

Slate Roof Repair, Restoration, and Maintenance Guidelines



Slate Roofing Contractors Association of North America, Inc.

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INTRODUCTION:

These Guidelines have been developed and produced for the general public by professional slate roofing contractor members of the Slate Roofing Contractors Association of North America, Inc., a 501c6 non-profit international trade association, via a peer-reviewed, consensus-based committee process taking place over an extended period of time. These Guidelines, if followed, are designed to produce a long-lasting weathertight slate roof for most basic applications.

PART 1 — ROOF ASSESSMENT

1.1 EVALUATION

- A. An evaluation must be conducted by a slate roofer with a demonstrated competency and expertise specifically in repair, restoration, and maintenance of natural quarried slate roofs, not just expertise in new slate roof installation or estimating, or expertise in the repair and restoration of other types of roofs.
- B. A roof evaluation should first include an examination of the building interior and underside of the roof, whenever possible, to determine the type and condition of the roof decking, and to identify signs of water penetration or leakage.
- C. A thorough evaluation requires accessing the roof and closely examining the conditions of the slates, substrate, fasteners, flashings, and penetrations.
- D. A correctly installed roof that has slates with a reasonable remaining longevity (for example, at least fifteen years), is a candidate for restoration.
- E. In some cases, full replacement of all or a section of roof will be part of the restoration process.
- F. The type(s) of slate must be determined and the remaining longevity estimated.
 - 1. Determine the type, size, shape, thickness, color, weathering characteristics, and texture of the slate.
 - 2. Has the roof been well-maintained, or abused and neglected? Have past repairs been correctly executed? If so, repaired areas should appear very similar or the same as the original roof.
 - 3. No brush-grade or trowel-grade coatings should be covering the slates.
- G. Identify the substrate material and condition. Is it solid wood, laminated or glued wood, nailable concrete, nailable gypsum, or metal?
- H. Identify the type and condition of the fasteners. If they are nails, what type and length?

Smooth shank or ring-shank? Copper, stainless steel, hot-dipped galvanized, electrogalvanized, cut steel nails, slate hooks, etc.?

I. Determine the existing headlaps and sidelaps.

1.2 CONDITIONS

A. Examine the field slates, starter slates, ridge and/or hip slates, valley slates, etc. How many slates need replaced or repaired?

B. Examine the valley metal, chimney flashings, step flashings, cap or counter flashings, ridge and hip metal, pipe vent flashings, parapet wall flashings, turret and/or tower flashings, etc. What flashings need maintenance work, repair, or replacement? Refer to *Part 6 - Flashings* for additional information on evaluating the conditions of individual types of flashing.

C. When the valley flashing condition cannot be observed, such as on a closed valley, then overlying slates must be removed to expose the flashing. The lower flashings are typically more deteriorated than the higher flashings because they carry more water, so inspect the lower flashings first.

D. What other repairs are needed? Are there flat-lock, soldered metal roofs adjacent to the slate roofs that need replaced? Are there built-in gutter systems? Exterior gutters? Skylights? Chimney or masonry pointing? Snow retention systems?

PART 2 — GENERAL PROJECT PREPARATION AND EXECUTION

2.1. CONTRACTORS

A. It is recommended that prospective contractors have a minimum of five years of professional experience in the repair and restoration of natural slate roofing, and can provide a resume' demonstrating the successful completion of slate roof repair and restoration projects of a similar size and scope.

B. Contractors shall furnish all insurance, permits, labor, materials, equipment, apparatus, tools, transportation and services necessary for, and incidental to, the repair and restoration of the slate roof, unless otherwise agreed upon.

C. Contractors shall use workmen who are trained and experienced in slate roof repair and restoration, removing and re-installing metal flashing, and all other skills needed to satisfactorily complete the project as specified, or use workmen who are under the full-time supervision of a foreman or supervisor with such training and experience.

D. Contractors shall use workmen familiar with the use of slate hammers for punching and nailing slate shingles, slate rippers for removing slates already installed, slate cutters for trimming and cutting slate shingles, slaters stakes used with slate hammers that have a cutting

shank, roof brackets and scaffolding for staging the roof, and hook ladders for accessing areas of the roof not staged.

2.2. CONTRACT DOCUMENTS

- A. Contractors shall provide contract documents that include a detailed scope of work and specifications for all materials.
- B. Contingency fees or unit prices may be included in the contract for unforeseen work such as roof decking replacement, or replacement of additional slates not identified in the original assessment. A contingency fee allowance may also consist of a credit, where applicable.
- C. Contract documents shall include a detailed warranty, when required.

2.3 CODES AND REGULATIONS

- A. Contractor shall comply with all federal, state, local and contractual regulations, and abide by applicable building, safety and health codes related to construction practices or use of equipment.
- B. Contractor shall comply with the regulations of local governing Historical Societies and the National Registry of Historic Properties, when applicable.

2.4 PROTECTION OF ROOF SURFACES

- A. Workers shall not damage slates by walking on them.
- B. The roof shall be properly staged to allow safe work surfaces, such as scaffold-grade planks, that prevent unnecessary foot traffic on the slates.
- C. Roof ladders, hook ladders, chicken ladders, lifts, or other such devices, shall be used to protect the roof surfaces from foot traffic.

2.5 INSURANCE

- A. Contractor shall carry Liability Insurance and Workers Compensation Insurance per state requirements.
- B. Contractor will provide, upon request, Certificates of Insurance to Owner prior to the execution of any work.

2.6 CLEAN UP

- A. Tools, equipment, surplus materials, slate scraps, and debris resulting from the work shall be organized and cleaned up, or removed and properly disposed of, on a daily basis.
- B. Gutters and roof areas will be cleaned of debris at the end of each work day and upon completion of the work.

C. Dust and dirt may infiltrate into the attic space during installation or removal of roofing slate. Owner shall be advised to remove any valuable items from the attic space and/or to cover such items with plastic, tarps, or other suitable covering prior to the commencement of any work.

2.7 WARRANTY

A. Contractor's warranty terms, when required, shall be clearly detailed in the contract documents.

B. The contractor cannot be held responsible for damage caused by other persons or by unusual and damaging weather events such as large hail, strong winds, lightning, flooding, earthquakes, excessive snow and ice buildup, or other "acts of God."

C. An extended service maintenance agreement is recommended beyond the warranty period.

PART 3 — MAINTENANCE

3.1 GENERAL MAINTENANCE

A. General maintenance on slate roofs includes:

1. Replacement of any broken, missing or defective slates;
2. Removal and replacement of existing faulty repair work;
3. Painting of flashing metal, traditionally with Tinner's Red or Tinner's Green paint;
4. Emergency repairs.

B. Slate repair as well as removal and replacement of faulty repair work is discussed in Part 5.

3.2 PAINTING OF FLASHING

Old ferrous-metal flashings can be preserved with *Tinner's Red* or *Tinner's Green* paint or other suitable metal paint. The flashing should be painted with a coat of paint approximately every five years. The most common flashings that require regular painting include hips, ridges, valleys, chimney flashings, built-in gutter linings, pipe vent flashings, and any exposed ferrous-metal flashings.

3.3 SEALING OF FLASHING

A. Existing flashings shall be sealed with a high-grade caulk where needed, such as at mortar joints.

B. Loose flashings shall be riveted or else refastened in a manner that does not leave exposed or

unsealed fasteners.

C. Missing flashing pieces shall be replaced with compatible flashing metal.

PART 4 — TEMPORARY EMERGENCY REPAIRS

As a last resort to stop water entry until proper repairs can be executed, temporary emergency repairs can be conducted on flashings when: a) painting no longer preserves the metal; b) the property owner can't afford to have the flashings replaced immediately; and c) entire roof replacement is neither desired nor needed.

4.1 GENERAL FLASHINGS

A. General flashing metal can be coated with a trowel-grade, or brush grade mastic or other sealant.

B. Reinforcing membrane, such as fiberglass mesh, is recommended to be included in all mastic repairs. When reinforcing membrane is used, a second layer of mastic must be applied over the membrane.

C. Avoid applying mastic or sealant over the exposed surface of the slates. Never apply a mastic repair over top of valley slates. Trowel mastic over the valley metal, but *underneath* the valley slates on either side of the valley.

4.2 BUILT-IN GUTTER LININGS

A. Built-in gutter linings can be temporarily preserved with a brush-grade roofing compound painted onto the cleaned gutter trough lining. Brush-grade or trowel-grade compounds should be layered with a reinforcing membrane, then a second layer of compound applied over top of the membrane. Roofing compounds should not be applied over top of any roofing slate surfaces.

B. Built-in gutter linings can also be temporarily preserved with a self-adhering membrane or other adhesive-applied membrane installed over the existing gutter lining, so long as the membrane is not applied over top of any slates.

C. Larger holes in the gutter lining should first be patched with trowel-grade roof cement and reinforcing membrane.

4.3 TEMPORARY SLATE REPAIR

A. Temporary repair of a missing or damaged slate can be accomplished by cutting a piece of non-ferrous sheet metal (copper, zinc, or dark aluminum), slightly wider than the damaged or missing slate, and sliding it in place *under* the defective slate or where the slate is missing. The flashing must slide underneath the overlying slates far enough to ensure correct headlap over the top of the flashing.

B. Broken or missing slates are not to be repaired with mastic or caulk applied on the exposed slate surface.

4.4 EXPOSED FASTENERS

Unsealed, ungasketed, exposed nail heads, screw heads, and other potentially leaking fasteners in existing flashings shall be sealed with a high-grade caulk, or the fasteners replaced with gasketed non-ferrous nails or screws, or with soldered fasteners, or with galvanically compatible rivets.

PART 5 — SLATE REPAIR

5.1 REPLACEMENT SLATES

A. All slate roof surfaces shall be inspected for cracked, broken, missing, perforated, face-nailed, screwed, caulked, or otherwise leaking slates.

B. Defective slates will be removed using appropriate tools such as a slate ripper. When using a slate ripper, the handle of the tool must be held down parallel to the roof surface when hammered on to pull slating nails. If the handle of the ripper is lifted off the roof during use, it can break the overlying slates.

C. Defective slates must be replaced with slates that match the existing slates in type, length, width, thickness, shape, color and, if necessary for a good match, age.

D. Refer to http://slateroofers.org/sources_salvaged_slate.html for a list of salvaged roofing slate suppliers.

5.2 NAIL AND BIB REPAIR METHOD

A. Replacement slates should be fastened with copper or stainless-steel smooth-shank roofing nails installed through the top of the slot between the two overlying slates, then covered with a minimum 16-ounce copper bib flashing, minimum 4 inches wide and minimum 6 inches long, slid underneath the overlying slates, but over the replacement nail head.

B. The bib flashing should overlap the nail head by three inches, and underlap the overlying slate by three inches.

C. The bib shall be bent slightly lengthwise to allow for a friction fit, and/or barbs may be cut into the sides of the bib to improve retention.

D. Alternatively, the same type of slating nails as on the existing roof can also be used to fasten the replacement slates. Many older slate roofs are installed with hot-dipped galvanized steel roofing nails, which can be used when installing replacement slates on these roofs.

E. Painted aluminum bib flashings (dark side facing out), minimum .019 gauge, are suitable for slate repair when the roof only has an estimated 50 or less years remaining.

5.3 SLATE HOOKS

Replacement slates may be installed using either copper or stainless-steel slate hooks.

5.4 STRAP HANGERS

Exposed sheet-metal strap hangers shall not be used as a replacement slate fastening mechanism.

5.5 CAULKING, MASTICS, AND ADHESIVES

- A. Caulking, mastic, or adhesives shall not be used to repair the exposed face of the slates.
- B. Caulking, mastic, or adhesives are not to be used to fasten slates without additional mechanical fasteners.
- C. Caulking, mastic, or adhesives, in conjunction with mechanical fasteners, may be used to help fasten slates in limited circumstances, such as on windward rake edges, on ridges and hips that are subjected to chronic wind pressure, and on small pieces of slate that require additional anchoring.
- D. Caulking, mastic, or adhesive is to be applied only underneath the slates, and only in conjunction with mechanical fastening. Otherwise, mastics and adhesives shall not be used underneath slates as they interfere with repair and maintenance.

5.6 FACE-NAILING

Replacement slates shall not be “face-nailed” or screwed. No exposed nail or screw heads, including gasketed or sealed heads, shall be visible on any repaired or replaced slates.

5.7 BIB FLASHING SLATE REPAIR

- A. When a slate is split lengthwise (such as with a vertical hairline crack), or has a small hole in it, but is otherwise intact, it can be repaired with a non-corrosive sheet-metal bib flashing slid underneath the defective slate.
- B. A slate with a vertical crack can be repaired by slipping an oversized bib flashing *underneath* the slate so that the bib extends from the bottom edge of the cracked slate up to its slating nails. A second bib flashing of the same size is also slid underneath the slot overlying the defective slate. The bib flashings should be a minimum of 6 inches in width and approximately as long as the length of the slate exposure plus three inches.
- C. A slight lengthwise bend in the bib flashings, or else barbing the sides, will help to friction fit the bib into place.

5.8 SIDE LAP REPAIR

- A. Where there is insufficient side lap, the deficiency can be repaired by sliding an oversized

non-corrosive bib flashing underneath the side-butt joint that is too close to an underlying side-butt joint.

B. The bib flashing should be a minimum of 6 inches in width and approximately as long as the length of the slate exposure plus three inches.

C. A slight lengthwise bend in the bib flashing, or else barbing the sides, will help to friction fit the bib into place.

5.9 ROOF CANNIBALIZATION

A. When matching replacement slates cannot be obtained, identify a section of the existing roof that is:

- 1) Least visible from the ground,
- 2) Contains enough slates to repair the entire remaining roof,
- 3) Has slates that can be removed and used for the repairs.

B. Remove the slates from the identified area and use them for restoring the remaining roof.

C. The “cannibalized” roof section shall then be slated with either new or salvaged natural quarried roofing slates that match the original roof as closely as possible.

PART 6 — FLASHING REPAIR

6.1 REFERENCES

Refer to the Sheet Metal and Air Conditioning Contractors’ National Association (SMACNA) *Architectural Sheet Metal Manual*, the Copper Development Association’s (CDA) *Design Handbook*, and the Revere’s *Copper and Common Sense* publication for additional flashing guidelines.

6.2 FLASHING INSPECTION

A. All flashings, including valleys, step and counter or cap flashings, parapet wall flashings, ridges and hip flashings, chimney flashings, dormer step flashings, apron flashings, finials, vent flashings, skylights and other roof penetrations, and gutters, are to be inspected for cracks, holes, splits, deterioration, exposed nail heads, and looseness.

B. Flashing metal that is perforated and leaking must be removed and replaced.

C. Special attention shall be paid to valley flashings, as these are more likely to be eroded over time than other flashings.

6.3 SOLDER JOINTS

- A. Solder joints in flashings shall be inspected and resoldered or repaired as needed, when possible.
- B. If solder joint failure is evident, the entire assembly should be examined for expansion and contraction design issues.
- C. Refer to SMACNA, CDA and Revere publications for sheet metal expansion and contraction design recommendations.

6.4 MORTAR JOINTS

- A. Mortar joints that have been cut out to allow for the insertion of new flashing may be sealed using a high-grade caulk/sealant.
- B. Fully cut out mortar joints may be repointed with mortar.
- C. Refer to National Parks Service (NPS) Preservation Brief *Repointing Mortar Joints in Historic Masonry Buildings*.

6.5 CHIMNEY FLASHING

- A. Worn out or improperly installed chimney flashings shall be replaced in their entirety, including the front apron, the side step flashings, front, side and rear counter flashings, and back flashing and/or cricket flashings, per applicable building codes. Flashing material shall be minimum 16-ounce copper or 4-pound sheet lead.
- B. All corner flashings on the chimney, where the chimney protrudes through the roof at the roofline, shall be installed to be water tight without sealant.
- C. Chimneys that are no longer in use on old roofs can be removed to below the roofline when they are not a structural component of the roof.
 - 1. It is imperative that existing chimneys be inspected before removal to ensure that they are not in use for any reason (such as for a gas water heater), and are not structural.
 - 2. The property owner should confirm, in writing, that the chimney is not structural and not in use for any reason, and must provide the roofer with written authorization to remove the chimney top, releasing him or her from liability.
 - 3. Once the chimney top is removed, the resulting hole in the roof must be closed with matching roof sheathing and then slated to match the existing roof.
- D. Refer to SMACNA, CDA and Revere publications for chimney flashing design recommendations.

6.6 POSITIVE FLASHING OVERLAP

All flashings are to be installed to have “positive overlap,” such that higher flashings overlap on top of lower flashings, not underneath them. Refer to SMACNA, CDA and Revere publications for flashing overlap recommendations.

6.7 APRON FLASHINGS

Lower, exposed edges of apron flashings are to be fastened to the roof with cleats when fastening is required (no exposed fasteners are to be used).

6.8 REUSE OF EXISTING SLATES

Slates overlying flashings should be carefully removed and saved for reuse whenever possible.

6.9 VALLEY FLASHINGS

A. Open Valleys

1. Exposed valley metal that is pitted, split, leaking, tarred or otherwise compromised must be replaced in its entirety. The original, defective valley metal must be completely removed down to the bare roof deck. This is done by carefully removing several slates on either side of the valley to expose the existing flashing.
2. Slates overlying valley flashings must be carefully removed and saved for reuse whenever possible. Number the valley slate courses before removal. Numbering the slates makes the re-installation of the slates quicker and easier.
3. After removal of the original valley flashing, sweep the roof deck and check for nail heads or other obstacles that may impede the proper laying of the new flashing material. Re-nail the roof deck as needed. Install minimum 30 pound felt underlayment in the valley over the roof decking when required.
4. Valley metal should be a minimum of 16-ounce copper. The valley metal must be wide enough to extend under the slates on either side of the valley by a minimum of 5 inches. Lower slope applications (e.g., 6:12 or less) may require increased overlapping.
5. Nails shall not penetrate more than one inch from the outer edges of the valley metal.
6. Alternatively, fasten the valley metal using copper cleats. Refer to SMACNA, CDA and Revere publications for cleated valley design recommendations.
7. Do not make valley sections longer than ten feet, otherwise expansion and contraction problems can occur.
8. Overlap valley sections six inches in most cases, but more overlap, as much as twelve inches, may be required in lower slope situations (e.g., 6:12 or less).

9. Instead of overlapping, valley sections may be seamed and soldered together, using cleats to attach them to the roof deck to allow for thermal movement.
10. Where two valleys meet at a top juncture, they can be folded, soldered, or lock-seamed. Refer to SMACNA, CDA and Revere publications for valley flashing design recommendations.
11. When two differing roof slopes come together in a valley (e.g., 6:12 on one side and 10:12 on the other), form the valley metal with a one-inch inverted “V” groove down the center.
12. When the valley is located between two steep symmetrical slopes, a simple straight-line bend down the center may be required.
13. Valley metal may be simply forced into the valley using a knee, creating a traditional rounded metal valley configuration. Once one side of the rounded metal valley is fastened to the roof deck, hold the metal down tight with your knee and fasten the other side, starting at one end and working toward the other. Traditional rounded valleys must be nailed rather than cleated.
14. Once new valley metal has been installed, reslate the valley. The numbered slates will be nailed back into the same place where they were removed.
15. If the original valley had a six-inch exposure (for example), mark lines three inches out from the center of the valley metal. When re-installing the slates, align them with the marks to create a straight valley appearance.
16. Valley exposure lines can be parallel, or they can be tapered so that they’re wider at the bottom.
17. Any slates that were removed that are broken, tarred, cracked, perforated, or defective, should be replaced with sound, matching slates during the valley replacement process.

B. Closed Valleys

1. Closed valley flashings are to be replaced when any of the existing valley metal becomes pitted and leaking.
2. Slates overlying valley flashings should be carefully removed and saved for reuse whenever possible.
3. The valley slate courses are numbered before removal to facilitate the re-installation of the slates.
4. Closed valleys are flashed with a form of step flashing. A common method is to cut sheets of flashing material (minimum 16-ounce copper) and lay them in the valley with each slate course, on top of the slates, but covered by the overlying slates.

- a. Closed valley flashing sections should overlap each other by a minimum of six inches, and extend out of the centerline of the valley a minimum of five inches.
 - b. The step flashing should extend above the top of the slates far enough to allow for nailing without penetrating the slates.
 - c. Slating nails shall not penetrate the flashings.
 - d. Flashing sizes vary according to slate size and roof slope.
 - e. The reinstalled valley slates shall be butted in the center.
 - f. For a closer fit in the center of the valley, cut the valley angle on the valley slates on the front face of the slate (rather than cutting them on the back, as is routine when cutting roofing slates).
5. Any slates that were removed that are broken, tarred, cracked, perforated, or defective, should be replaced with sound, matching slates during the valley replacement process.

6.10 PIPE FLASHINGS

- A. Pipe flashings that are cracked, pitted, tarred, or otherwise defective, should be replaced in their entirety. The old pipe flashing is to be removed and a new flashing, either shop fabricated or purchased, is to be installed in its place. Non-corrosive metal pipe flashings are recommended.
- B. The slates surrounding the pipe flashing must be carefully removed and saved for reuse, whenever possible.
- C. The pipe flashing baseplate shall be sized to maintain a minimum of three inches of headlap with underlying and overlying slates, as well as minimum three inches sidelap with adjacent slates.
- D. Any slates that were removed when replacing the pipe flashing that are broken, tarred, cracked, perforated, or defective, should be replaced with sound, matching slates during the flashing replacement process.

6.11 STEP AND COUNTER FLASHINGS

- A. Step flashings may not be subjected to the exposure and wear that other flashings endure. For example, step flashings along parapet walls may still be serviceable although the valley flashings have worn out on the same roof. If so, the step flashings can remain original while other flashings are replaced.
- B. Step flashings lower on a roof will wear out sooner than the upper ones and it may be necessary to only replace the lower flashings.
- C. When step flashings are replaced, the procedure is the same as with most flashings. Slates

overlying step flashings shall be carefully removed and saved for reuse. The original flashings are then removed in their entirety and replaced with minimum 16-ounce copper.

D. Step flashings shall be installed immediately underneath the overlying slates such that the bottom edge of the step flashing is flush with the bottom edge of the overlying slate.

E. Step flashings shall extend vertically underneath the second course of overlying slates a minimum of 3 inches. The lengths of the step flashings shall be equal to the length of the slate exposure plus a minimum 3 inches, thereby allowing the step flashings to overlap each other by a minimum of 3 inches (4 inches when the roof slope is less than 8:12, two inches when the slope is 20:12 or greater).

F. Step flashings shall extend a minimum of 4 inches onto the roof and a minimum of 4 inches vertically, wherever possible.

G. Nail the step flashing to the roof above the underlying slate so that the slating nails do not penetrate the step flashing.

H. If replacement of the overlying counter flashing or cap flashing is necessary, remove the original counter flashings by pulling or prying them out of the mortar joints or anchor points.

1. Replace counter flashings as needed using minimum 16-ounce copper or 4-pound sheet lead.

2. Wedge the counter flashings into mortar joints at least 3/4 inches deep, using galvanically compatible metal wedges, such as lead or copper.

3. Mortar joints that have been cut out to allow for the insertion of the new flashing may be resealed using a high-grade caulk/sealant.

4. Fully cut out joints can be repointed with mortar.

5. Refer to National Parks Service (NPS) Preservation Brief *Repointing Mortar Joints in Historic Masonry Buildings*.

6.12 RIDGES AND HIPS

A. Slate ridges/hips are repaired by removing and replacing the defective slate(s). These can sometimes be pulled out using a slate ripper. Replacement slates may be installed using a pair of slate hooks rather than nails. This is a situation where an adhesive underneath the replacement slate may be beneficial.

B. Saddle slate ridges may need to be completely or partially disassembled and reassembled to avoid face-nailing.

C. Worn metal ridges and hips are to be completely removed and replaced in their entirety. There are often no slates overlying metal ridges and hips, but the underlying slates are typically

in need of repair. These repairs should be conducted when the metal is removed.

D. When replacing metal ridges and hips, it is recommended to use wider replacement metal to cover the old nail holes, if the original ridges and hips had been nailed.

E. It is recommended that new ridge/hip metal be installed with concealed fasteners such as cleats, not with exposed nails.

F. If ridge/hip metal is being nailed into place, the nail heads should be gasketed.

G. New ridge/hip metal must be sized to maintain correct headlap with underlying slate.

6.13 GENERAL ROOF PENETRATIONS

There may be other roof penetrations that have not already been discussed here that may need flashing replacement. These can include such things as air vents, skylights, and cupolas.

Generally, these can be reflashed in the same manner as chimneys and the other flashing systems discussed herein.

6.14 THROUGH-WALL FLASHINGS

If non-ferrous metal through-wall flashings are found properly installed and in good condition, they may be reused when underlying flashings are replaced.

6.15 RECYCLING FLASHINGS

Old flashing metal, when removed for replacement, should be taken to a scrap yard or otherwise recycled, whenever possible.

PART 7 — GUTTERS

7.1 BUILT-IN GUTTERS

A. Built-in gutters include box gutters, Yankee gutters, Philadelphia gutters, pole gutters, flush gutters and standing gutters, among others. Built-in gutters are built into and below the roof plane, or on the plane of the roof, usually at or near the eaves. These types of gutters are common on older slate roofs.

B. When built-in gutters wear out and leak, the metal linings must be removed and replaced in their entirety.

C. Built-in gutter liner replacement can be delayed with temporary or emergency patching as discussed in the Maintenance and Temporary Emergency Repairs sections of these guidelines.

7.2 HANGING GUTTERS

A. Hanging gutters, including half-round, ogee, and k-style gutters, are installed on the exterior of the structure at the eaves. When they wear out and leak, are damaged, or installed incorrectly, they may need to be removed and replaced in their entirety.

B. Gutter hangers shall not be face-nailed or screwed through the roofing slate, but must be installed directly onto the roof deck underneath the slates, or to the fascia.

C. Exposed gutter hangers face-nailed through slates must be removed, correct hangers properly installed underneath the slates, and any damaged slates repaired.

D. It is recommended that the metal type of hanging gutters be galvanically compatible with roof valleys and other roof flashings.

PART 8 — SNOW RETENTION SYSTEMS

8.1 SNOW RETENTION SYSTEM LAYOUTS

A. Snow guard layouts should be designed by a qualified design professional.

B. Snow guard quantities and layout should be based on conditions specific to the geographic area, roof slope, rafter length, etc.

C. Refer to manufacturer's recommendations for snow guard installations.

8.2 FAILURE AND REPLACEMENT

A. Snow retention systems may fail with age, or when incorrectly designed, or when the snow guards are installed in insufficient quantities.

B. Inadequate snow retention systems can be removed and replaced in their entirety, or supplemented with additional snow guards or snow rails.