

How to Avoid Installation Errors When Installing Slate Roofs

**ARCHITECTS AND INSTALLERS
SEMINAR SERIES**

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Natural quarried slate roofs are
arguably the world's finest roofs.
Installation is not difficult.

Most slate roof installation mistakes can be easily avoided. It is imperative that installers understand the basics of correct installation.

For example, this new slate roof had to be completely taken off and reslated.



Overlap was incorrect, as were the fasteners and the flashing material.

This new slate roof was condemned.

Installation components were poor, as were the flashings.



This new slate roof also had to be removed and replaced.



Replacement slates were poor quality and were installed with poor techniques in the early 2000s. The roof was entirely, and correctly, replaced again in 2019.

This new slate roof also had to be removed and replaced.



This shopping center roof, installed by storm chasers, had incorrect overlap.

This new slate roof also had to be removed and replaced.



This multi-million-dollar home had slates installed without any headlap.

This new slate roof also had to be removed and replaced.



This Manhattan roof was slated with poor quality imported slates that failed.

This replacement slate roof
had to be slated a 3RD time.



This historic home had been reslated with no headlap.

What causes new slate roofs to fail?

- 1) Poor quality slates
- 2) Incorrect headlap (not to code)
- 3) Poor choice of flashing material
- 4) Inadequate roof slope
- 5) Inexperienced installers
- 6) A combination of the above

Know Your Slate Quality

- Know the origin of the slate.
- Use slates with a proven track record!
- Make sure they're manufactured correctly.
- Use the correct size (e.g. not too small).
- Get a quality guarantee from the manufacturer.
- Include detailed specifications in the contract documents (slate type, size, origin, thickness, headlap, fasteners, flashings, etc.).

This China multi-color roof fell apart. Always use slates with a proven track record from confirmed and reputable sources.



Some imported slates may not fare well in freeze-thaw cycles. Use slates that have a history of success.



These Chinese slates were marketed as “unfading black” slates. Don’t gamble on low-cost products.



This roof had to be removed because of slate failure.
The slates were imported from China.



Not all Chinese slate is bad! Some of it is excellent!

Fake “slates” at 20 years of age are failing.
Use only genuine quarried roofing slates.



Unmarked pallets from different foreign quarries did not blend well on the roof.



Make sure all slate pallets are marked with the quarry origin!

Note that the mid-length slates on this graduated roof were thicker than the slates below them. The slate thicknesses should have been checked by the contractor prior to installation. The graduation scheme should have been detailed in the contract documents!





These 12" long slates were too small for the 200 square 12-story roof. 356 slates/square greatly increased the labor costs. The contractor went bankrupt in the middle of the job. Size your slates correctly!





These faulty slates had iron inclusions that defaced the roof. This is an installation error. The contractor should have culled out the few bad slates.

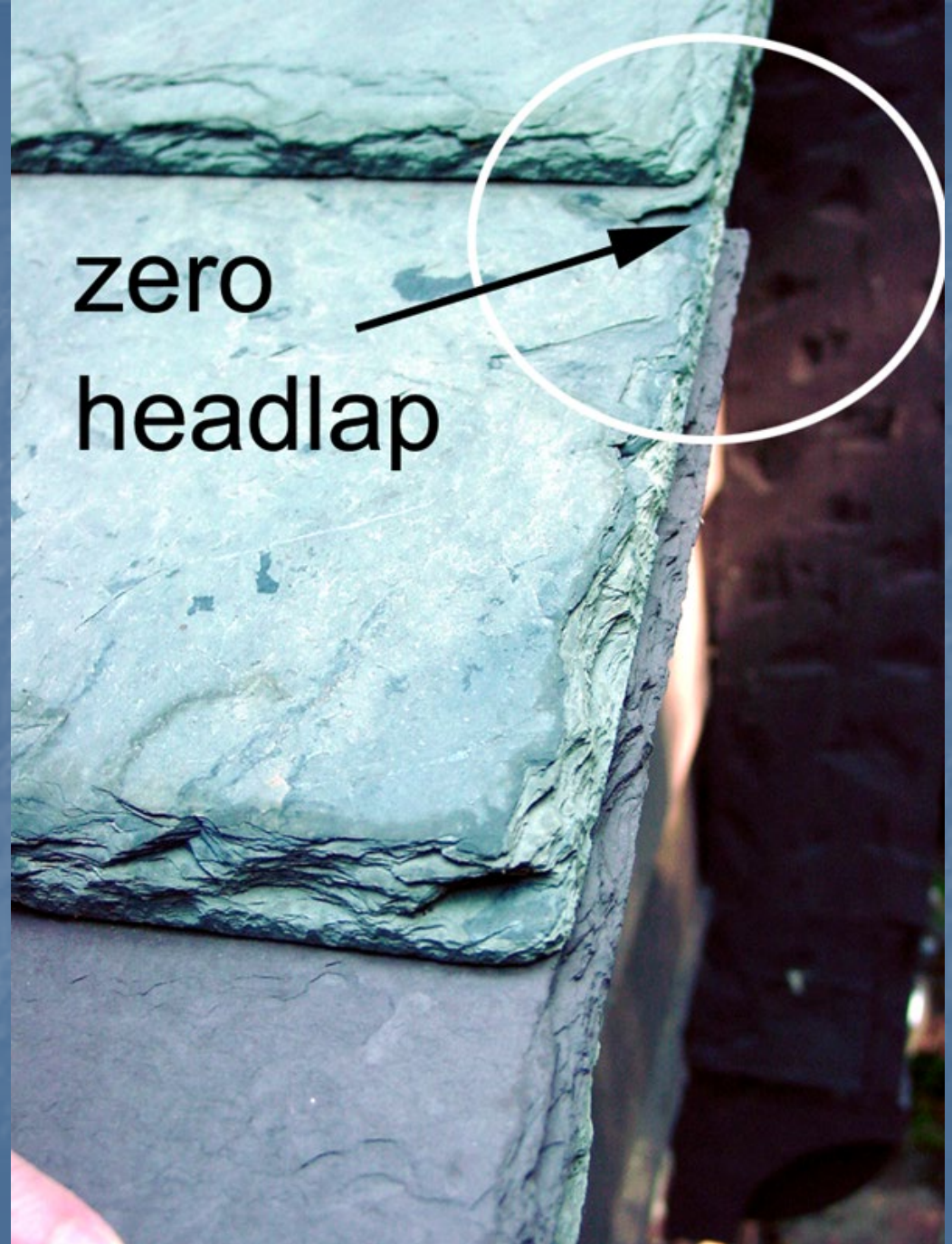


Incorrect Headlap

- Headlap is the overlap each slate course has on the slates two courses below.
- Typical headlap is 3" but varies.
- Understanding headlap is critical.
- Headlap is specified in the building code.



This \$450,000 slate roof was installed with no headlap. Instead, felt was laid over every slate course. When the felt wore out, the roof failed.



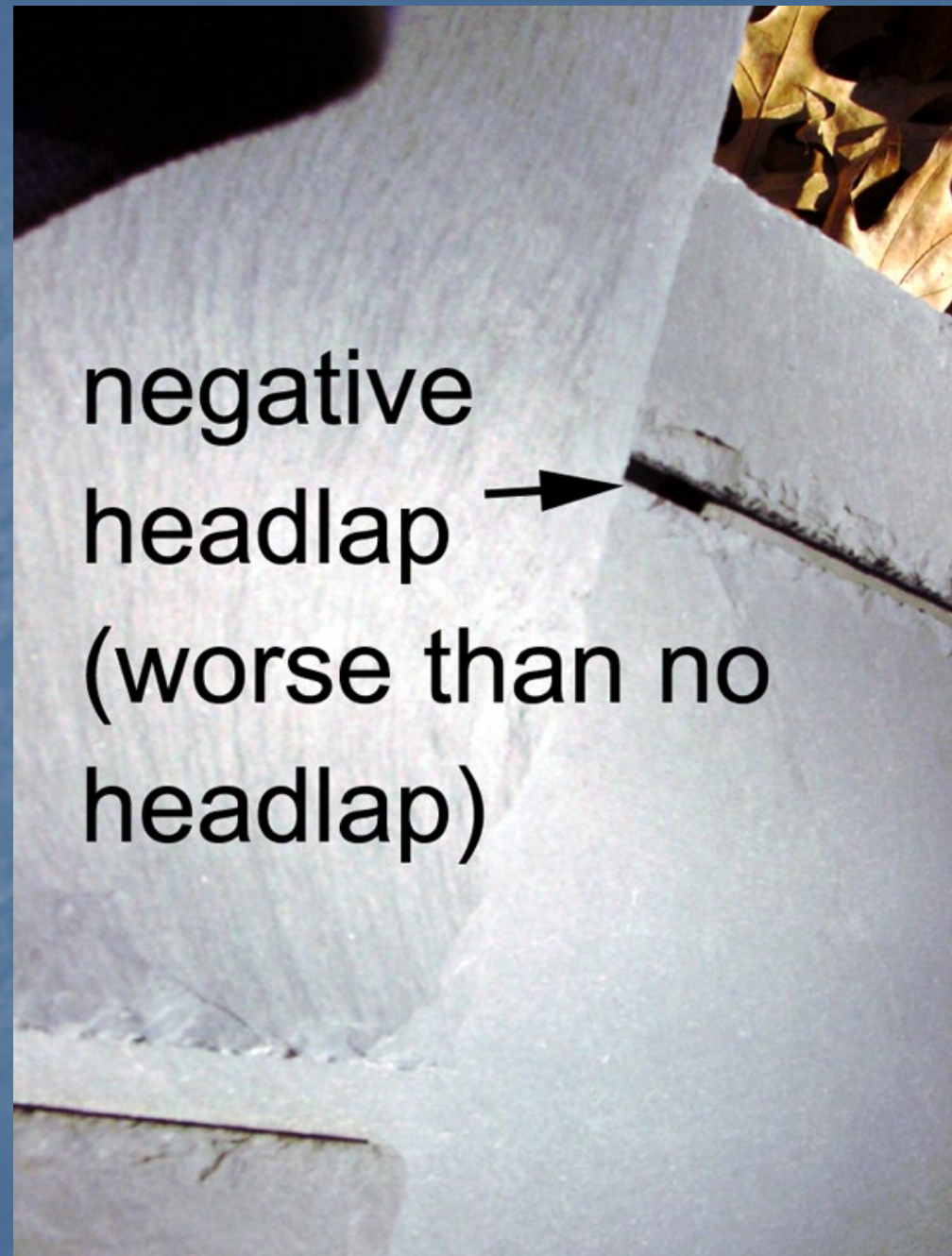
That was this roof:



This expensive college dormitory slate roof was installed without correct headlap. This is a mistake that is very easy to avoid!

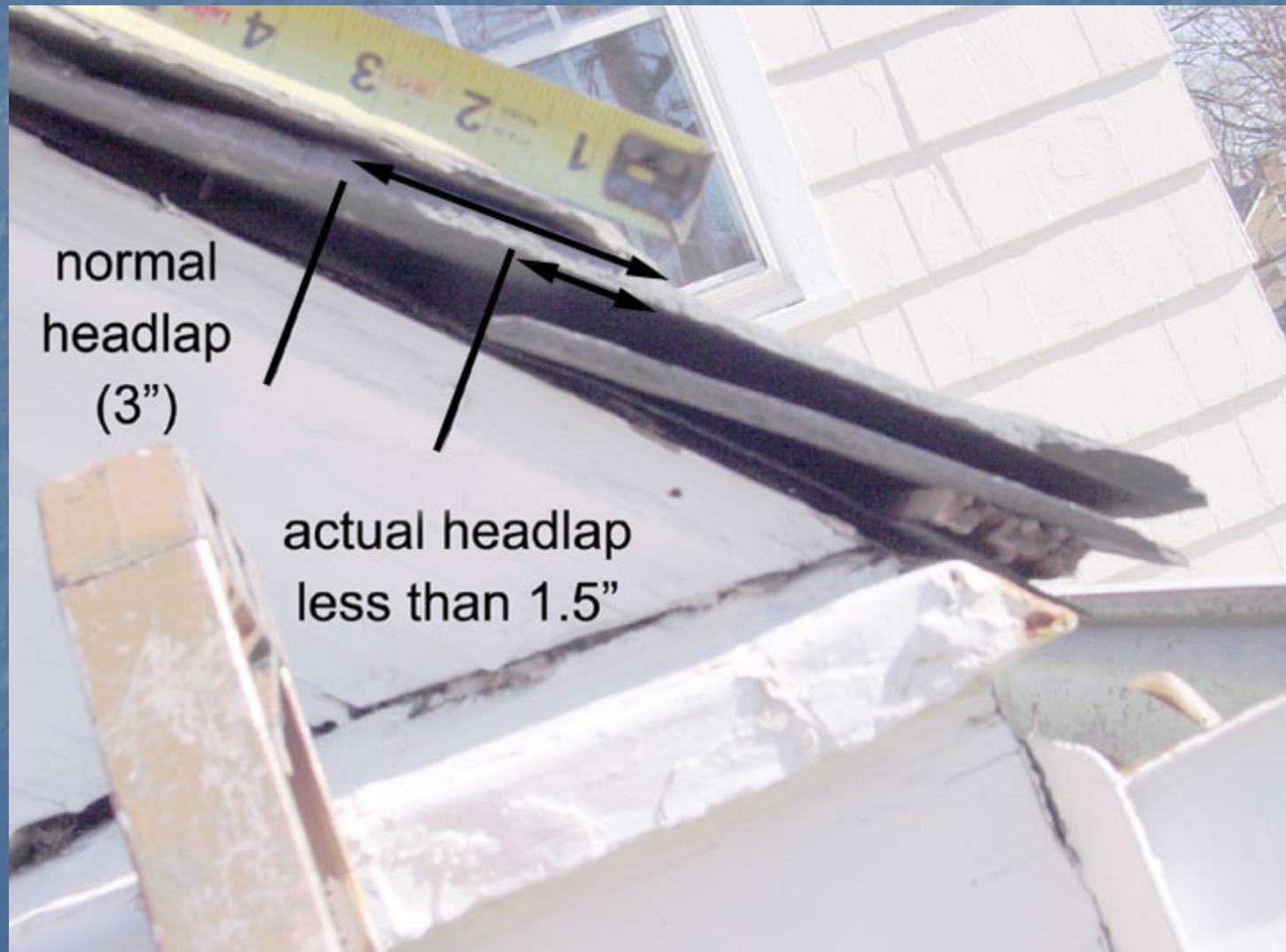


The same dormitory showed areas of negative headlap (i.e. direct water entry). This mistake is avoided very simply by the correct placement of the chalk lines when installing the slate!

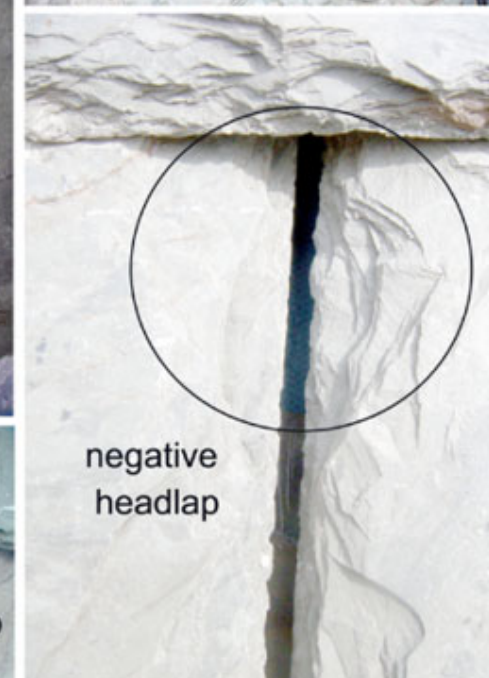
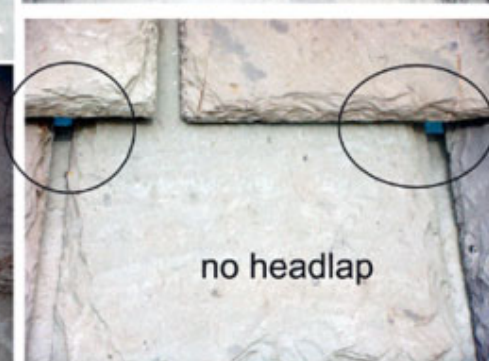
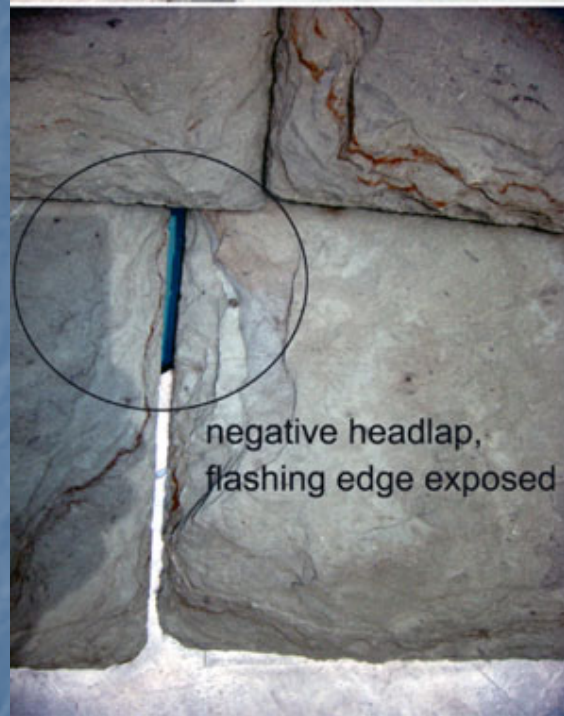
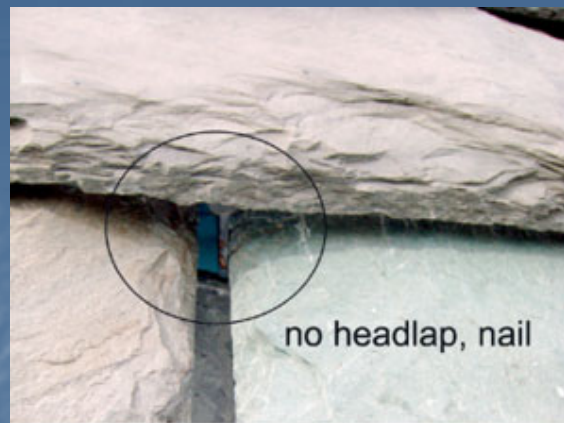




Insufficient headlap on the starter course is a common problem for inexperienced installers. This mistake can be easily avoided!



Other examples of negative (incorrect) headlap. Chalk your course lines correctly to avoid this mistake. It really is that simple!




2" headlap on a 6:12 slope violates code requirements (should be 4" headlap). Ring-shank nails are not recommended for installing slate shingles. Foot traffic causes breakage of new slates. All these mistakes were evident on this roof.





Foot traffic on a slate roof causes breakage. Make sure the roof is staged correctly during installation! These photos show foot traffic damage on a 6:12 sloped roof, newly installed.





Slate roofs should not be walked on during installation or at any time unless necessary. It's easy to stage a roof correctly to avoid this problem!



Avoid ring-shank nails when installing roofing slates. During repairs, they tend to break rather than pull out, making repair work very difficult!

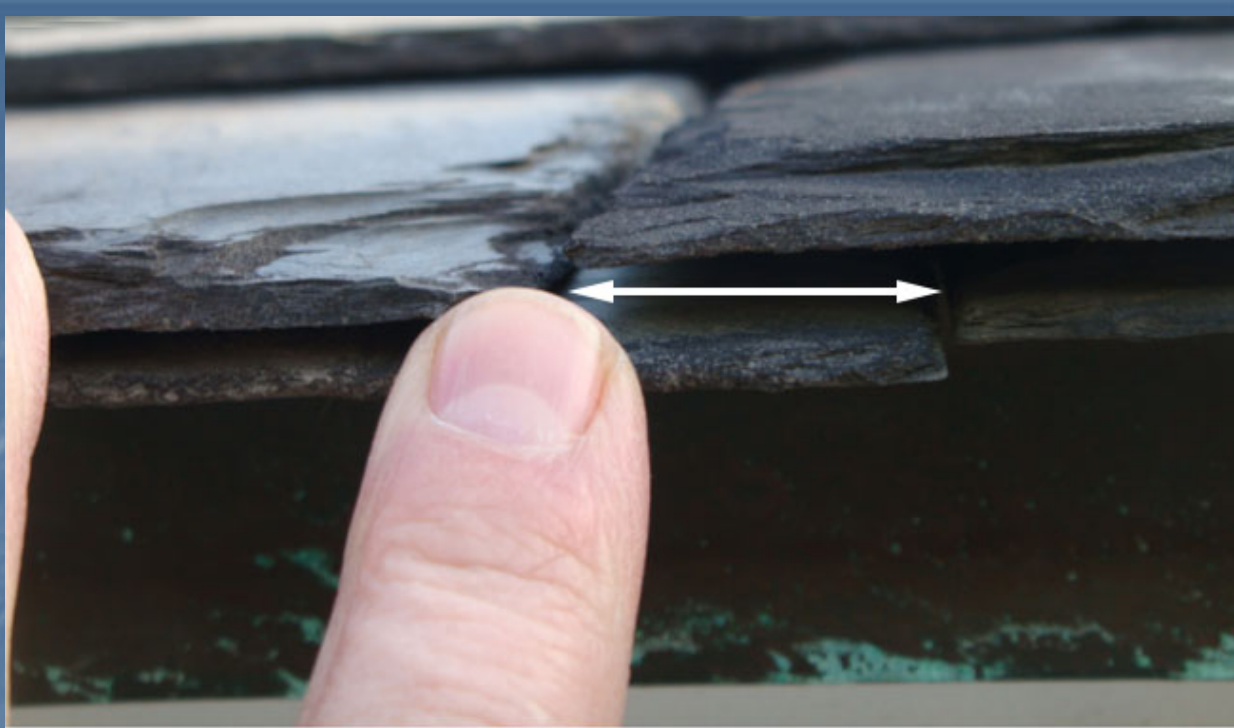


Headlap cannot be decreased, but it can be increased to mitigate ice-dam or drainage problems. The bottom 3 feet of this roof has 5" headlap, the remainder has 3".

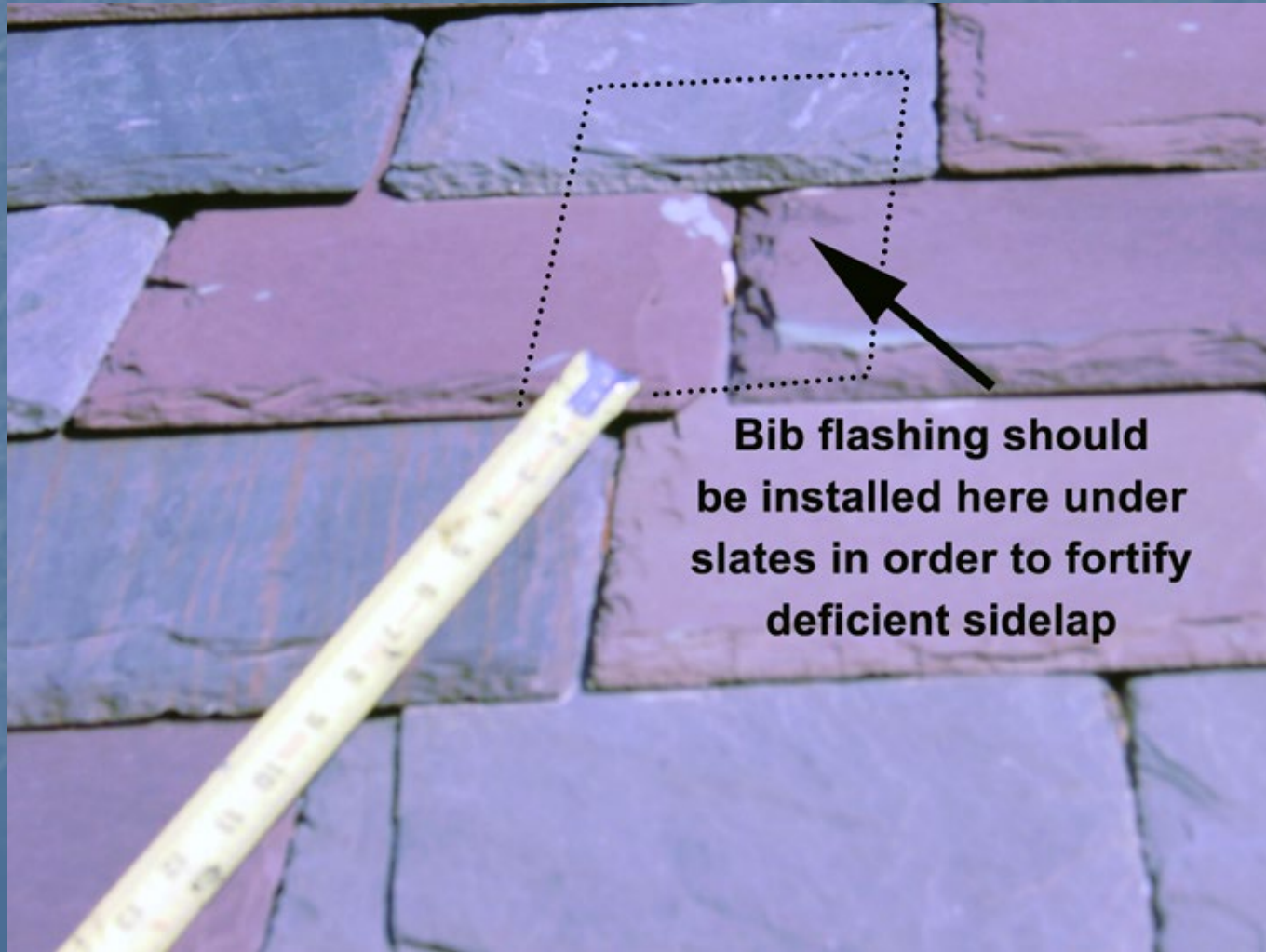


Incorrect side laps
can create problems,
but can easily be avoided.

Incorrect
sidelaps on the
starter course
are a common
problem among
inexperienced
installers.



If the side butt is too close to the edge of the underlying slate, it can allow water into the underlying nail. A bib flashing can correct this.

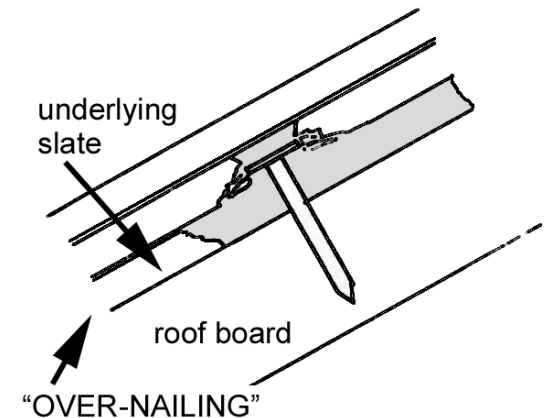
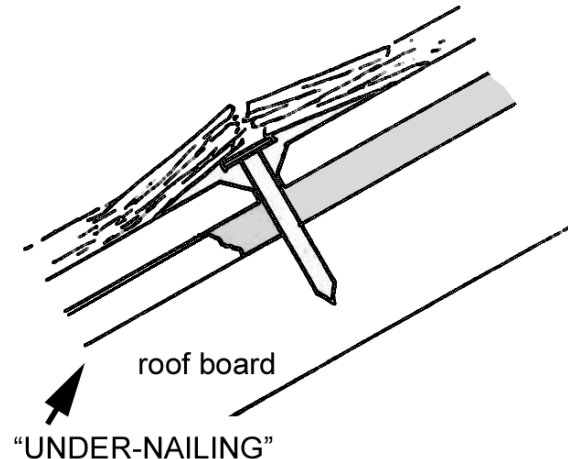
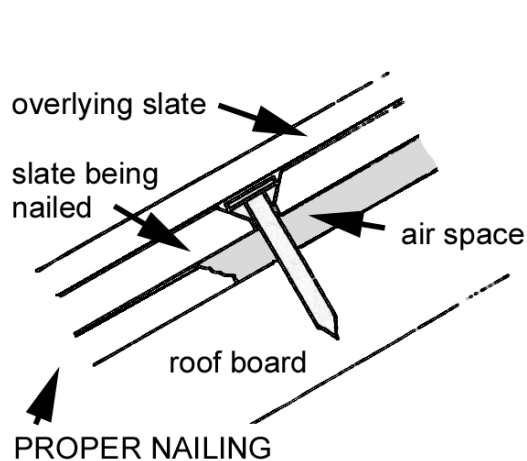


Over-nailing and Under-nailing

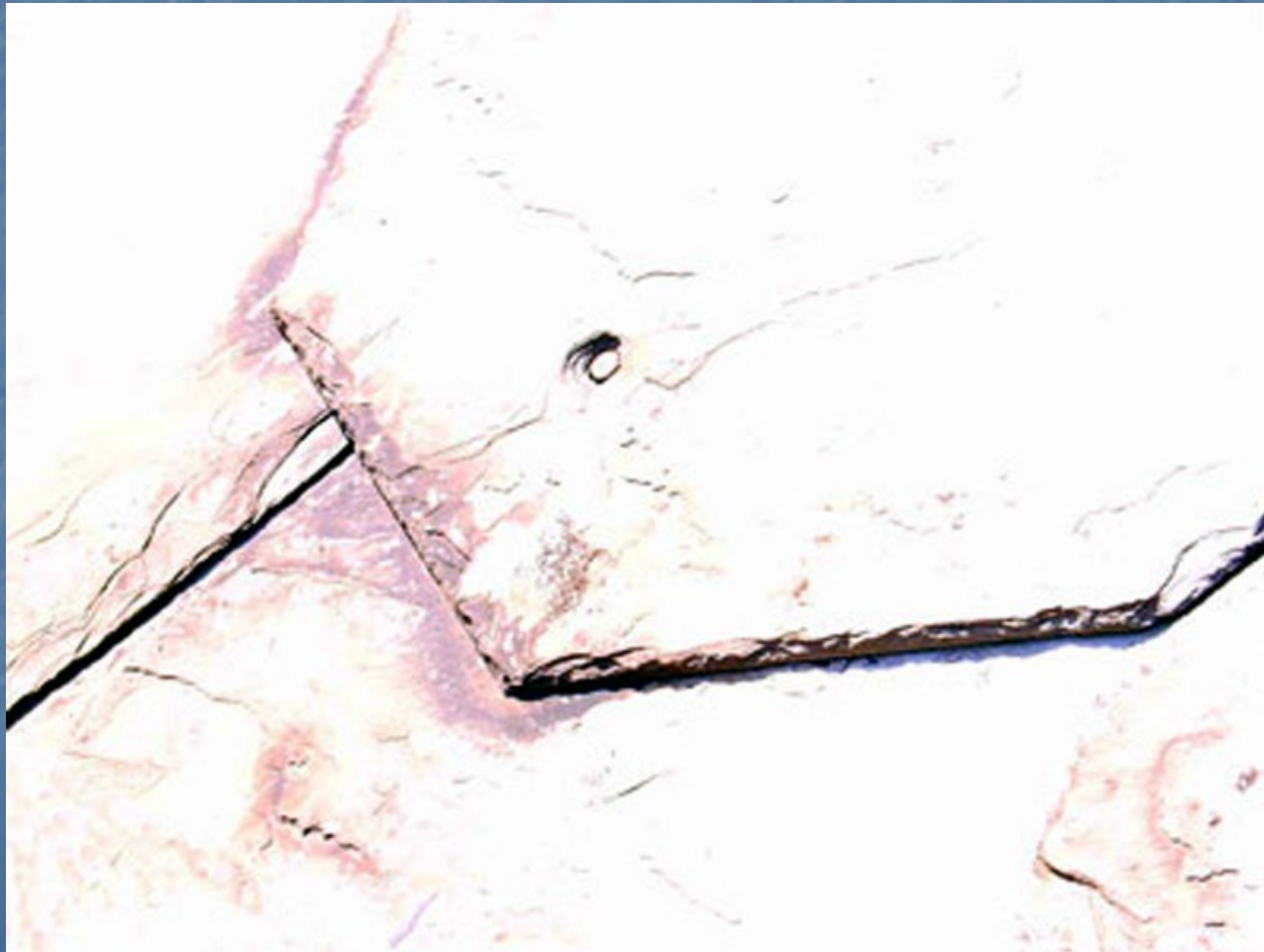
Nails must be correctly installed.

Nailing Slate:

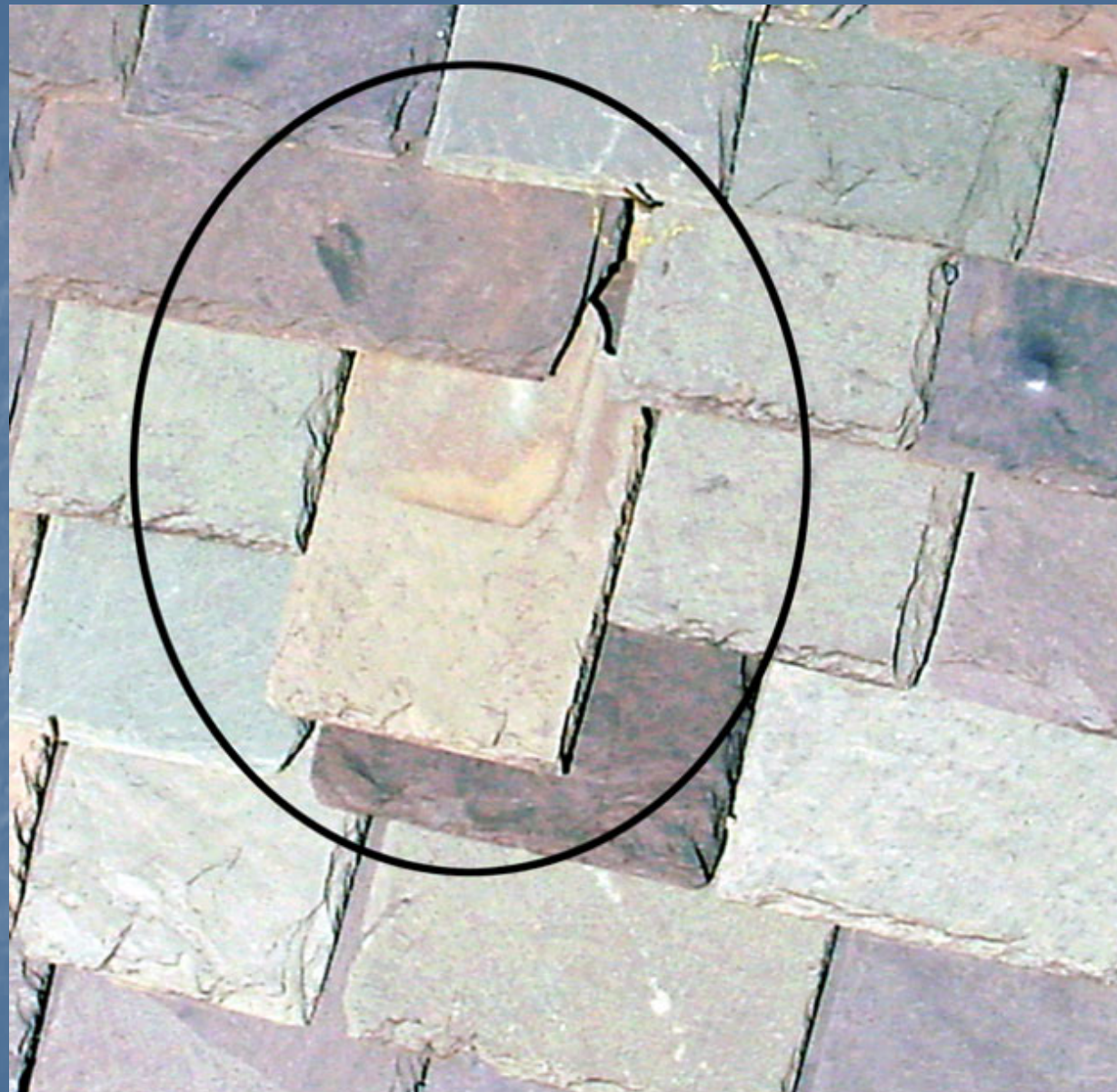
The nails should not be over-driven or under-driven.



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



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



The bottom of the slate should be held down when the slate is nailed, not the top. Otherwise the slates may not lie flat (when irregular slates are being used).



Nail Length

Use the correct nails.

The slating nails should be twice the thickness of the slate plus 1". They should barely penetrate the roof decking. The nails used here were too long, and the roof deck was too thin.



The slating nails will barely penetrate a properly nailed roof deck made with correct materials, as shown here.



This is another properly nailed slate roof deck.
Note that there is no nail penetration.



Flashing Mistakes

- Negative overlapping
- Lack of expansion joints
- Bad corner joints
- Wrong fasteners
- Soldering with open flame torches

Negative overlapping means the flashing is overlapped incorrectly. Upper flashings must lie on top of lower flashings, not underneath them!



Double-locked curved standing-seam corners are leak-proof and don't require solder or sealants.



Lack of expansion joints in built-in gutters causes the solder joints to fail prematurely. Refer to SMACNA guidelines for thermal expansion allowances.



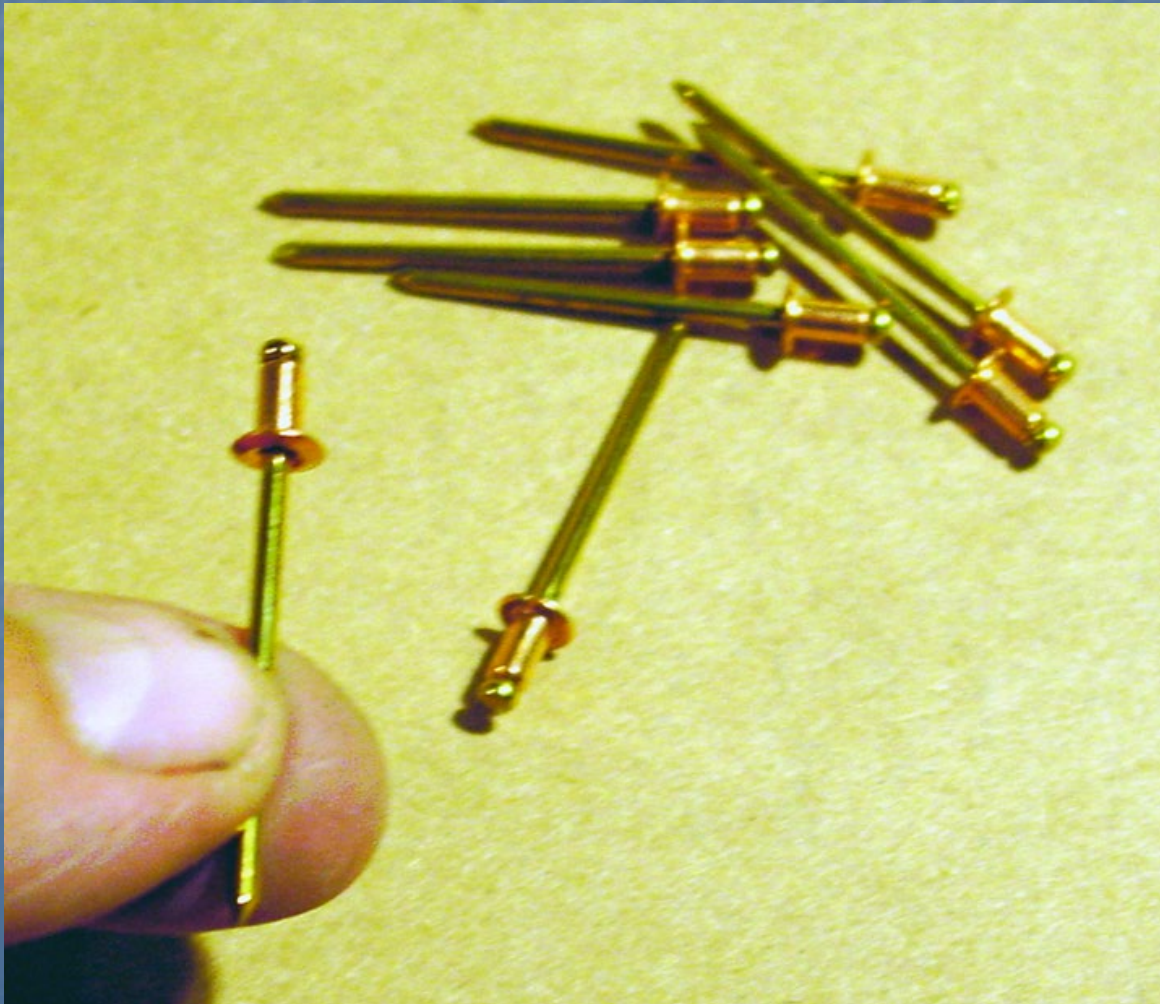
Make allowances
for thermal
movement,
otherwise solder
joints can crack
and leak.



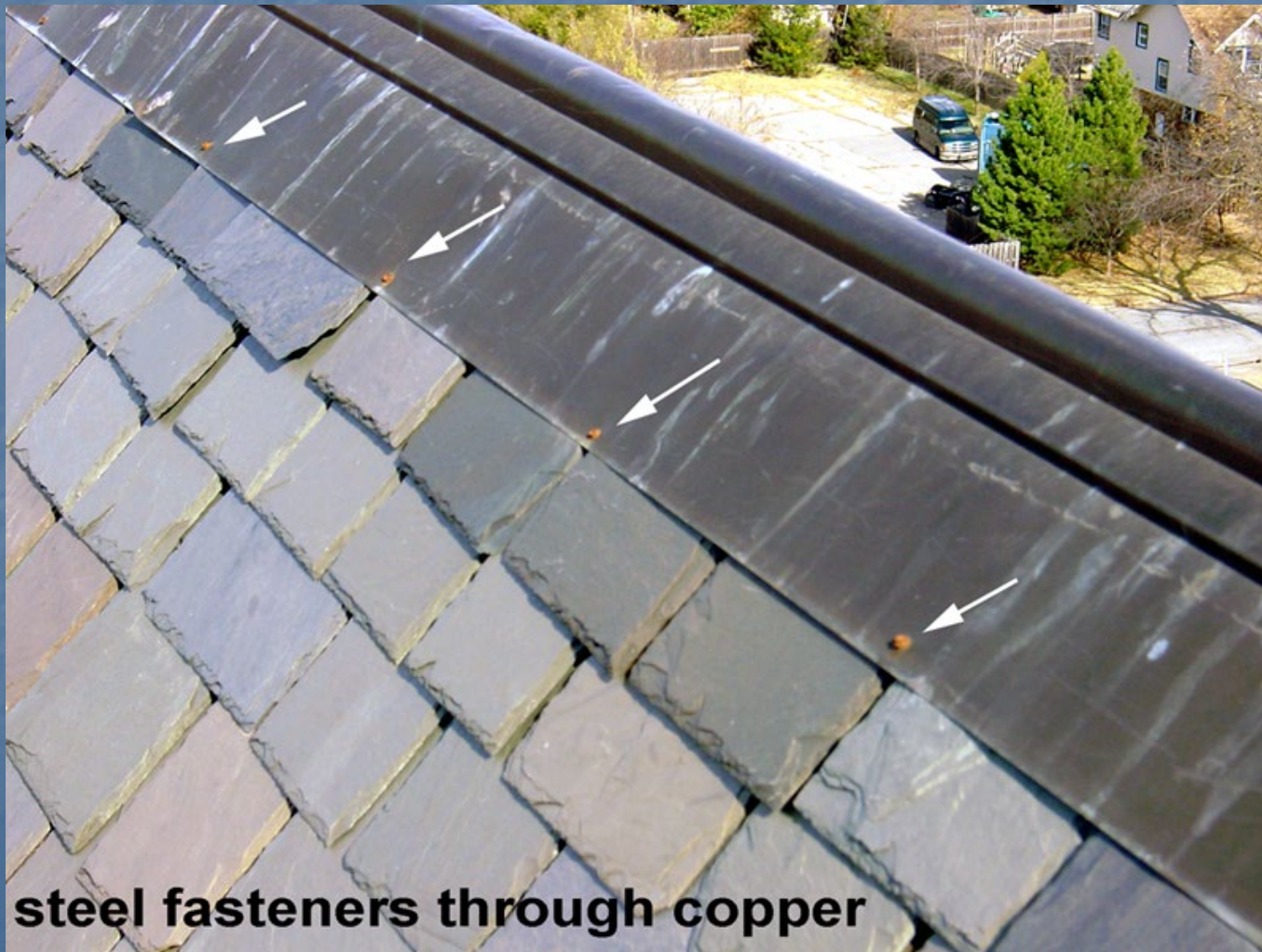
Make sure metal fasteners are galvanically compatible with the flashing metals! Here steel rivet mandrels are rusting in copper sheet metal. This is an error.



Use copper rivets with brass mandrels, or stainless-steel rivets, when riveting copper.



When steel is used on copper,
the steel rusts prematurely.



steel fasteners through copper

Exposed fasteners will leak. Flashings should be installed with concealed fasteners whenever possible.



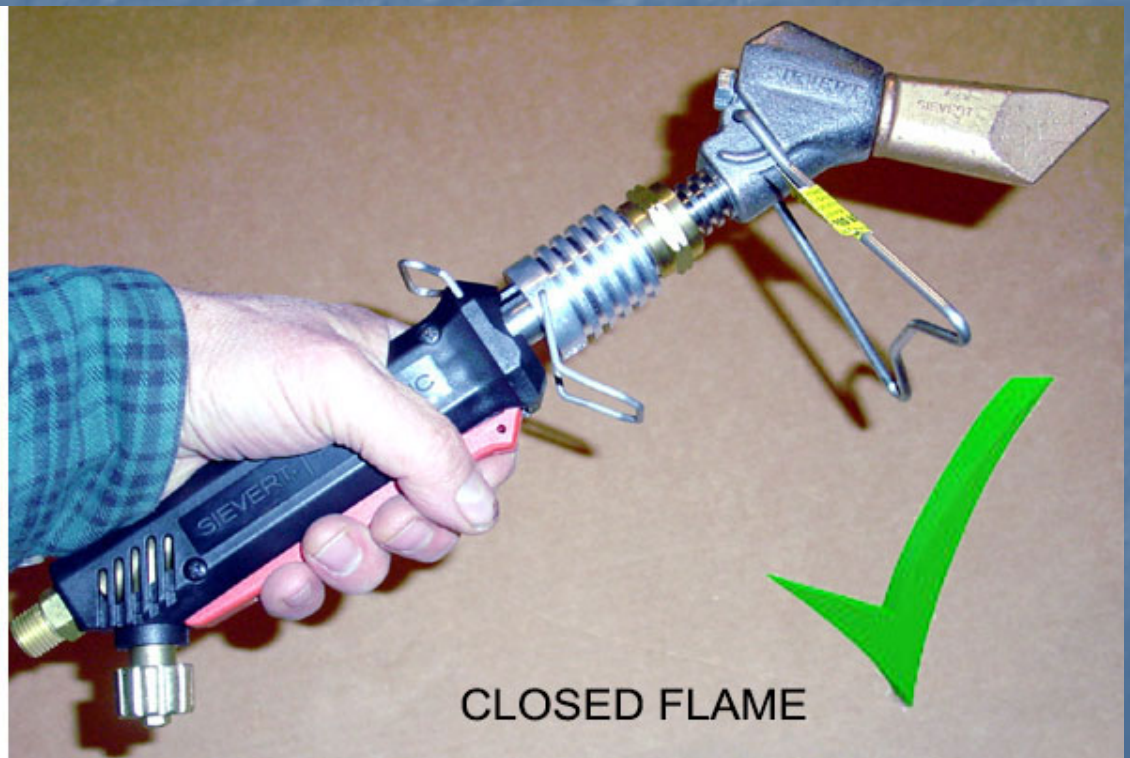
This copper ridge is riveted to copper cleats, leaving no exposed fasteners. The cleats are fastened to the roof underneath the ridge



Open flame torches used to solder flashings can start a building on fire. Use closed-flame soldering devices such as this one shown.



OPEN FLAME



CLOSED FLAME

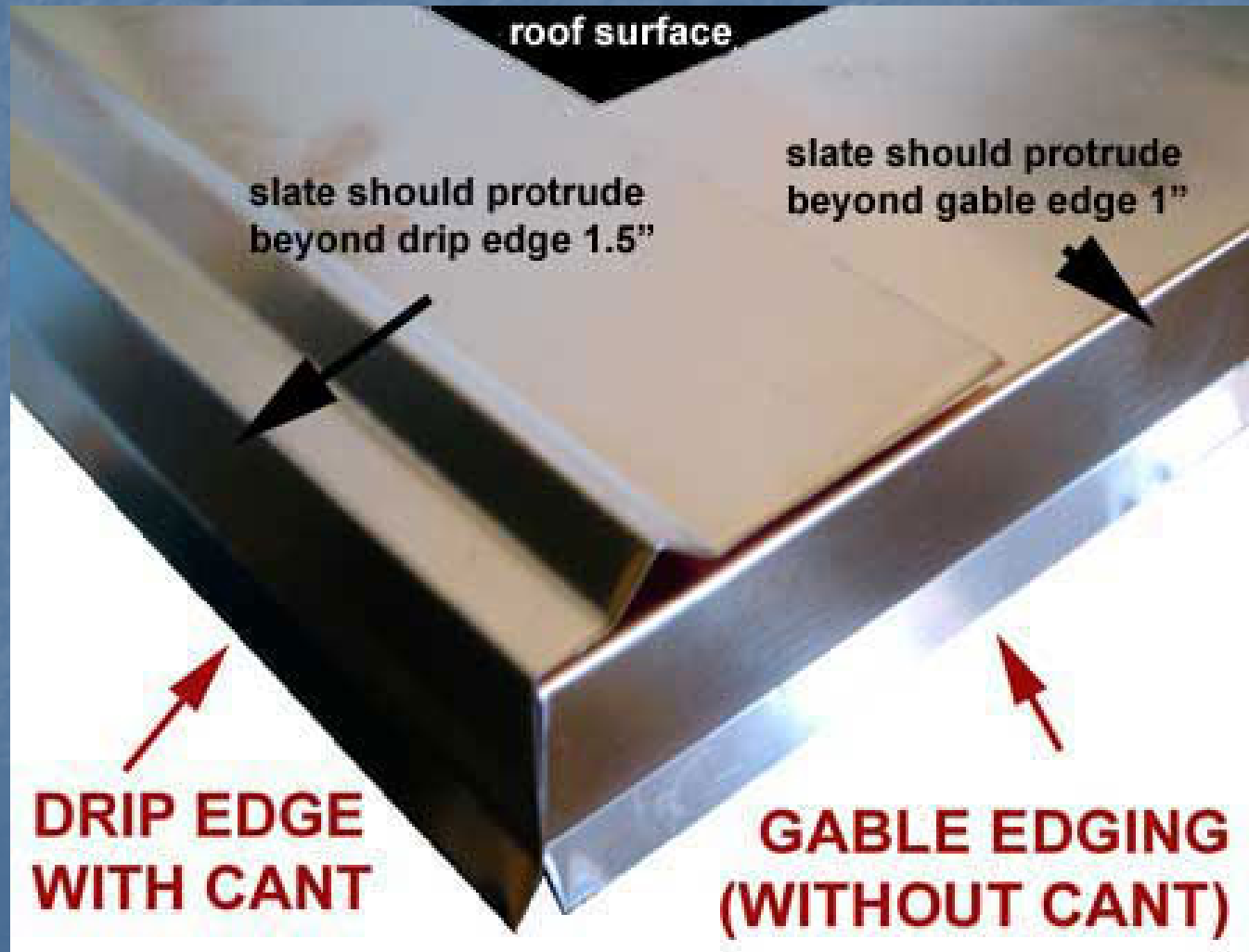
Other Areas of Concern

- Cant strips under starter courses
- Gutter placement
- Snow guards and snow retention
- Roof Slope

Lack of a cant strip prevents the starter course from lying flat.



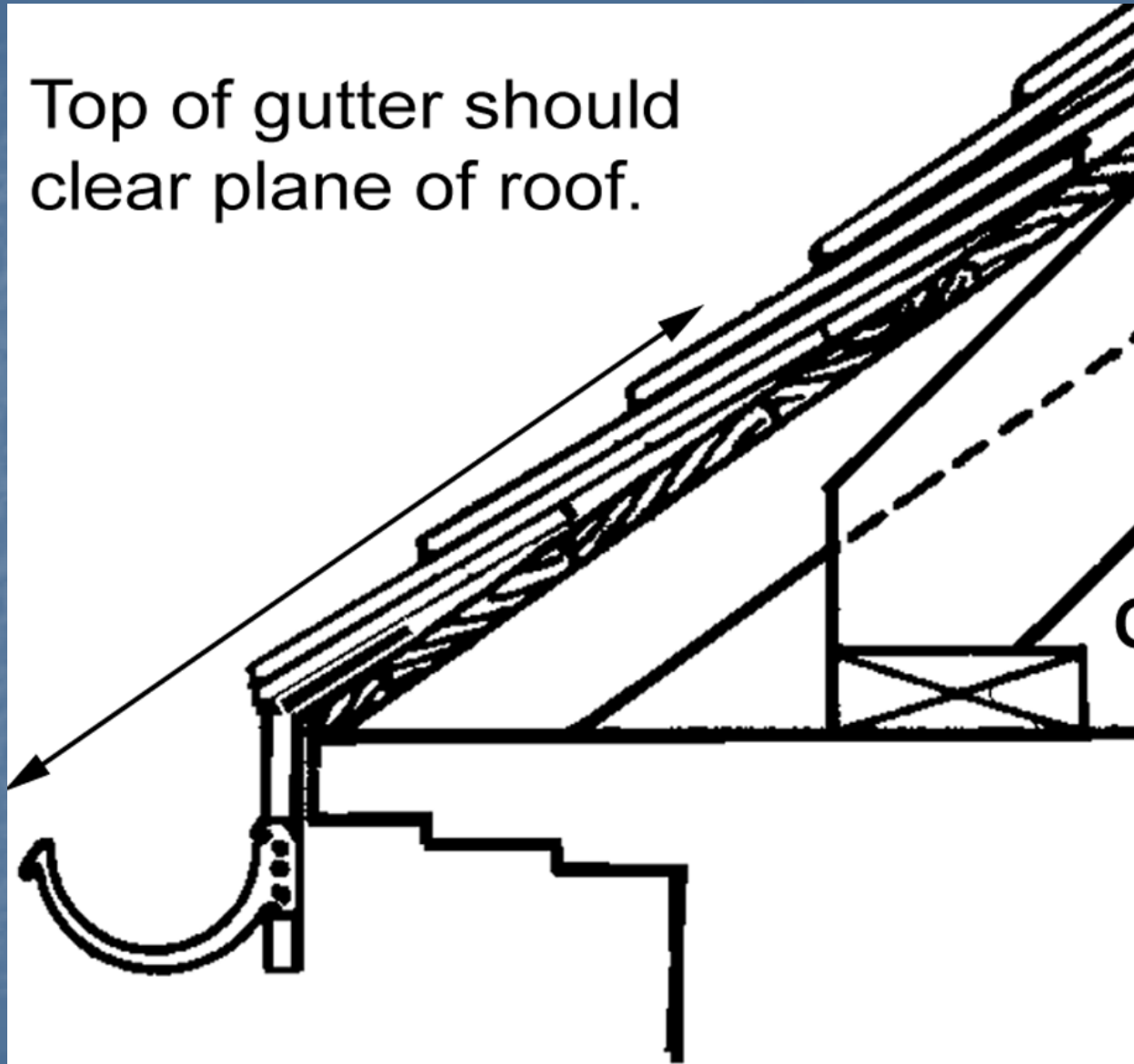
Traditional wooden cant strips work well. A cant can also be formed into a copper drip edge.



Gutters hung too tight against a roof will be damaged by sliding ice and snow.



Top of gutter should
clear plane of roof.





Snow guards must be installed in adequate numbers, otherwise they can fail and damage the roof. One row is not adequate.



Manufacturer recommends a minimum of 3 rows of snow guards.

Galvanized snow guards will rust and stain the roof.

Even heavy snow rails will fail under extreme circumstances if not installed in adequate quantities.





Don't install slate below a 4:12 slope!



Summary

- Inexperienced or uneducated contractors should not be installing slate roofs.
- A reliable source of natural quarried roofing slate is imperative.
- Correct installation techniques and materials are essential, including headlap, fasteners, and flashings.
- Detailed contract documents are important.

For more information:

SRCA Slate Roof Installation Guidelines can be downloaded free online:

- http://slateroofers.org/downloads/SRCA_Installation_Guidelines.pdf
- Find additional information at SlateRoofers.org: Contractor List, Source Lists for new and salvaged slates and architectural sheet metal, etc.
- SRCA Training courses are available for installers.
- Additional SRCA educational seminars are also available.
- <http://slateroofers.org/training.html>

QUESTIONS?