available.



SLATE ROOF INSTALLATION

The slate hook is pounded in like a nail.

Copper slate hook installed.

SLATE ROOF INSTALLATION

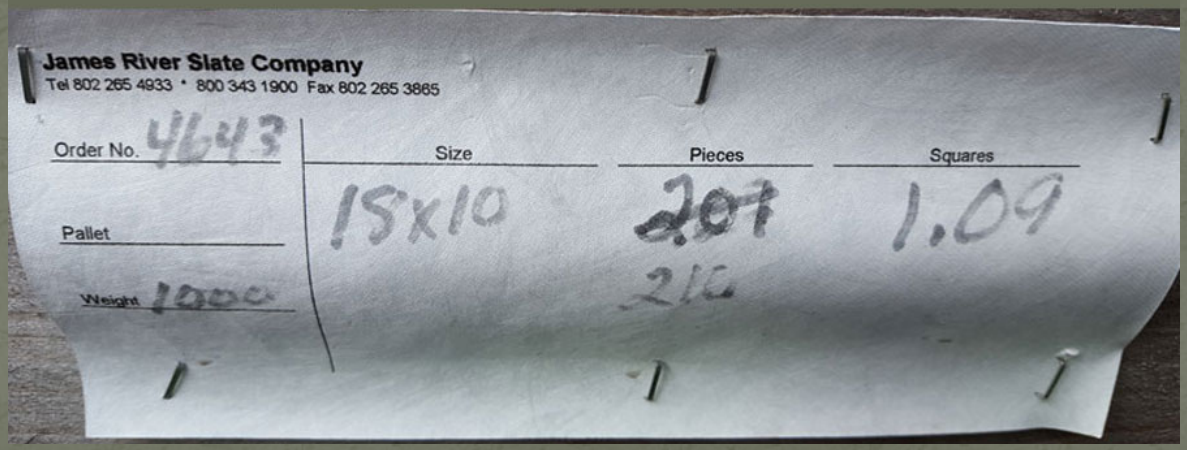
Do not install slates with straps. They're prone to failure and they look bad.

SLATE ROOF INSTALLATION

MATERIALS

SLATE ROOF INSTALLATION

New roof slates should be delivered on pallets with intact labels indicating the source.



SLATE ROOF INSTALLATION

SOURCES OF ROOFING SLATES

- SRCA New Slate Source List:
- http://www.slateroofers.org/sources_new_slate.html

- SRCA Salvaged Slate Source List:
- http://www.slateroofers.org/sources_salvaged_slate.html

SLATE ROOF INSTALLATION

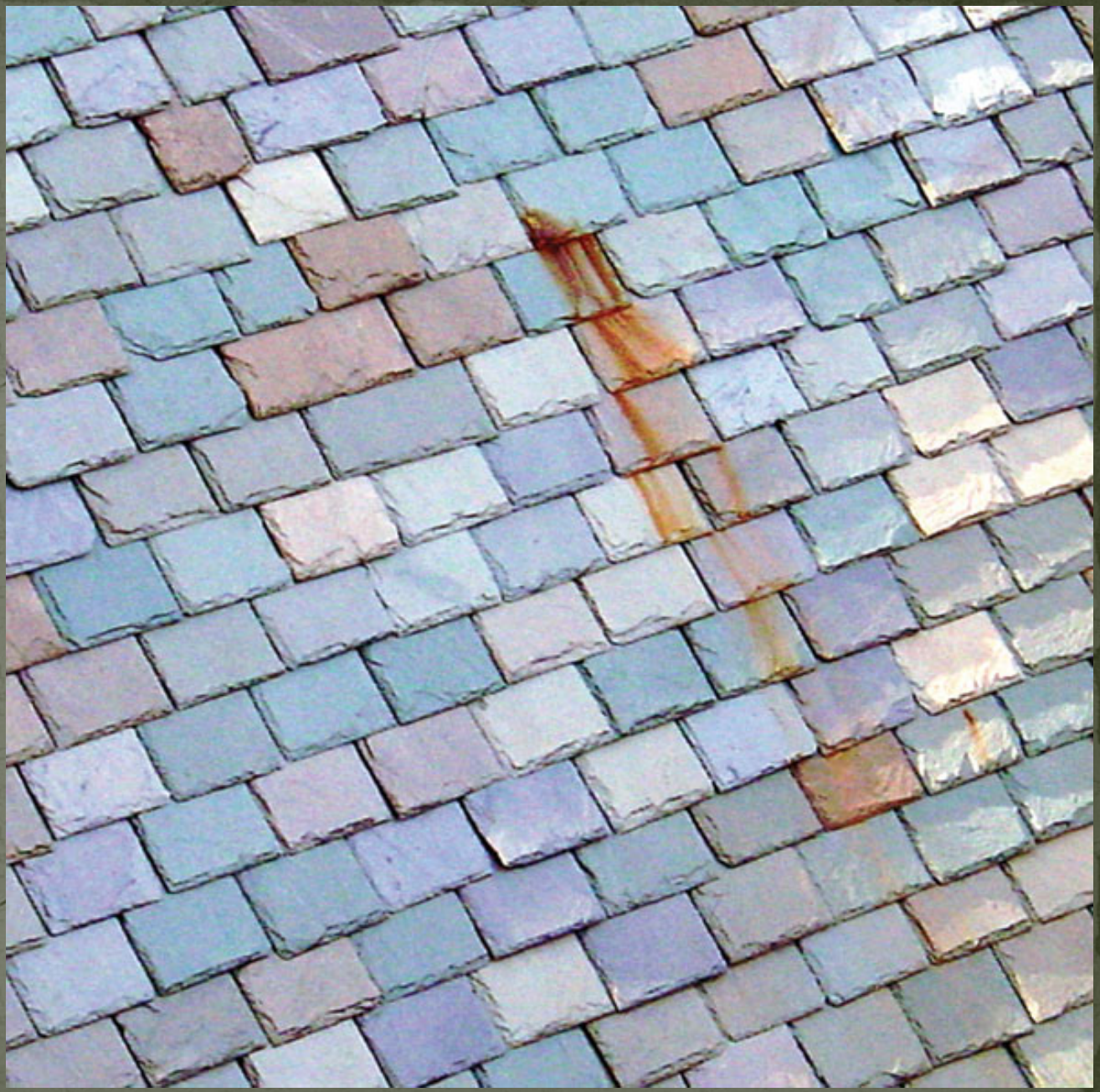
QUALITY CONTROL

No broken or cracked slate can be used, although broken slates can be cut into smaller, unbroken pieces.

Reject rectangular slates with exposed broken corners if a corner is broken off greater than 1.5 inches along the vertical or horizontal edge.

Bumps on the surface of roof slates, sometimes called knuckles, knots, knurls, or cramps, should be installed on the exposed surface so they don't interfere with the laying of the slate. Below are defective slates.

Slates should be free of iron inclusions that can visibly leach rust stains onto the roof.

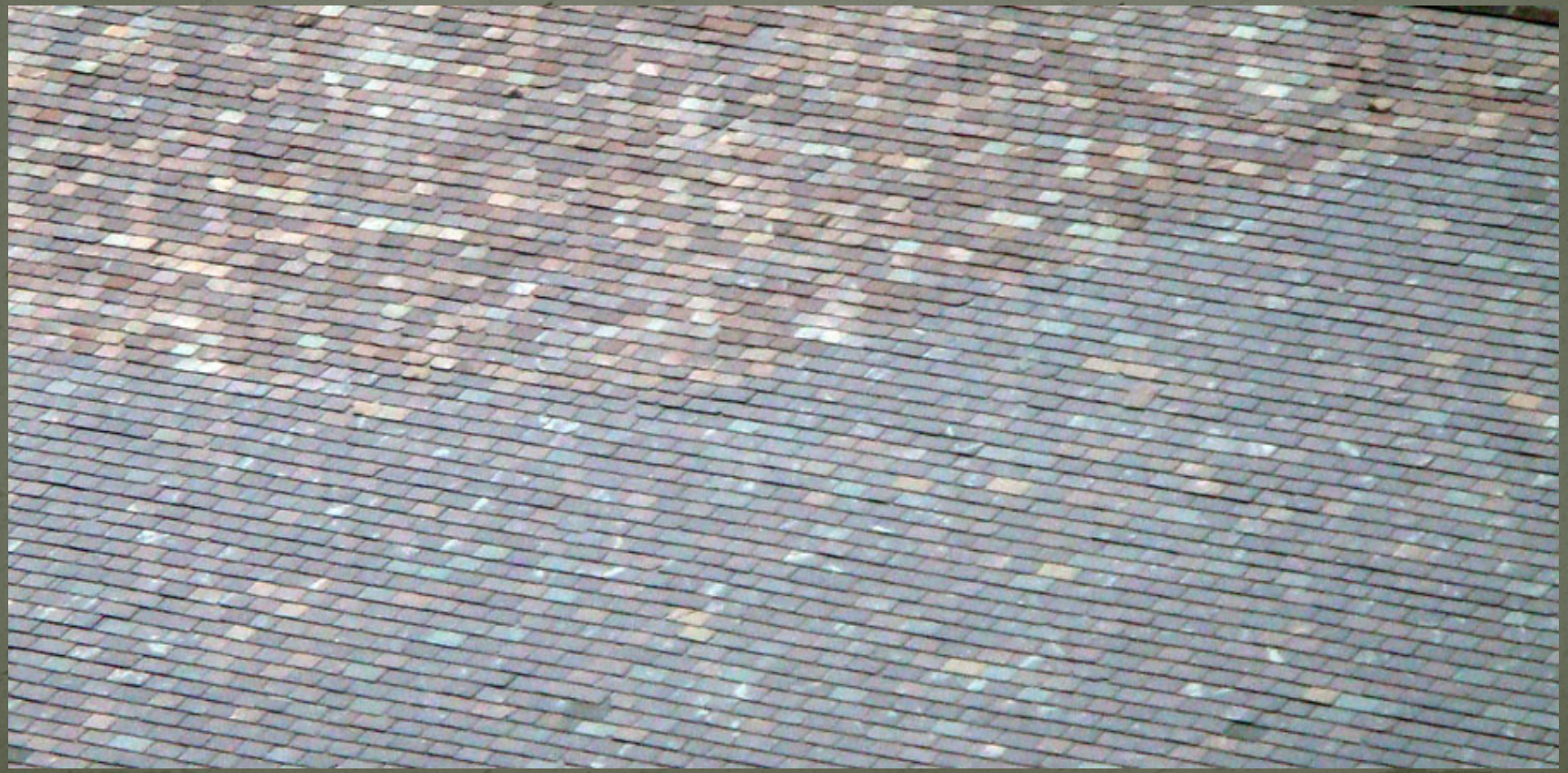


Carbon-bearing PA “ribbon” slates are low quality and should be avoided. These are not to be confused with hard ribbons from Vermont, or Chapman, PA, for example.

Although some VT slates may look like they have ribbons, they are not “ribbon slate.”

Vermont Gray/Black

When supplied on pallets, slates are not to be used from one pallet at a time but are to be used from all pallets simultaneously in order to blend the various pallets uniformly on the roof.



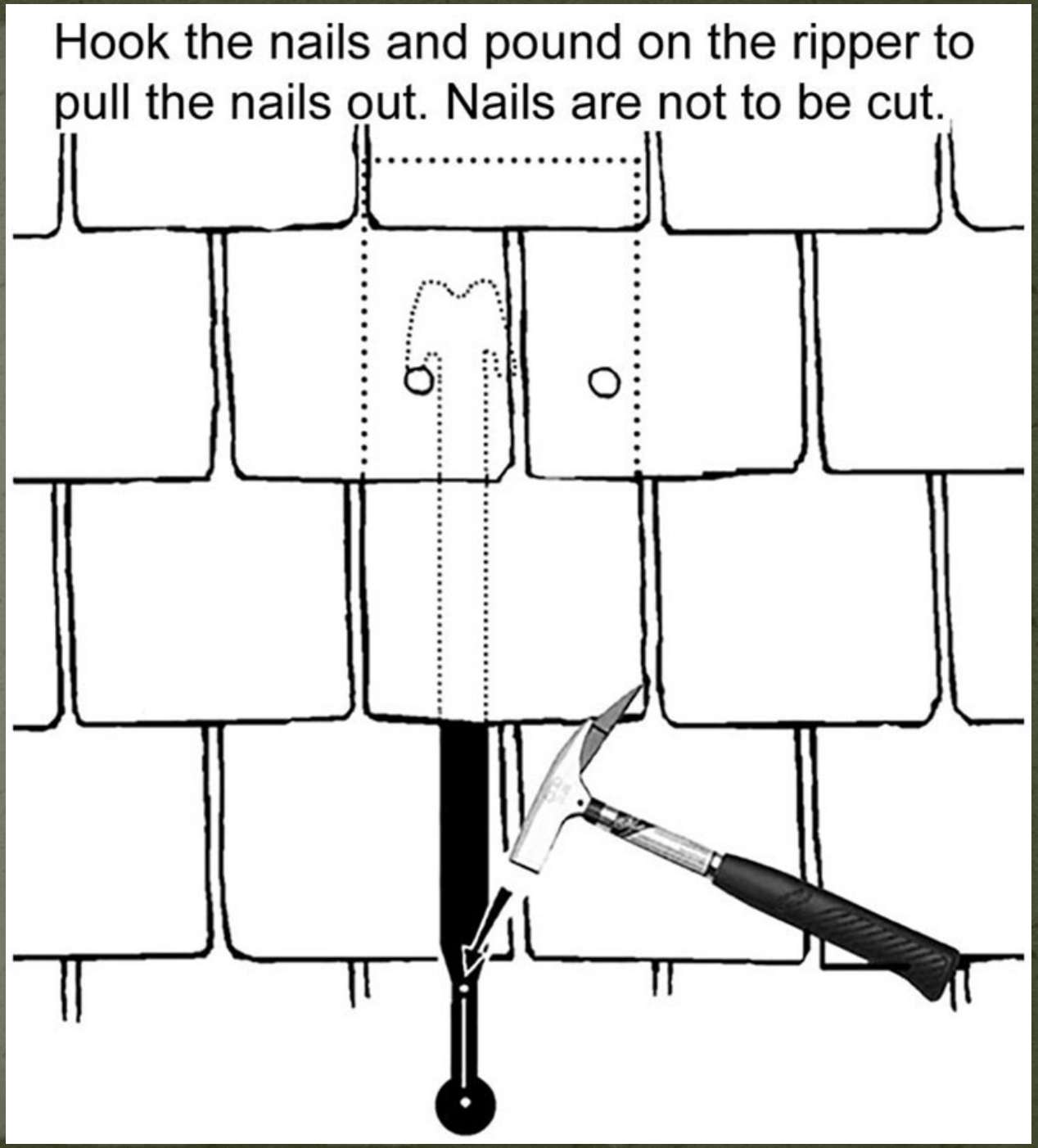
TOOLS

SLATE ROOF INSTALLATION

Slate rippers pull (or push) nails.

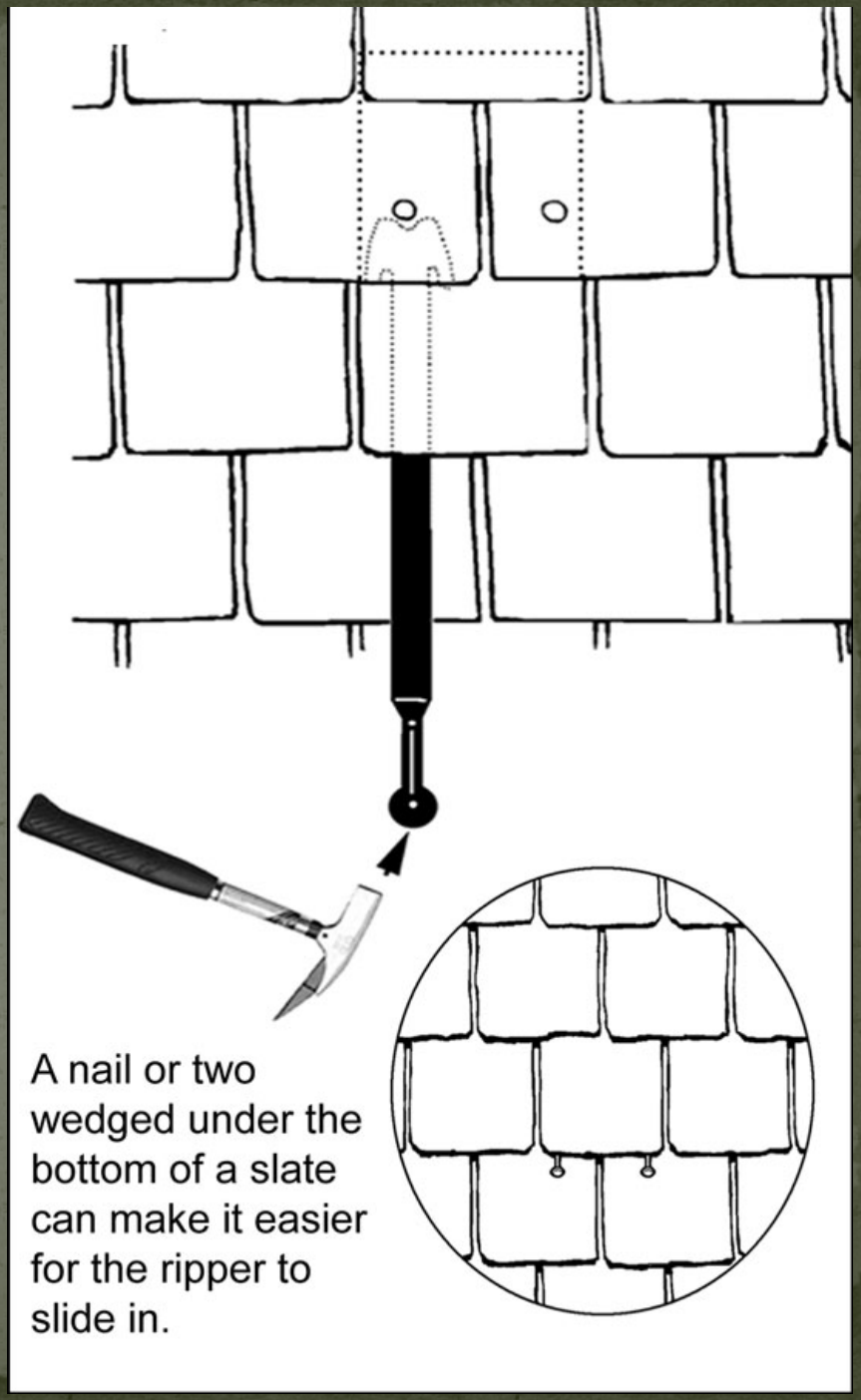
SLATE ROOF INSTALLATION

Slate Rippers pull out slates that have already been installed.



SLATE ROOF INSTALLATION

Rippers can also be used to push nails to loosen them up, making them easier to hook. Sometimes nails must be worked back and forth, pushing and pulling.



SLATE ROOF INSTALLATION

Slate cutters cut and trim roofing slates.

SLATE ROOF INSTALLATION

Cut & punch slates on the back side (except on the starter course, slate hips, and closed valley centers).

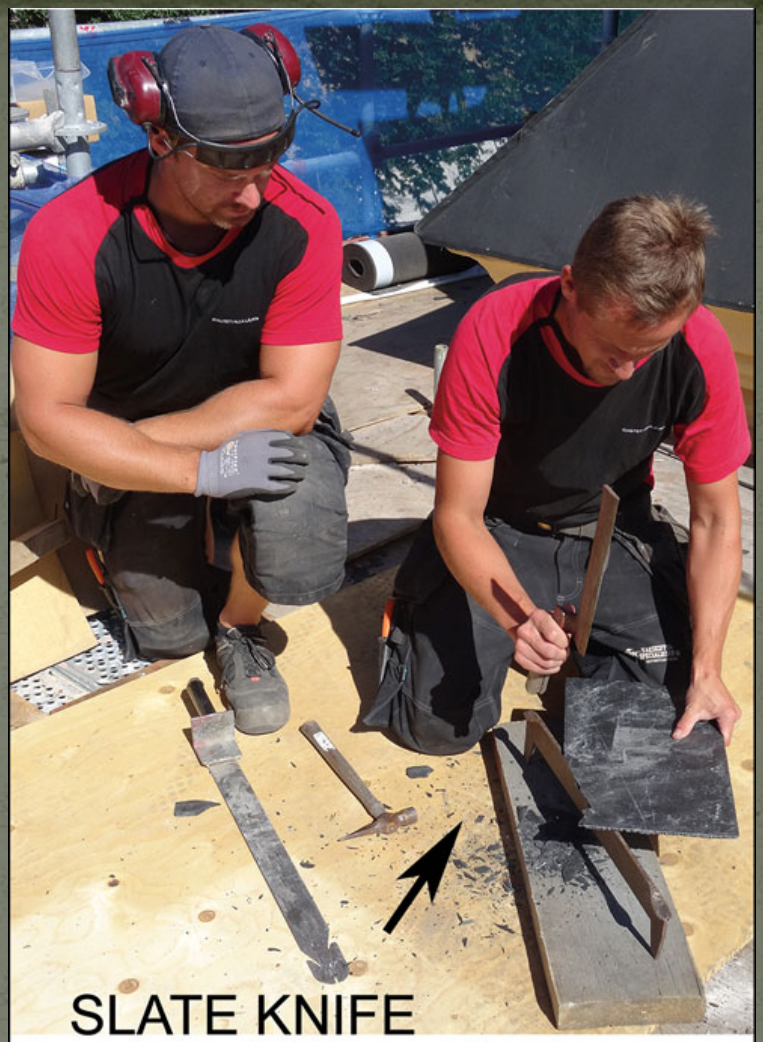
Thicker slates may need to be to cut with a hammer and slaters’stake.

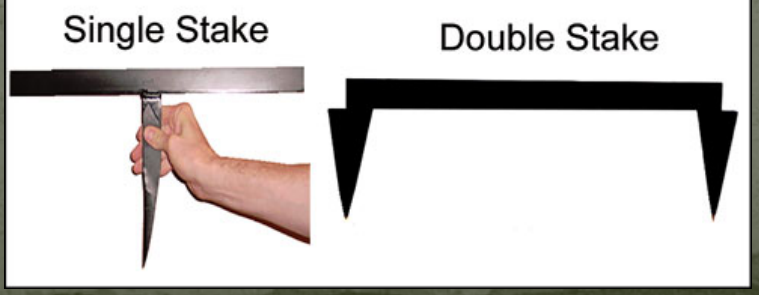
DON’T use tile saws and diamond grinders to cut slates unless on “heavies” and then hand dress the cut with a slater’s hammer & stake or similar hand tools, after cutting, to eliminate the square edge.

Slate Hammers: Some are designed to cut slates, some aren't. All can punch nail holes in slates.

SLATE ROOF INSTALLATION

Slate Stakes and Knives (Zax) are also used to cut slates.





SLATE ROOF INSTALLATION

ROOF DECKS

SLATE ROOF INSTALLATION

The three main components of a slate roof are:

(1) the slates
(2) the fasteners
(3) the substrate or roof deck.

All three should have a longevity of at least 100 years, preferably 200 or more.

SLATE ROOF INSTALLATION

- The roof deck should be a minimum of ¾-inch-thick wood. Solid, glue-free wood is recommended.
- Nailable concrete and gypsum may also be suitable roof decking materials.
- Minimum ¾-inch glue-free “slating lath,” also called “skip sheathing,” can be spaced on rafters as a nailing substrate.

- Minimum ¾-inch glue-free boards, slating lath, or skip sheathing, can be installed over glued or laminated roof decks to provide a long-lasting nailing substrate.

This is a typical roof deck under slate: ¾-inch to 1.5-inch thick glue-free wood.

SLATE ROOF INSTALLATION

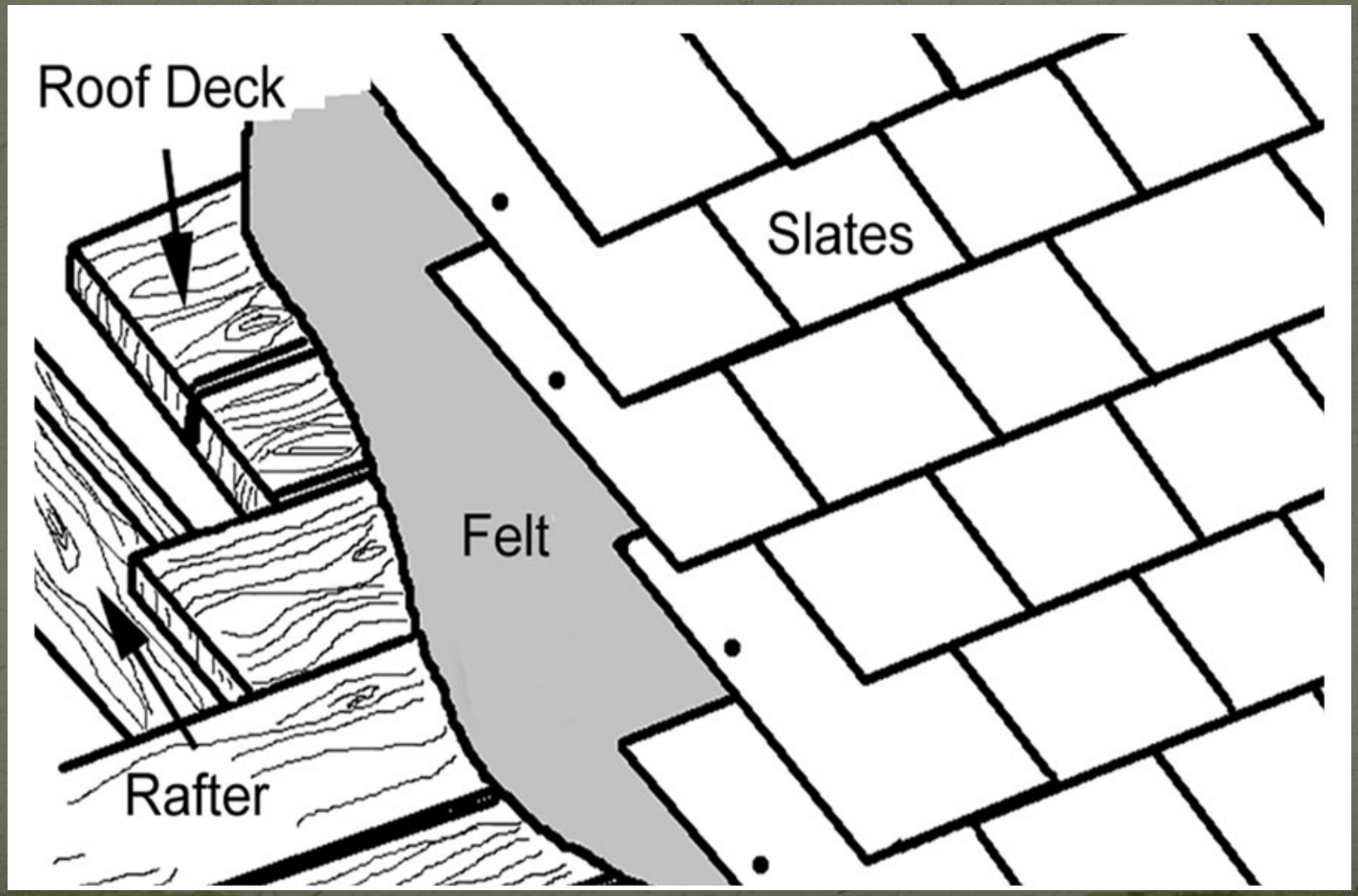
UNDERLAYMENT

Underlayment covers the roof deck and is installed underneath the slate.

SLATE ROOF INSTALLATION

SLATE ROOF INSTALLATION

The underlayment lies beneath the slates and covers the roof deck.



- Cover the roof deck with underlayment to weather in the building, when needed.
- Underlayment shall, at a minimum, comply with ASTM D 226 asphalt-saturated organic felt, Type II, No. 30, unperforated.

Slate roofs on barns typically do not have any underlayment at all.

When self-adhesive underlayment is used, it should be covered with standard felt to prevent the slates from sticking to the underlayment.

On slopes that are 6:12 or less, half-lap (double layer) felt.

ROOF STAGING

SLATE ROOF INSTALLATION

PROTECTION OF ROOF SURFACES

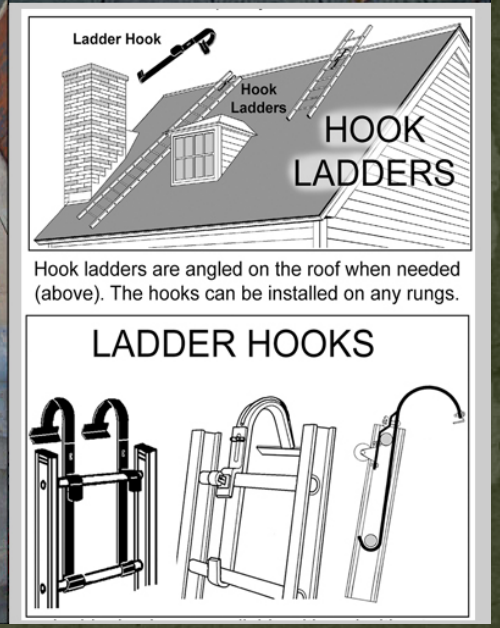
- Do not damage slates by walking on them.
- The roof should be properly staged to allow safe work surfaces that prevent unnecessary foot traffic on the slates.
- Where foot traffic is unavoidable, roof ladders, hook ladders, foam pads, or other such devices should be used to protect the slates.

SLATE ROOF INSTALLATION

Stage the roof for safety and to protect the slates.

SLATE ROOF INSTALLATION

Hook ladders come in various styles and provide safe access when scaffolding isn't required.



SLATE ROOF INSTALLATION

SLATE HEADLAP

The headlap is the overlap each slate has on the slates two courses below.

SLATE ROOF INSTALLATION

HEADLAP

SLATE ROOF INSTALLATION

- Standard field slates must be installed with a minimum 3" headlap on roof slopes from 8:12 up to 20:12.
-
- Less than an 8:12 slope down to a 4:12 slope, the slates must be installed with a minimum 4" headlap.

- Installing roofing slates on slopes less than 4:12 is not recommended in the US.

- On slopes 20:12 or greater, slates may be installed with a 2" headlap.
- Headlaps may be increased at ice-dam prone or poor drainage areas.

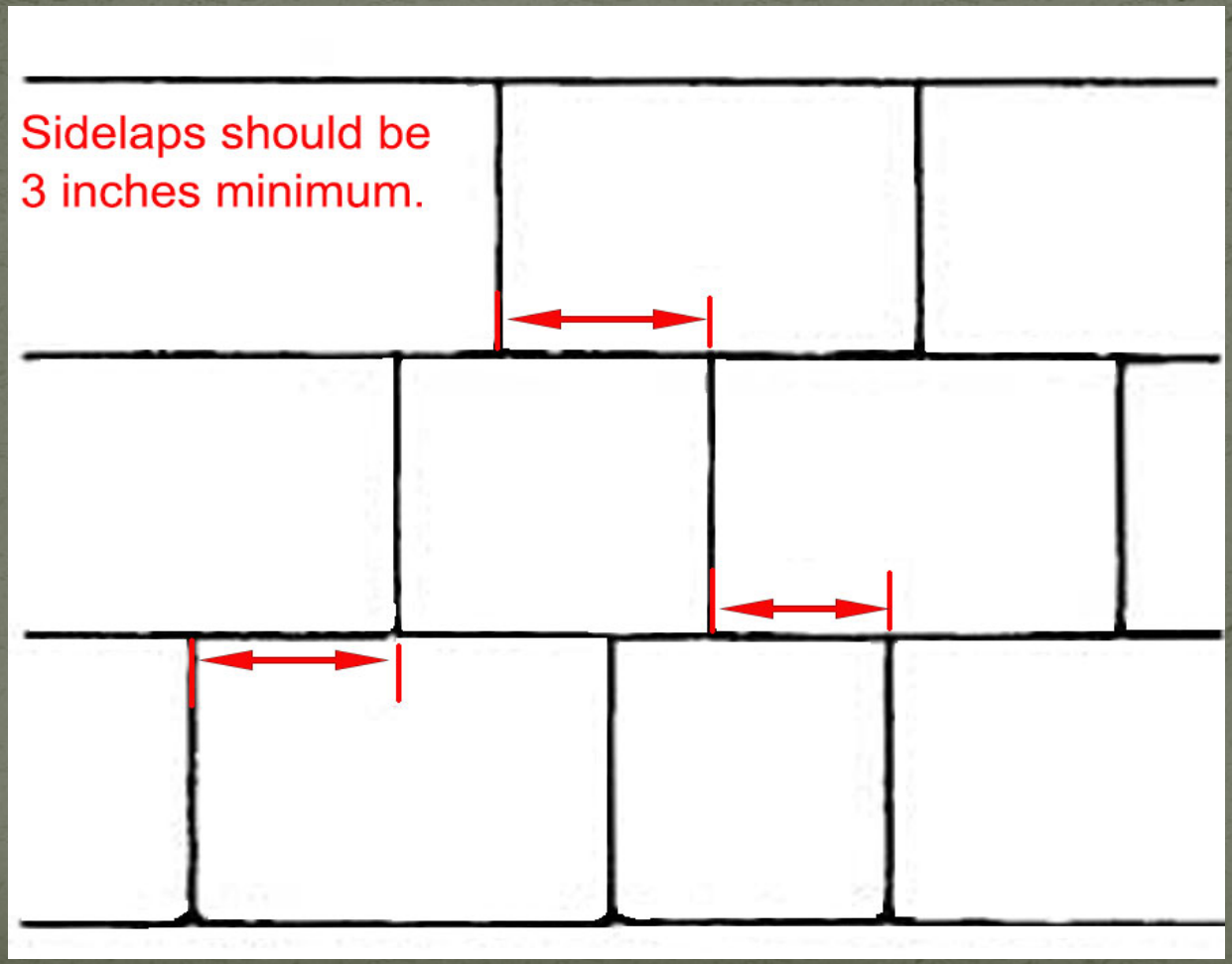
SLATE ROOF INSTALLATION

SLATE ROOF INSTALLATION

SLATE SIDELAP

The sidelap is the horizontal overlap each slate has on the slate course immediately above or below.

Sidelaps must be carefully watched when installing random width roofs.



SLATE ROOF
INSTALLATION

- Slate side-butts should be positioned as near the mid-point of the underlying slates as possible, and not less than 3 inches from the underlying side-butt joints.

- The side-butt joints are where the sides of the slates butt together.

SLATE ROOF INSTALLATION

A common mistake is to have inadequate sidelap on the starter course.

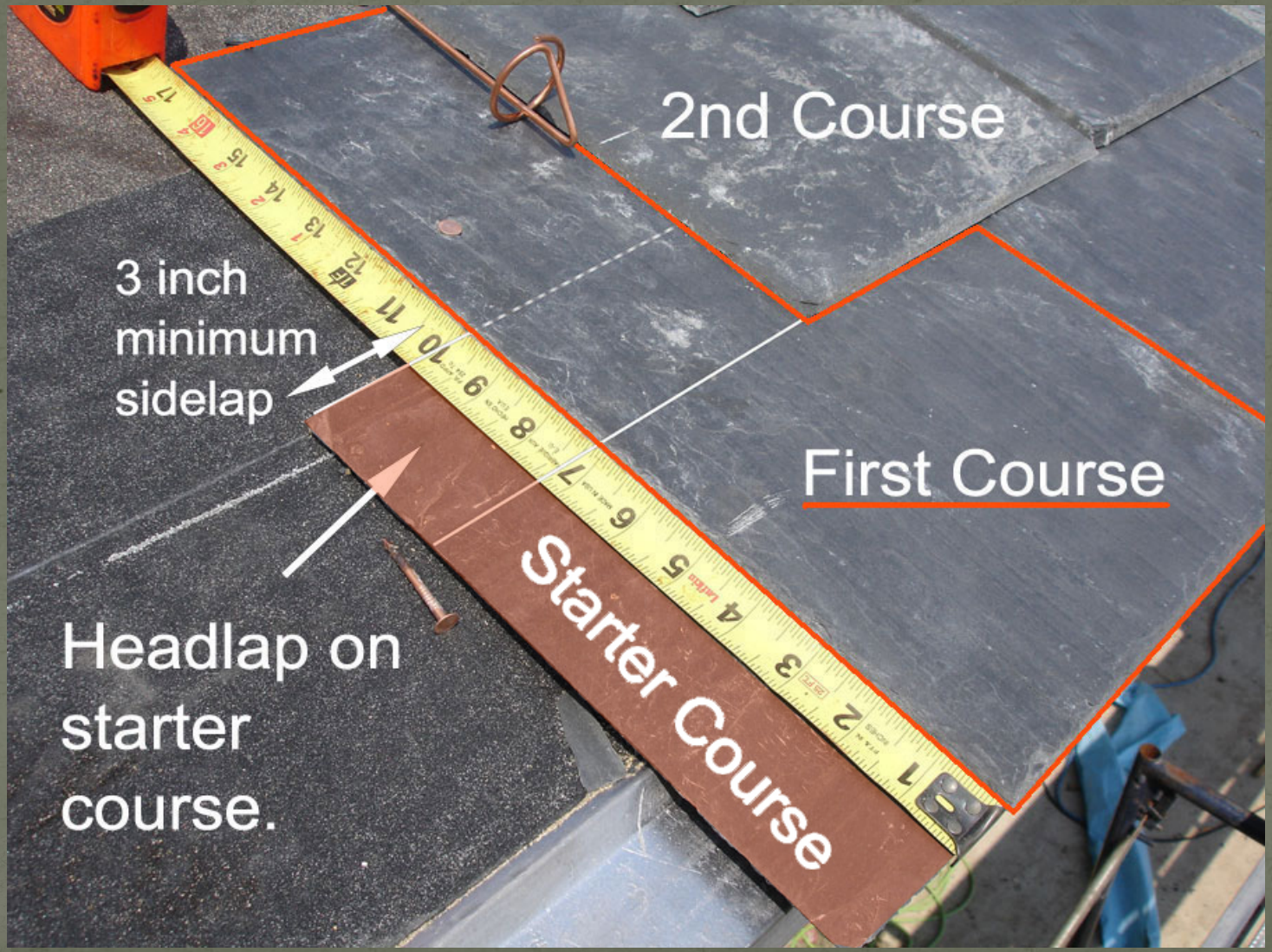
SLATE ROOF INSTALLATION

STARTER COURSE

The starter course is also called the “under eave” course. It’s not visible on the roof because it’s covered by the first course.

SLATE ROOF INSTALLATION

Starter slates are installed back side up.

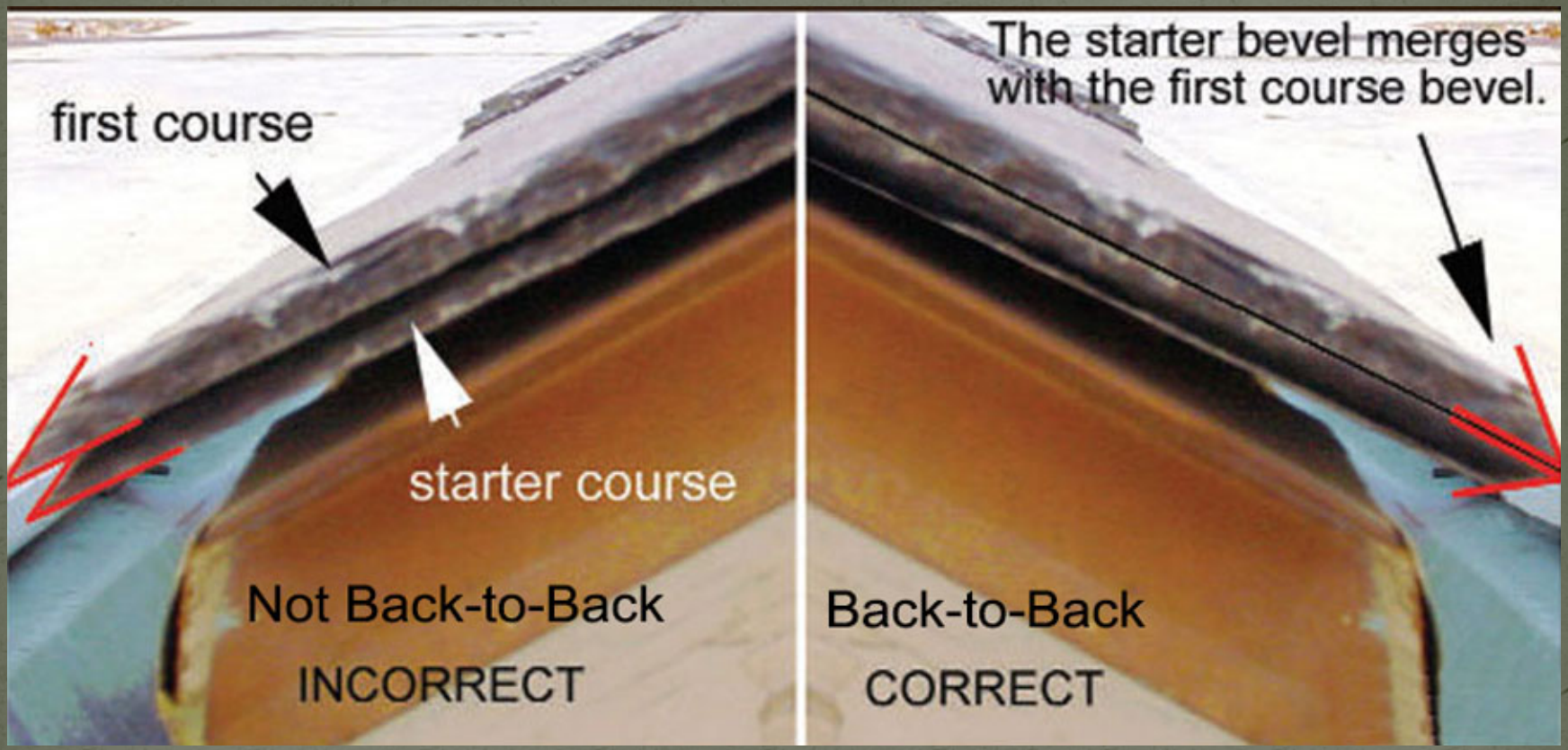


SLATE ROOF
INSTALLATION

- Eave slates are doubled with the under-eave (starter) course installed back side up.
- The 1st course and starter course drip edges should align flush.
- Eave slates should project a minimum 1.5 inches beyond the eaves.
- Rake (gable) edge slates should extend 1 inch beyond the edge of the roof.

SLATE ROOF INSTALLATION

Back-to-back slates create a nicer drip edge.

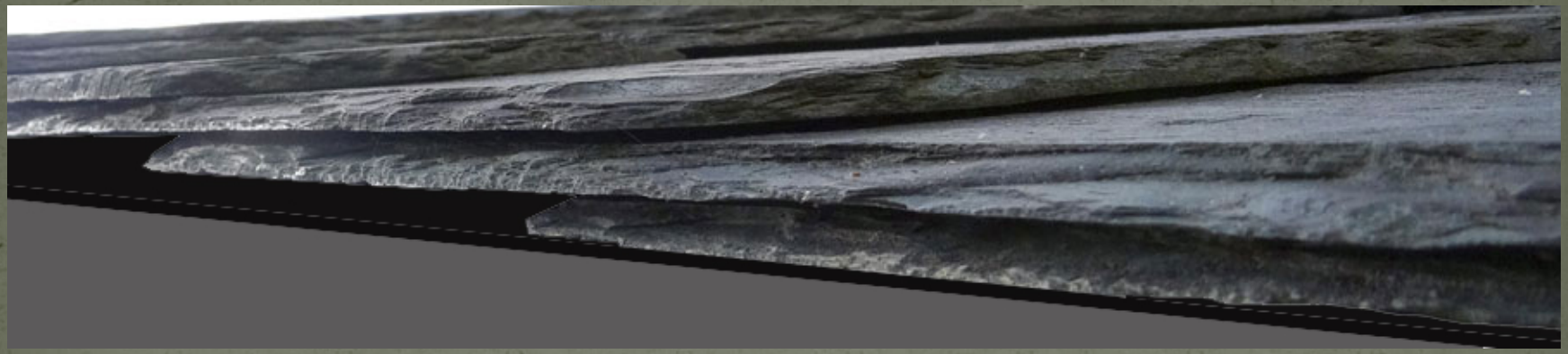


SLATE ROOF INSTALLATION

CANTS

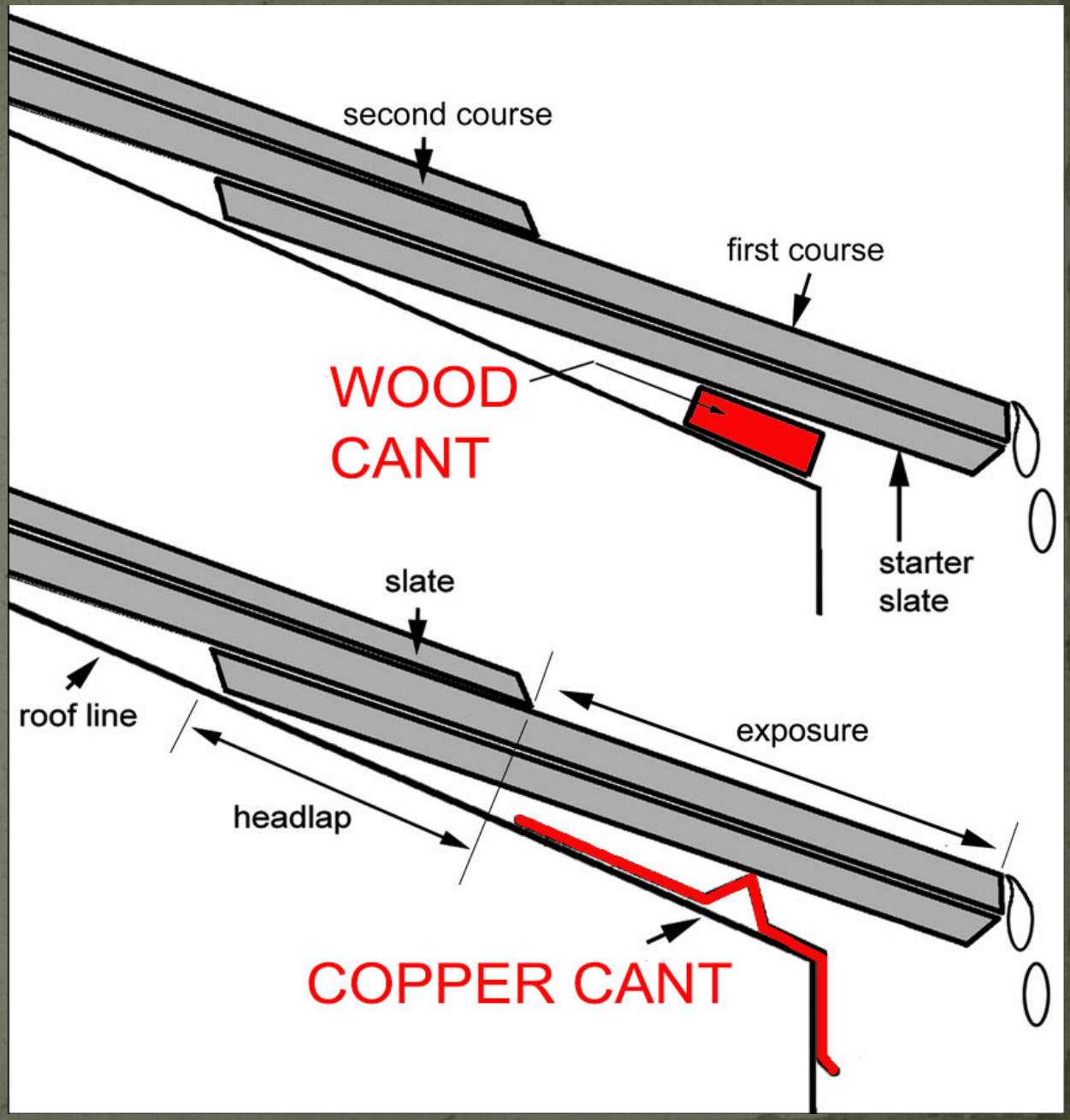
SLATE ROOF INSTALLATION

No slate lies flat on the roof. Starter slates require “cants” to tilt them correctly.



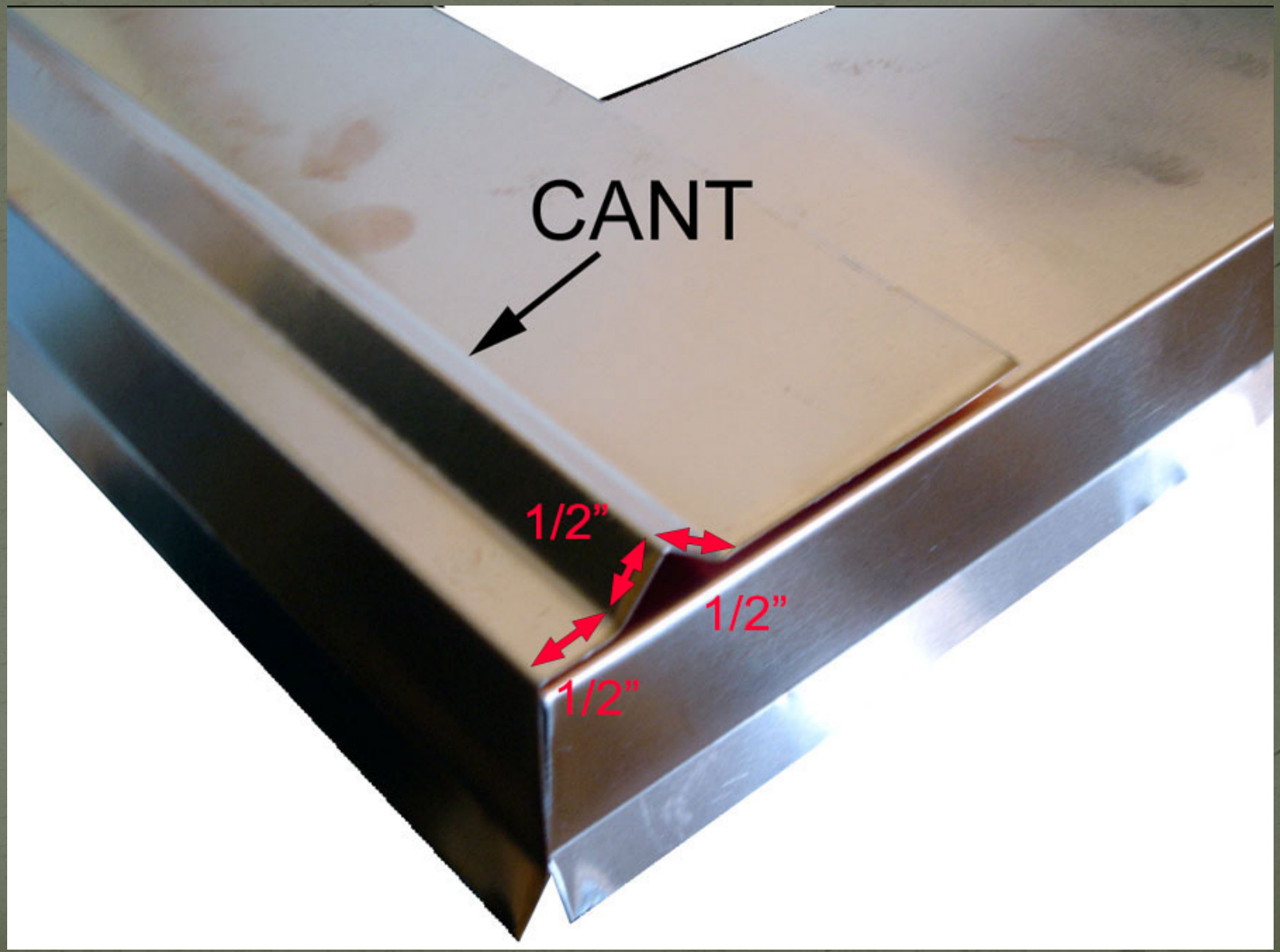
SLATE ROOF INSTALLATION

Cants can be wood, metal, or other materials. Wood cants are traditional.



SLATE ROOF INSTALLATION

Cant fabricated into copper drip edge.



SLATE ROOF INSTALLATION

STARTER COURSE HEADLAP

SLATE ROOF INSTALLATION

- Lack of headlap on the starter course is one of the most common mistakes made in slate roof installations.

Note that there is no visible cant and the starter slate is wrong side up.

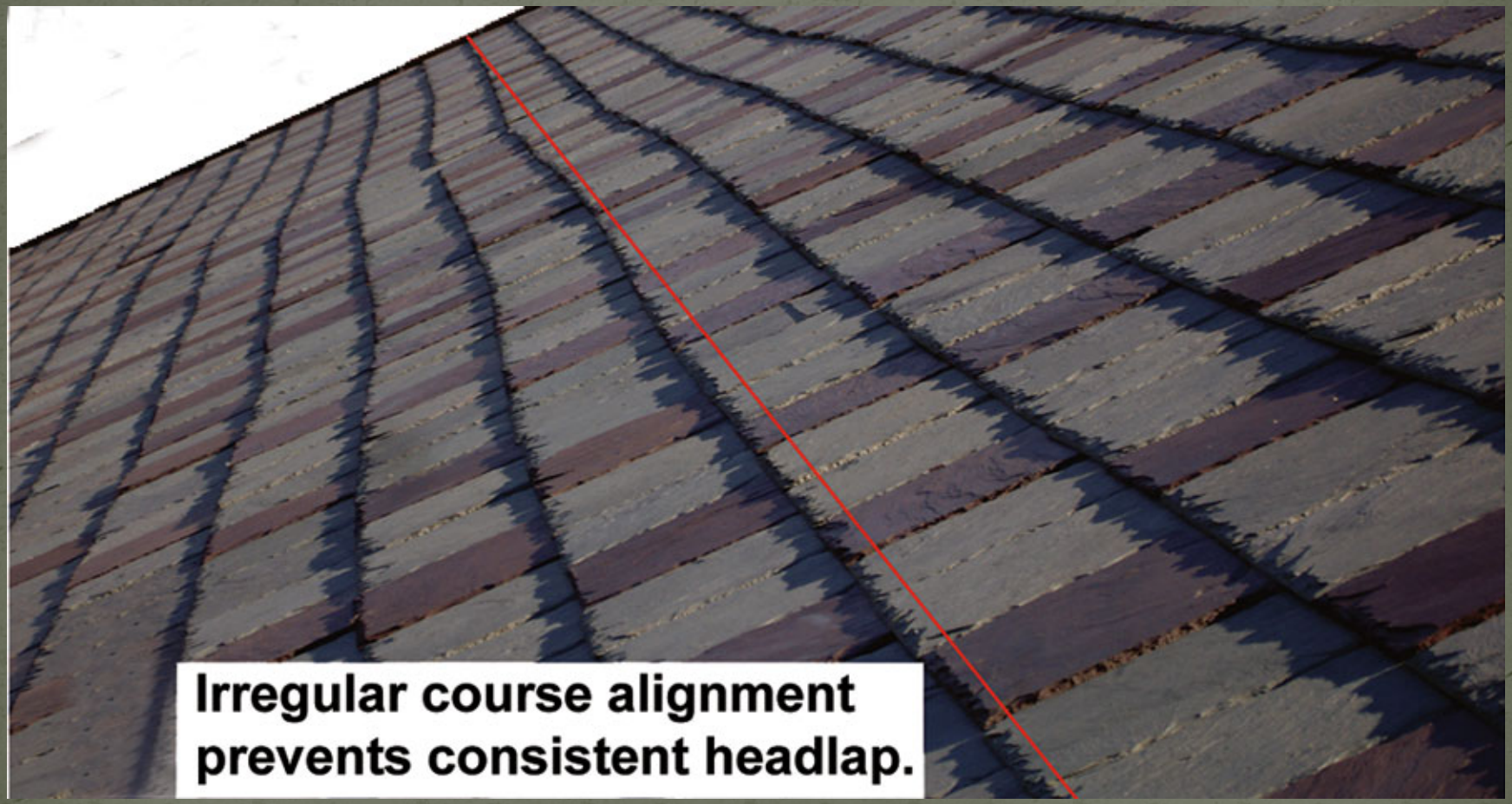
LAYING OUT THE ROOF

SLATE ROOF INSTALLATION

- Slate is installed starting at the bottom or eaves and going toward the ridge or top.
- All slates should be installed following chalk lines marking the top edge of each course of slates, whenever possible.
- Slates shall be laid side-to-side with a maximum 1/8-inch gap between slates, unless otherwise specified.

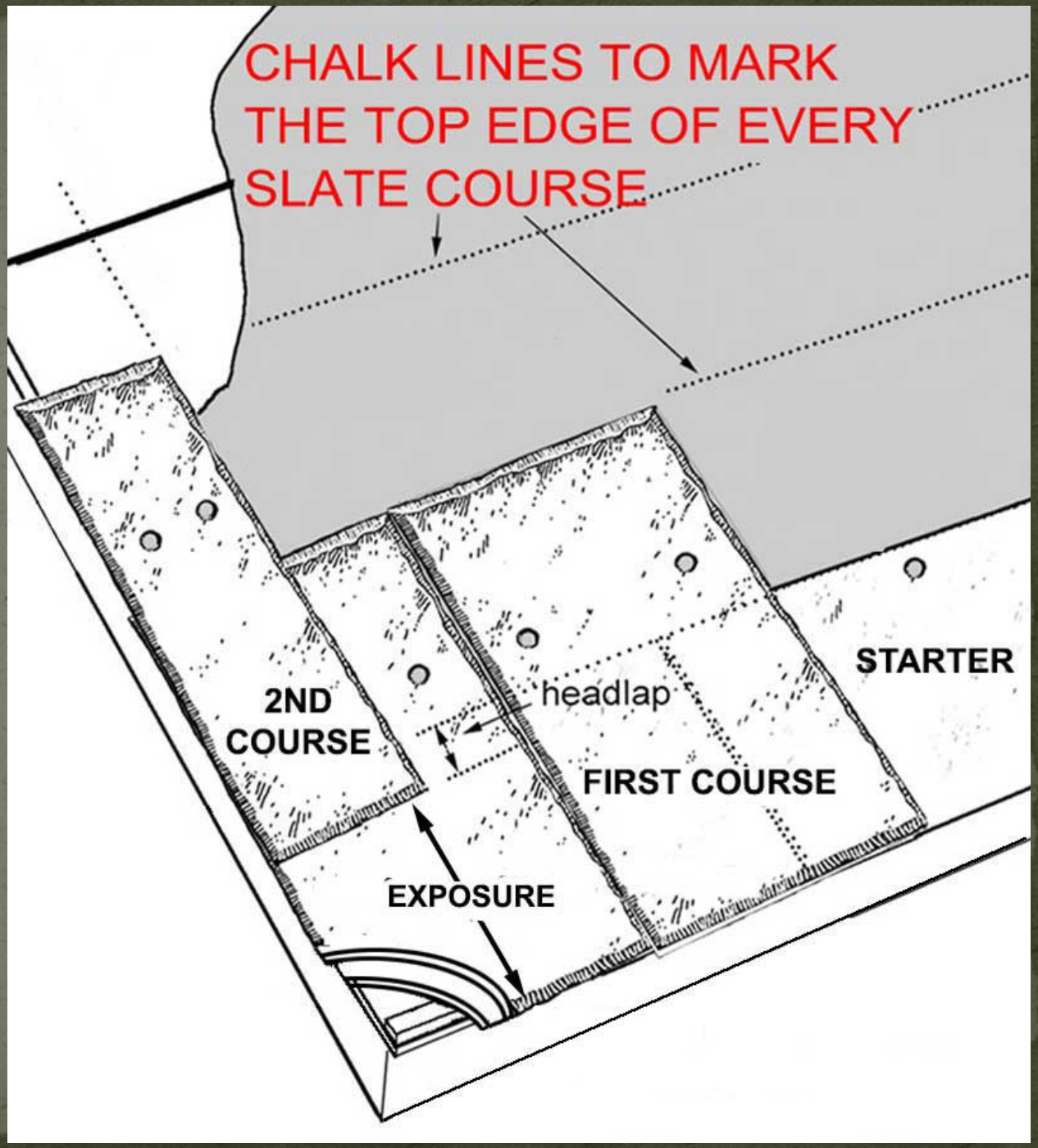
SLATE ROOF INSTALLATION

Keep your courses straight!



This looks good.

The spacing between the chalk lines is the exposure measurement of the slates.



SLATE ROOF INSTALLATION

To calculate slate exposure, subtract the headlap measurement from the length of the slate, then divide the remainder in two.

A three-inch headlap on a 20-inch slate requires an 8.5-inch exposure.

20-3=17 17/2=8.5

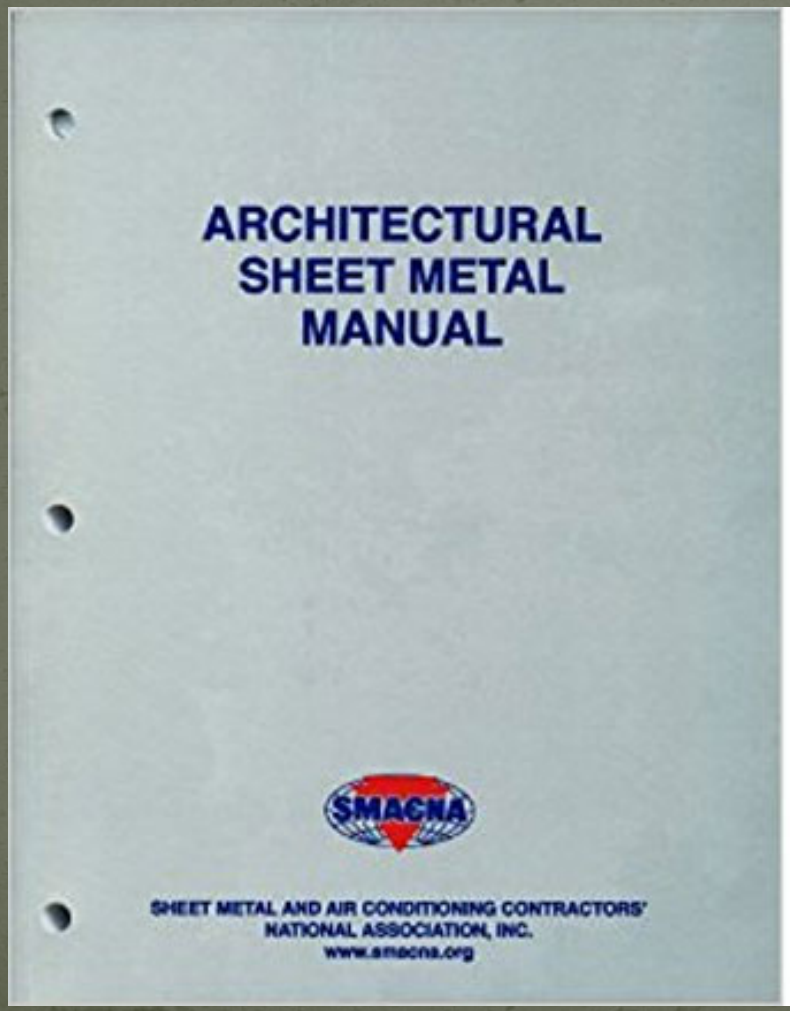
SLATE ROOF INSTALLATION

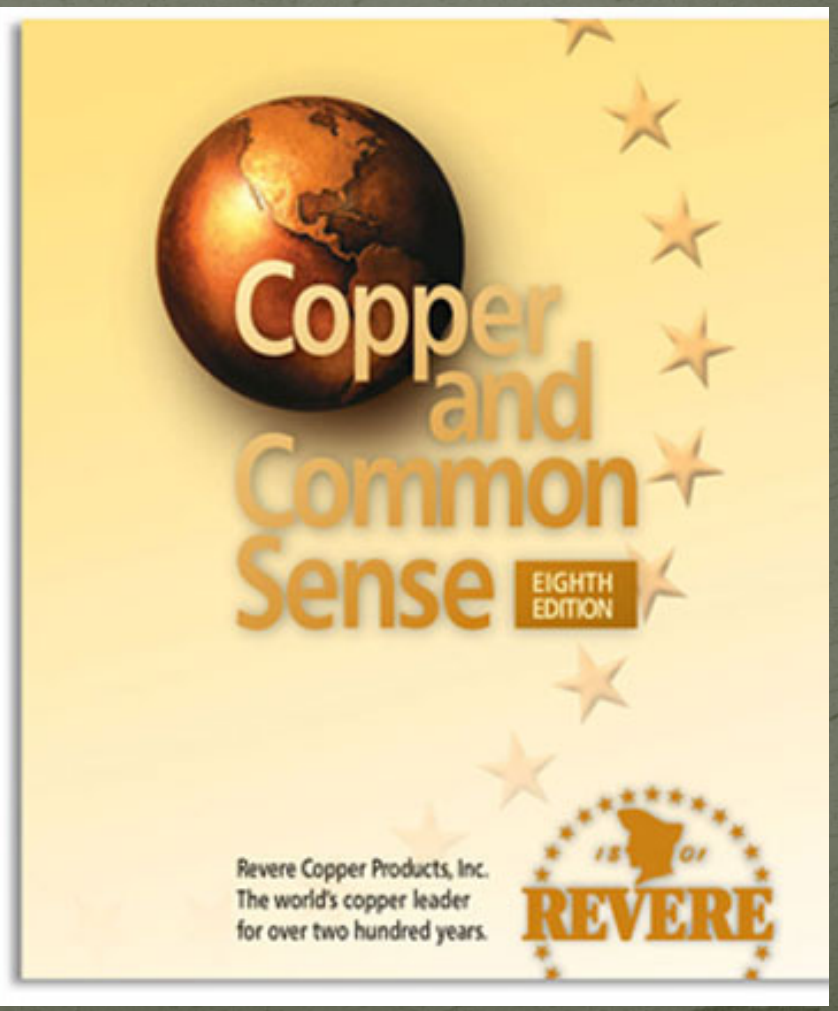
FLASHING

SLATE ROOF INSTALLATION

- Flashing should be minimum 16-ounce copper, minimum 28-gauge stainless steel, or minimum 4-pound sheet lead.
- When using copper, 20-ounce is recommended.
- Flashings and fasteners are to be galvanically compatible.

Refer to these manuals for flashing guidelines.





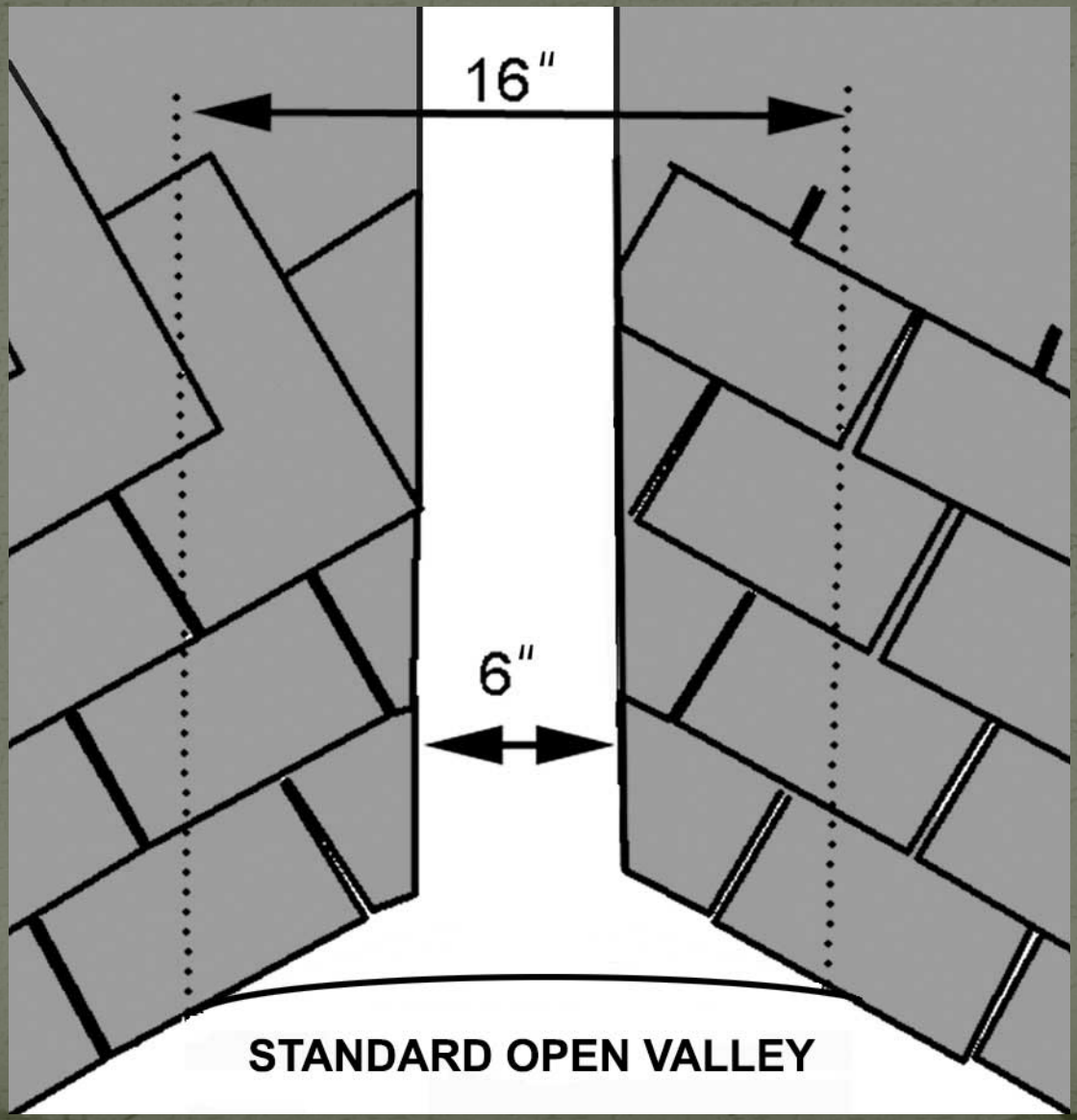
VALLEYS

SLATE ROOF INSTALLATION

Closed and Open Valleys

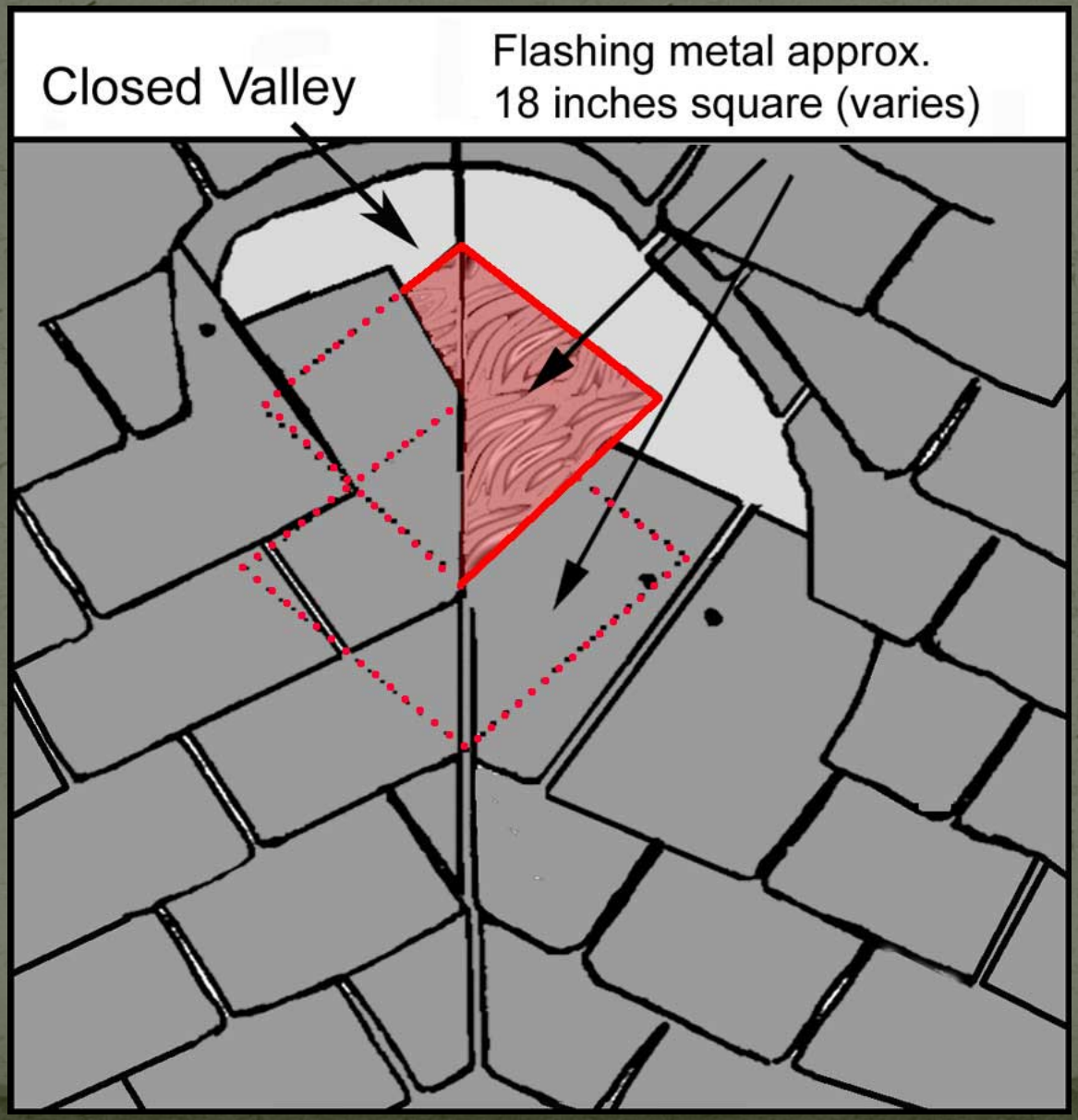
SLATE ROOF INSTALLATION

Open Valley



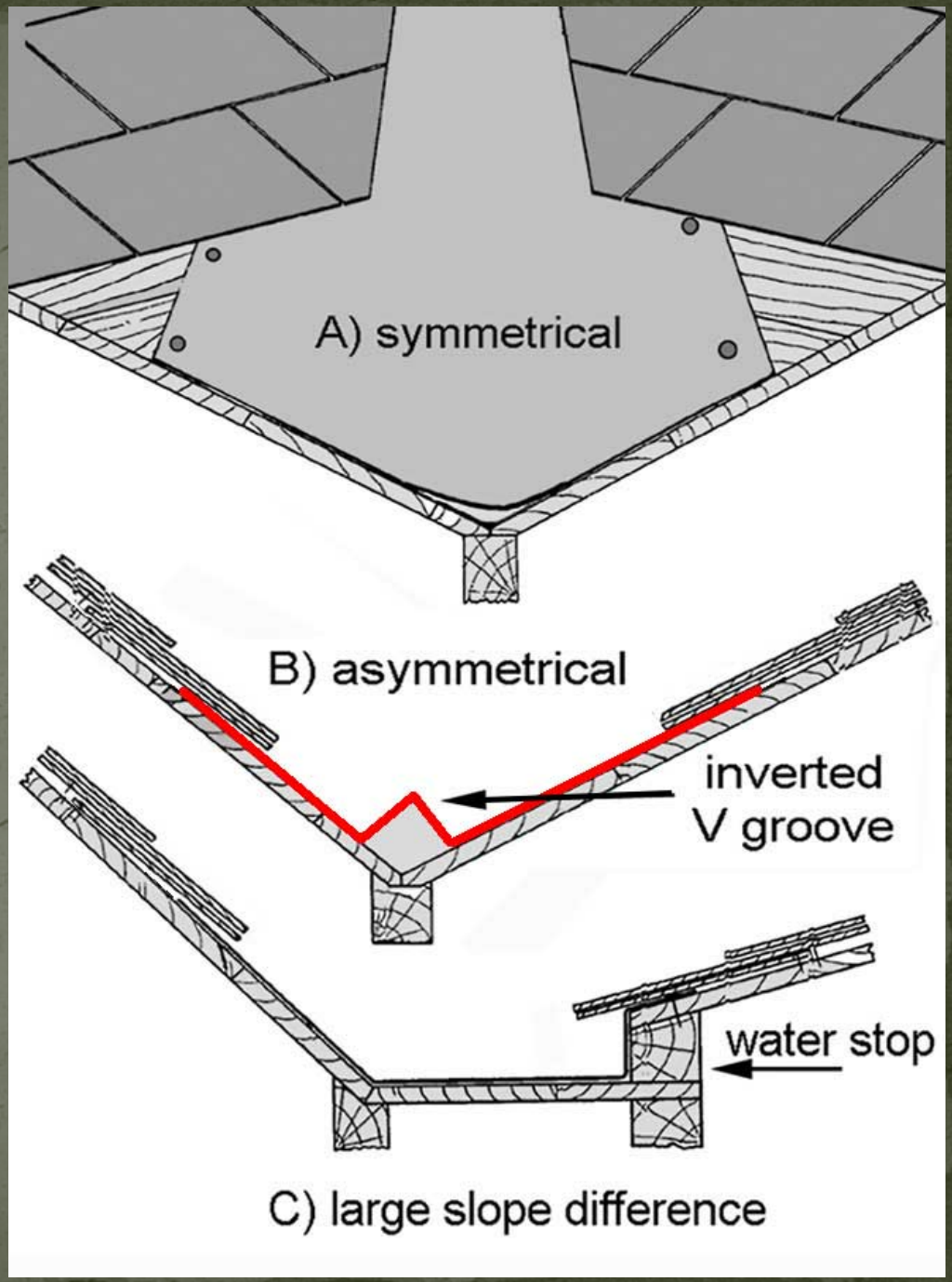
SLATE ROOF INSTALLATION

Closed valleys typically use step flashings.



SLATE ROOF INSTALLATION

Asymmetrical Valleys must have an “Inverted V-Groove” to prevent sideways water flow.



SLATE ROOF INSTALLATION

SLATE ROOF
INSTALLATION

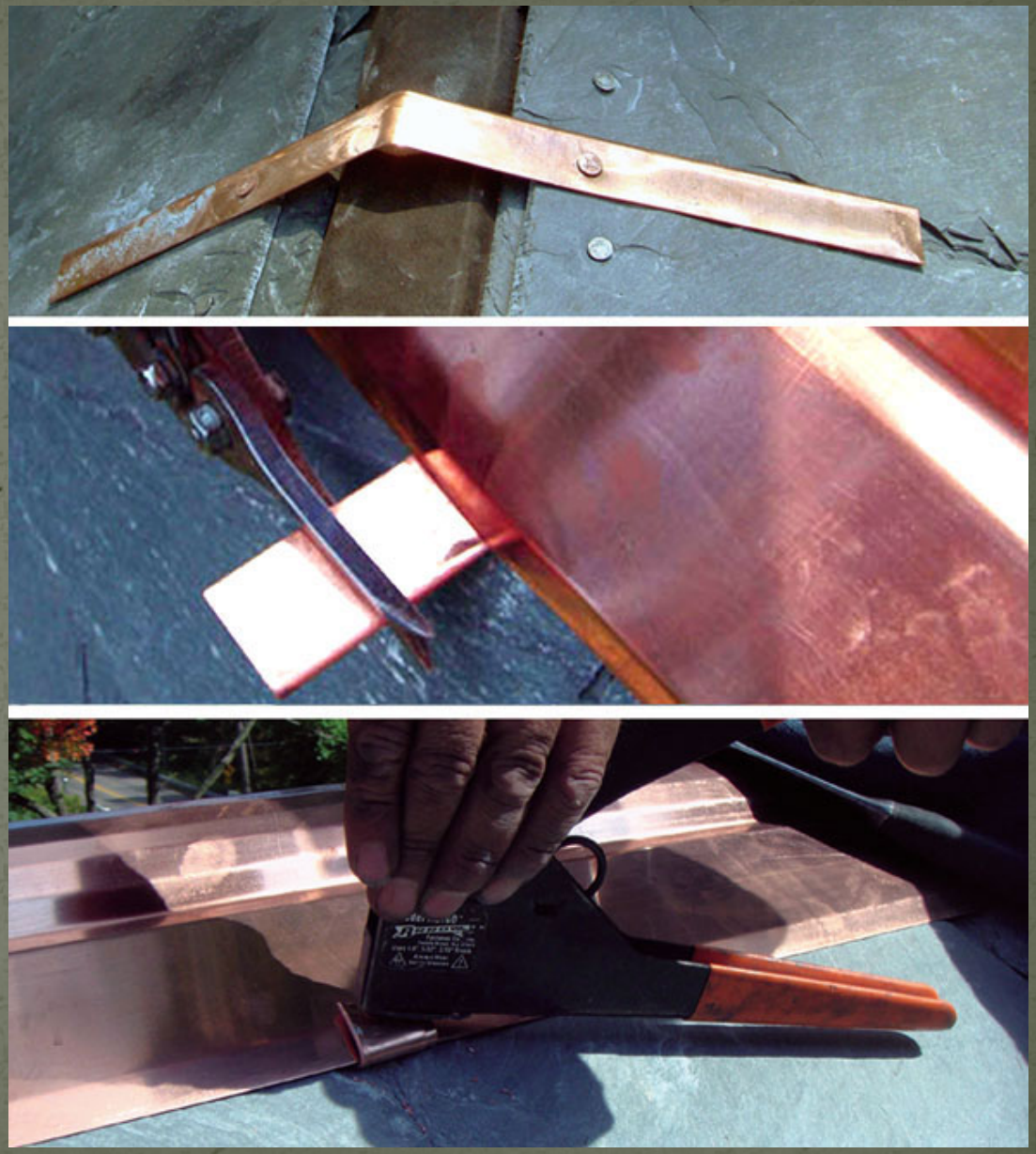
RIDGES and HIPS

SLATE ROOF INSTALLATION

Install ridges and hips with unexposed fasteners
Example of a ridge installed with no exposed fasteners.

SLATE ROOF INSTALLATION

You can hide the nails or screws on a ridge installation by using cleats, straps, or clips attached underneath the ridge metal.



SLATE ROOF INSTALLATION

This shop-fabricated 20-ounce ridge is installed with unexposed riveted fasteners.

SLATE ROOF INSTALLATION

Ceramic tiles also make an excellent ridge on slate roofs.

SLATE ROOF INSTALLATION

STEP FLASHINGS

SLATE ROOF INSTALLATION

- Step flashings are installed when the roof abuts a vertical surface.
- They extend both vertically and horizontally, typically 4 inches each way.
- They must be as long as the slate exposure plus the headlap measurement.

SLATE ROOF INSTALLATION

Step flashings are usually covered by “counter” flashings or “cap” flashings.

CHIMNEYS

SLATE ROOF INSTALLATION

- Most chimneys have three sets of flashings:

- (1) Front Apron Flashing
- (2) Step and Counter Flashings
- (3) Back Flashings

SLATE ROOF INSTALLATION

SLATE ROOF
INSTALLATION

- Chimney flashings will leak at the corners unless:

(1) Folded correctly, or
(2) Soldered, or
(3) Double-locked

- Do not rely on caulks or sealants on the flashings at the chimney corners.

SLATE ROOF INSTALLATION

SLATE ROOF INSTALLATION

Soldered Copper Chimney Flashing

SLATE ROOF INSTALLATION

Double-locked “sweep seam” front corner.

PIPE FLASHINGS

SLATE ROOF INSTALLATION

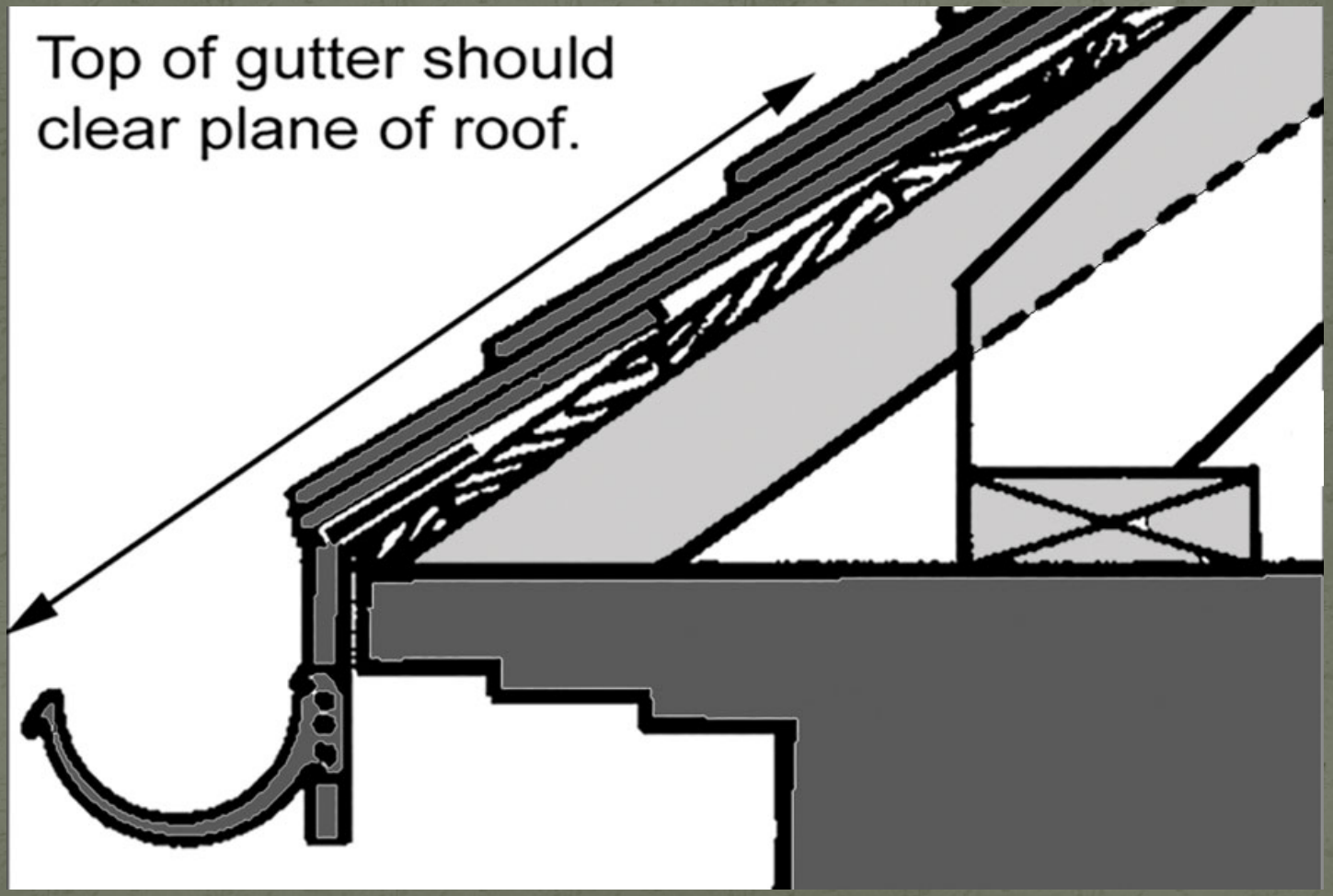
Slates will be neatly fitted around roof penetrations.

SLATE ROOF INSTALLATION

GUTTERS

SLATE ROOF INSTALLATION

Hang your gutters low enough so they don't get torn off the roof by ice and snow



REPAIR and CLEANUP

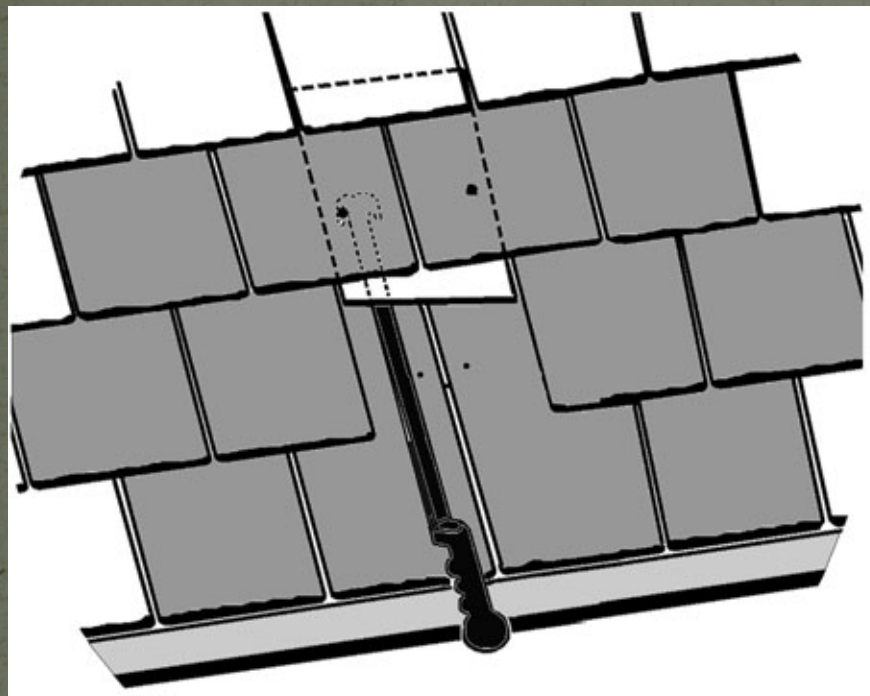
SLATE ROOF INSTALLATION

Slates installed in the field of the roof after the installation is complete should be installed using stainless steel or copper slate hooks.

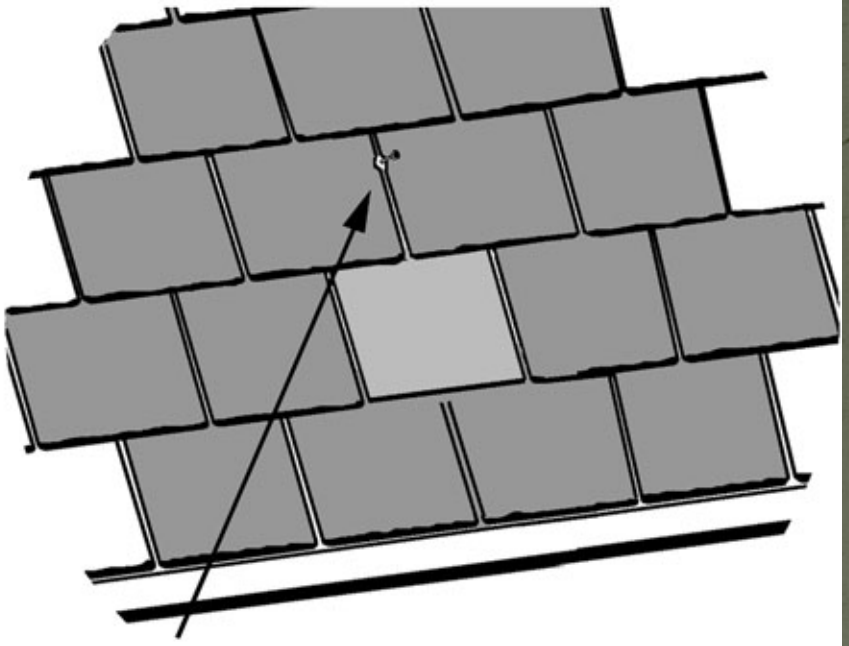
The “nail and bib” method may be used when the use of slate hooks is not possible.

SLATE ROOF INSTALLATION

Nail and Bib Repair



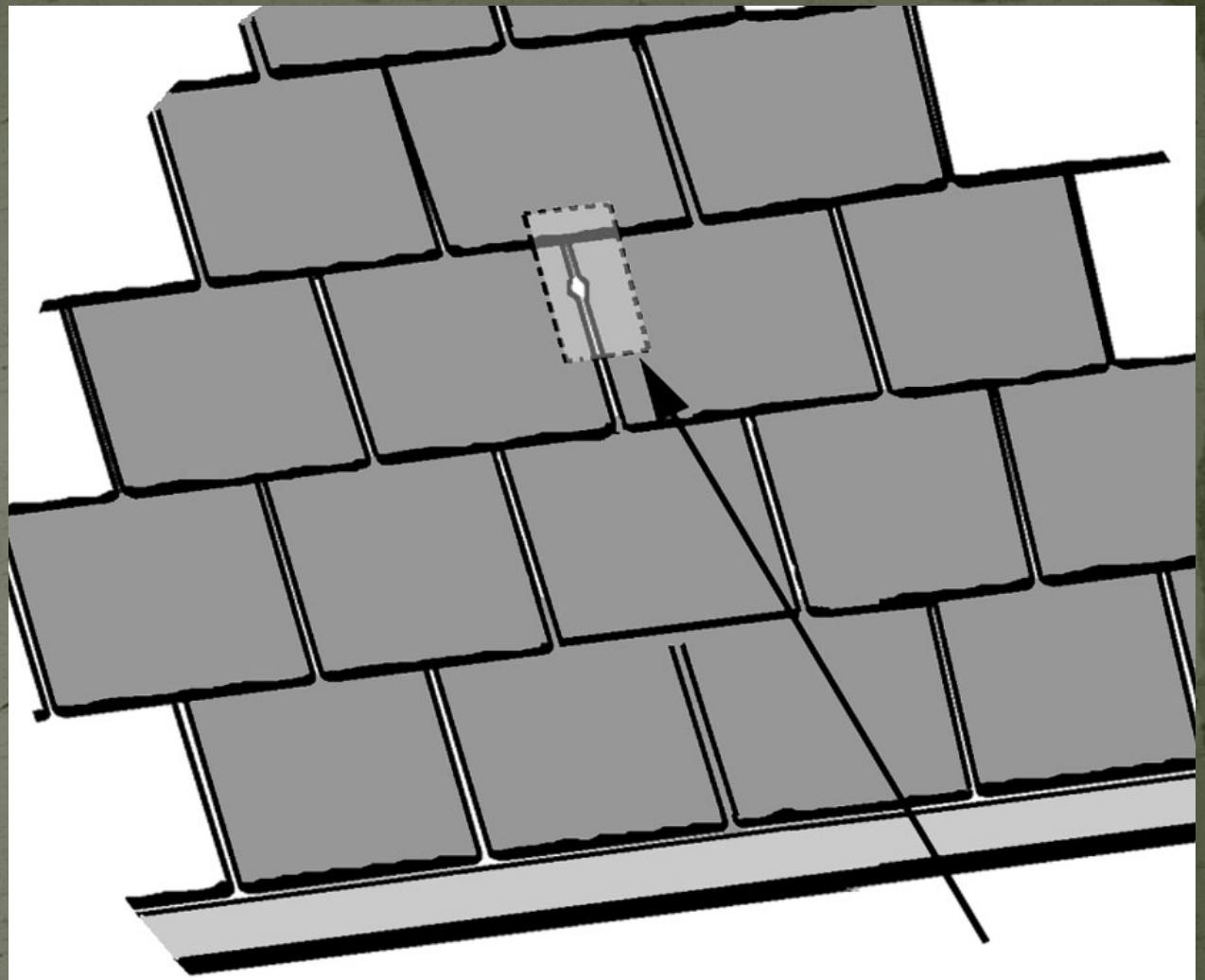
Slate ripper hooks slate nails and pulls them out, removing slate.



Replacement slate is slid into place and fastened with a nail in the slot.

SLATE ROOF INSTALLATION

Nail and Bib Repair (cont.)



The roofing nail is tapped down and a bib flashing is slid under the slate but over the nail head.

SLATE ROOF INSTALLATION

This slide presentation was voluntarily created by Joe Jenkins on behalf of the Slate Roofing Contractors Association of North America, Inc. The following SRCA Board Members contributed to this project:

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SLATE ROOF INSTALLATION

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SLATE ROOF INSTALLATION