

## Chapter 9 - Roofing

### Things to Consider

- The fall protection must still be in place.

### Components

Building Felt  
Shingles  
Ridge Vent  
Flashing

### Timing & Prerequisites

- This phase of the project cannot begin until the roof trusses and sheathing work are complete.
- The activities in this phase may be performed by either volunteers or contractors. If the house is a 2-story house, the roofing will be installed by a contractor. On 1-story houses, the House/Project Lead and the Habitat Superintendent will decide the resources to be used.

### Materials Needed

Materials Needed	
Roofing	Flashing
3 Tab Shingles	Step Flashing
Ice & Water Shield	Apron Flashing
Building Felt	Roof Patch (Black)
Staples (5/16" to 1/2")	
1 1/4" Roofing Nails	
1 1/2" Roofing Nails	
3" Roofing Nails	
16d Common Nails	
Drip Edging	
Ridge Vent	

### Phase Specific Tools Needed:

Phase Specific Tools Needed	
Description:	Quantity:
Framing	
○ Caulking Gun (2)	
○ Hook Blades (2)	
○ Tin Snips (2)	
○ Extension Ladders (2)	

- Staplers (4)
- Roof Jacks (8)
- 2x6 for Safety Boards (6)
- 100' Tape Measure (2)

## Activities

### Setup up the Ladder

#### **Critical Issues**

- ◆ **The shingles used cannot tolerate much foot traffic. Care must be taken when installing the shingles, but care must be taken as well as when working above the shingles for siding tasks. Plan work to completely eliminate or severely limit walking on the shingles.**

1. Determine the ladder position.
 

It is important to setup the ladder on the other side of the house from where you will start roofing. This will limit the foot traffic on the new roof.

Take into consideration the location of the sun and the roof temperature in your decision on which side to start.
2. Build a stand out to protect the edge of the singles.
 

Cut a piece of 2x4 which is 10" longer than the width of the ladder.

Nail a 2x4 block to each end of the first piece.

Nail the 2x4 with the blocks to the sub-fascia.
3. Set the ladder.
 

If the ground is uneven, dig out enough dirt to bring the 2 sides even. Never place blocks of wood under the ladder.
4. Tie in the ladder.
 

The top of the ladder must be tied in to the blocking. If the ground is uneven, the bottom should be staked and tied.

### Supply the Roof with Shingles

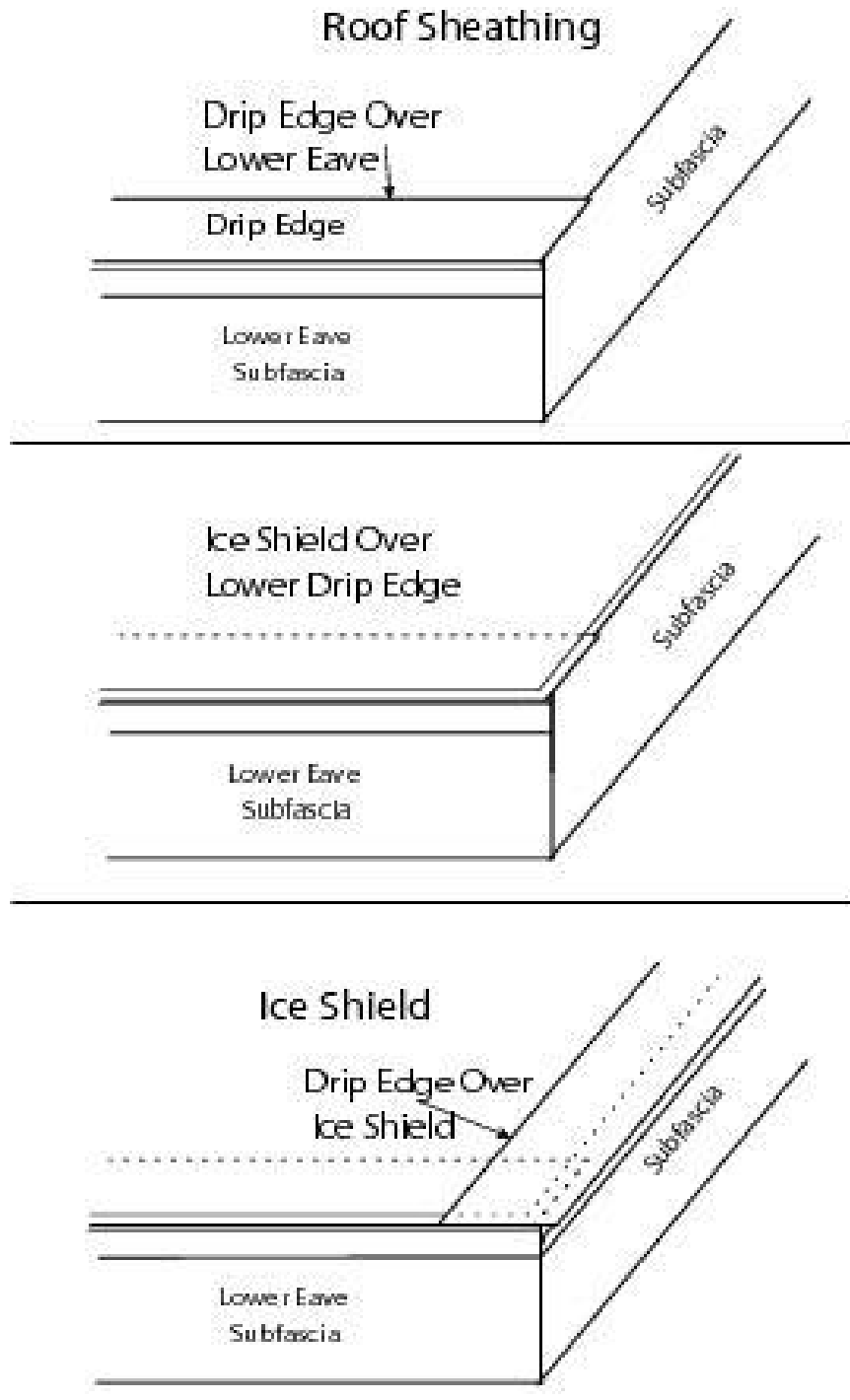
#### **Critical Issues**

- ◆ **Ensure the fall protection is still in place**

- In most cases, the company supplying the bundles of shingles will deliver them onto the roof. There are instances that may preclude them from being physically able to do it.

- If you do have to put the bundles of shingles onto the roof, place them in small stacks of about 3 bundles each spread out near the peak of the roof.
- The bundles can be broken up into manageable sizes to be delivered to the roof by volunteers via extension ladders or up the stairs and through a hole in the roof.

Figure 9.1 - Drip Edge



**Apply Drip Edge Along Lower Edge of the Roof**

**Critical Issues**



1. Note – the drip edge along the lower edge will go under the ice shield paper and the drip edge on the rake edge will go over the ice shield.
2. Position the drip edge along the lower edge of the roof. Cut the drip edge to extend ½” over the rake edge on both ends. (see Figure 9.1)
3. Nail the drip edge in place using 1 ½” roofing nails.
  - Use 4 nails per strip; 1 at each end and 2 in between. The nails from the starter strip which will be added later will help hold the strip in place.
  - Make sure you nail along the inside edge of the drip edge so that the nail goes through the sheeting.
4. Overlap the pieces of drip edge by 2”.
5. Repeat this process on the other side of the roof.

### Apply Ice and Water Shield

#### Critical Issues



#### Horizontally at lower edge of roof

1. Apply one or two 36” wide sheet of Ice and Water Shield over the lower drip edge and the bottom edge of each roof. If the first strip of Ice and Water Shield does not extend up the roof 2’ beyond the exterior wall below, add a second strip above the first strip. Overlap the 2 strips by 2”.
2. Make a chalk line 36” up the roof from the front edge of the drip edge.
3. Temporarily remove the roof jacks. Drive the nails flush into the roof.
4. Unroll the ice shield and flush it to the chalk line.
5. The shield is very sticky. Apply the shield from one end of the roof. Pull back the covering paper from the first two feet of the material. Install the ice shield with it aligned with the rake edge of the roof and flush to the chalk line.
6. Continue installation by pulling the covering paper while holding the ice shield flush to the chalk line. Smooth the shield onto the roof.
7. When joining two sections of Ice and Water Shield, overlap the 2 pieces by 6”.
8. Re-install the fall protection.
9. Add second strip of Ice and Water Shield, if needed.

#### Up Roof Valleys

1. Apply a 36" wide sheet of Ice and Water Shield over the OSB seams where two intersecting roofs form a valley.
2. Mark a chalk line 18" from the valley seam; running parallel to the seam.
3. Start at the top of the valley. Uncover the first 2' of ice shield and attach it; keeping the shield flush with the chalk line. Cover the entire seam and smooth the shield into place.
4. Continue installation by pulling the covering paper out and smoothing the shield to the roof.

### Apply Felt Paper

#### *Critical Issues*



1. Make a chalk line 30" up the roof from the top of the ice shield.
2. Starting at one end of the roof; unroll 12' of the paper and flush it to the chalk line. Insert a 1" cap nail 2" down from the top edge and 6" in from the outside edge. Continue across the roof pulling the paper tight; holding it to the chalk line; and inserting a cap nail every 36". Insert cap nails across the bottom of the felt paper every 36".
3. Continue installing felt paper up the roof. Overlap the rows by 4". The overlap can be determined using either the white lines on the paper or by snapping additional chalk lines 32" above the previous sheet.
4. When joining two pieces of felt, overlap the two pieces by 6".
5. Lap the felt paper over the top. The top vent will be cut out later.

### Install Drip Edge on the Rake Edge

#### *Critical Issues*



1. Position the drip edge on the rake edge flush to the drip edge previously installed on the eave. Force the drip edge over the nail fin of the eave drip edge.
2. Nail the drip edge with 1 ½" roofing nails.
 

Use 4 nails per strip; 1 at each end and 2 in between. The nails from the starter strip which will be added later will help hold the strip in place.

Make sure you nail along the inside edge of the drip edge so that the nail goes through the sheeting.
3. Overlap pieces of drip edge by 2". The higher piece should be on top of the lower piece.

4. Install drip edge up to the peak of the roof.

### **Install Sub-Flashing**

At all vertical walls along the sides and top of the roof, install aluminum sub-flashing. This flashing is applied over the building felt and prior to the 2" Dow board being installed.

1. Cut sub-flashing from strips of 12" wide rolled aluminum to a length to cover the vertical wall. If the wall is along the sloped side of the roof and the roof extends below the wall, add 6" to the length of the flashing to allow it to extend below the wall.
2. Bend the sub-flashing with a 90° bend in the middle with 6" of metal each side.
3. Push the sub-flashing into the seam. Attach the flashing to the wall and to the deck with 1 ¼" roofing nails; 1 nail every 16" along the edges of the flashing.

### **Install Dow Board on the Vertical Walls**

Before installing the shingles, cover the vertical wall above the roof deck with 2" Dow Board. The Dow board should extend over the sub-flashing and fit snugly to the roof. See "Apply Dow Board to Exterior" in "Exterior Dow Board" for installation instructions.

**Do not nail the bottom of the Dow board within 6" of the roof.**

### **Install the Starter Course**

#### **Starter Course on Eave**

1. The shingles will overhang both the rake and eave drip edges by ½".
2. Snap a chalk line across the bottom of the roof 6" above the outside edge of the drip edge.
3. Using manufactured start shingles cut enough to cover the entire length of the bottom drip edge plus 1". Position the shingle flush with the chalk line with the tar strip edge over the drip edge. The shingles should overhang the bottom and side drip edges by ½".
4. Nail the starter course down with 1 ¼" roofing nails; 1 nail every 12" along the top of the strip.

#### **Starter Course on Rake**

1. Snap a chalk line up the sides of the roof 6" in from the outside edge of the drip edge.

2. Using manufactured start shingles cut enough to cover the rake drip edge from the bottom starter strip to the peak. Position the shingle flush with the chalk line and the bottom starter strip with the tar strip edge over the drip edge. The shingles should overhang the side drip edges by  $\frac{1}{2}$ ".
3. Nail the starter course down with 1  $\frac{1}{4}$ " roofing nails; 1 nail every 12" along the top of the strip.

### **Set Reference Lines**

Snap chalk lines to align the rows of shingles; one line for every other row. The reveal on the dimensional shingle is 5"; therefore the lines will be 10" apart. The first row of shingles will be installed flush with the bottom edge of the starter strip.

1. Starting 12" from the bottom edge of the starter strip, place marks up both rake drip edges 10" apart (i.e. 12", 22", 32", 42"...). Mark the drip edge all the way to the top.
2. Snap chalk lines between the first two or three sets of marks. It is best to snap a few rows at a time, and then snap additional lines as needed. This will keep the lines fresher.
3. **Use blue chalk, red chalk will stain the shingles.**

### **GAF Instructions for Timberline Dimensional Shingles**

- These shingles have a special thermal sealant that firmly bonds the shingles together after application when exposed to sun and warm temperatures.
- Shingles installed in the Fall or Winter may not seal until the following Spring. If shingles are damaged by winds before sealing or are not exposed to adequate surface temperatures, or if the self-sealant gets dirty, the shingles may never seal. Failure to seal under these circumstances results from the nature of self-sealing shingles and is not a manufacturing defect. To insure immediate sealing, apply 4 quarter-sized dabs of shingle tab adhesive on the back of the shingle (25mm) up from bottom of the shingle. Press shingle firmly into the adhesive. For maximum wind resistance along rakes, install GAF-Elk Starter Strip Shingles with GAF-Elk Dura-Grip® sealant or cement shingles to underlayment and each other in a 4" (102mm) width of asphalt plastic cement. Caution: Apply ONLY a thin uniform layer of asphalt plastic cement less than  $\frac{1}{8}$ " (3mm) thick. Excess amounts can cause blistering of the shingles and may soften the asphalt in certain underlayments, including StormGuard®, Weather Watch® and other GAF-Elk Leak Barriers, resulting in the asphalt flowing, dripping and staining.
- **RELEASE FILM:** The film strips on the back of each shingle are to prevent sticking together of the shingles while in the bundle. Their removal is NOT required during application.

- **EXPOSED METAL:** All exposed metal surfaces (flashing, vents, etc.) should be painted with matching GAF-Elk roof accessory paint.
- **Application of underlayment:** Cover deck with one layer of underlayment installed without wrinkles. Use only enough nails to hold underlayment in place until covered by shingles. **Application of eave flashing:** Install eave flashing such as GAF-Elk Weather Watch®, StormGuard®, or other GAF-Elk Leak Barrier in localities where leaks may be caused by water backing up behind ice or debris dams. Eave flashing must not overhang the eave edge by more than 1/4" (6mm) and extend 24" (610mm) beyond the inside wall line.

**Underlayment: Standard Slope—4/12 (333mm/m) or more**

- **Application of underlayment:** Cover deck with one layer of underlayment installed without wrinkles. Overlap pieces at side edges by 4" and top edges by 2". Use only enough nails to hold underlayment in place until covered by shingles. **Application of eave flashing:** Install eave flashing such as GAF-Elk Weather Watch®, StormGuard®, or other GAF-Elk Leak Barrier in localities where leaks may be caused by water backing up behind ice or debris dams. Eave flashing must not overhang the eave edge by more than 1/4" (6mm) and extend 24" (610mm) beyond the inside wall line.

**1) Underlayment: Low Slope 2/12-4/12 (167mm-333mm/m)**

- **Application of underlayment and eave flashing:** Completely cover the deck with two layers of underlayment. Use only enough nails to hold underlayment in place until covered by shingles. Use blind nailing for eave flashings. At eaves and where ice dams can be expected, use one layer of GAF Weather Watch®, StormGuard® or other GAF-Elk Leak Barrier. Eave flashing must not overhang the roof eave edge by more than 1/4" (6mm) and extend 24" (610mm) beyond the inside wall line. Where ice dams or debris dams are not expected, install 2 plies of Shingle-Mate® underlayment.

**2) Starter Course**

- For maximum wind resistance along rakes, install any GAF-Elk starter strip containing sealant or cement shingles to underlayment and each other in a 4" (102mm) width of asphalt plastic cement. Note: GAF-Elk starter strips with sealant are recommended at the eaves and rakes for best performance and required for the best limited wind warranties on certain products (see limited warranty for details).

**3) First Course**

- Start and continue with full shingles laid flush with the starter course. Shingles may be laid from left to right or right to left. Place shingles close together but don't crowd. DO NOT lay shingles straight up the roof

(racking) since this procedure can cause an incorrect color blend on the roof and may damage the shingles.

#### 4) Second Course

- Trim 6" (152mm) from the end of the shingle. Position the shingles in the second and subsequent courses flush with the tops of the wide cut-outs. This results in a 5" (127mm) exposure. Continue with full width shingles across the roof.

#### 5) Third Course

- Trim 11" (279mm) from the first shingle in the course; then continue with full shingles across the roof. Strike a chalk line about every 6 courses to check parallel alignment with eaves. NOTE: Shingles may be laid from either left or right-hand side.

#### 6) Fourth Course and Remaining Courses

- Trim 17" (432mm) from first shingle in the course, and then continue with full shingles across the roof. Fifth and subsequent courses; repeat Steps 3 through 6.

#### 7) Hip and Ridge

- Install GAF-Elk Timbertex®, Z®Ridge, Seal-A-Ridge®, or Ridglass® hip and ridge shingles (check regional availability). Follow the application instructions shown on the hip and ridge wrapper.

### Install the Shingles

1. Follow the GAF instructions above.
2. The first course of shingles will extend over the bottom and rake drip edges by ½". (See Figure 9.2)
3. Loosely butt the shingles together.
4. Cut the first shingle for each course to size specified by the manufacturer. (See Figure 9.3).
5. Apply flashing at all vertical walls. Walls along the sloped side of the roof will require step flashing. Walls along the top edge of the roof will require apron flashing. Sub-flashing will be required at both types of seams.
6. Ridges will require installation of ridge vents.
7. Use manufactured ridge shingles to cover ridges, hips, and ridge vents.

Figure 9.2 - First Course of Shingle

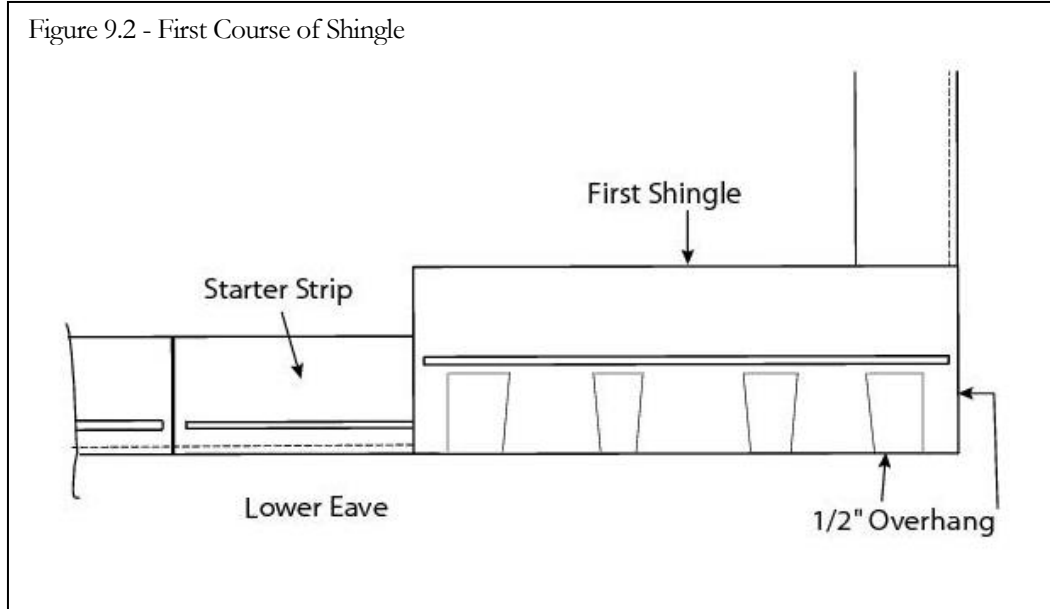
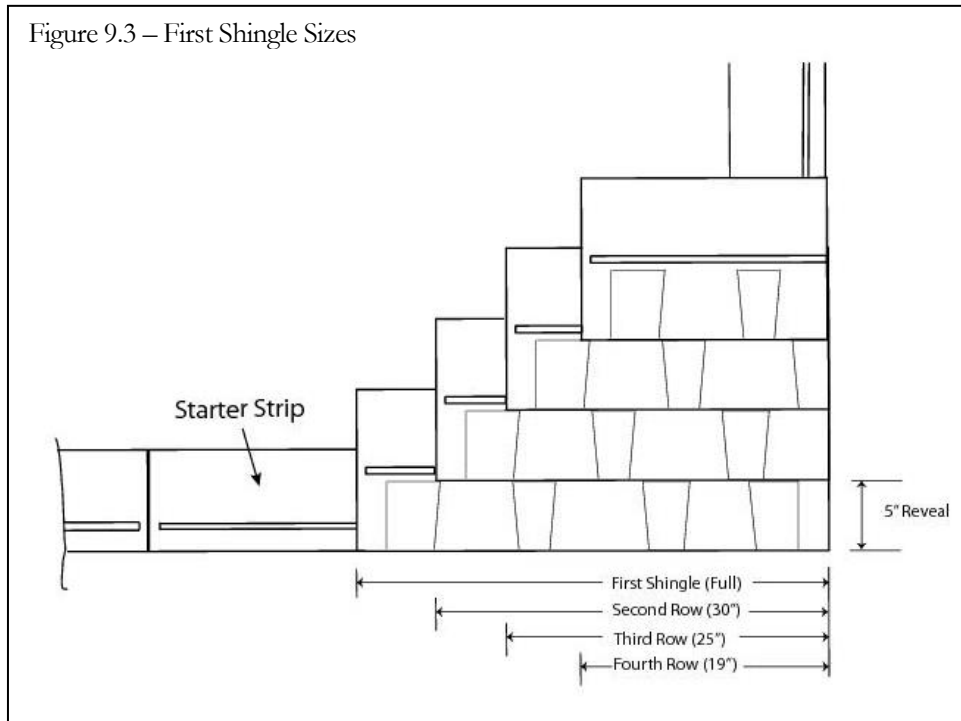


Figure 9.3 – First Shingle Sizes



## Replace Fall Protection

### Critical Issues

- ◆ Fall protection must be in place as soon as possible.

1. Replace the "fall protection" after the third course has been installed.
2. Install the jacks nailing 16d common nails; 2 per jack

Place the nails under the fourth course of shingles. If possible, place nails into truss below.

Do not nail in tight, but do not leave the nails up too high to prevent them from poking through the 4<sup>th</sup> shingle.

3. After the jacks are installed, position the 2x6 safety boards.

### **Valley Construction - Woven Valley**

When installing the shingles on a roof with a valley, the shingles will be woven together at the valley. The valley must be covered with Ice & Water Shield prior to the installing the shingles. (See Figure 9-4).

1. The shingles will need to be installed on both roof planes in unison. Install the first course on the roof plane with the lower slope or lesser height.

#### **First Course**

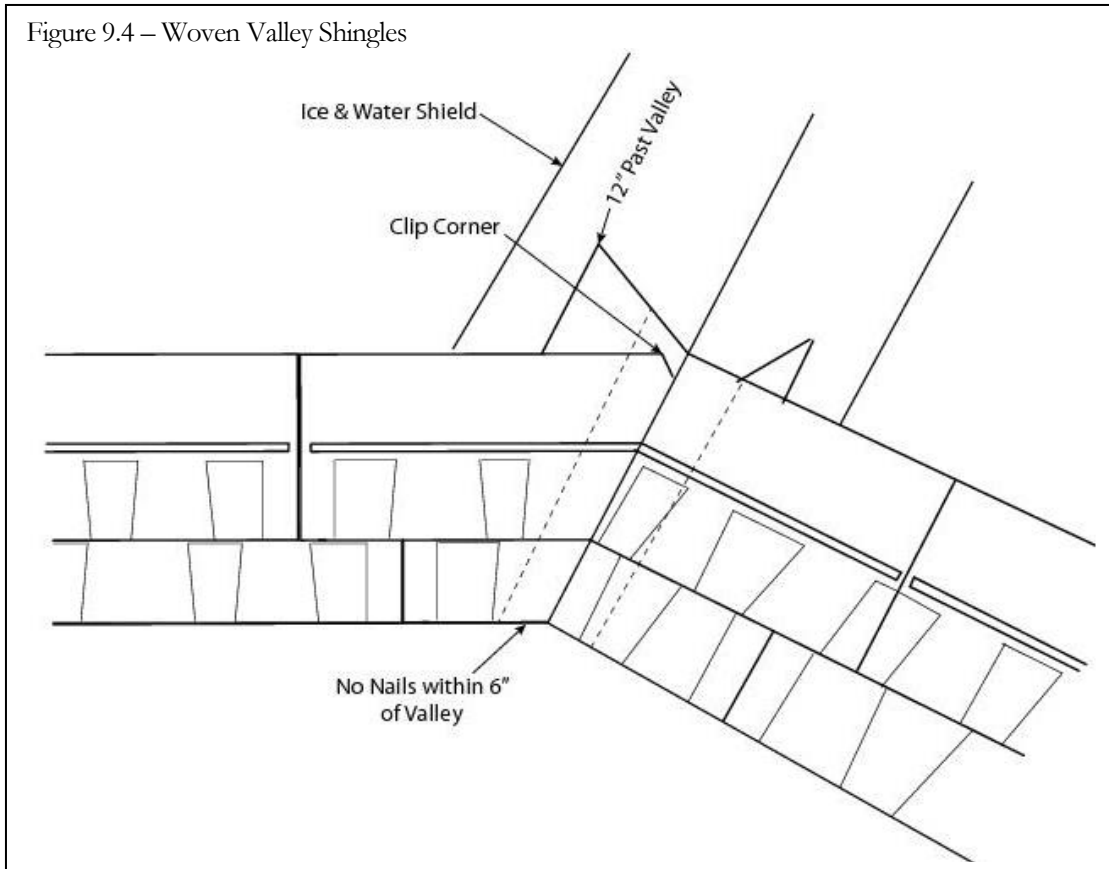
2. On the first roof plane, install the first course starting at the end of the roof opposite the valley using procedures defined above. At the valley, extend the last shingle 12" past the valley center line. Use normal shingle fastening methods (no fasteners within 6" of valley center line, two nails at the shingle's end).
3. On the second roof plane, also install the first course starting at the end of the roof opposite the valley. At the valley, trim the shingle even with the valley seam. Clip the top corner of the valley edge of the last shingle. (2"x2" triangle).
4. Seal the shingle down with plastic roof cement. (Note: Excess cement can cause shingle blisters).

#### **Second and remaining Courses**

5. Repeat the process for the first course starting with the second roof plane and extending 12" on to the first roof plane.
6. Continue the same process for the remaining rows, alternating the shingle extending across the valley until the last course of shingles extends above the ridge.

#### **Last Course**

7. The procedure of the last course of shingles and ridge caps is defined below in "Covering the Peak".



### Install Step Flashing

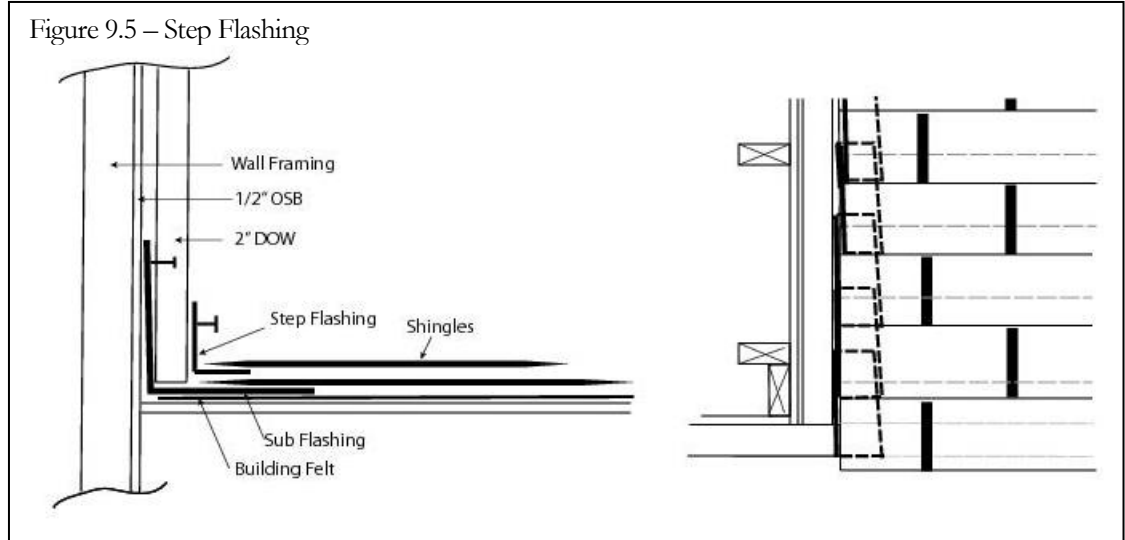
#### Critical Issues



Step flashing is individual pieces of flashing which are interwoven with the shingles which run along a vertical wall on the side of a roof. (See Figure 9.5).

The flashing pieces are short 7" long pieces of aluminum with a 90° bend. One leg of the flashing is longer than the other. The long leg of the flashing extends up the wall.

After the last shingle in each course is installed, place a piece of step flashing on top starting 5" up the shingle and extending over the back of the shingle. The flashing should not extend over the portion the shingle which will be exposed.



1. Position the flashing over the shingle and tight into the seam between the shingle and the Dow board. Position the flashing just above the reveal line for the next shingle above.
2. Nail the flashing down with roofing nails (1 ¼"), nail down through the step flashing and the shingle below. **Do not nail into the wall.** The J-channel will cover the top of the flashing.

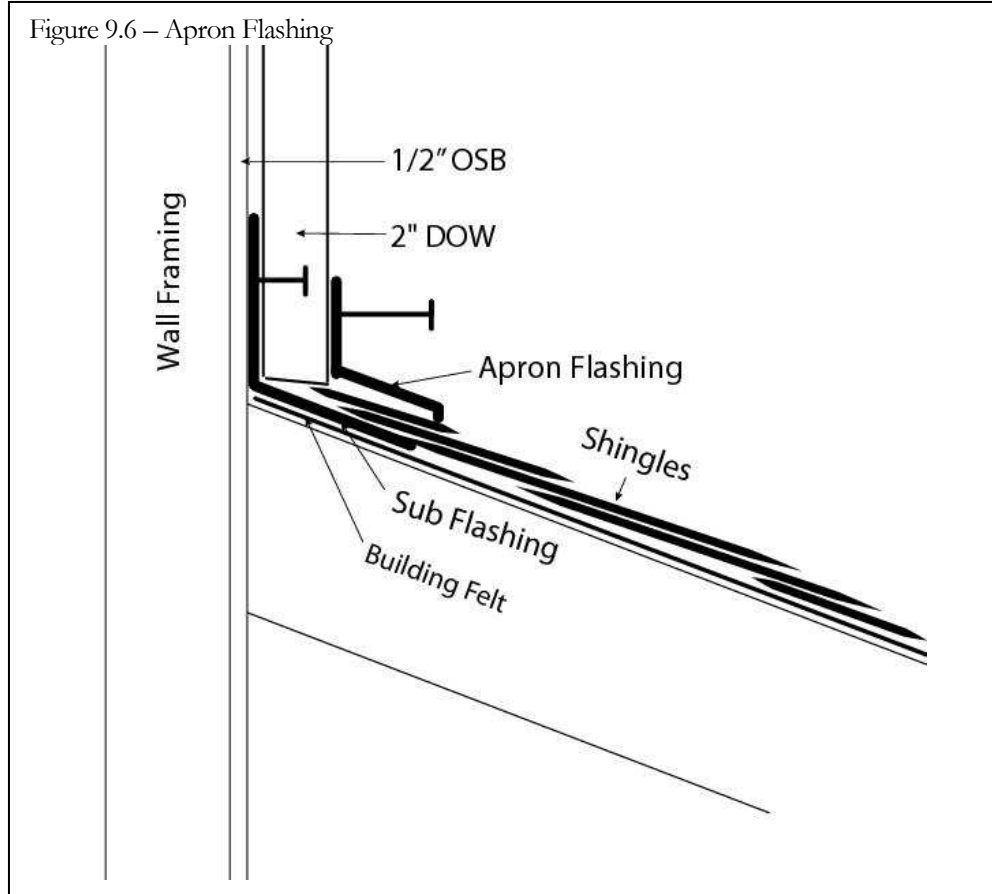
### Install Apron Flashing

#### Critical Issues



Apron flashing is installed along a vertical wall at the top of a roof. This flashing is installed after the shingles. (See Figure 9.6)

1. Position the apron flashing so that its ends are flush to the end of the wall with the lipped edge covering the shingles.
2. Lightly press the flashing into the joint, so that the flashing has a slight downward pressure on the shingle.
3. Nail the apron flashing across the top edge into the wall with 3" roofing nails. **Do not nail into the shingles.**



### Covering the Peak

#### Critical Issues

- ◆

  1. If there is a peak at the top edge of the roof, continue installing rows until the top edge of the row being installed extends above the peak.
  2. Cut the shingle off even with the peak (first 12" of the roof) or even with the ridge vent cutout (center portion of the roof).
  3. After shingles have been installed on both side of the roof, install one (1) more course of shingles to both sides. Install the shingles with the same 5' reveal. The portion of the shingles which cover the first 12" of the peak at each end of the roof are bent over the peak. Trim the portion of the shingle which extend over the peak to 3"; attaching them with two (2) 2" roofing nails on each side. Trim the shingles which cover the ridge vent opening even with the opening and nail in place with 1 1/4" roofing nails along the edge; 1 nail every 24".

## Install Ridge Vents

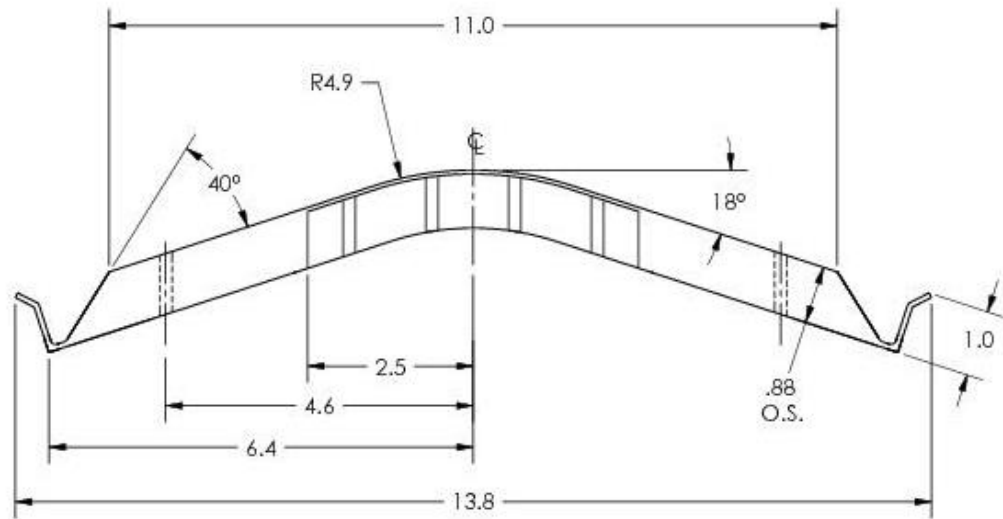
### *Critical Issues*



The attic is vented at the ridge of the roof. The shingles have been cut back 1 ½" on each side to allow for ventilation. The opening will be covered with a plastic ridge vent, and then the ridge vent will be covered with ridge cap shingles. (See Figures 9.7 & 9.8).

1. If it hasn't been done already – the sheathing, underlayment, and shingles should be cut out about 1 ½" down from the peak on both sides of the peak to within 12" of each end of the roof. Set the circular saw so you don't cut the trusses under the sheathing.
2. Measure the width of the ridge vent. Snap a chalk line of both sides of the peak that is 6 ½" from the peak. Use this chalk lines to properly align the ridge vent.
3. Nail the ridge vent into place using 3" roofing nails every 24".
4. Either butt the pieces of ridge vent or connect them as indicated in the manufacturer's instructions.

Figure 9.7 – Ridge Vent Profile



NOTES:

1. ATTACH WITH NAILS OF SUFFICIENT LENGTH TO FULLY PENETRATE ROOF DECK.
2. PROVIDES 18 SQ. INCHES NET FREE AREA PER LINEAR FOOT.
3. 3/12 TO 16/12 ROOF PITCH.
4. INTEGRAL ENDPLUG AND WEATHER FILTER.
5. AVAILABLE IN 4 FT. LENGTHS.
6. MATERIAL: POLYPROPYLENE.

**MAIR VENT INC.** DALLAS, TEXAS

DESCRIPTION: SHINGLE VENT II - 11" - BLACK

DO NOT SCALE DRAWING

DRAWING NUMBER: C-SHFVBL

PREP: J.FLODRKA

DATE: 05-09-2008



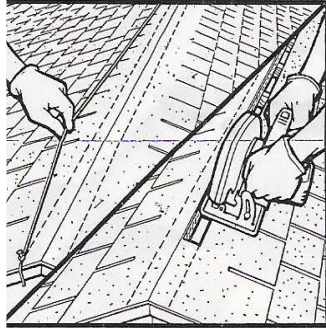
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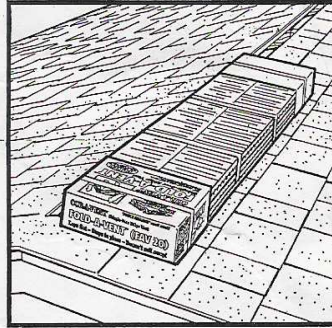
5. Using manufactured cap shingles cover the ridge vent. Continue to maintain a 5" reveal on the cap shingles. Use two (2) 3" roofing nails per shingle about 6" from the revealed edge of the shingle and about 1" from the side of the shingle. On the last shingle cover any exposed nail heads with roof cement.
6. When possible install cap shingles according to the prevailing winds. In Columbus, start at the East end of the house and move to the West end of the house; or start on the North end of the house and move to the South end of the house.
7. Cover the 12" of the peak on either side of the ridge vent with cap shingles using the same process.

Figure 9.8 – Coravent Ridge Vent Installation Instructions

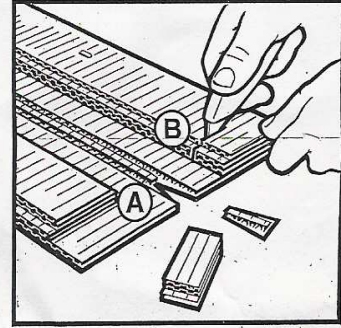
**Fast and easy “one man” installation.** All you need is a hammer or power nailer, 1 1/2” roofing nails\*, circular saw, chalk line, utility knife, tape measure and a caulking gun. **For best appearance and function cover the entire ridge with FAV 20.** Here’s an installation overview for a standard pitch\*\* gable roof application:



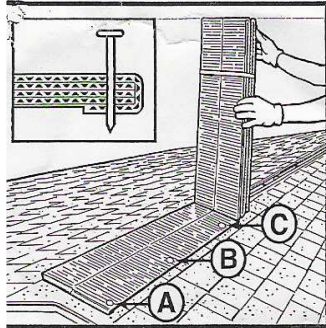
1. Measure a 3” slot, 1 1/2” each side of ridge enterline. This allows for a 2x ridge board or maller. Snap chalk lines the entire length of the ridge. Cut slot with a circular saw and clean out debris. **Set saw depth so as not to cut roof rafters.** Stop the slot 12” short of any ridge end, intersecting ridge or obstruction (such as a chimney).



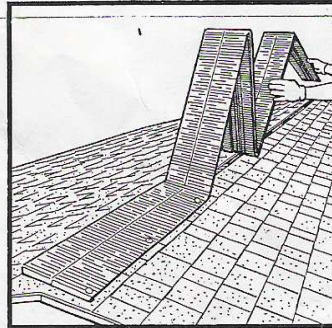
2. Cut the 3 clear bands leaving the colored band to hold all but the starter section together. Turn the vent bundle upside down to expose the underneath side of the starter section end. Follow steps 3 – 4 to create its own Folded End Cap.



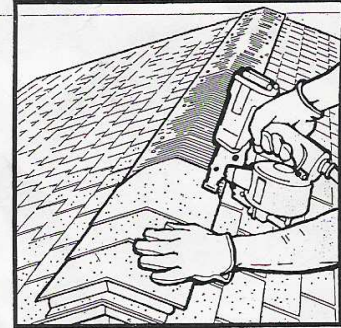
3. Use a utility knife to cut out a “V” shaped notch from the centerline approximately 1 3/4” in from edge and remove loose material (A). Cut through the bottom 3 layers of the vent as pictured (B) (located approx. 1 3/4” from & parallel to the end). Remove loose pieces. Be careful not to cut into top layer.



4. Fold flap under and secure with a 2” roofing nail. This allows the nail to penetrate an extra layer of vent material (inset). Align starter end 1/2” in from edge of roof, and centered on ridge. Be sure to caulk between bottom edge of vent and roof. Nail the starter section at points A, B & C, 2” up from edge. If architectural hinges, shakes or roofing with an irregular surface is used, apply a bead of caulk to roof deck before installing vent. This will seal any gaps that could allow weather penetration under the vent.



5. Continue applying FAV 20 by walking out remaining sections. Pull firmly to fully extend, center vent on ridge and nail other end down. Make sure vent matches roof pitch before nailing both sides in place. If necessary add FAV 20 until entire ridge is covered. Use a utility knife to cut last section to length. Fold end to finish (steps 3 - 4). Caulk between bottom edge of vent and roof.



6. Continue to tack nail both sides of entire length of vent. Use nail pattern shown in step 4. Center shingle cap on vent and nail. Continue nailing until all vent is covered with ridge caps. Be careful not to overdrive nail. Nail head should be flush with top of shingle, without indenting it. Pre-forming caps in cold weather helps avoid cracking.

*Be careful not to touch knife blade. Always cut in a direction away from yourself. Wear proper hand and eye protection.*



### Remove the Fall Protection

1. Remove the walk boards.
2. Remove the roof jacks.
3. Drive the nails.
4. Cover the nails with roof patch.

## Tips & Techniques

- Use Caution when working on the roof. If the weather or some other condition caused the surface to become slippery – get off of it immediately.
- Be careful to not damage the edges of the overhanging shingles. You can temporarily tack blocks onto the sub-fascia for the ladders to rest against and between.
- When removing items from the roof, be very cautious regarding people working around the house on the ground level. It's a good idea to place a person or persons as "look-outs" on the ground when you're throwing items down.
- Persons on the ground need to be very alert for items falling from the roof such as hammers, shingles, knives, etc.
- **Blue chalk will not stain the roof – red chalk will.**
- When snapping chalk lines:
  - Double snap if the distance between the ends is more than 10'. (Have a 3<sup>rd</sup> volunteer place a finger on the line in the middle and then snap each side separately)
  - Lift the string only 1". Pulling too hard will cause shadowing.
- Wear shoes with little tread to prevent damage to the shingles, especially on hot days. Work boots can dig into the shingles when kneeling.

## Quality Assurance Checklist

- From the ground, double check the overhang of the shingles.