

Slate Roofing: How to Install a Roof That Will Last a Century (or Two)



International Roofing Expo 2012 - Joe Jenkins
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Objectives:

1. LEARN HOW TO CONSTRUCT A CENTURY ROOF
2. LEARN CRITICAL INSTALLATION DETAILS
3. LEARN HOW TO AVOID MISTAKES
4. AVOID LITIGATION

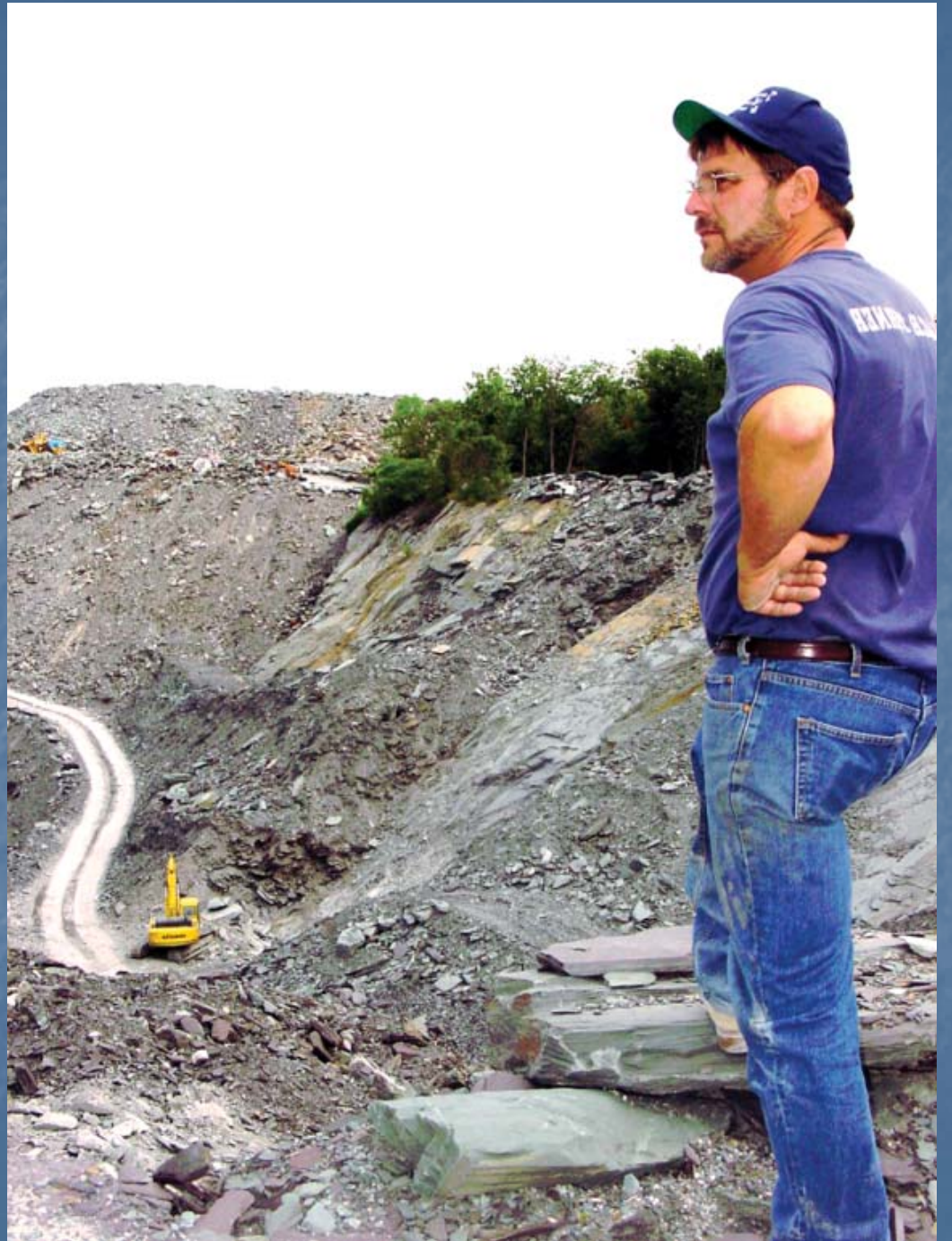
Joe Jenkins Introduction

- Executive Director of the Slate Roofing Contractors Association of North America, Inc.
- Has worked on slate roofs since 1968.
- Published the Slate Roof Bible in 1997.
- Publishes the Traditional Roofing Magazine.
- Provides slate roof consulting services nationwide.
- Has provided slate roofing seminars on two continents.
- Manages an online slate roof supply outlet.
- Has written slate roofing articles for several magazines.
- Has done radio and TV interviews about slate roofing.
- Provides slate roof contracting services in NW PA.

What is slate? It is stone.



Slate is
quarried
or mined.



The shingles are split out by hand.



The slates are trimmed and punched at the quarry.



Slate roofs have been installed in the U.S. for over 161 years with great success.



We can learn how to create 150+ year roofs by studying roofs that are 150+ years old.



This roof will celebrate its 161st
birthday this year.



I worked on over 1,000 slate roofs before age 50. For example, this roof, installed in September, 1887, is now 125 years old. A slate had the installers name and date scratched on the back.



Now my two boys do the roofing work.



There are only three necessary components of a slate roof: 1) slate, 2) substrate, 3) fasteners.



Let's look at slate first.
There are many types. This is Vermont.



North American slates are a good bet. Imported slates can be risky. This is a defective Spanish slate.



These are Chinese slates that are failing prematurely.



More Chinese slates going bad prematurely:



Even
American
slates can
lack quality
control.
These are
Vermont
slates.



When choosing slates:

1. Select a slate type that is tried and proven.
2. Buy from a conscientious manufacturer.
3. Know the quarry source.
4. Get the right slate size for your purpose.
5. Request correctly made nail holes.
6. Also: always include detailed slate specifications in your contract documents.

Mixed origins can be a disaster. These are Spanish slates from two quarry sources.



The Substrate

- The substrate is the material the nails fasten into.
- It must be a long-term material that will hold nails.
- It must last a century, preferably two.
- It should be able to breathe.
- Proven materials include $\frac{3}{4}$ " boards, 1" boards, 1.5" boards, gypsum concrete and nailable concrete.
- For best results, avoid laminated woods, engineered lumber and other materials that rely on glue.

This bank roof decking is $\frac{3}{4}$ " yellow pine, an excellent material for slate roofs.



Here's
another
good
example: 1"
rough-sawn
roof deck
boards.



Another example: $\frac{3}{4}$ " boards



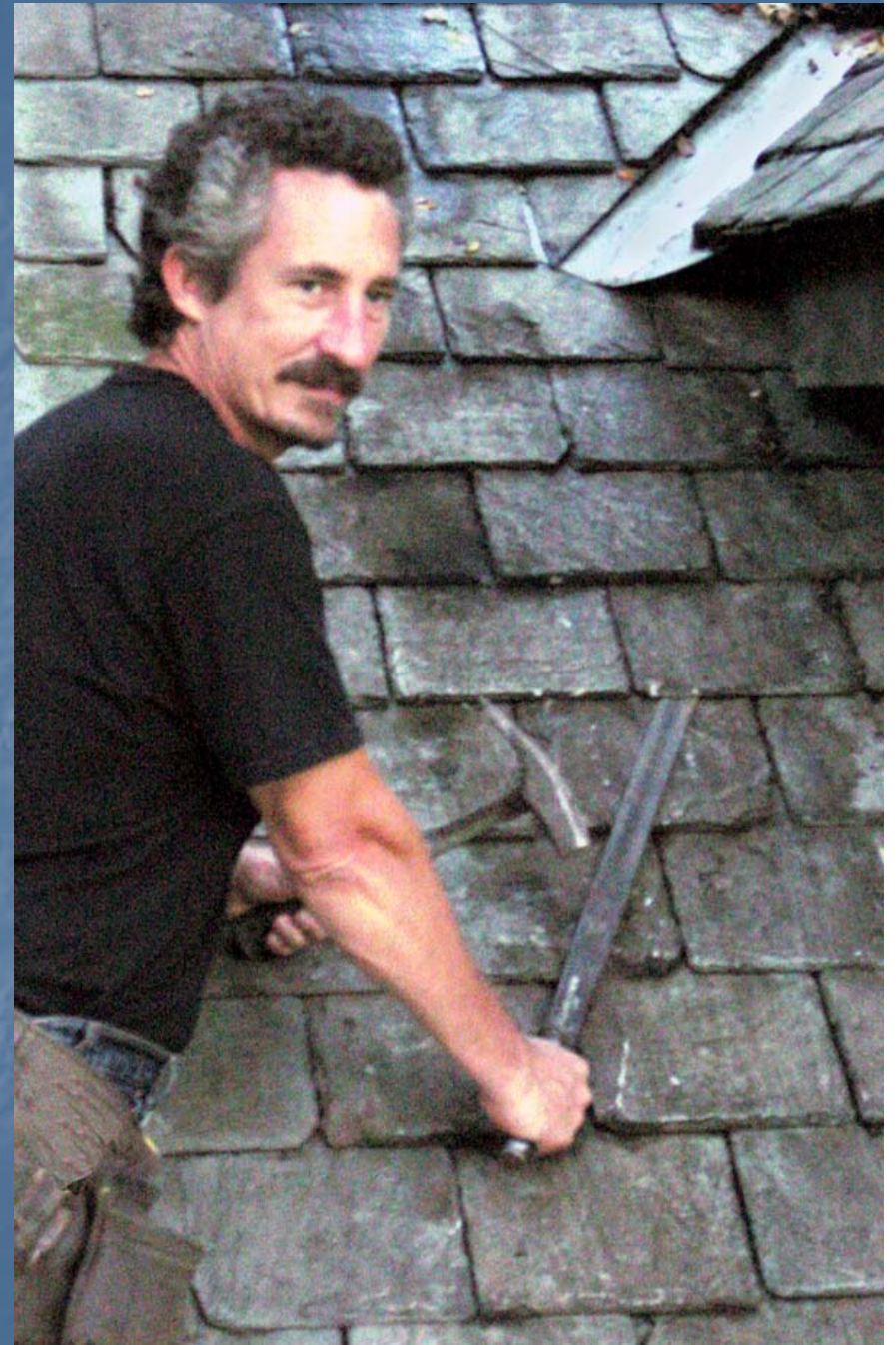
This cathedral was roofed with new slate over the original 120-year-old yellow pine.



A Word About Underlayments

- Underlayment keeps water out of a building until the roof is installed.
- Underlayment typically provides no long-term benefits for slate roofs.
- Excessive underlayments can inhibit the routine maintenance of slate roofs.
- Slate roofs do not need any underlayment at all and many century roofs were installed with no underlayment whatsoever.

The long term maintenance of a slate roof requires free access underneath the slates by a slate ripper, the tool most often used by the slate roof restoration professional. Excessive use of underlayments can severely inhibit the use of this tool.



Slate Roofing Fasteners

- Copper roofing nails (smooth shank)
- Stainless steel roofing nails (smooth shank)
- Hot-dipped galvanized roofing nails (smooth shank)
- Slate hooks are used in places in Europe

1879 steel nail, 132 years old, removed from an existing slate roof in the fall of 2011. Note the lack of deterioration.



Critical Installation Details

- Do Your Homework First
- Roof Slope and Design is Important
- Correct Headlap is Critical
- Use Correct Sidelaps
- Stage the Roof Correctly
- Blend the Slates from All Pallets
- Get the Starter Course Right
- Don't Over-Nail or Under-Nail
- Use Professional Flashing Techniques

Do Your Homework

- There is a wealth of information online and in print form:
- Slate Roof Bible
- Traditional Roofing Magazine
- SlateRoofCentral.com
- SlateRoofWarehouse.com
- YouTube

Roof Design is Important

- The steeper the better.
- Low slope roofs drain too slowly.
- People walk on low-slope roofs.
- 4:12 or greater is required, but 8:12 or greater is preferred.
- Be careful about upper roofs dropping ice on lower roofs.

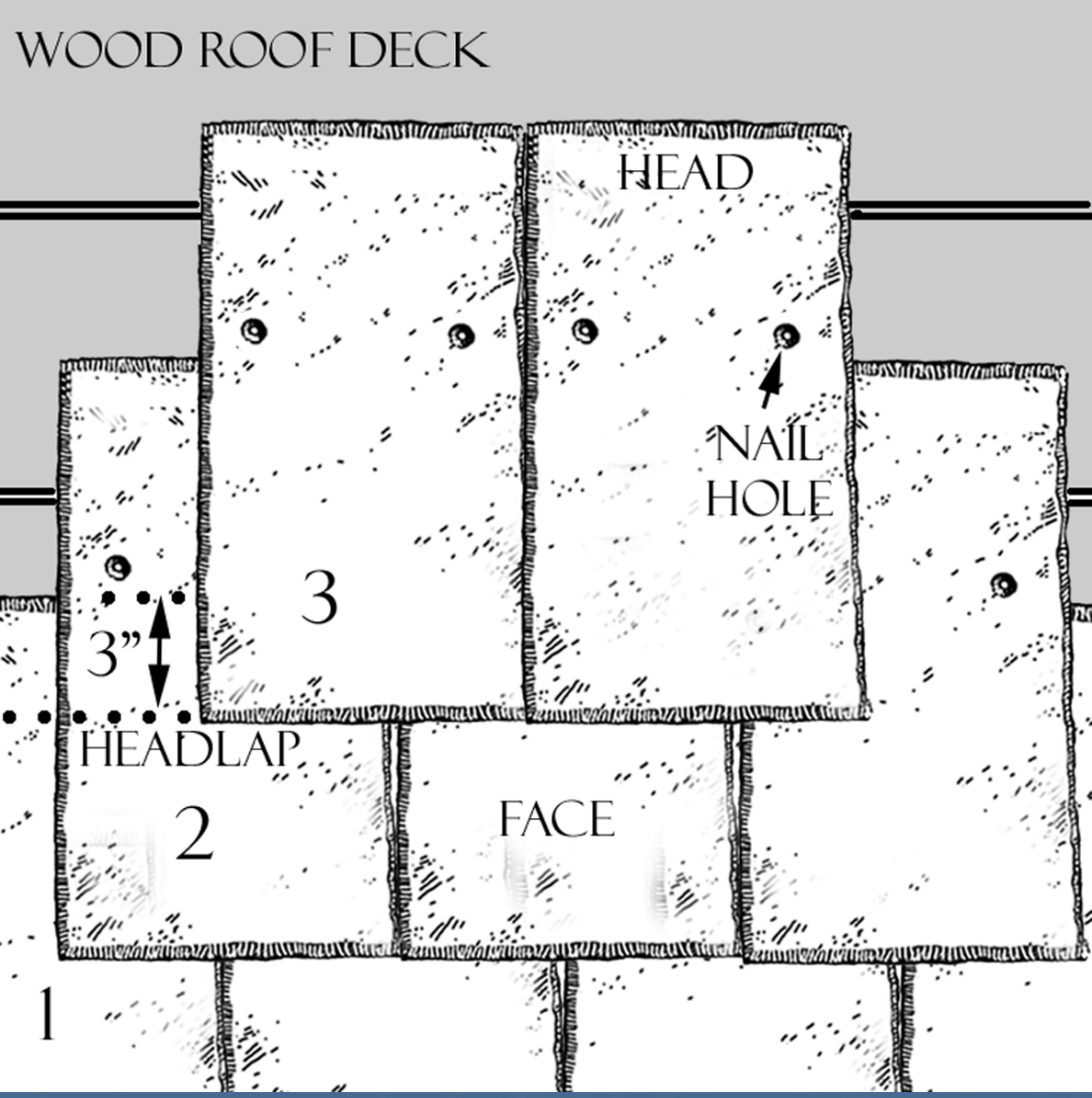
Headlap

- Headlap is the overlap each slate course has on the slates two courses below.
- Typical headlap is 3", but varies.
- Understanding headlap is critical to successfully installing a slate roof.
- Slate roofs with improper headlap can be condemned.

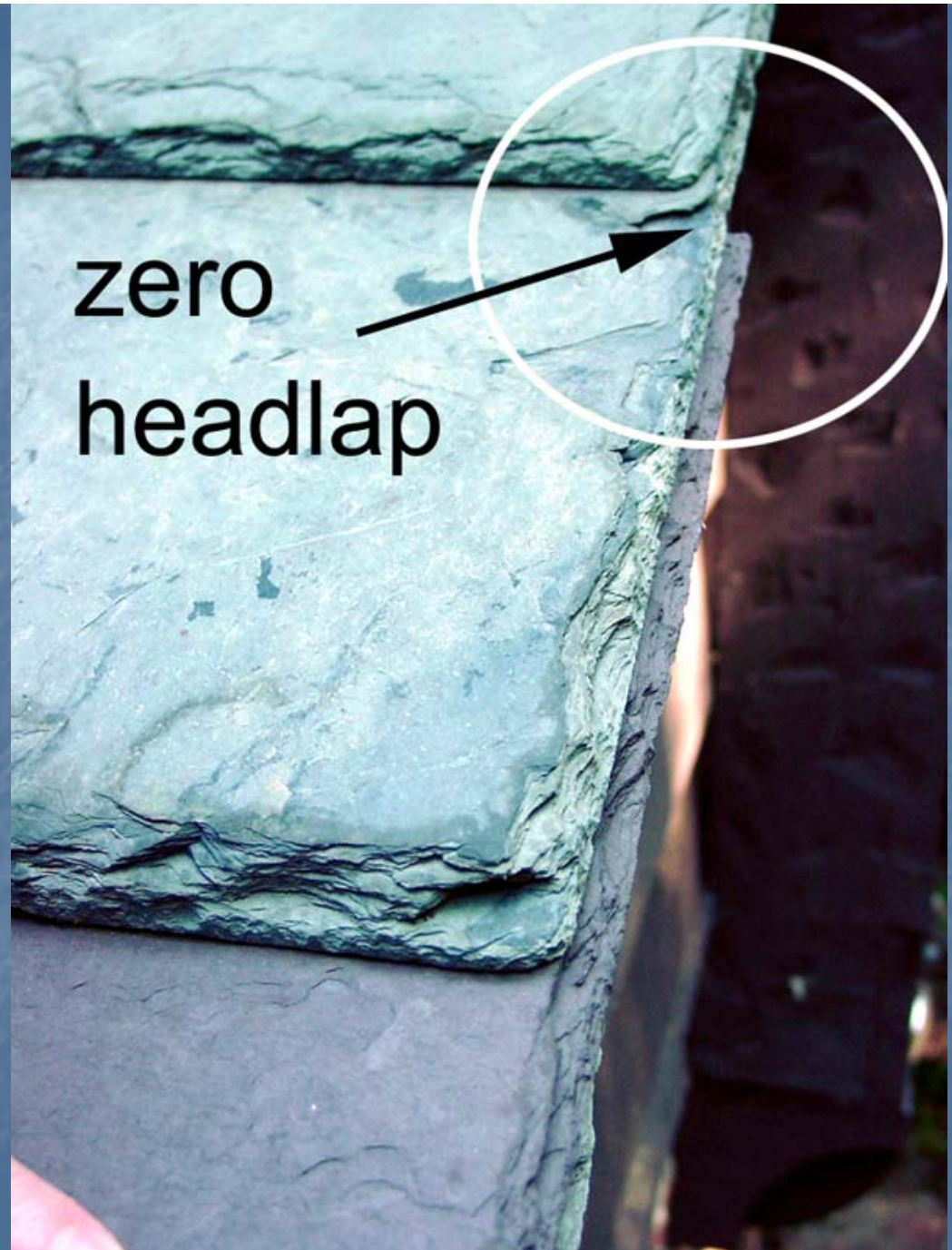
Headlap

- To calculate headlap take the length of the slate and subtract twice the exposure.
- Lower than 8:12 slope use 4" headlap
- In ice dam areas use 5" headlap.
- 8:12 or greater use 3" headlap

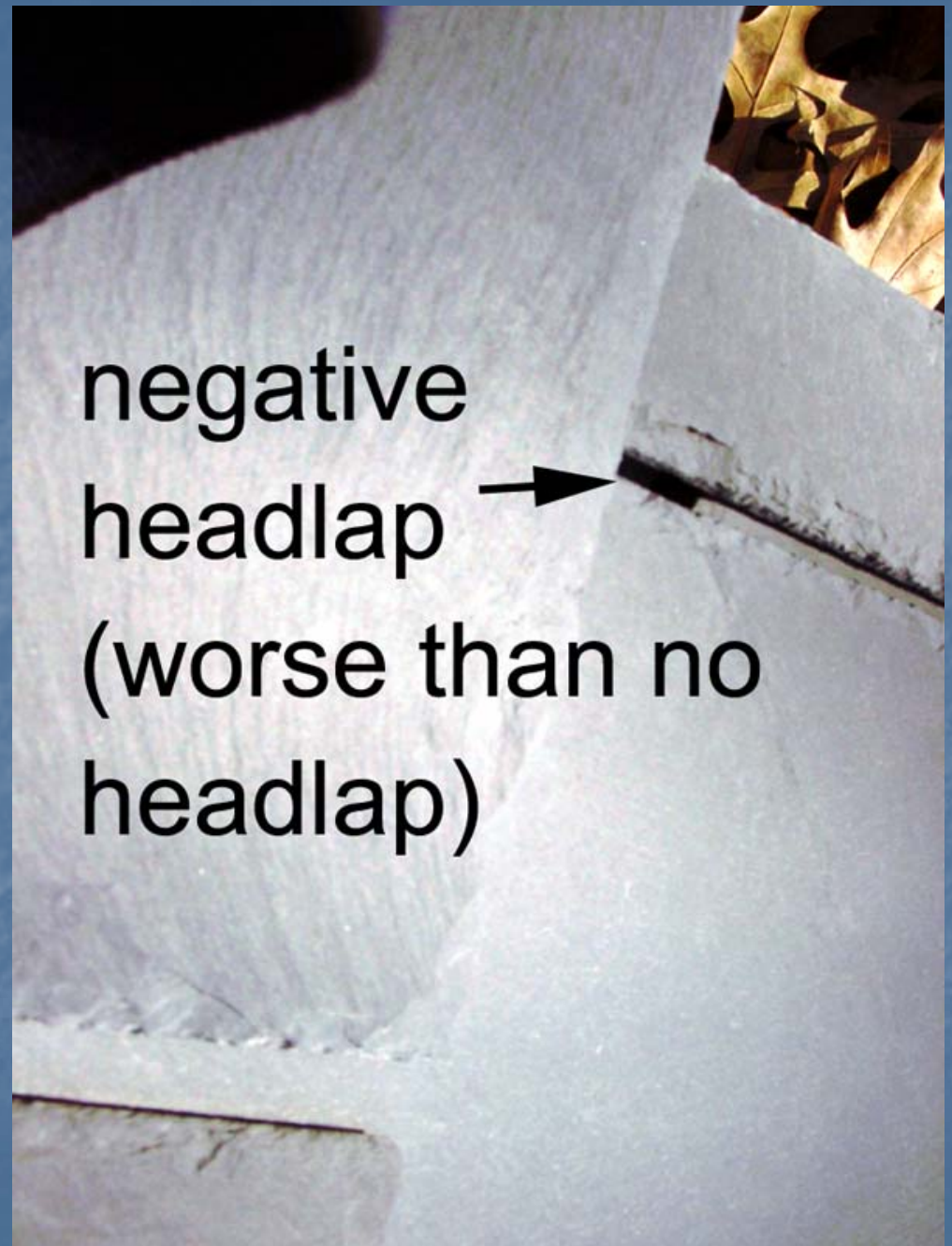
Headlap is what keeps the water out.



This \$450,000 slate roof was installed with no headlap. When the underlayment wore out after 20 years, the entire roof had to be replaced.



A new slate roof on a college dormitory shows areas of negative headlap (i.e. direct water entry).



One inch headlap
on an entire
shopping center
roof in Louisiana.
This new slate
roof was torn off
and discarded.



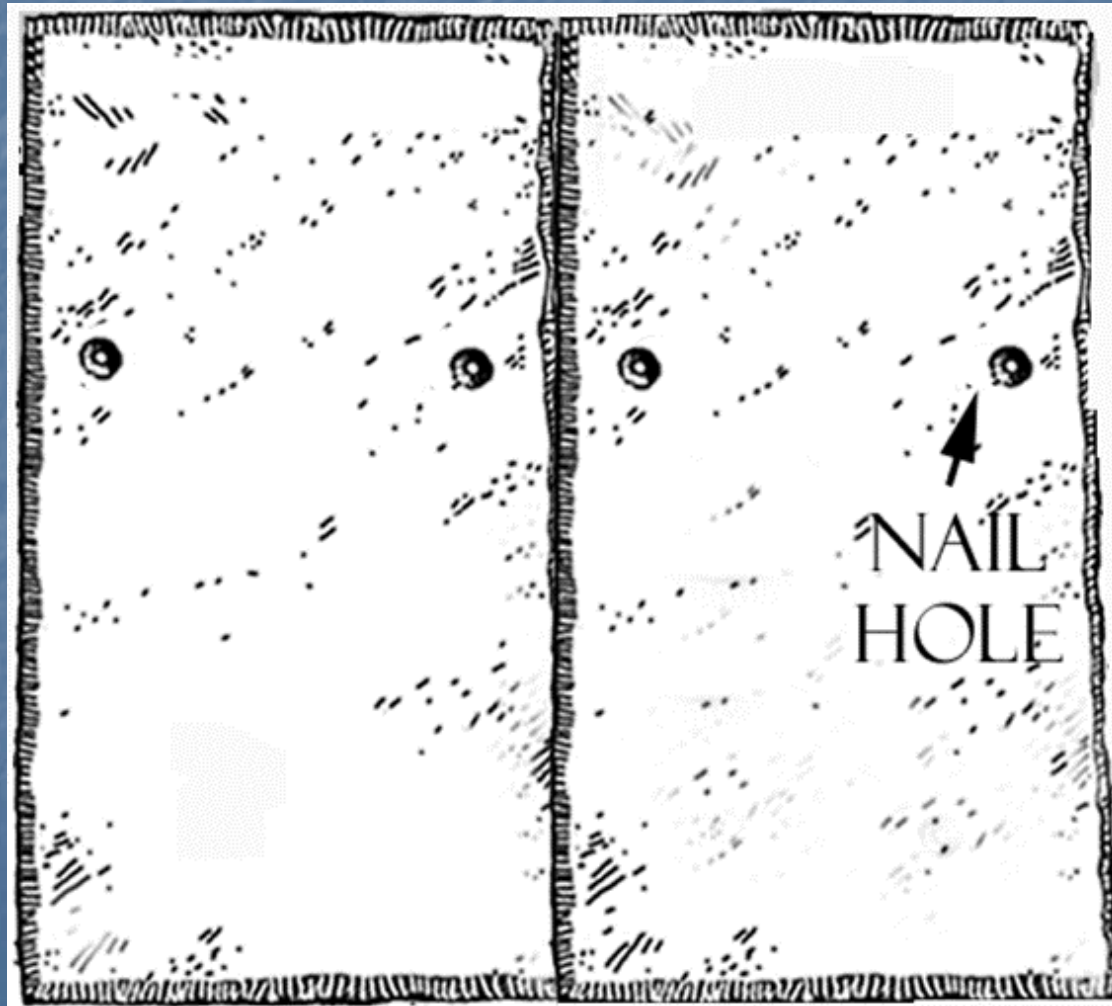
Headlap can be increased to 5" at the eaves to prevent ice-dam problems. This roof has 5" along the bottom 3' and 3" on the remaining roof.



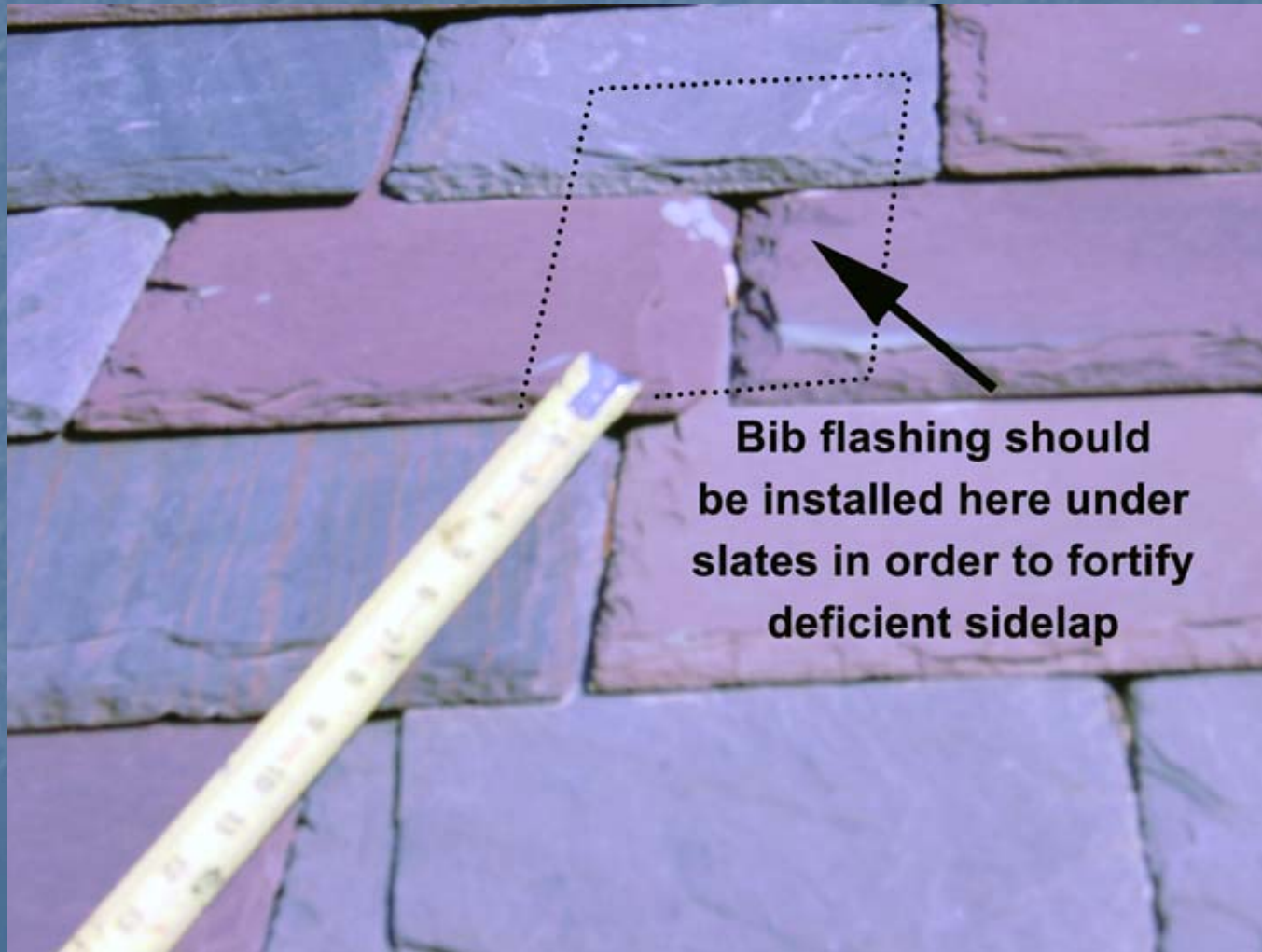
Sidelaps

- The lateral staggering of slate side-butt joints should be approximately 3" minimum to keep the joints away from the underlying nails.
- Slates must be manufactured correctly so the nails are not too close to the center.

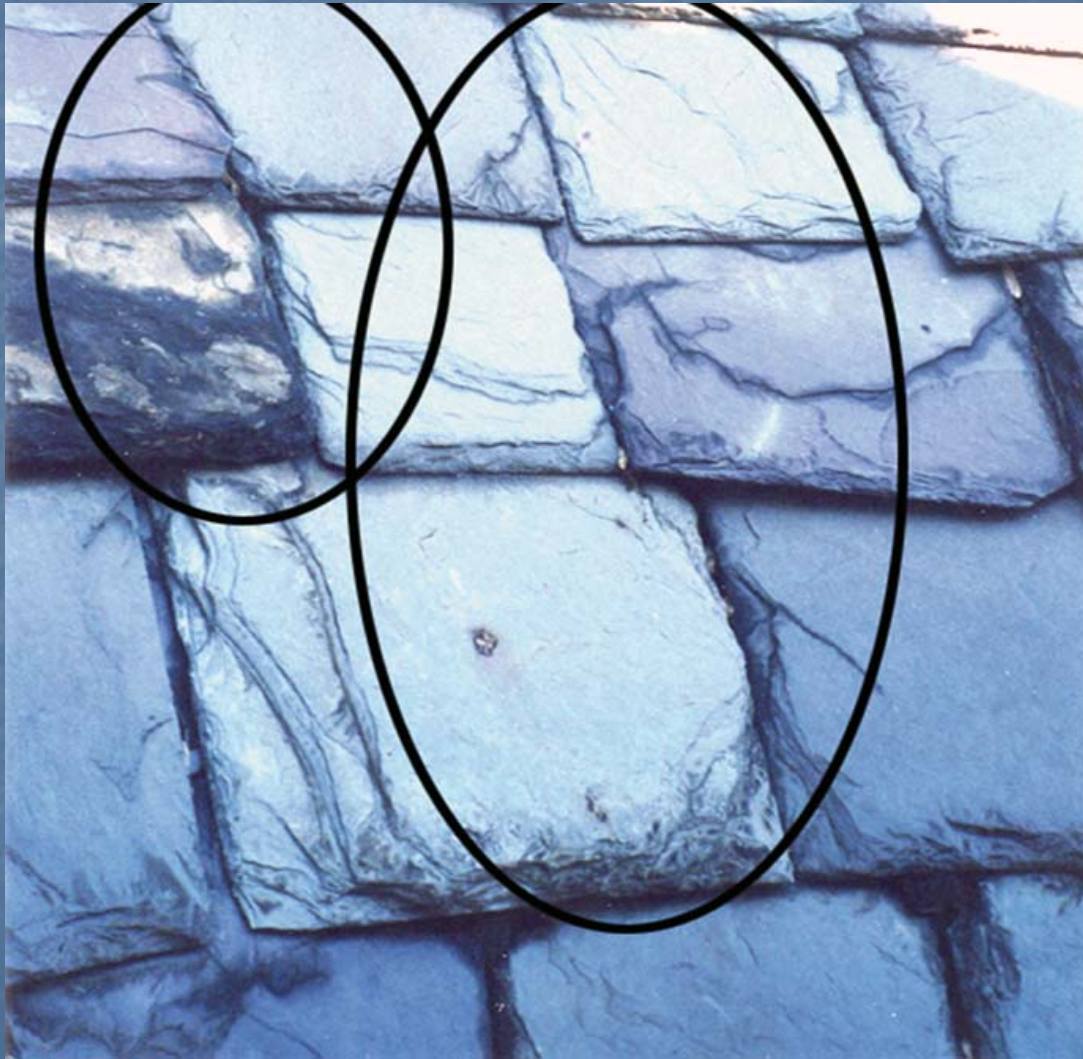
Nail holes should be 1.25" to 1.5" from the outer edge of the slate.



If the butt-joint is too close to the nail hole, it will allow water into the nail.



Incorrect sidelaps.



Another example of incorrect sidelaps.



Staging the Roof

Don't walk on the slates. They do not lie flat on the roof and can crack or break under foot traffic.



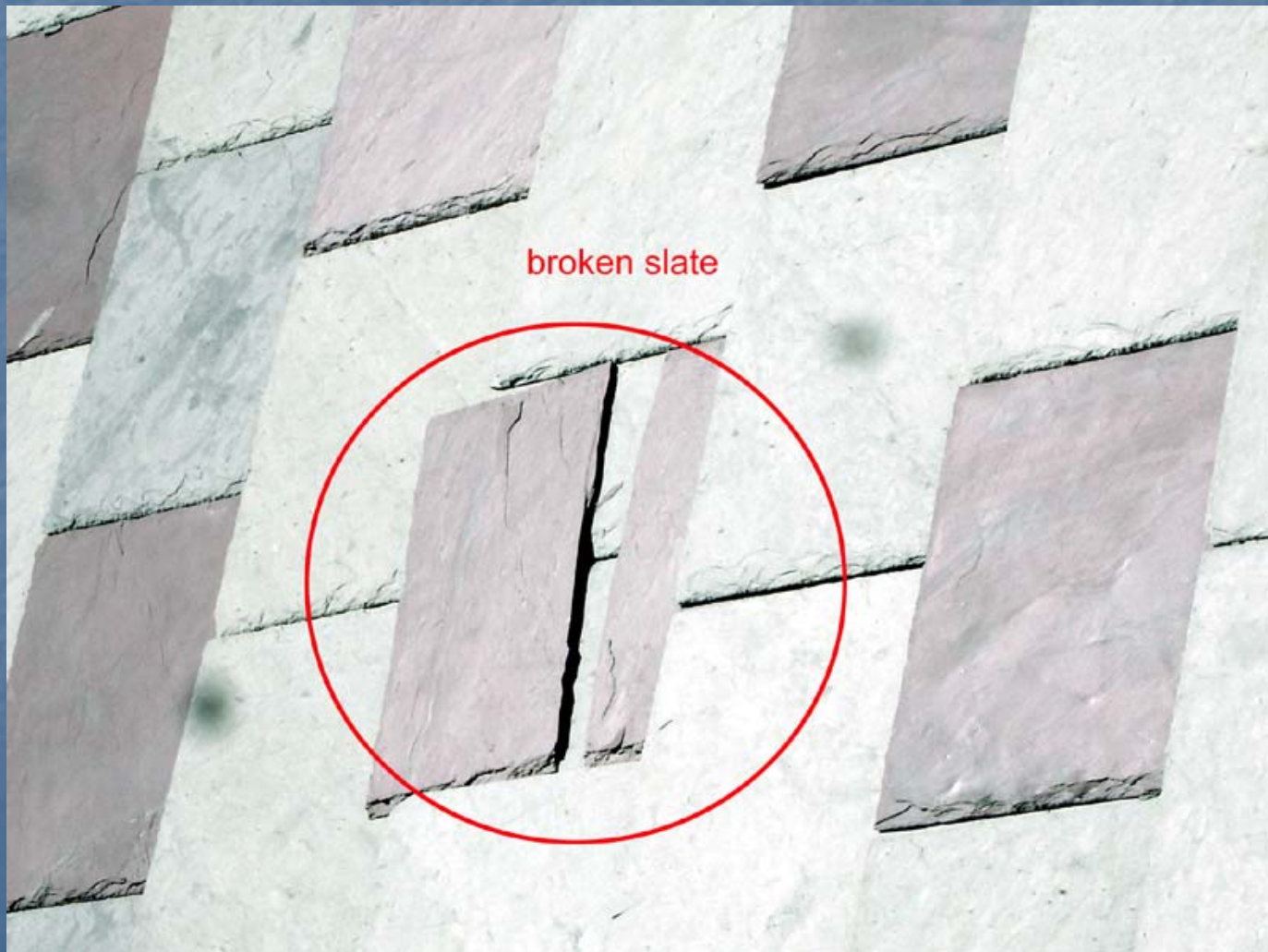
Classic errors: walking on the slates and wearing heavy boots.



Use roof scaffolding (roof brackets and scaffold planks).



This is what can happen to slates that have been walked on during installation. The slate may break apart immediately, or five or ten years later.



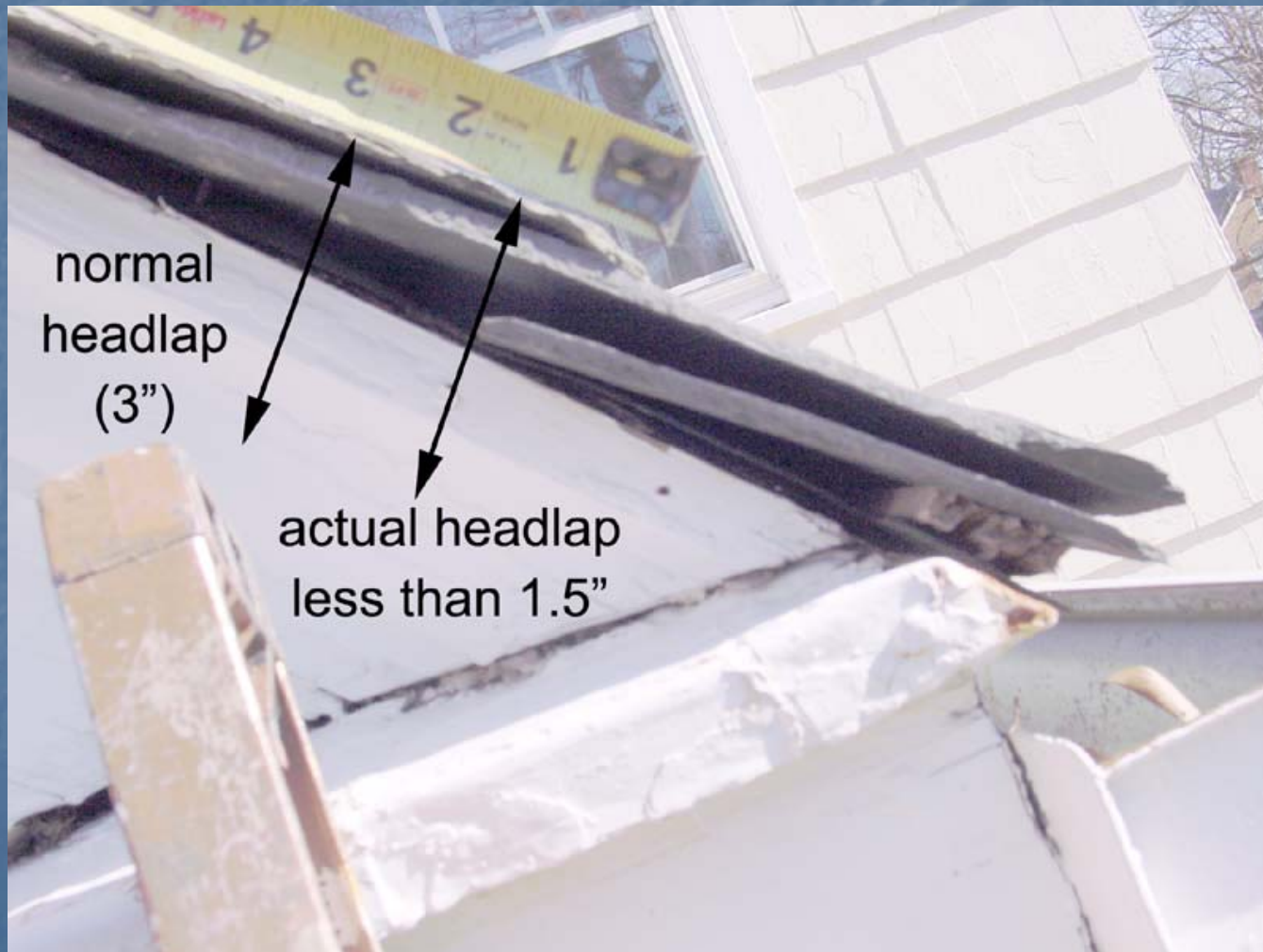
Blend the slates from all pallets during installation. Unblended slates are a mistake.



Starter Course

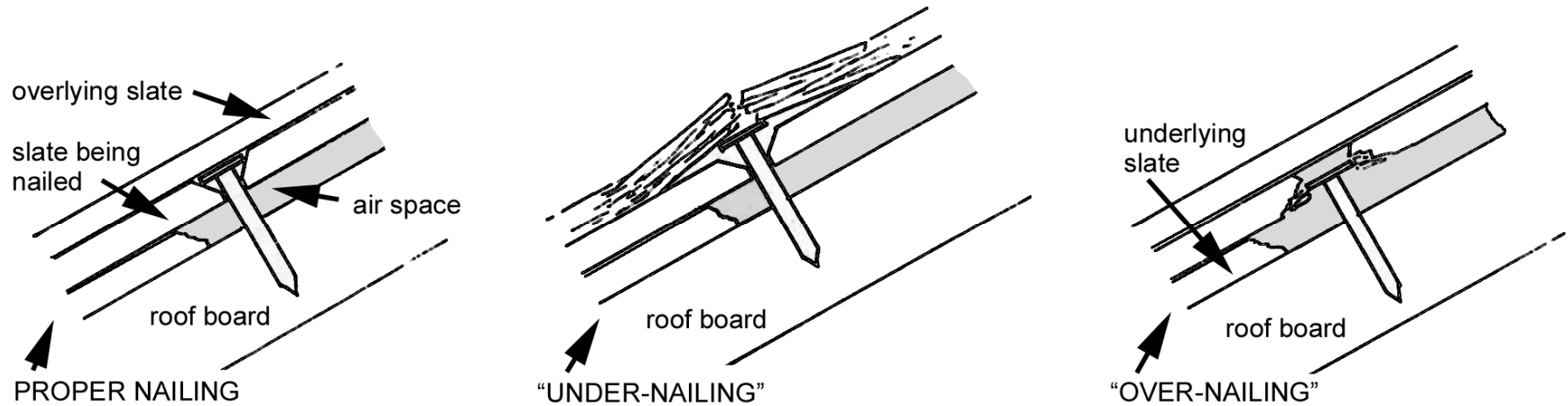
- Lay starter slates back-side-up.
- Use a cant underneath the starter slates.
- Provide adequate headlap.
- Provide adequate sidelap.
- Install the starter course and first course at the same time to ensure correct sidelaps.

Insufficient headlap on the starter course is a common problem.

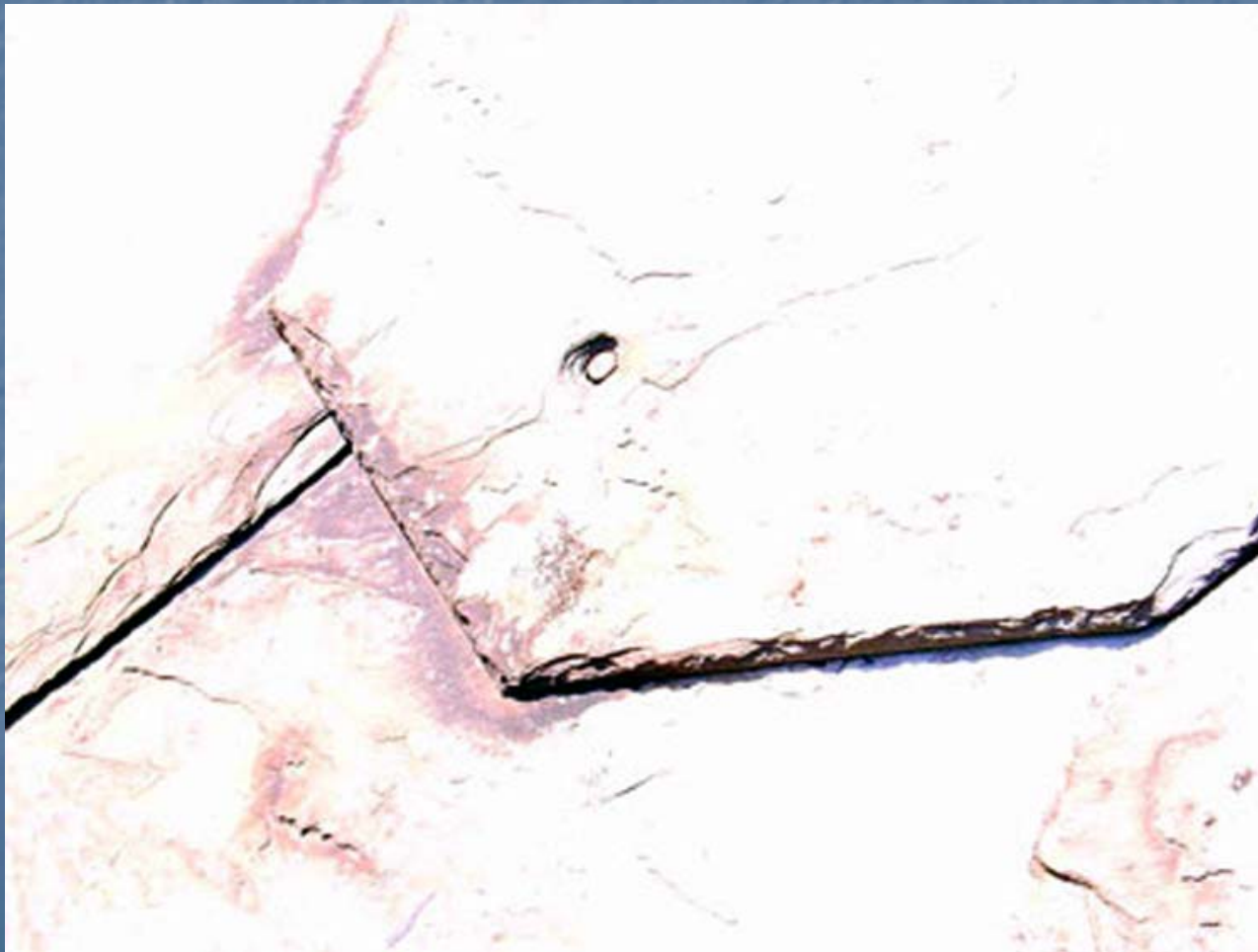


Nailing Slate:

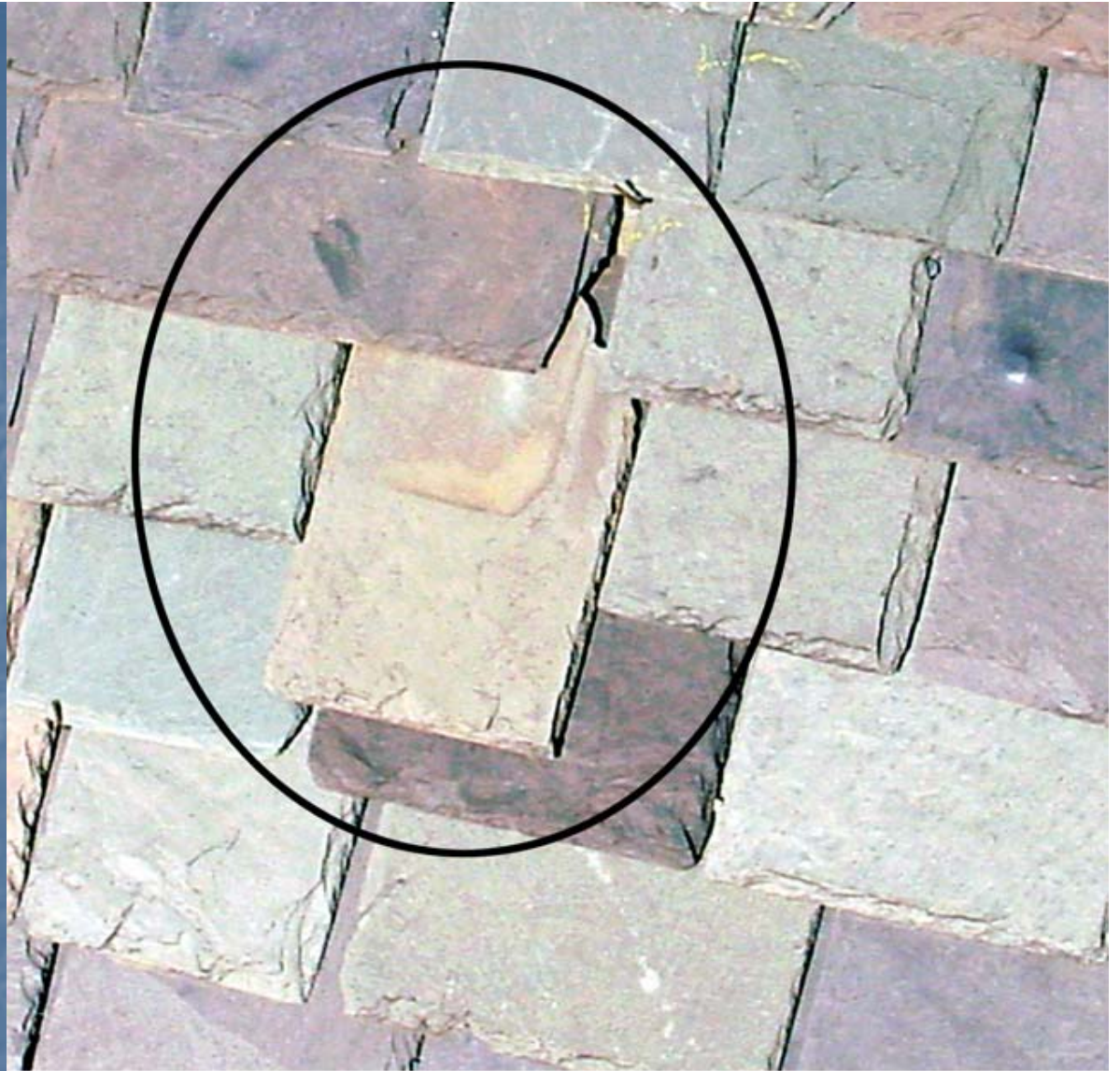
The nails should not be over-driven or under-driven.



Under-nailing:
The nail head will work a hole in
the overlying slate over time.



Over-nailing will result in slates sliding off the roof.



Slipping slate probably caused by “overnailing” during installation. Note broken-out nail hole.

The bottom of the slate should be held down when the slate is nailed, not the top.



Slates on east-facing main roof slope are not lying flatly on the roof deck, probably due to overnailing.

The slating nails should not be too long. Nail length should be twice the thickness of the slate plus 1". Use smooth shank nails, not ring shank.



This is a properly nailed roof deck made with correct materials. Note that just the tip of the nail is penetrating through the deck.



Common Flashing Mistakes

- Poor flashing materials (use copper or stainless steel).
- Negative overlapping
- Lack of expansion joints in built-in gutters
- Failure to either fold or solder corner joints
- Incorrect rivets or fasteners
- Soldering with open flame torches
- Non-compatible metal types

Negative overlapping means the flashing is overlapped incorrectly. Upper flashings should always be on top of lower flashings.

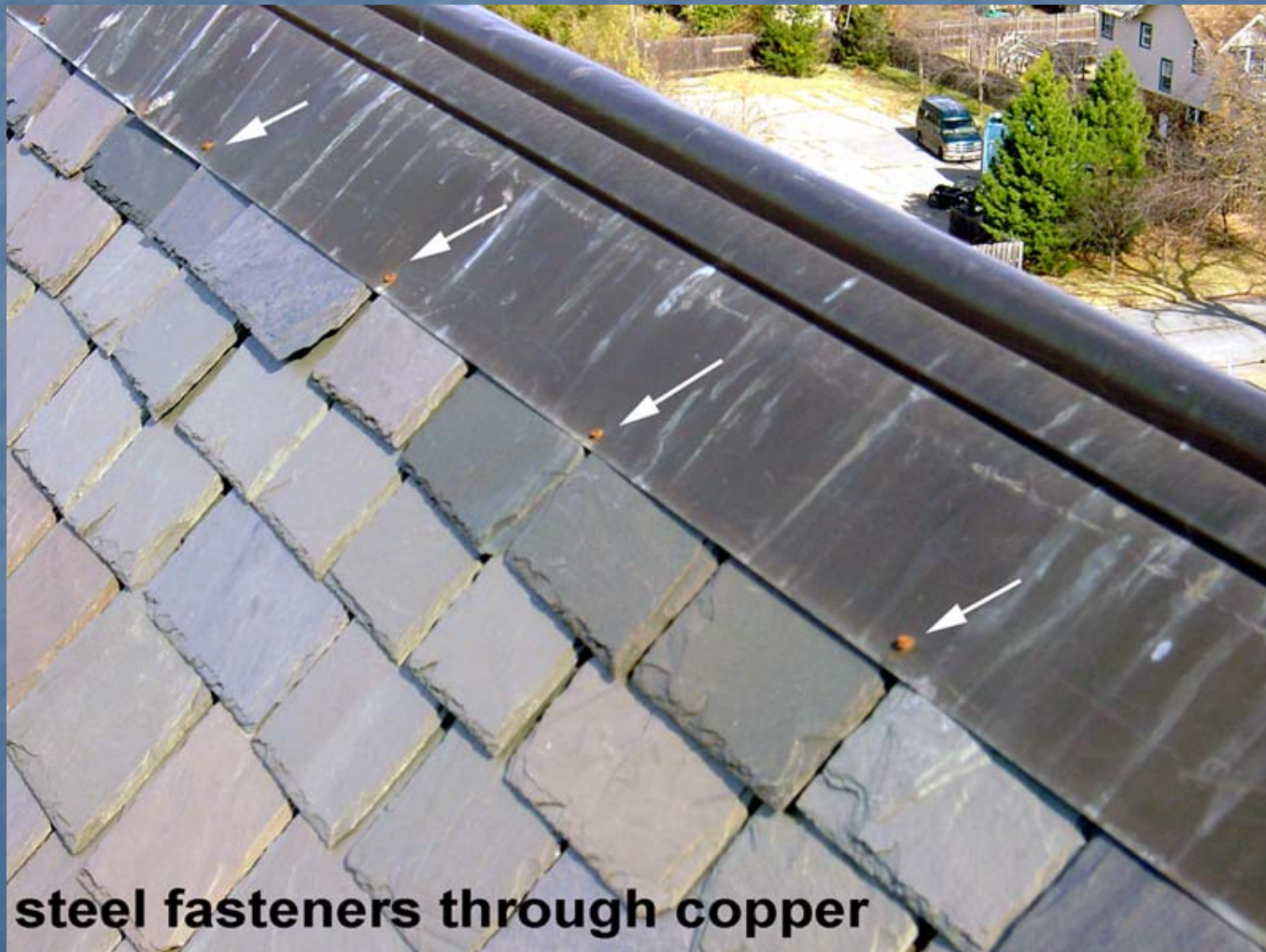


Corner joints
must be either
properly folded
or soldered to
prevent leakage.



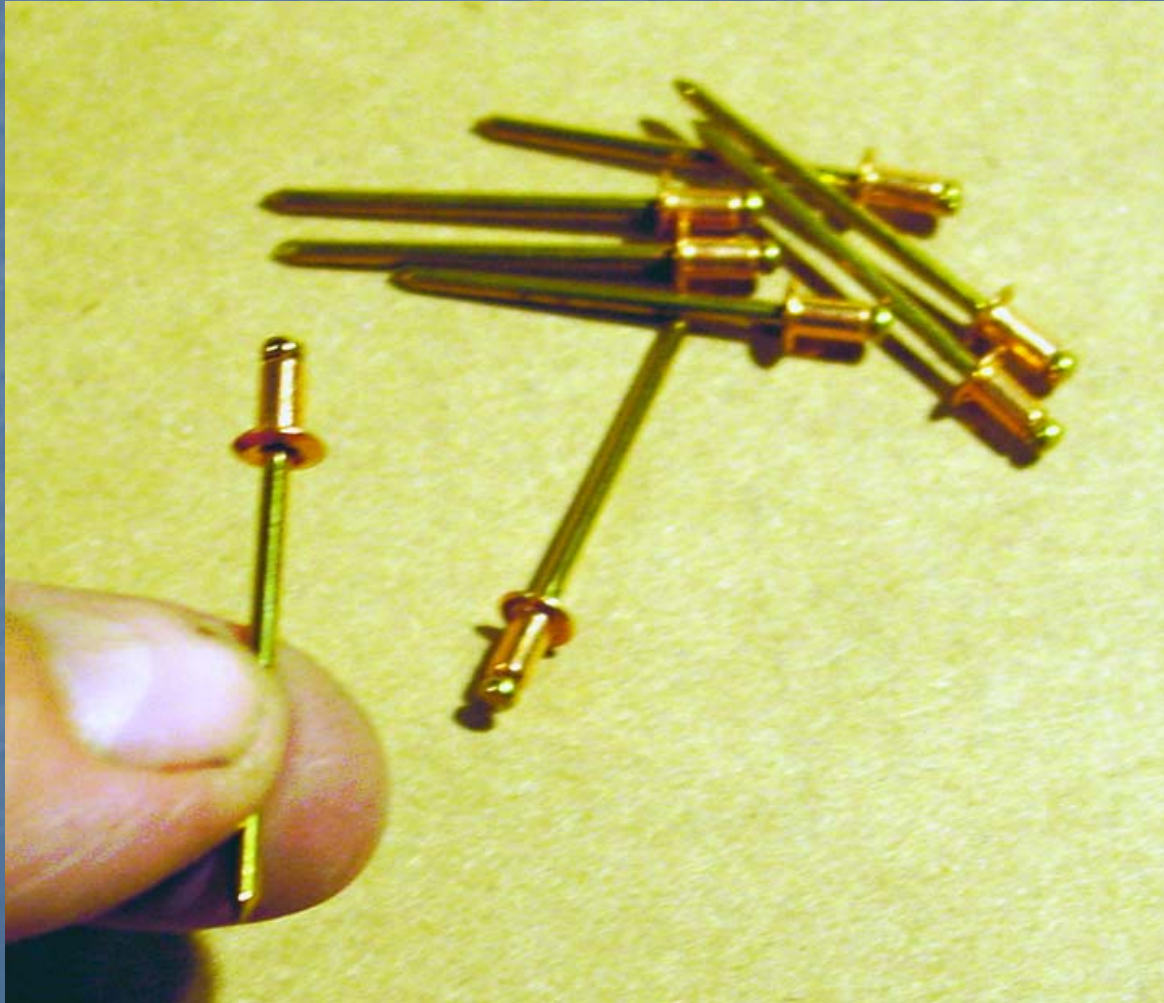
improperly folded front corner
provides inadequate protection
from water entry

Incompatible metal fasteners: steel screws with copper flashing.



steel fasteners through copper

Many copper rivets have copper-plated steel shanks and should be avoided. If they're magnetic, don't use them. Only use copper rivets with brass shanks.



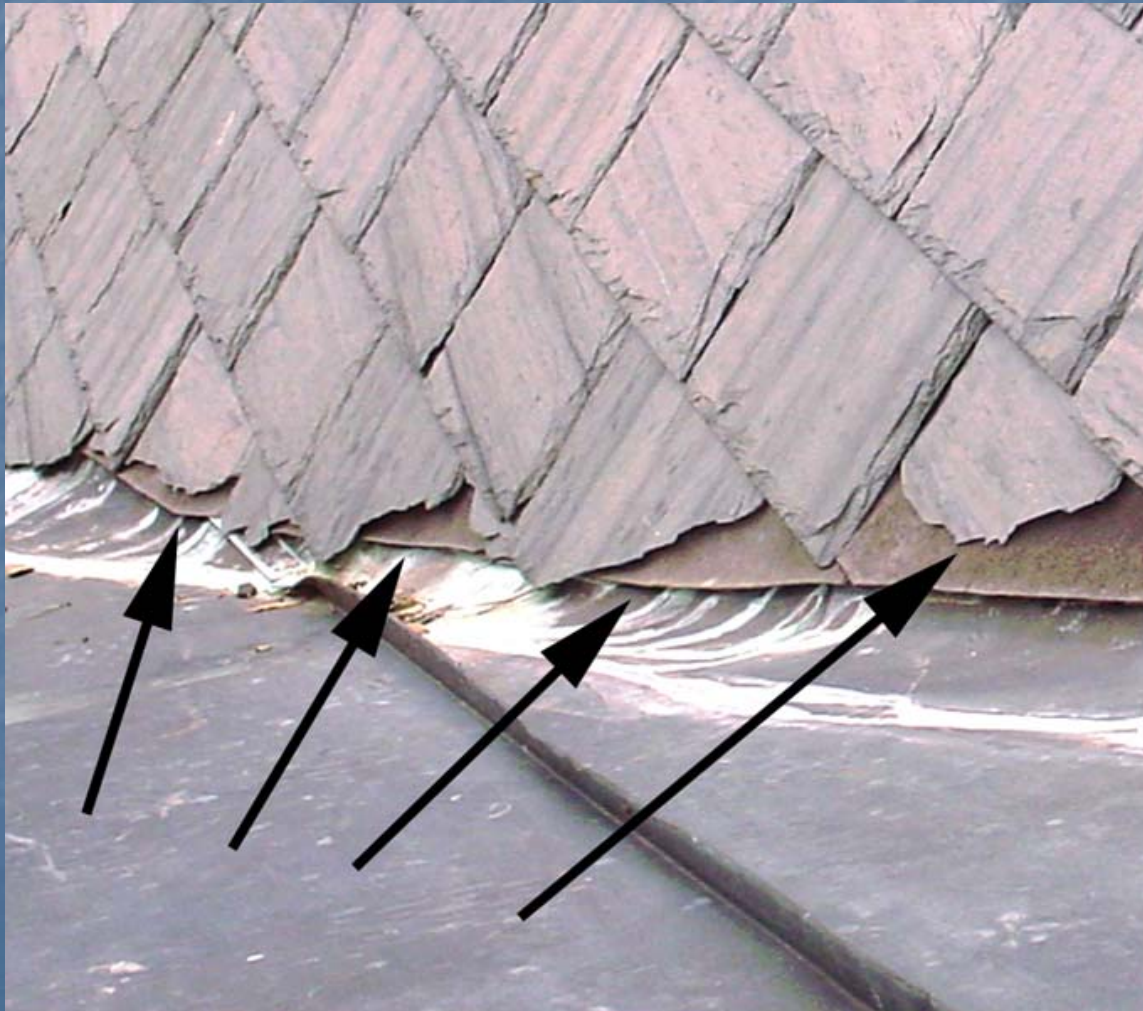
Copper plated steel rivets will rust and leave a hole in the roof because a piece of the steel mandrel remains in the center of the rivet.



Use the Proper Tools

- Cut slates with either a slate cutter or hammer and stake.
- Punch nail holes in slates with a slate hammer or slate cutter.
- Remove nailed or broken slates with a slate ripper.

This is an example of poorly cut slates.



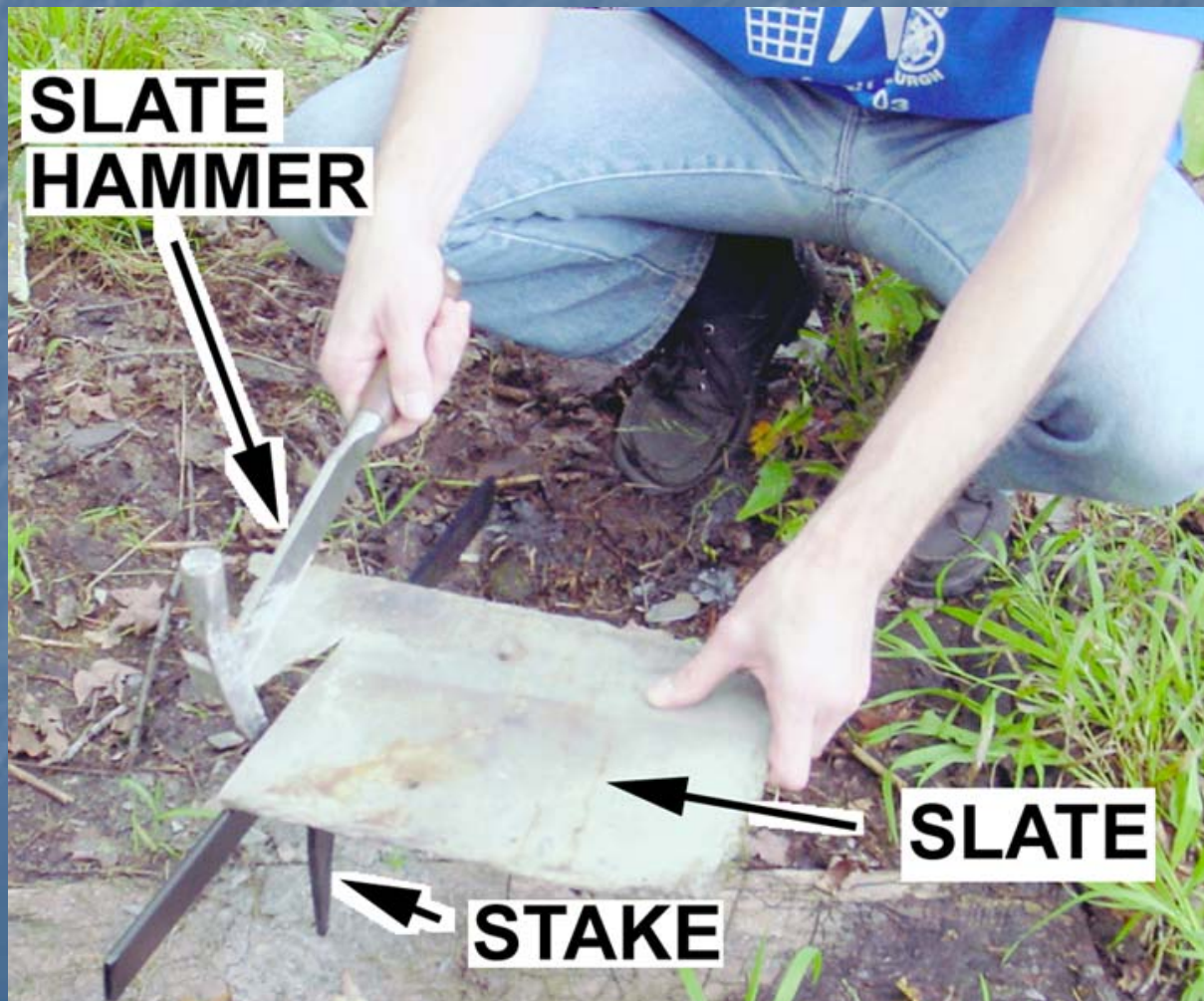
Slate tools are readily available on the internet.



Slates that are diamond sawn lose their beveled edge and should be trimmed by hand.



A stake and hammer can be used for cutting thicker slates.



More Areas of Concern

- Soldering
- Cant Strips
- Snowguards

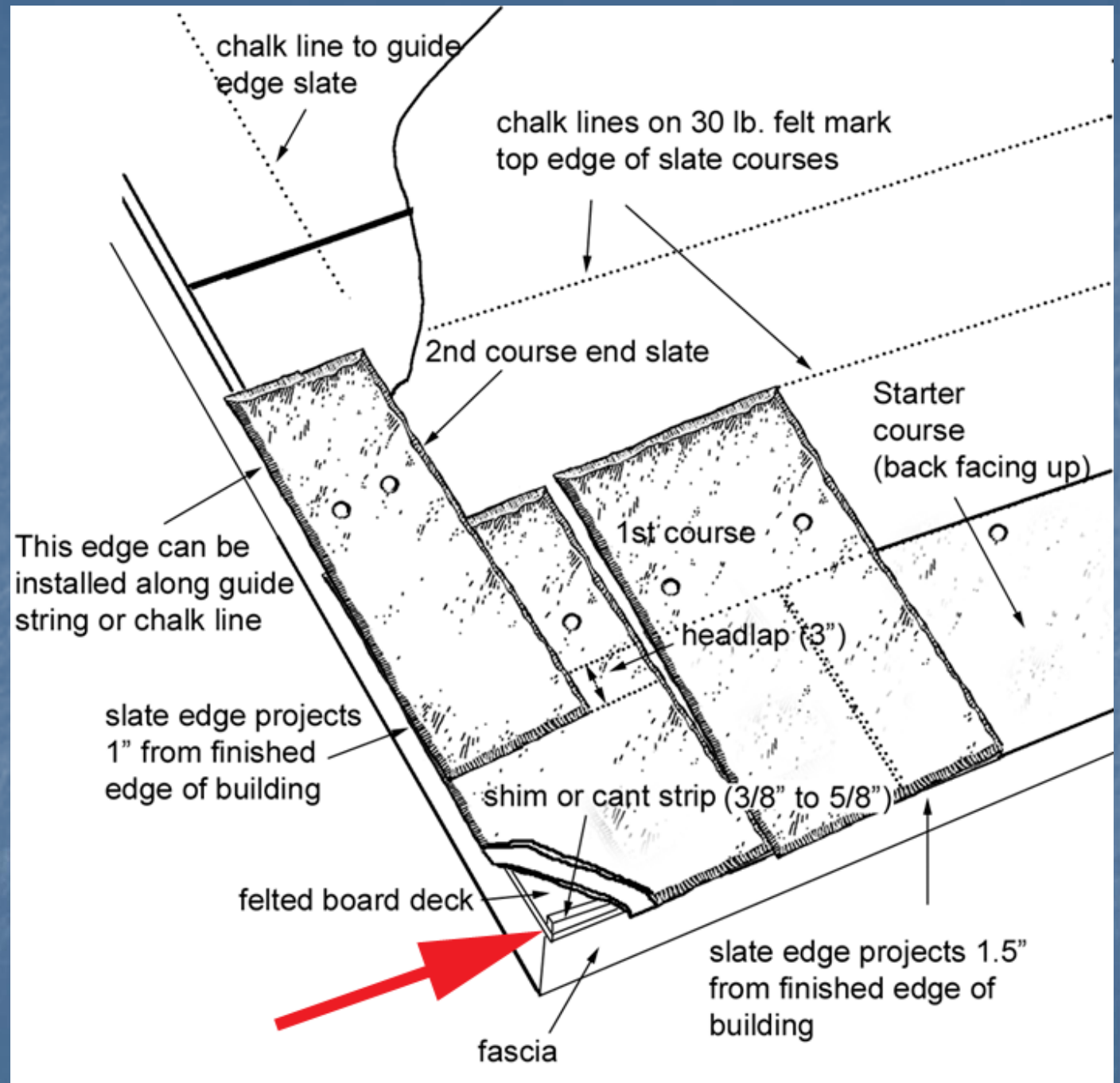
Open flame torches used on roof flashings are a quick way to start a building on fire. Use closed-flame soldering devices when soldering against a building.



A cant strip should be installed under the starter course to tilt it to the correct angle.



The cant strip raises the bottom edge of the starter slate to the same angle as the slates on the rest of the roof.



Traditional wooden cant strips work well.



Copper drip edges with built-in cants also work well.



Snowguards must be installed in adequate numbers. One course is not enough. This is a recipe for failure.



Manufacturer recommends a minimum of 3 rows of snow guards.

Galvanized snow guards will rust and stain the roof.

Summary

- A century roof is not difficult to install.
- Contractors should do their homework before installing such a roof.
- Make sure the roof has adequate slope.
- Use a long-lasting roof deck material.
- A good slate source is imperative.
- Use high-quality fasteners.
- Use high-quality flashing materials.
- Use the correct tools.
- Use detailed contract documents.
- Stage the roof correctly.

For more information:

- The Slate Roof Bible, 2nd edition
- SlateRoofWarehouse.com (source of tools, supplies)
- SlateRoofCentral.com (source of info, videos, etc.)
- SlateRoofers.org (source of contractors)
- TraditionalRoofing.com (source of articles)
- SnowGuardWarehouse.com (source of snowguards)
- SolderWarehouse.com (soldering supplies)
- Call us toll free at 1-866-641-7141
- Questions?