Master Craftsman®
Shingle Applicator's Manual

Seventeenth Edition

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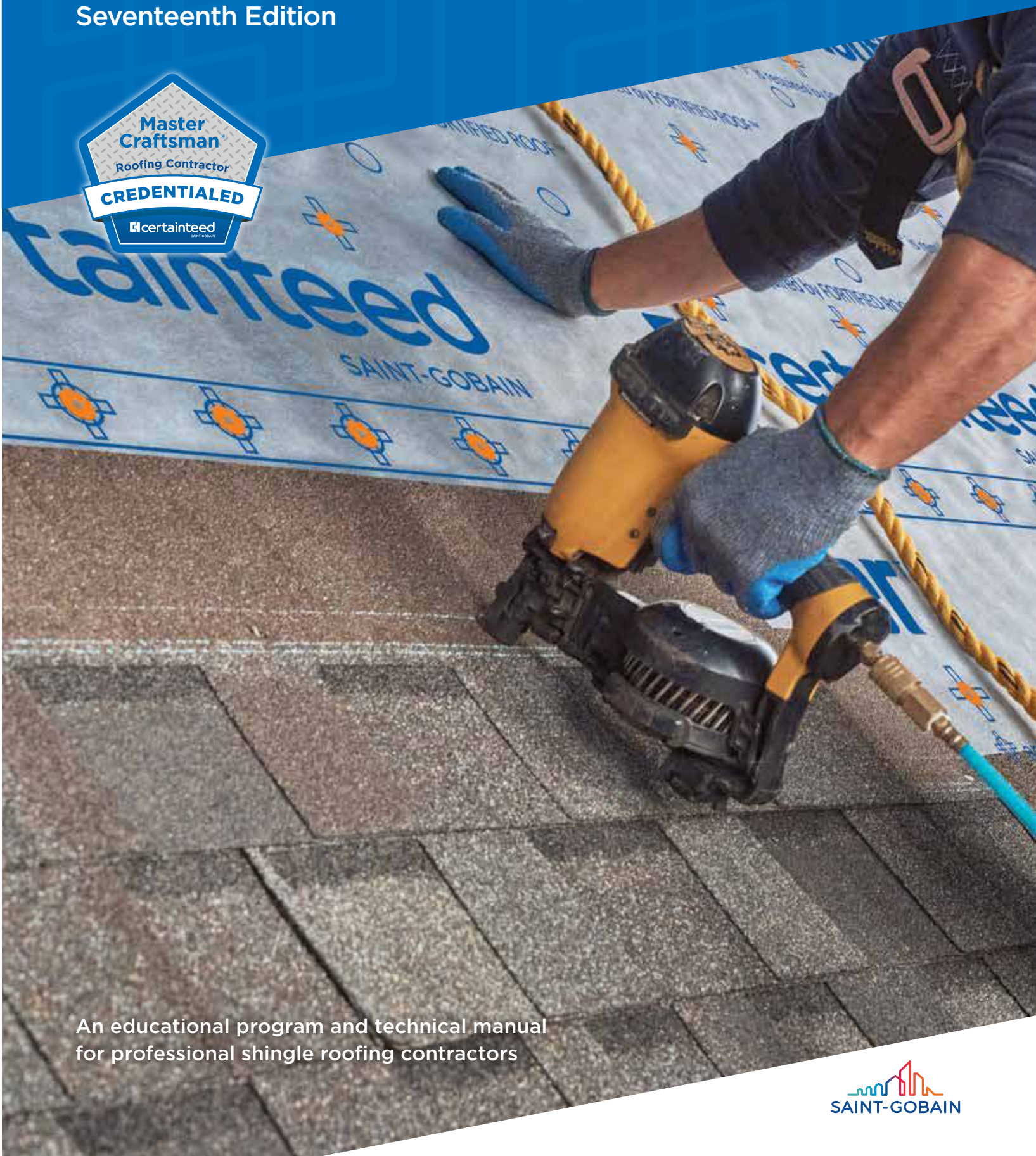
SAINT-GOBAIN



An educational program and technical manual
for professional shingle roofing contractors

SAINT-GOBAIN

We Never Stop Improving

Master Craftsman® Shingle Applicator's Manual in Publication Since 1993

The Contractor's EDGE™ program supports each aspect of your business. We understand that different contractors have different business needs, and the Contractor's EDGE programs reflect this diversity. Gain product knowledge and installation expertise from the best manuals in the business. Earn the industry's most meaningful credentials: education-based, straightforward and free of charge.

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Table of Contents

Introduction 2

Chapter 1 4
Safety, Workmanship, Seasonal Roofing and Roof Repairs

Chapter 2. 12
Roof Systems: Shingle Specifications, Styles, Performance and Warranties

Chapter 3. 21
Estimating Roof Covering

Chapter 4 30
The Roof Deck and Tearing Off or Roofing Over

Chapter 5. 38
Shingle Underlayments

Chapter 6. 48
Flashing, Valleys, Walls, Chimneys, etc.

Chapter 7. 62
Ventilation Standards and Systems

Chapter 8. 74
Correct Fastening

Chapter 9. 78
Installing Shingles on Special Shaped Roofs

Chapter 10. 84
XT™ 25

Chapter 11 94
Patriot® XL

Chapter 12 100
Patriot®

Chapter 13 106
Landmark® Series

Chapter 14 115
Landmark® TL

Chapter 15 123
NorthGate® ClimateFlex®

Chapter 16 132
Presidential Shake® and Presidential Shake® TL

Chapter 17 142
Highland Slate®

Chapter 18 151
Belmont®

Chapter 19 158
Grand Manor® and Carriage House®

Chapter 20 167
Flintlastic® SA Roof Systems

Glossary 185

Introduction

YOUR OBJECTIVE:
Distinguish yourself as a
more professional craftsman.

The Master Craftsman® program is a self-study course. By studying and learning the information in this handbook, you can become a more effective and more professional craftsman.

This can pay off in several ways:

1. You are a more valuable employee for your employer because:
   - Your status as a Master Craftsman is proof to the homeowner that your company employs competent workers who can do the job right.
   - Your company can be confident that the work you do will be done in accordance with CertainTeed warranty requirements.
2. Your proven competence as a Master Craftsman is valuable to your career in the roofing trade because:
   - Your professional capability, along with your Master Craftsman status, can make you a more valued and dependable worker. This can mean added job security.
   - Added confidence and competence can result in more job satisfaction and responsibility, as well as more challenging work.

STUDY HINTS

To become a Master Craftsman, CertainTeed recommends that you study this material in the following manner:

1. Read over the entire handbook once, without attempting to answer questions. This will give you the "big picture."
2. Next, read just one chapter. Underline or highlight the details that are new to you or that seem to be of special importance.
3. After you have studied the chapter, try to answer the questions at the end. If the answers are not obvious, re-read the chapter to find the right answers and underline, highlight, or circle them.
4. Repeat hints two and three for all chapters.
5. After you have read and tested yourself on all the chapters, use scratch paper to take the Master Craftsman Test. Do not write on the test form yet.
6. Identify the questions about which you are unsure. Re-read the handbook to find the answers. Some questions are answered directly in the manual. Some require that you put together several pieces of information from the same chapter — or from two or more chapters — to find the answer.
7. To answer the tougher questions, it is sometimes best to talk them over with someone else who has read the handbook. This is not cheating in the Master Craftsman exam. This is part of the learning process.

When you are as certain as you can be about the answers to the questions, mark the correct answers on the test form and return it to CertainTeed, as instructed.

REQUIRED VS. RECOMMENDED

Information contained in this manual falls into several categories: whether it is a required or just recommended procedure, whether it is a procedure or advice concerning workmanship, or whether it is just advice of general use to the roofing profession.

- **REQUIRED PROCEDURES** must be followed otherwise CertainTeed's warranty coverage may not be in force for the completed job. Required procedures are either specifically labeled as "required" in the text or the procedure contains the word "must."
- **Recommended procedures on workmanship** can be valuable to an installer but do not affect the CertainTeed product warranty. CertainTeed does not have control over every detail of workmanship and therefore does not usually warrant it. Only a ShingleMaster™ PRO or ShingleMaster™ PREMIER can offer a SureStart PLUS warranty that includes workmanship coverage. All *recommended* procedures are **REQUIRED** procedures when offering a SureStart PLUS warranty with workmanship coverage. Please reference SureStart Warranty brochure for complete details.
- **Information and advice on a contractor's business dealings** is offered as coaching. A contractor should consider these as recommendations for his/her own organization. Included in this category is material on safety and material that's useful for estimating a job, such as ventilation, tear-offs and seasonal roofing.

SOME REPETITIVE INFORMATION

The *Master Craftsman Shingle Applicator's Manual* **contains two different types of shingle chapters. One type is the roof-system-oriented chapter, the other is product application. Roof system chapters include, for example, "The Roof Deck" and "Flashing." These chapters focus exclusively on the roof system components described by the title and are different from each other.**

On the other hand, product application chapters focus on the installation of the specified product and contain some repetitive information from chapter to chapter. This is intentional so that a quick brush-up on the installation instructions for a single product is possible without flipping back and forth among the different chapters.

In addition, each product chapter contains much of the detailed application instructions and illustrations that appear on the simplified bundle wrappers of CertainTeed shingle products. This illustrated instructional format was developed in response to requests from roofing contractors, who asked for wrappers that would help applicators more quickly grasp the essential details of proper installation.

A glossary of roofing terms and definitions are incorporated into the manual.

NEW OR REVISED INFORMATION

IN THE SEVENTEENTH EDITION OF THE MASTER CRAFTSMAN SHINGLE APPLICATOR'S MANUAL

New or revised information is marked in the manual with a blue star (★).

A few noteworthy topics include:

- **Requirements to obtain enhanced wind warranty for Lifetime shingles**
- **Patriot®**
- **Patriot® XL**
- **RoofRunner® AIR**
- **SureStart PLUS**
- **StreakFighter Algae Resistance Warranty Update (effective on all products installed on or after June 1, 2023)**
- **SwiftStart® SA**
- **CertaSeam™ Roof Tape**

CERTAINTEED'S WEB SITE

Please visit www.certainteed.com for additional information. Always be sure to check this resource and the product packaging for the most current application instructions. For further information or clarification of installation details, we invite you to consult CertainTeed's library of Technical Information Sheets by contacting our Technical Services Department at 800-345-1145 or by emailing us at rpgts@saint-gobain.com.

AN INVITATION TO READERS

After you've had a chance to study the material in this handbook, we would appreciate hearing from you! Tell us what you think of the program and send us your ideas, suggestions, and tips so that we can keep improving this publication for shingle applicators.

Safety, Workmanship, Seasonal Roofing and Roof Repairs

1

YOUR OBJECTIVE:
To fully appreciate the importance of learning and practicing roofing safety.

You owe it to yourself, and to those who depend on you, to learn as much as possible about roofing safety equipment and its use, government safety regulations for roofers (especially those issued by the Occupational Safety and Health Administration ("OSHA"), and trade association safety recommendations. And, while you're learning all about roofing safety, put it immediately into practice!

There are many steep roof safety devices available to the installer. These include ropes, slings, harnesses, perimeter rails and catchers, cleats, roof jacks, and other items. Yet, perhaps 80 percent of installers use none of these things.

SOME ATTITUDES SEEM TO BE CHANGING

Fortunately, more and more contractors are requiring their crews to use a safety system. There are several reasons for this change:

- First of all, there's the high cost of insurance, especially workers' compensation. Many contractors have simply found that it is too expensive not to impose a safety program.
- Another reason we're seeing more safety programs in action is the difficulty of finding qualified and productive workers. The cost of losing an experienced worker (a valuable asset) is very high.
- OSHA is a third reason. OSHA enforces a federally mandated safety program on all roofing contractors. An inspection which reveals no safety program in effect, ignorance of the regulations or, even worse, blatant disregard for the regulations, can cost a contractor an enormous amount of money (from hundreds to many thousands of dollars).
- Finally, there is the simple human concern that we all feel for each other. Few of us want to see harm come to another.

WHAT'S PREVENTING OTHERS FROM PRACTICING SAFE ROOFING?

The statistics and day-to-day reality prove there are powerful obstacles to the adoption of effective safety programs by the majority of installers and their employers.

- Perhaps the most powerful obstacle is the **installer**. Many are highly confident of their own abilities to survive the risk of the roof. Others, especially newer installers, simply don't believe it will ever happen to them. Still others are afraid their images will suffer by wearing safety equipment.
- A second obstacle to adopting a safety program is that many fear that safety equipment will interfere with work productivity. This perception is shared by both installers and employers.

It all boils down to this: resistance to the use of safety equipment is due to a lack of vision. Try to picture your loved ones 10 years from now. Picture the circumstances they might be living under if you become a victim of a serious roofing accident. An accident which probably could have been prevented if you practiced "safe roofing." Test this out by seeking out a roofer who has fallen, preferably someone who was using safety equipment at the time. Ask him or her what they thought about safety before and after the fall.

The concern about productivity loss should be addressed by talking to workers and employers who have adopted and enforced safety programs. Most will say that initial productivity loss was overcome in a relatively short time by workers as they learned to use the devices. They were then able to focus a greater portion of their attention on the work at hand rather than having to constantly split their attention between getting the work done and avoiding a fall. Some will even tell you that productivity actually improved.

Let's face it, both the employer and the installer have a significant interest in working out and following an effective safety program. There are many safety devices, training materials, and experts available to assist, instruct, consult, evaluate and to even help you implement a safety program. Remember, it will always be in everyone's best interest if you decide to work under the safest conditions possible.

HERE ARE BASIC ROOF SAFETY TIPS COMPLIMENTS OF THE ENGINEERED WOOD ASSOCIATION (APA)

- **TIE-OFF:** Wear a safety harness that is securely tied off to a fall arresting device and proper anchor.
- **AVOID SLIPPERY ROOFS:** When the roof is slippery from rain, snow, frost or dew, the best precaution is to wait until the roof surface is dry.
- **KEEP IT CLEAN:** Make sure someone keeps the roof clean by frequently sweeping up sawdust, wood, shingle particles, and other kinds of dirt.
- **WEAR SOFT-SOLED SHOES OR BOOTS:** Rubber-soled boots typically provide better traction than leather-soled boots. Some crepe-soled boots also provide good traction. However, whatever shoes or boots you decide to wear, make sure they're in good condition. Badly worn shoes of any type can be a real safety problem.

Here's a Tip...

Keep at least one hand on the ladder side rail when climbing, not the rungs which require letting go of the ladder. (Thanks to Brian King, Baldwinsville, NY.)

- **SECURE OPENINGS:** Cover and secure all skylights and openings, or install guardrails to keep workers from falling through.
- **KEEP THE SKID-RESISTANT SIDE OF APA PERFORMANCE RATED PANELS FACING OUT:** Some Oriented Strand Board (OSB) panels are textured or splatter-coated on one side to increase traction on the panel surface. When installing OSB panels on trusses or rafters, make sure the skid-resistant side is up. With proper orientation of the panels, the grade stamp will be on the inside of the structure.
- **INSTALL SHINGLE UNDERLAYMENT:** Cover the deck with underlayment as soon as possible to minimize its exposure to the weather. Underlayment tends to make the roof less slippery when properly installed. (However, be aware of the risk that underlayment can tear away from fasteners on a steeper pitch. The lighter weight, undersaturated felts are most likely to tear out.)
- **INSTALL TEMPORARY WOOD CLEATS FOR TOE-HOLDS:** Nail 2" x 4" wood cleats *or adjustable roof jacks* to the roof deck to provide temporary toe-holds. Remove the cleats *or roof jacks* as the roofing is installed. (See also "OSHA Regulations in Brief.")
- **CONSTANTLY INSPECT THE ROOF AND IMMEDIATELY REMOVE ANY POSSIBLE TRIPPING HAZARDS:** Tools, electric cords and other loose items can all pose hazards and should be removed from the roof.
- **LEARN THE FEDERAL, STATE, AND LOCAL WORKER-SAFETY REQUIREMENTS:** Learn what the government agencies require of you and the contractor you work for. These requirements exist to protect you. So, if you're going to be a roofing professional, it's an important part of your job to learn and follow these regulations.
- **USE YOUR COMMON SENSE:** Safety programs and regulations cannot foresee each of the roof conditions and layouts on which you must work. Adapt to protect yourself.

HERE ARE A FEW LADDER SAFETY TIPS

- **LADDER RATING:** Ladders are rated by how much weight they can safely bear, and you should consider the highest available rating of 1A or 300 pounds.
- **MATERIAL:** When it comes to safety the best material for a ladder is fiber glass. Although wood is cheaper and aluminum is easier to handle, wood also deteriorates when used outdoors, and aluminum is dangerous when used around electric power lines. Some businesses and industrial plants will not allow you to use aluminum ladders and some insist on the use of fiber glass ladders only.
- **POWER LINES:** Even ladders made of wood or fiber glass should not be used in the vicinity of power lines or other electrical hazards.
- **POSITIONING:** Ladders should extend above the eaves by 3 to 3½ feet and sit on a firm level base. Leveling can be attained by digging or by use of adjustable leg levelers. Firmness can be attained by use of a 2-foot square piece of ¾" plywood under each leg.
- **LADDER ANGLE:** To be at a proper angle, the distance of the foot of the ladder from the wall supporting it should be one quarter of the height of the wall. (1 foot for every 4 feet of vertical rise).
- **TIE-OFF:** A ladder in place for use over an extended period should be tied off at the bottom rung to a stake driven into the ground or stack two shingle bundles on the ground against the base of the ladder and near the top to an eye bolt screwed into the fascia.
- **OVER-REACHING:** Don't over-reach to either side while on a ladder: A good rule is to keep your belt buckle between the rails.
- **NOT A PLANK:** Do not use the ladder or even a section of a ladder as a plank or to provide stiffness to a wooden plank. Besides the danger of failure, the stresses set up during this usage loosen the ladder's connecting points.
- **STEP LADDERS:** Step ladders are intended for use fully opened, not closed and leaning against a wall. The highest step for standing on is 2 feet below the top.

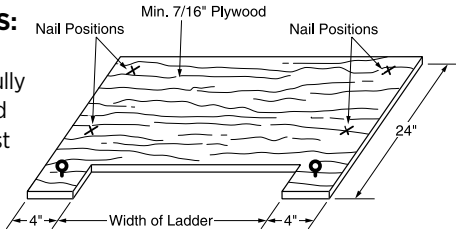


Figure 1-1: Plywood gutter guard.

- **INSPECTION:** A ladder should be inspected every time it is set up for use. Check the ladder from bottom to top for any visible defects or wear, and that it's correctly and securely anchored and properly positioned.

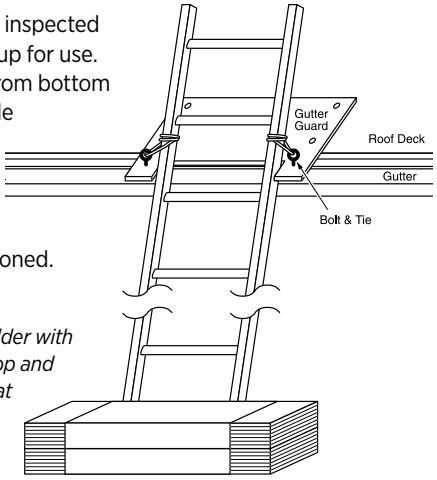


Figure 1-2: Secure ladder with gutter guard at the top and two shingle bundles at the bottom.

Here are Some Tips...

Never use your entire body as a tool when pulling something loose from the roof; it can result in falls. Set your body in an appropriate position from the shoulders down, using the motion of your arms only as a means of pulling something loose. If you use your lower back as a hinge while pulling, and the material comes loose, you might fall backwards.

Never stand on the rake edge of a roof with your feet next/close to each other. If you slip in this position, you are likely going off the roof. Rake edges and eaves should be approached with caution and unless you are in the process of laying shingles, you should most often not be standing near the rake or eave. (Stefan Mach of Frederick, MD)

Here are Some Tips...

When doing repairs and separating set/sealed shingles, you might want to try using a mason's trowel – it cuts through the fastener, it separates the shingles, and it generally does not tear any shingles. (Thanks to Brian O'Donnell from Sinsbury, CT.)

Place first bundle parallel with the ridge, about one foot below ridge. Stack other bundles on the ridge and top edge of first bundle. This keeps the shingles flat and also provides level surfaces for tools, drinks, etc. (Thanks to Jack Connelly from Lansdale, PA.)

WET WEATHER SITUATIONS

There are five common wet weather conditions that must concern a roofing installer: dew, frost, ice, rain and snow. All pose safety and liability problems.

In the case of dew and frost, early mornings present increased risks for workers walking on a roof. Underlayment can be slippery without appearing so to the untrained eye.

In all wet weather conditions, be sure to protect paper shingle bundle wrappers from getting wet. Wet bundles are very difficult to handle. They may present safety problems and almost certainly will reduce productivity. Keep bundles under cover and off of the ground. Never take safety short cuts in this situation.

In the case of rain, many professional roofing contractors will only tear off shingles that can be replaced with new ones the same day. If a tarp or a water-resistant underlayment is installed as temporary roofing, it is important that they be able to resist high wind gusts to protect the deck and home from rain infiltration. Wood roof decks should not be exposed to rain without well-fastened underlayment in place. If a wood deck becomes soaked for any reason, allow it to sufficiently dry out before applying underlayment and shingles.

Nowadays, most professional roofing contractors install synthetic water-resistant underlayment instead of asphalt-based underlayment (felt-paper) which was commonly used in the past. Unlike synthetic underlayment, when asphalt-based underlayment is wet from rain or dew, it is prone to wrinkling, especially the inexpensive underlayments which can wrinkle a great deal. Do not apply shingles over underlayment which has wrinkled significantly as it can cause buckling in the shingles. Allow the underlayment to dry out and re-flatten, or cut out the wrinkled areas and install patches, or replace entire sections of underlayments.

NOTE: In certain areas of the United States, the weather is predominated by wet conditions. As a result, it becomes neccessary for roofing contractors to install roofs when the weather is not completely dry. Such roofing projects can be completed when contractors take the proper precautions during installation. Contractors should ensure that the roof deck is reasonably dry and that any underlayment installed is sufficiently dry and in good condition before installing shingles.

OSHA REGULATIONS IN BRIEF

OSHA IS THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION UNDER THE U.S. DEPARTMENT OF LABOR

The United States Department of Labor's Occupational Safety and Health Administration (OSHA) has issued a directive rescinding the Interim Fall Protection Compliance Guidelines for Residential Construction (STD 03-00-001).

Before issuance of this new directive, STD 03-00-001 allowed employers engaged in certain residential construction activities to use specified alternative methods of fall protection (e.g., slide guards or safety monitor systems) rather than the conventional fall protection (guardrails, safety nets, or personal fall arrest systems) required by the residential construction fall protection standard (29 CFR 1926.501(b)(13)). Employers could use the alternative measures described in STD 03-00-001 without first proving that the use of conventional fall protection was infeasible or created a greater hazard and without a written fall protection plan. With the issuance of the new directive, all residential construction employers must comply with 29 CFR 1926.501(b)(13).

- Residential construction employers generally must ensure that employees working six feet or more above lower levels use guardrails, safety nets, or personal fall arrest systems. A personal fall arrest system may consist of a full body harness, a deceleration device, a lanyard, and an anchor point. (See the definition of "personal fall arrest system" in 29 CFR 1926.500).
    - Other fall protection measures may be used to the extent allowed under other provisions of 29 CFR 1926.501(b) addressing specific types of work. For example, 1926.501(b)(10) permits the use of warning lines and safety monitoring systems during the performance of roofing work on low-sloped roofs.
    - OSHA allows the use of an effective fall restraint system in lieu of a personal fall arrest system. To be effective, a fall restraint system must be rigged to prevent a worker from reaching a fall hazard and falling over the edge. A fall restraint system may consist of a full body harness or body belt that is connected to an anchor point at the center of a roof by a lanyard of a length that will not allow a worker to physically reach the edge of the roof.
- If the employer can demonstrate that use of conventional fall protection methods is infeasible or creates a greater hazard, it must ensure that a qualified person:
    - Creates a written, site-specific fall protection plan in compliance with 29 CFR 1926.502(k); and
    - Documents, in that plan, the reasons why conventional fall protection systems are infeasible or why their use would create a greater hazard.

For complete information on OSHA guidelines, visit www.osha.gov.

SAFETY DATA SHEETS (SDS)

Asphalt shingles, accessory shingles, and roll roofing products are all considered to be non-hazardous "articles" when used according to their label directions and for their intended purpose.

All CertainTeed roofing SDS are available on www.certainteed.com or by contacting CertainTeed's Technical Services Department.

WORKMANSHIP

YOUR OBJECTIVE:

To understand how your work performance affects roofing warranties, your employer, the homeowner, CertainTeed, and you.

THE PURPOSE OF WARRANTIES

Well-established manufacturers of quality roofing products, like CertainTeed, offer very good product warranty features such as SureStart™ protection because they believe in their products. Quality products with superior warranties are good for business.

In the same way, established roofing contractors usually provide reliable workmanship warranties. These are promises of good performance, which means good workmanship. Obviously, home-owners prefer to do business with contractors who will stand behind their work.

When the level of workmanship is low, however, a lot of the goodwill and customer confidence created by warranties and reputation goes right out the window. It costs the employer a lot of money to send a crew back to an old job site and rework a job that should have been done right in the first place. And, if a homeowner takes the employer to court and sues for lack of professionalism, there's a chance the case may be lost. When companies lose money, everybody's job is at risk, including the installer's.

THE INSTALLER'S RESPONSIBILITY

As a professional roofer, there's a lot you can do to help keep your employer out of warranty and legal trouble, and also help maintain and grow their good reputation in the community. Basically, your employer, the homeowner, and the roofing products manufacturer all depend on the installer to know his/her business and perform professionally. This professionalism extends from having the know-how to install a complicated valley on a steep roof to thoroughly cleaning up the job site at the end of each work day.

COMMON WORKMANSHIP DEFECTS

Some of the most common applicator faults, which can place at risk the protection offered by the manufacturer's warranty, are these:

MISAPPLIED AND MISSING FASTENERS (REFER TO CHAPTER 8 FOR MORE DETAILS)

Over- and under-driven nails: This particular fastener misapplication is very common when using pneumatic nailers. Often the problem centers around changes in equipment air pressure, especially in cold weather. Generally, higher air-gun pressure is needed in colder weather. Since air pressure changes as the temperature changes, be sure to check and adjust air pressure as necessary. In cold weather, many experienced roofers hand-nail for best results.

Fasteners outside the approved nail pattern: Nails are sometimes driven in an arc that derives from the swing of the gun from the waist and shoulder of the installer. When you allow this arc to happen, the fasteners tend to go outside the approved nail pattern.

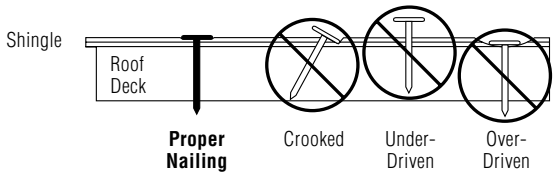


Figure 1-3: Proper and improper nailing.

Missing fasteners: Missing fasteners are an obvious problem. This fault seems to occur most often when the vertical racking application method is used.

Fasteners outside the target area: Fasteners consistently applied outside the approved target area often lead to roofing failures (Figure 1-4).

Short fasteners: When fasteners do not penetrate the deck at least 3/4" or all the way through thinner panels, the likelihood of nails backing out, or coming loose, is very high.

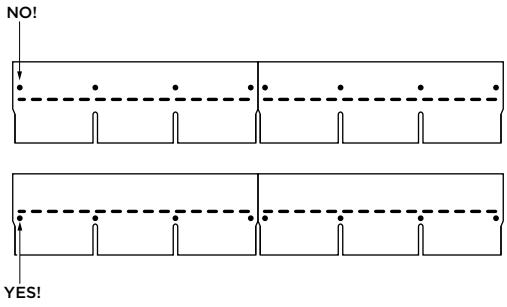


Figure 1-4: High nailing: prohibited

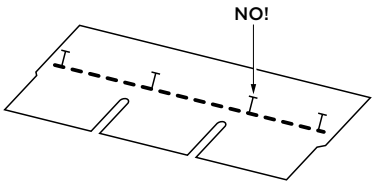


Figure 1-5: Avoid nailing into sealant strips.

Here are Some Tips...

Every roof installer needs to know that it isn't the wet roofs or icy roofs we fall off of...It is the dry hot ones [Over Confidence]! (Thanks to Kennon Halverson from Syracuse, NY.)

I've learned that rubber bands from coiled nails are dangerous. To prevent possible falls, after removing rubber band from coil, put it on the back of your nail gun. (Thanks to David A. Sova from Flint, MI.)

YOU LESSEN THE LIKELIHOOD OF FASTENER PROBLEMS WHEN YOU USE NAILS: CertainTeed, the Asphalt Roofing Manufacturers Association, and the National Roofing Contractors Association all agree that you will probably have fewer fastening problems when you use nails than you will if you use staples.

CertainTeed does not manufacture any shingles that are approved to be installed with staples. In fact, most building codes do not even permit the use of staples to fasten asphalt shingles.

The rationale generally given for not using staples is the tendency of the installers to apply them incorrectly by high nailing, cocking, or over- or under-driving. If you're thinking of striving toward better workmanship, a good place to start is by putting the staple gun away — for good.

VERTICAL RACKING

Some CertainTeed products may not be applied using the vertical racking method. There is a high probability that when using the vertical racking method to install some products, a pattern will appear on the roof which the homeowner will find objectionable. If vertical racking is not an approved application method, and such patterning appears, CertainTeed will not accept responsibility.

USING UNAPPROVED APPLICATION METHODS

Roofing material installation instructions can change frequently. Unfortunately, many installers do not bother to look for such changes. Also, some installers assume that the application instructions are the same from manufacturer to manufacturer. This assumption can create big problems because the instructions are not the same, they're different. Applicators are expected to know and use the correct procedures for each product they apply.

IGNORING "DO NOT MIX" LABELS

Color variations that result from mixing shingles from bundles marked with "DO NOT MIX" labels or imprints, and bundles without the labels will be entirely the contractor's and supplier's responsibility. Accordingly, complaints arising from such color variations will also be the contractor's and supplier's responsibility.

SEVEN REPUTATION-BUILDERS

FOR CUSTOMER SATISFACTION, COMPANY GROWTH, AND JOB SECURITY

Here are some suggestions that will help build your company's reputation as a quality organization. These suggestions are all designed to please customers, because pleasing customers is good business. As your company's reputation grows, your employer will begin to outpace the competition. With this good reputation comes more business and job security for you.

1. Make sure you have the right materials before starting a job. If the roofing materials seem faulty (maybe the color is off on a bundle of shingles), contact your supervisor before proceeding.
2. Take care that you don't damage the shrubs, the homeowner's car, or create other problems that will break down goodwill between your company and the customer. Some other common things that homeowners will complain about, if you and your employer don't handle them well, are: equipment placement, product and equipment storage, missed delivery schedules, vehicle parking, electrical take-offs, and access to water.
3. If the customer talks with you, be polite and don't "bad mouth" your employer or the roofing products manufacturers. These types of things also tear down the goodwill your employer has spent years developing. The customer may lose all confidence in you and your company, and may start looking for things to complain and worry about.
4. Two effective ways a worker can respond to customer questions, comments or complaints:
   - "What you're saying is..." (Repeat the comment or complaint. It's highly desirable to write it down on a notepad at this time.) "I understand why you might feel that way. I'll bring it to the attention of my supervisor, and let him/her know you'd like to speak as soon as possible."
   - "I think I understand your question/comment." (Then repeat the question or comment and write it down.) "What we're doing has been company practice for a long time. But I know my supervisor is always willing to consider suggestions for improvement. I'll bring it to their attention and ask them to get in touch with you as soon as possible."

   Be sincere in your response. Don't contradict your words with conflicting facial expressions or negative body language.
5. Make sure the deck is in good condition before proceeding. Contact your supervisor if you find problems. As you know, a faulty deck can make the new roof fail. When this happens, the homeowner starts looking for someone to blame.
6. Be professional while you're on the job. Keep unnecessary noise to a minimum. Dress responsibly, since you're a representative of your employer. Remember, it's important for the homeowner to have confidence in the people putting on his/her expensive new roof.
7. Watch your workmanship very carefully. The materials manufacturer will not stand behind a failed roof if the roof wasn't installed correctly. Install the roofing material just as the manufacturer suggests. Put the fasteners in the roof like you know you should, and cut the shingles the right way with no sloppy short-cuts.

SEASONAL ROOFING

YOUR OBJECTIVE:
To learn safe and effective application techniques for underlayment and asphalt shingles during all seasons of the year.

SAFETY IS THE TOP PRIORITY

Safety should always be your first consideration while on the job. Winter can present dangerous conditions with ice and snow on the roof deck or the roofing itself. CertainTeed recommends not working at all on such roofs.

APPLYING WATERPROOFING SHINGLE UNDERLAYMENT

Products like WinterGuard® and VYCOR® will not adhere to a wet or frozen surface, and lose most of their stickiness when the temperature is under 40°F. Before applying, check that the deck is clean, smooth, and dry, and if at all possible wait for fair weather with the temperature above 40°F. If the job cannot be put off, a compromise solution is to fasten the WinterGuard or VYCOR® with mechanical fasteners that will hold it fast until the warm weather enables it to seal properly (provided it was an even, smooth application to a clean, dry deck). This compromise risks the possibility of leaks due to ice dams before the onset of the warmer weather. Other options for cold weather application are:

- Use a heat gun along the seams during installation.
- Use a bead of caulk such as CertanTeed FlintBond® or a comparable modified bitumen caulk or trowel grade adhesive between the seams.

FORMING AND HANDLING SHINGLES IN COLD WEATHER

Asphalt composition shingles become very hard in cold weather. It is important that the ambient temperature be warm enough that shingles do not crack during forming, or that they be placed in a warm location that softens them before forming. Hand forming/bending is necessary for applying shingles to closed valleys, hips, or ridges. Extra care is needed when installing multi-layer laminated shingles.

SEALING IN COLD WEATHER

The self-sealing capability of shingles may not be immediately effective when the shingles are applied in cold weather and tabs may be lifted by winter winds. To prevent this problem, we suggest hand-sealing the shingles in cold weather by applying a 1" diameter spot of roofing cement as shown in the steep slope fastening diagram for the particular shingles being installed. The cement should conform to one of the following standards: ASTM D4586 Type II, Federal Specification SS-C-153C Type II or ASTM D2822. Use just enough cement for a secure seal, because too much can cause the shingle to blister. When the sun comes out or the weather moderates sufficiently, the self-sealing material will do the job it was designed to do and bind the shingles together.

FASTENING IN COLD WEATHER

It is difficult to maintain the proper pressure on air compressors in cold weather. For this reason, many installers choose to hand-nail when temperatures drop. Hand-nailing reduces the chances for blow-through (nails being driven completely through brittle shingles) and other problems caused by improperly regulated gun pressure.

STORM NAILING

If weather conditions are such that sealing may not occur prior to a significant windstorm, then it is recommended that the shingles be fastened using the steep slope nailing instructions (Also see Chapter 8 – Applying Shingles in High-Wind Areas).

SCUFFING SHINGLES

Scuffing is sometimes caused by too little stabilizer or filler (finely pulverized minerals) added to the asphalt to give shingles more body or toughness and increase its life. Such shingles become soft and gooey and scuff easily. Even good-quality shingles with adequate filler, however, experience a certain degree of softness at high temperatures. The installer, therefore, must take special precautions to avoid scuffing during mid-day/mid-summer heat even when using good-quality shingles.

Precautions include early working hours and the use of shoe wraps and carpet or foam-rubber sit-upons. Employment of the racking method (as recommended in some application instructions) keeps installers to the side of the shingle rack and off the shingles.

MAKING REPAIRS

YOUR OBJECTIVE:
To learn how to:
(1) Replace damaged shingles,
(2) Repair waterproofing shingle underlayment and
(3) Remove algae from asphalt-shingle roofs.

REPLACING SHINGLES

The need to replace a relatively small number of shingles can happen at any time during the life of a roof.

- A recently installed roof might show signs of damage that occurred during installation especially if the roof was applied during very cold or very hot weather. During a cold weather installation, product brittleness could result in cracked or broken shingles, while during hot-weather, personnel and equipment can easily dislodge granules or asphalt (scuffing).
- At any time during the life span of a roof, damage can result from overhanging trees, windstorms, or installing an antenna or other device that penetrates the surface.

Here are Some Tips...

When diagnosing a roof leak, first ask the homeowner if the leak is in the bathroom or laundry room. If it is, check for condensation or ventilation problems in the attic. (Thanks to Michael Sanville of Joliet, IL.)

Replace damaged shingles as follows:

1. Carefully break loose the seal of the tabs of selected shingles in three courses:
   (1) all tabs of the shingles to be removed,
   (2) the tabs of shingles immediately above the shingles to be removed (that overlay the shingles to be removed), and
   (3) the tabs of shingles in the second course above the shingles to be removed.

IMPORTANT: In hot weather it is more difficult to break loose the sealant from the tab; in cold weather, simply use a simple pry like a wide-blade putty knife. In hot weather, it may be necessary to slice the sealant with a knife and carefully separate it from the tabs to avoid causing damage to the remaining shingles. Hot air can also be useful in softening the sealant.

2. Remove each nail from any shingle to be removed by inserting a pry under the shingle at the site of the nail and gently raising it slightly. Push the shingle down along the shank of the nail and then pull the nail out completely.
3. Using the same technique, remove the nails from the shingles in the course above that also penetrate the damaged shingles.
4. Slide out the damaged shingles.
5. Inspect the exposed underlayment for acceptability for new shingle installation. Replace all damaged underlayment with compatible underlayment. If an adhered Waterproofing Shingle Underlayment was installed, fill all nail holes with a rubber-modified asphalt cement. Use a putty knife to squeeze in only enough to fill the hole. Do not use an excessive amount of cement.
6. Insert a new shingle of the same dimension, design and color for each shingle removed. Depending on the age of the original shingle, colors may vary slightly, but natural aging will minimize the difference.
7. Reinstall the nails in the proper positions of the replacement shingles taking care not to lift the tabs of the remaining old shingles any higher than is necessary to hammer the nails flush.
8. Install replacement nails in the old overlying shingles where they were removed to permit the damaged shingles to be removed. Again use care when lifting overlying tabs.
9. Hand-seal all loosened tabs with an accepted asphalt adhesive.

REMOVING ALGAE

Algae discolors a roof by giving it a brown to black appearance and is particularly unsightly on a white or light-colored roof. Although it is most prevalent in coastal areas and regions subject to warm and humid weather, it occurs in all regions of the country.

The algae discolorations should not be confused with those due to moss or tree droppings, which typically produce only localized discolorations.

CertainTeed produces a line of AR (algae-resistant) products. Specifically, CertainTeed "algae resistant shingles" are warranted to remain free of algae for a period up to 30 years, depending on the product purchased. See applicable warranty for additional requirements.

The warranty does not cover discolorations caused by moss, soot, rust, or tree droppings, and CertainTeed reserves the right to clean algae stains from the shingles rather than repair or replace them.

Algae discolorations are difficult to remove. They may be lightened, however, by applying a solution of chlorine bleach, TSP (trisodium phosphate), and water as follows:

1. Mix a solution of 1 part chlorine bleach, 3 parts water, and a pinch of trisodium phosphate (known as TSP).
2. Apply this solution gently to the surface of the roofing working from the bottom up, being careful to avoid damage to other parts of the building and its surroundings.
3. Avoid scrubbing as well as other physical contact with the roof because the friction may loosen and remove granules that coat the surface of asphalt shingles. Work from a ladder whenever possible, or use "walkboards."
4. Finally, rinse the bleach solution from the roof by gently spraying the surface with water.
5. Observe all possible safety precautions when working on or near the roof. Besides giving special attention to ladder safety, be advised that the solution application and rinsing process makes the surface of the roof slippery and therefore hazardous to walk on.

The effectiveness of the cleaning and bleaching techniques is temporary, and discoloration is likely to recur. A better response to the problem is to use algae-resistant roofing especially if the environment near the roof is favorable to the growth of algae.

CAUTION: High-pressure washing systems should **never** be used for algae removal because their use can result in granule removal and shortened roof life. Also, the treatment/cleaning contractor should take steps to ensure that chemical solutions do not adversely impact vegetation and property.

Here are Some Tips...

Dimitri Ledkovsky of Chapel Hill, NC cautions us that an algae stained roof can be very slippery when covered with morning dew or after a brief rain. He slipped on one with a 6/12 slope and nearly skated off due to the slippery surface. Dimitri says, "Don't walk on algae, unless the roof is completely dry."

SECTION 1 SELF-TEST

1-1. Ladders should extend above the eaves by 3 to 3-1/2 feet.

A. True.

B. False.

1-2. The safest ladder angle is:

A. The foot of the ladder should be away from the wall 1⁄4 of the wall's height.

B. The foot of the ladder should be away from the wall 1⁄6 of the wall's height.

1-3. On roofs greater than 6 feet above a lower level, the use of guardrails, safety nets or personal fall arrest systems are required.

A. True.

B. False.

1-4. According to OSHA's fall protection regulations, if an employer can demonstrate that use of conventional fall protection methods is infeasible or creates a greater hazard, then he must create a written site-specific safety plan and document the reason why.

A. True.

B. False.

1-5. A solution of 1 part bleach, 3 parts water and a pinch of TSP is recommended to lighten algae discoloration.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Roof Systems: Shingle Specifications, Styles, Performance, and Warranties

2

YOUR OBJECTIVE:

To learn (1) How asphalt shingles are made, (2) The differences between the various types of asphalt shingles, and (3) The difference between a high quality shingle and a poor quality shingle.

Asphalt shingles have been used on homes in the United States since the early 1900s. Since that time, leading shingle manufacturers, like CertainTeed, have been continually improving asphalt roofing products through their research and manufacturing efforts. As a result, an asphalt shingle roof has become a great value. Today, asphalt shingles can be purchased in a wide variety of colors, designer styles and weights. These products have become so attractive and rugged that 80 percent of the homes in the United States now have an asphalt shingle roof.

HOW ARE ASPHALT SHINGLES MADE?

The manufacturing process for fiber glass asphalt shingles starts with a tough reinforcing "mat". The mat is made of glass fibers and a special binder.

SEVERAL MATERIALS ARE ADDED TO THE REINFORCING MAT AS THE SHINGLES ARE BEING MANUFACTURED

- The first material put on the mat is the asphalt coating that make the shingle tough and water-resistant.
- The amount of asphalt used gives the shingle its thickness and much of its weight, and adds to its strength.
- Up to a point, the more asphalt used, the longer the shingle will last.
- However, the quality of the asphalt is even more important than the quantity. Low quality asphalt can be brittle and cause the shingle to have a shortened life. High quality asphalt keeps the shingles more flexible.
- Finely pulverized minerals, (called "stabilizers" or "filler"), present in the asphalt coating give the shingle more "body" and "toughness," which ultimately increase the life of the shingle. When too little stabilizer is used, the shingles become soft and "gooey" and they scuff easily. However, scuffing in high heat is not a sign of a poor shingle. A certain amount of softness at high temperatures is a necessary feature of good quality flexible asphalt. The installer must take precautions to avoid scuffing during mid-day/mid-summer heat when using good quality shingles. Such precautions include early working hours and the use of carpet or foam rubber "sit-upons" and shoe-wraps. If shingle application instructions recommend a "racking" method, that can help keep workers off the shingles, as they can work to the side of the shingle rack.
- Next, small opaque granules are adhered to the asphalt to protect the shingles from the harmful ultraviolet rays of the sun. Made from crushed and screened rock, these granules receive a ceramic color coating which gives the shingle its color. Sometimes, copper granules are added for algae resistance.
- A crushed mineral called "backsurfacing" is applied to the back of the shingles. The backsurfacing is added to keep the shingles from sticking to the manufacturing machinery and from sticking to each other when they are stacked and wrapped in bundles. Some manufacturers use a heavy backsurfacing that gives the shingle more weight. Note: The extra weight created in this way does not make the shingle stronger.
- Solid or broken strips of sealant adhesive may be applied to the face or back of the shingles to seal and hold them down under severe wind conditions.
- Release tape prevents shingles from sticking together while packaged.

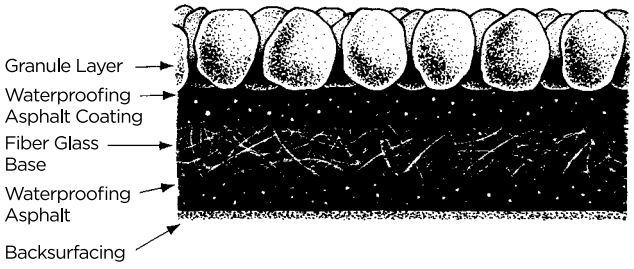


Figure 2-1: Anatomy of a fiber glass shingle.

FREQUENTLY ASKED QUESTIONS

IS VENTILATION REALLY THAT IMPORTANT?

It is important to understand that shingles failing, due to inadequate ventilation, will not be protected by most manufacturer warranties.

Ventilation can be very beneficial for roofs, especially for those that can be ventilated at both the peak and the soffit. In short, provide adequate ventilation. (See Chapter 7, "Ventilation.")

MUST ALL SHINGLE BUNDLES BE OF THE SAME DATE-CODE FOR AN ENTIRE ROOF?

CertainTeed does not require that bundles have the same date codes. In fact, beginning in 1993, we stopped printing date codes on most of our bundles. We were able to eliminate the date-code because of our ability to closely control colors in each production run. However, some manufacturers still require that you match date-codes on bundles in order to assure proper color appearance.

NOTE: The color code numbers (representing individual colors) that are still found on each bundle of CertainTeed shingles must match.

It should also be noted that, regardless of the manufacturer, shingles in storage for a long time may become temporarily stained. This is normally eliminated by natural weathering. Please allow at least six months of exposure to sun and rain.

HOW CLOSE SHOULD THE ACTUAL DIMENSIONS OF SHINGLES COME TO THE NOMINAL OR PUBLISHED DIMENSIONS?

CertainTeed assures that the dimensions on all its shingles (except laminated shingles) will be within ±1⁄16″ of the published dimension. Every other manufacturer assures that the dimension of its shingle will be either ±1⁄4″ or ±1⁄8″. When applying three-tab strip shingles, it is extremely important that the dimensional variation be as small as possible so that the shingles and their cutouts line up properly. Laminated shingle dimensions may vary by as much as ±1⁄4″. This is permitted by CertainTeed specifications because it is not necessary to align cutouts.

SHOULD THE RELEASE TAPE ON THE SHINGLES BE REMOVED?

No! This tape does its job of protecting the sealant when the shingles are stacked in the bundle. Once the shingles are applied, the sealant is exposed and can seal properly; the release film is out of the way and will not harm shingle performance (Figure 2-2). Also, the tape on CertainTeed shingles contains valuable coded information that should remain with the shingle throughout its life. Printed on the release tape, on every CertainTeed shingle, are the words "DO NOT REMOVE THIS TAPE" and the CertainTeed logo.

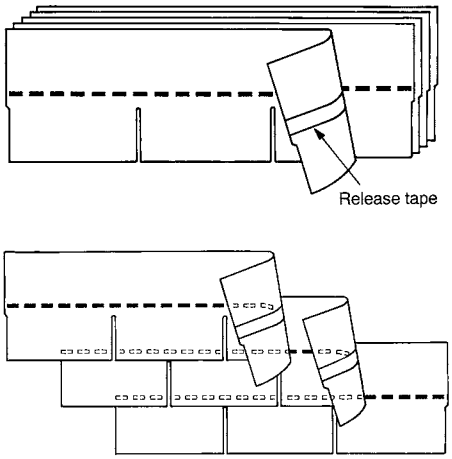


Figure 2-2: Release tape.

SHINGLE TYPES

STARTER-COURSE SHINGLES: Pre-cut starter shingles are designed to be used with the corresponding field shingles. CertainTeed products in this category include SwiftStart®, High-Performance Starter and Presidential® Starter (see specific product chapter for recommended starter course). CertainTeed also offers SwiftStart® SA Rolled Starter, a self-adhered starter designed to eliminate cutting shingle tabs and allows for quick installation.

THREE-TAB STRIP SHINGLES: The most commonly known type of shingles are the traditional strip shingles.

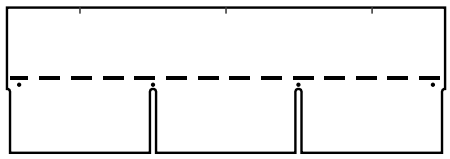


Figure 2-3: Three-tab shingle

LAMINATED SHINGLES: There are many different brands and sizes of laminated shingles. Do not assume common sizes or application procedures when installing these shingles.

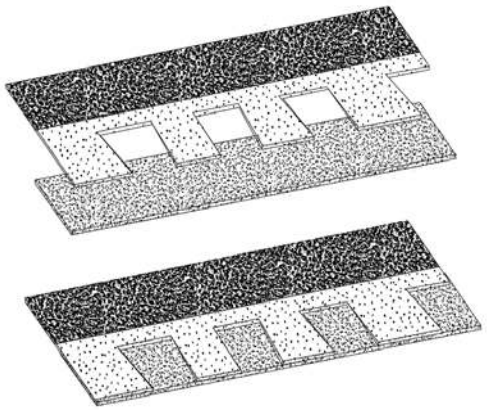


Figure 2-4: Laminated shingle construction

TRI-LAMINATES: This is a unique category of products. This innovative tri-laminate design provides a dramatically thick, 3-dimensional appearance of the classic wood shakes. Landmark® TL and Presidential® TL Shake are the only products in this class.

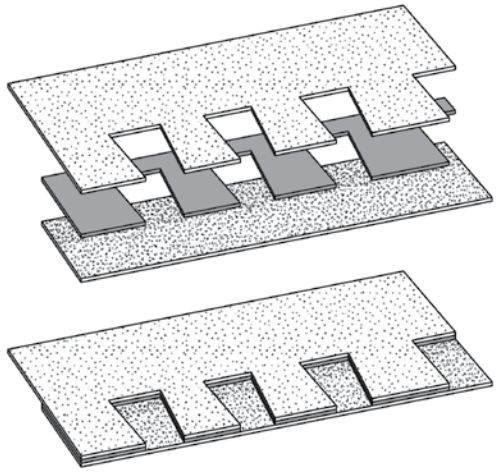


Figure 2-5: Landmark TL construction.

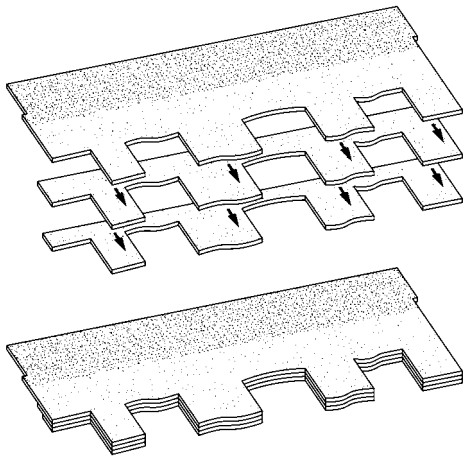


Figure 2-6: Presidential TL construction.

SUPER HEAVY-WEIGHTS: CertainTeed Grand Manor® and Carriage House® provide a minimum of quadruple coverage over the entire roof. They measure 18″ x 36″ and the exposed tabs are 8″ deep.

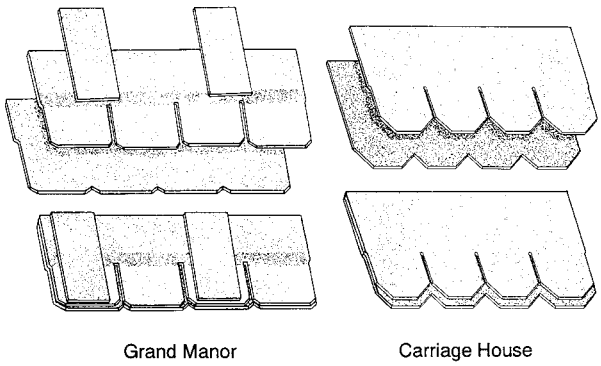


Figure 2-7: How shingle layers form a Super Heavy-Weight shingle.

HIP AND RIDGE SHINGLES: Cap shingles are designed to match color blend, dimensionality and depth of the field shingles. There are many options available to complement the appearance of CertainTeed shingles such as Shadow Ridge, Shadow Ridge XL, Cedar Crest®, Shangle® Ridge, and Mountain Ridge® (see specific product chapter for complementary cap shingles).

ALGAE-RESISTANT SHINGLES: Although sometimes wrongly called "fungus", the dark stains on roofs are usually caused by blue-green algae.

To fight the algae, some manufacturers make a shingle which has algae-resistant granules on the weather side. Two granules have been used for this purpose: zinc metal and copper oxide coated granules. At this time, copper oxide coated granules are the most commonly used and are the granules of choice for CertainTeed.

Copper oxide granules work to prevent the formation of blue-green algae. Copper-pigmented granules are produced with a colored ceramic coating that blends with the other color granules on the surface of the shingle. Copper granules do not produce "blooms" as do zinc granules. CertainTeed offers a wide variety of shingle types that are algae-resistant.

If shingles aren't algae-resistant, it may be possible to at least lighten the discoloration with the use of an algicidal treatment. CertainTeed suggests using Safer® brand Moss and Algae Killer & Surface Cleaner, Shingle Shield™ Roof and Deck Cleaner, or a mixture of one part laundry bleach and three parts water, with a pinch of trisodium phosphate (known as TSP, available in hardware stores). When using a bleach solution be sure to cover and protect all of the plants and shrubbery in the vicinity. Keep in mind that most of the solution will be running down the rain spout. Extreme care should also be taken when cleaning shingles. Use a soft-bristled brush and gently clean the shingles so as not to loosen or remove the granules. A word of caution: the cleaning solution will make the roof surface slippery and potentially hazardous to walk on during treatment.

ALGAE STAINING

The appearance of a shingle roof is important to a buyer, and algae staining can cause problems to customer satisfaction. Algae staining consists of those dark streaks creeping down the shingles that can continue to get larger and larger over time. Eventually, sometimes within five years, the algae will cause the entire roof surface to look "muddy."

Algae stains can be prevented for a time, though not permanently in all cases, by introducing a certain minimum zinc- or copper-oxide coating to the granules that adhere to the surface of the shingle. These granules release a wash of metal oxide over the shingles when it rains and prevent the algae from taking hold.

MOSS AND LICHENS:

Keeping moss and lichens in check is more difficult than controlling algae. Cleaning with special formulations can help, but prevention is the best method. Keep the roof clear of debris, such as leaves and pine needles, and keep tree limbs cut back from the roof. Trees produce sap and will naturally drop some of the sap onto a roof when in very close proximity to a home. Tree sap contains nutrients and sugars that are considered fine dining for algae, moss and lichens. Sap from trees on a shaded roof area can accelerate micro-organism growth versus a roof not influenced by trees. Trees will also shade a roof from the sun, allowing moisture

to be retained on a roof surface and, depending on the size and type of trees, may inhibit airflow across the roof. All of this combined with dropped tree leaves and debris make a perfect environment for algae, moss and lichen growth.

SHINGLE STAINING/DISCOLORATION:

In storage, shingles may pick up asphalt oils (yellowish-brown) and/or backsurfacer (grayish/white) from adjacent shingles. Natural weathering eliminates this temporary discoloration.

OTHER CLEANUP PROBLEMS:

Generally, cleaning shingles discolored by rust, cement, or paint is a difficult task. It is usually best to replace the damaged shingles. Rust stains may be reduced by using a diluted water solution of oxalic acid. But, just as with bleach, always remember to protect the plants in the area from the acid solution. Let it sit for a few minutes and then rinse off with plenty of water. Never try to remove cement or mortar from shingles with muriatic acid.

Descriptively named after its color, "Tobacco Juice" is a dry residue that may accumulate on roofs and walls under certain weather conditions. On steep slopes, this water-borne residue may trickle down the roof and stain surfaces that are not properly protected by gutters or rain-diverters. Light-colored shingle roofs may also become discolored. On flat roofs, it usually occurs where puddles form and then dry up. This "Tobacco Juicing" phenomenon is usually limited to the Southwest region of the United States but may also occur in any part of the country that experiences drought conditions and morning dew.

The Asphalt Roofing Manufacturers Association (ARMA) explains Tobacco-Juicing as being "...the normal result of the weathering of all asphalt-based products...regardless of their manufacturer. The residue will not affect the performance of the roof and should not be considered a performance problem."[1] The conditions necessary for Tobacco-Juicing are: 1) intensive sun exposure, 2) heavy collection of night moisture, and 3) prolonged lack of rain. Typically, all three conditions must exist. Tobacco-Juicing generally occurs only during the first weathering cycle of the roof, rarely appearing after the first year or rainy season.

Industry research has failed to find any ingredient or procedure that would eliminate the occurrence of Tobacco-Juicing. Although the residue formation cannot be prevented, gently hosing down the roof at regular intervals during long, dry periods of the roof's first summer after installation and installing gutters or rain-diverters can minimize the discoloration associated with Tobacco-Juicing.

[1] Asphalt Roofing Manufacturers Association Technical Bulletin: "Water Soluble Residue from Asphalt Roofing Products ("Tobacco-Juicing")", ARMA, November 1994.

FIRE RESISTANCE

EXTERNAL FIRE RESISTANCE

The required degree of external fire resistance is usually established by local building codes and/or insurance companies. Asphalt roofing shingles are manufactured to meet either UL Class A or Class C fire ratings. CertainTeed submits its shingles to UL Solutions where the shingles are subjected to testing in accordance with UL 790 Fire Resistance standards. Shingle fire resistance performance is judged on the basis of three tests that determine resistance to flame spread, intermittent flame, and ignition due to burning brands on the top surface of the shingle roof. There are three levels or classes of severity that are used to rate shingles:

- Class A: Severe exposure to fire. All CertainTeed fiber glass shingles meet Class A fire resistance.
- Class B: Moderate exposure to fire. This class is not currently used for asphalt shingles.
- Class C: Light exposure to fire. Organic shingles typically meet Class C fire resistance.

Each CertainTeed shingle bundle carries a UL label indicating the shingles' degree of fire resistance. In addition, UL Certificates of Compliance are available from CertainTeed indicating that the shingles meet their appropriate standards.

REQUIREMENTS BY UL SOLUTIONS (UL) FOR FIRE-RATED PREPARED ROOFING

- UL classified underlayment is required under Class A fire-resistant shingles when plywood or non-veneer (OSB, WB, etc.) APA sheathing is at least 3/8" thick but less than 15/32".
- When sheathing thicker than 15/32" is used under fiber glass-type shingles, shingle underlayment is not required for a UL Class A fire rating.

TEAR RESISTANCE

The best way to compare the "toughness" of shingles is to look at tear resistance. Read manufacturers' shingle audit reports or reports published by independent testing services.

The industry-accepted method used for comparing shingle toughness is tear resistance as defined by the American Society for Testing and Materials (ASTM). This method is part of ASTM D3462 performance standard for fiber glass shingles. It requires that a shingle resist a minimum of 1700 grams of force on a pendulum type tear tester. **ALL** CertainTeed fiber glass shingles sold in North America meet the tough requirements of ASTM D3462. UL Solutions certifies that these CertainTeed shingles have been manufactured to pass this test. This certification is found on each CertainTeed fiber glass shingle bundle (Figure 2-8).

UL LISTED

PREPARED ROOF COVERING MATERIALS

DEGREE OF RESISTANCE TO EXTERNAL FIRE – CLASS A

ALSO CLASSIFED IN ACCORDANCE WITH:

- ASTM D3161 WIND RESISTANCE CLASS F
- ASTM D3462
- ASTM D7158 AS TO UPLIFT RESISTANCE CLASS H

R-684 **LOT NO.**

Figure 2-8: UL Listing Mark.

Low budget shingles can, and often do, present a lot of problems. For example, they might have coloring that doesn't quite match from bundle to bundle, a shingle length that is out of "spec," not enough asphalt used when the shingle was made, a weak fiber glass mat, and so on. These types of defects can lead to roofing problems that range from poor appearance and a short life-span, to a high risk of blow-off.

WIND RESISTANCE

Wind is a major threat to a shingle roof system. Shingle sealant, drip edge, the construction of the shingle itself, and using proper fastening techniques are the primary defenses against wind damage.

IMPACT RESISTANCE

Impact-resistant shingles are specially manufactured to meet UL 2218 Class 3 and Class 4 impact resistance rating. Available in both 3-tab and laminated shingle styles, impact-resistant shingles must be installed over a clean deck to meet the UL rating. Impact-resistant hip and ridge cap shingles are also available and required by some insurance companies who offer discounts for impact-resistant roof materials.

WEATHER RESISTANCE

Consider the conditions a roof must endure. First there is the intense heat of the sun, which scorches the surface of the roof and raises rooftop temperatures 50° – 75°F above ambient temperature. The sun's rays are relentless, especially during the early afternoon hours. In addition to heat, the sun is the source of ULTRAviolet radiation, which has been shown to degrade and accelerate the aging of the asphalt layers of the shingle. If not for the protective layer of colored granules, roofing shingles would fail very quickly. Other factors such as moisture, pollution and physical effects (roof traffic, hail, snow loads, tree limbs, etc.) all contribute to the aging and degradation of roofing shingles.

Seasonal and weather changes also play a role in the aging of asphalt roofing shingles. For example, consider the common situation in which the roof is bathed in the intense heat of the summer sun. On such a day the rooftop may reach temperatures in excess of 160°F. Now imagine a cold front sweeping through the area, bringing with it the violent thunderstorms that are a common occurrence during the sweltering days of summer. Almost instantaneously, the rooftop temperature drops 60° – 100°F as it's pounded with a summer shower. Thermal shocks such as this cause the roof deck beneath to expand and contract, placing a strain on the shingles. Year after year this process is repeated, resulting in cyclic fatigue of the shingles.

In addition to all of the climatic and external variables that can impact the performance of a roof, consider the internal factors that negatively influence the performance of roofing shingles. Research has confirmed that an improperly ventilated air space inhibits air movement and under most circumstances increases moisture content in comparison with properly vented attic air spaces. Heat shortens the shingles' life and moisture causes deck movement and/or deterioration, which ultimately affects the performance of shingles.

As you can see, the roofing environment is a hostile one with many factors influencing the longevity of roofing shingles. The natural aging process begins as soon as the shingles are installed on a roof. Day after day the shingles are exposed to the elements — sun, rain, heat and cold. A roof never has a "good" day.

SOLAR REFLECTIVE

Solar reflectance and thermal emittance are the two radiative properties used to measure the "coolness" of a roof. CertainTeed was the first to develop a patented technology that produces solar reflective shingles with deep and vibrant color blends. CertainTeed's Solaris® shingles have advanced technology granules that reflect solar energy and radiate heat much more than traditional shingles. Using cool roof technology, CertainTeed's Solaris shingles reduce the roof's temperature in the summer. Solaris shingle are rated by the Cool Roof Rating Council (CRRC) and can be used to comply with California's Title 24 Part 6 and Los Angeles County's Title 31 cool roof requirements (suitability may vary by climate zone or building type). The California Energy Commission has published a calculator for determining Solar Reflective Index (SRI) which uses Aged Solar Reflectance values and either initial or aged Thermal Emittance Values to determine SRI. To access this calculator, please visit www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards.

SYSTEMS AND WARRANTIES

A Master Craftsman® needs to understand how his/her work affects, and is affected by, the entire shingle roof system and the warranties that apply.

BACKGROUND

Roof systems go way back. The asphalt composition shingle is a modern version of a shingle system invented as far back as the Egyptian dynasties, but no one can be sure of its origin.

Wood shingles and shakes were probably the first shingles used in America by the colonists who brought the shingle concept from Europe. Slate remains common throughout Europe and the USA. Thatch is still used in Britain and elsewhere in Europe. Clay barrel tiles and hand-formed roofs made from malleable metal go back to ancient Greece and Rome and remain in common use. Each of these roofing alternatives has cost, appearance, availability and performance characteristics that affect their desirability for a homeowner. Composition asphalt shingles are a modern addition to the roofing material inventory, and widely used in the USA. Overseas, composition shingles are not so widely used.

The principle behind shingling is ancient and proven: to keep water moving down sloping roofs until it runs off and away from the house. It doesn't matter precisely what material is used so long as the slope is adequate. Materials don't even have to be waterproof if you have enough redundancy. Thatched roofing and wood shakes are examples of materials that are not waterproof but nonetheless shed water.

So, the first principle of shingle roofing is: Keep the water running off the roof at the eaves. Anything that interferes with that principle introduces the possibility of a leak. Steep roof slopes are the foundation for an efficient water run-off. The lower the slope, the greater the risk that water can somehow back-up under the shingles. For that reason no modern shingle manufacturer will approve the use of their materials in a shingle roof system on a slope below 2/12. On slopes below 4/12, down to 2/12, the risk of leaks is great, caused by phenomena like wind-driven rain and capillary action that can make water flow uphill, or by the backup of water behind ice dams. To reduce this risk, waterproofing shingle underlayment is applied beneath the shingles.

SHINGLE UNDERLAYMENT

Not all shingle underlayment is the same. There are two critically different grades: water-resistant and waterproofing.

Water-resistant underlayment, also known as tar paper and roofing felt, was invented to keep the roof decking dry until shingles could be applied. Applying this underlayment is called "drying-in the roof." It was also useful as a separation sheet between the roof sheathing boards and the asphalt shingles before OSB and plywood sheets were used as roof decking. This separation was important because direct contact with resin pockets in the pine planks caused the asphalt to degrade prematurely.

Intact water-resistant underlayment sheds most of the water that falls on it, but its water resistance is temporary. As the sun degrades the exposed asphalt, the material begins to dry out, absorb more moisture, lose its strength and eventually tear. The less asphalt used to saturate the underlayment sheet during manufacture, the shorter its life. Since asphalt is the most expensive component of shingle underlayment, lower-priced materials have less asphalt and a shorter life when exposed to the sun and are also subject to severe wrinkling when wet or even just damp.

Water-resistant shingle underlayment is not warranted by the manufacturer. Much of its water resistance is destroyed during the installation of the shingles by driving hundreds of nails through it.

Two common grades of water-resistant underlayment are available: Number 15 (standard) and Number 30 (heavy-duty).

SYNTHETIC UNDERLAYMENT. There are a variety of water-resistant underlayments made from different synthetic components. All are light-weight and claim superior resistance to tearing and wrinkling. Most of these types of underlayments meet one or more ASTM performance standards, or has one or more industry recognized code-body approval. CertainTeed will not void or reduce their Asphalt Shingle Warranty when their shingles are installed over these types of "rated synthetic underlayments"

DiamondDeck® is a synthetic, scrim-reinforced, water-resistant underlayment that can be used beneath shingle, shake, metal or slate roofing.

RoofRunner™ is a lightweight synthetic polyester-based water-resistant underlayment for use beneath asphalt shingles.

★ **RoofRunner® AIR** is a breathable synthetic roof underlayment with a multilayer coated structure that promotes rapid roof deck drying for use beneath asphalt shingles.

All have exceptional dimensional stability compared to standard felt underlayment and special top surface treatment that provides excellent slip resistance, even when wet.

WATERPROOFING SHINGLE UNDERLAYMENT (WSU) is an entirely different product that's used in locations such as penetrations, flashings, eaves and valleys that are most likely to leak under extreme conditions such as high winds, heavy rains and ice dams. WSU comes with a warranty against leaks and is not destroyed when nails are driven through it.

On low slopes where there is a potential risk of water running uphill, or in valleys where blockage from storm debris or ice dams can cause trouble, WSU is reliable insurance against leaks when used according to the manufacturers' instructions.CertainTeed offers two series in this category: **WinterGuard® and VYCOR®.**

WinterGuard® Series: Self-adhered, composed of a composite material of asphalt polymers, formed into a rolled sheet. The asphalt makes it vapor-tight, and the polymers make the asphalt elastic and sticky.

- **WinterGuard Sand ("WG Sand") and WinterGuard Granular ("WG Granular"):** Self-adhered modified asphalt on a glass mat reinforcement with sand or granular surface.
- **WinterGuard® HT X:** Self-adhered advanced waterproofing underlayment with film surface. Specially formulated with a more aggressive sealant and designed for high-temperature applications such as underneath metal or mechanically attached tile roofs.

VYCOR® Series: Self-adhered, composed of two waterproofing materials—an aggressive rubberized asphalt adhesive (except **VYCOR® ULTRA** which is butyl based) backed by a layer of slip resistant, coated high density cross laminated polyethylene film. Available in the following versions:

- **VYCOR® SELECT ("Select"):** Lightweight and easy to handle and install, while meeting or exceeding industry standards for fastener sealability. Smooth surface provides better lap adhesion.
- **VYCOR® ICE & WATER SHIELD ("Ice & Water Shield"):** Forms watertight seals for high performance in severe weather, protecting roofs from water intrusion due to wind-driven rain and ice dams.
- **VYCOR® ICE & WATER SHIELD HT ("Ice & Water Shield HT"):** Specifically designed to meet the challenges inherent in metal roof assemblies with in-service temperature up to 260F. High thermal stability for superior performance under the most demanding conditions.
- **VYCOR® ULTRA ("Ultra"):** 100% butyl adhesive formula is designed for extreme temperature roof assemblies like desert climates and high altitudes, with in-service temperature up to 300F (Ideal for copper, zinc, and COR-TEN® roofs). Compatible with EPDM and TPO roofing materials to provide watertight transition between low slope & steep slope roofs.

FLASHING

The roof deck is most vulnerable to leaks at three places: terminations, transitions and penetrations. These would include eaves and headwalls/sidewalls; changes in slope such as at a valley, saddle, mansard, hip or ridge; or soil pipes, chimneys, vertical ductwork and skylights. This vulnerability is due to:

1. Differential movements, (e.g. the roof deck moves but the chimney does not).
2. An accumulation of turbulent water (e.g., in valleys and on the high side of chimneys).
3. An accumulation of melting snow or ice (e.g., in valleys and on the high side of chimneys).
4. Breaks in overlapped shingles (e.g. at hips and ridges).

Flashing is installed at these locations to bridge adjoining structures and prevent water penetration. Flashing materials include sheet metal; cements, caulks, and sealants; and flexible sheets such as waterproofing shingle underlayment. At hips and ridges the cap shingles, not normally called flashing, serve the same function.

Leaks are most likely to originate at a flashing that has failed or was improperly installed.

VENTILATION

Proper attic ventilation that meets building code requirements is a critical roof system component and a requirement of most shingle manufacturers.

CERTAINTEED SHINGLE WARRANTIES

For complete details of terms and conditions concerning all CertainTeed warranty coverage, read the actual warranty.

WARRANTED AGAINST MANUFACTURING DEFECTS

Standard shingle manufacturer warranties tend to cover manufacturing defects. Some warranties only provide coverage if there is an actual leak caused by a shingle manufacturing defect. In some cases, the warranty remedy might provide replacement shingles. In other cases, the shingle warranty might provide non-prorated replacement (labor and materials) for any shingles found to be defective during the warranty period. On the other hand, the property owner might seek to hold the contractor fully responsible for the installed roofing system. Before undertaking a roofing project, contractors should clarify the limits of their responsibility regarding their own workmanship and the shingle manufacturer's warranty obligations.

SureStart™ PROTECTION

SureStart™ protection, a feature of all CertainTeed Roofing warranties, provides a period of non-prorated coverage for manufacturer defects. Should the shingle be proven to be defective during the SureStart period, CertainTeed will pay for the labor and materials to replace or repair at current labor rates, without prorating the cost from the time of installation.

★ SureStart™ PLUS

SureStart PLUS extends the basic SureStart protection period, and offers levels of extra protection to choose from (see CertainTeed's SureStart Warranty brochure for complete information).

NOTE: SureStart PLUS is only available through companies that have attained ShingleMaster™, ShingleMaster™ PRO or ShingleMaster™ PREMIER residential roofing company credential and abide by all program terms. SureStart PLUS Workmanship coverage is available through ShingleMaster™ PRO or ShingleMaster™ PREMIER companies only, solely under the terms and conditions outlined in the SureStart PLUS Coverage Operating Agreement associated with the company's credential.

ALGAE RESISTANT WARRANTY COVERAGE

Certain shingles, specifically labeled by the manufacturer, are warranted against the appearance of algae staining for a limited time period. Algae-resistant (AR) shingles help protect against dark or black discoloration, sometimes called staining or streaking, caused by blue-green algae (gloeocapsa magma). AR shingles are not available in all regions. At the time of this writing, the warranties are up to 30 years, with specified CertainTeed Hip and Ridge Cap Shingles required as listed in warranty document. Should staining appear during that period, the remedy is determined by the terms and conditions of the warranty. These can vary from brand to brand. Most common is the cleaning or replacement at the option of the manufacturer.

★ WIND WARRANTY

All shingles are warranted against blow-off. This coverage is shorter than the nominal warranty duration. In most cases it is limited to five years. One very common warranty limitation is the requirement that the shingle must be sealed for the wind warranty to be in effect. Another is that all wind damage coverage is limited to the product's maximum wind velocity in miles-per-hour. CertainTeed's lifetime shingles carry a 15-year warranty coverage for winds up to 110 miles-per-hour – a category 2 hurricane (Soffin-Simpson Scale).

When the below application methods are incorporated into the installation, Certainteed offers upgraded wind warranties. Please see CertainTeed's Asphalt Shingle Residential Products Limited Warranty in effect the year of shingle installation for complete list of eligible products and complete Wind Warranty information.

1. The CertainTeed shingles are not applied over existing roof shingles (roof-overs are not permitted).
2. The CertainTeed specified corresponding hip and ridge accessory products are installed as cap shingles (See individual shingle chapters for eligible products).
3. The CertainTeed specified corresponding starter shingles are installed along the roof eaves and rakes (See individual shingle chapters for eligible products).

Here's a Tip...

Take a clean copy of the SAM Manual with you when making sales calls. Show it to the customer to impress them with your professionalism. (Thanks to Ed Kerr of Dearborn Heights, Michigan.)

SHINGLE ROOF SYSTEM WARRANTIES

Because of the complex nature of the shingle roof system, the many component and brand choices available, and the lack of a standardized approach to workmanship, each shingle roof system is a custom-built, one-of-a-kind product. This lack of predictability has meant that no manufacturer can warrant the entire roof system. Nor can the contractor provide such a warranty because they do not manufacture the materials used, although it may often seem to the homeowner that their contractor does provide such coverage.

To standardize the roof system and bring a larger portion of the components under the same warranty, CertainTeed offers the Integrity Roof System® specification and SureStart PLUS extended warranty coverages.

THE INTEGRITY ROOF SYSTEM®

CertainTeed introduced the Integrity Roof System in 1998. The "System" was created to:

- Help specify an ideal steep-roof system.
- Establish minimum standards for SureStart PLUS.

SPECIFICATIONS FOR THE INTEGRITY ROOF SYSTEM® INCLUDE THE FOLLOWING:

- Clean roof deck installation. No "roof-overs" are permitted.
- CertainTeed Water-Resistant Underlayment.
- CertainTeed Starter Shingles.
- CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment must be installed along the eaves if required by local building code or when the roof system is in a snow zone, or north of the following states: North Carolina, Tennessee, Arkansas, Oklahoma, New Mexico and Arizona.
- WinterGuard® or VYCOR® must be used at roof penetrations and as a liner in closed-cut and woven valleys.
- A CertainTeed shingle with a warranty duration of 25 years or more.
- CertainTeed Hip and Ridge Cap Shingles.
- Approved CertainTeed flat roofing system components, (square maximum may apply) if flat roofs are part of the warranted job.
- Attic ventilation is installed to meet applicable model code requirements, or building code standards. **NOTE:** CertainTeed Ridge vents must be used IF installing a ridge vent.
- Workmanship must be in conformance with the Master Craftsman® Shingle Applicator's Manual required procedures.
- For SureStart PLUS Workmanship coverage, the installation must be in conformance with the Master Craftsman® Shingle Applicator's Manual *required* **and** *recommended* procedures, including replacement of all flashings.

SOME FREQUENTLY ASKED QUESTIONS ABOUT THE INTEGRITY ROOF SYSTEM

WHY IS A ROOF-OVER NOT PERMITTED?

From our many discussions with contractors over the years, we have learned that a roof-over installation introduces an increased risk of workmanship errors. Moreover, a tear-off will reveal defects in decking that might otherwise go undetected. A growing number of contractors recommend a tear-off to their customers.

Of course there are arguments in favor of doing a roof-over as well. For example, two layers of roofing provide redundant protection against leaks. Also, by allowing the original layer of roofing to remain, the cost of the job and the burden on landfills is reduced.

On balance, we are convinced that the argument for tear-offs and clean roof installations is persuasive for ensuring the highest possible quality finished roof system.

WHY DO WE REQUIRE CERTAINTEED BRAND PRODUCTS?

There are varying specifications and standards among the different manufacturers and these can be changed at any time. We audit competitive products on an on-going basis but not frequently enough to keep up with all the changes as they take place. Consequently, the only specifications and standards we can count on are our own. By requiring CertainTeed brand products we are better able to predict the final quality of the roof system.

Finally, we are in the business of manufacturing and selling CertainTeed products. The sale of these products paid the bill for this manual.

WHY IS SHINGLE UNDERLAYMENT REQUIRED?

CertainTeed does not require that shingle underlayment be used under their shingles for the standard shingle warranty coverage to be in effect on slopes of 4/12 and more. However, when we look at the performance of the roof system as a whole, underlayment has a legitimate role to play.

Underlayment is an important component in UL Solutions fire resistance classification. It can provide back-up protection in case of a shingle blow-off, and during the installation of the shingles it can keep the unshingled decking dry. For these reasons, and also because many contractors tell us they and their customers believe it is an important part of the roof system, we require its use in the Integrity Roof System™.

SECTION 2 SELF-TEST

2-1. UL Solutions classifies CertainTeed fiber glass shingles to meet ASTM D3462.

A. True.

B. False.

2-2. CertainTeed does not require that all date-codes match on all bundles applied to the same roof plane.

A. True.

B. False.

2-3. Rooftop temperatures can reach 50°-75°F above ambient temperature, and the UV rays degrade the asphalt layers of a shingle.

A. True.

B. False.

2-4. The CertainTeed Integrity Roof System specifications must be followed to qualify for a SureStart PLUS warranty.

A. True.

B. False.

2-5. SureStart™ PLUS offers different levels of extended coverage.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Estimating Roof Covering 3

YOUR OBJECTIVE:
To estimate the amount of roof covering needed for a job, it is necessary to know:
(1) The area of the roof
(2) The length of eaves, ridges, hips, rakes, and valleys.

This chapter presents both the detailed calculation for a shingle estimate and also a useful approximation approach. When you understand the details you will be able to develop estimating shortcuts of your own.

However, remember that estimating is not selling. This chapter shows you how to estimate the number of shingles you will need. However, that is seldom the whole job. More important, it says nothing about the selling proposition, the selling of your services and products to the homeowner. The homeowner needs to trust you to give you the work. Showing calculations is one way to add a level of trust. While this chapter focuses on long-hand methods to estimate roof covering, other tools are available for this purpose. There are companies that can provide detailed reports which include plan views as well as the size, shape, area and slope of all roof planes. Other options include the lengths of eave, rake, ridge, hips and valleys. (These reports are based on computerized interpretation of aerial imagery.) Much of this information can also be obtained by flying a drone over the structure, uploading the data into a vendor's website and then downloading a detailed report. The principles and methods described in this chapter are the foundation for those high-tech digital reports.

ESTIMATING THE AREA OF A ROOF

Roof areas can be broken down into several basic shapes:

- Rectangle
- Triangle
- Trapezoid

There are several ways to obtain the dimensions of the roof. These include:

1. Climb the roof and make direct measurements on the roof.
2. Observe the roof from the ground. Use various techniques we describe to break down the area into rectangles and triangles. Make a plan view.
3. Use existing plans of the building to obtain dimensions of the roof.

GABLE ROOFS

DIRECT MEASURE

Consider the gable roof in Figure 3-1. The area of this roof is made up of two rectangles. The area of each rectangle is A x B. Therefore by measuring A and B directly the area of the gable roof is:

Area = 2 x A x B

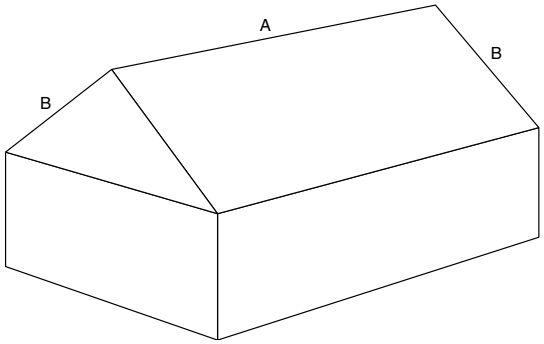


Figure 3-1: Direct Measure

WORKING FROM A PLAN VIEW

However, we can describe the roof in another way. Suppose we walk around the building and measure the length and width of the building. We can now draw a flat representation of the building at the ground level called the plan view. We have projected the inclined roof onto a horizontal surface to get the area shown in Figure 3-2. The dimension B, the rake, now appears as Y on the plan view.

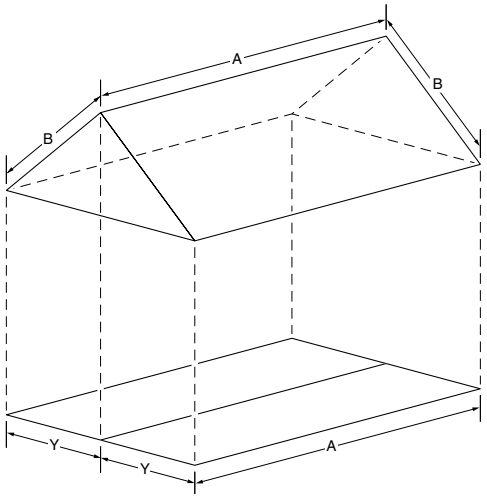


Figure 3-2: Plan View

In this view, the projected length of the eaves and the projected length of the ridge (both A), are correct actual lengths. However, Y does not equal B. To use Y to determine the actual length of B we need the concept of slope.

SLOPE OF A GABLE ROOF

In the cross section of the roof shown in *Figure 3-3* (a projection onto a horizontal plane), we can see the difference in length between B and Y.

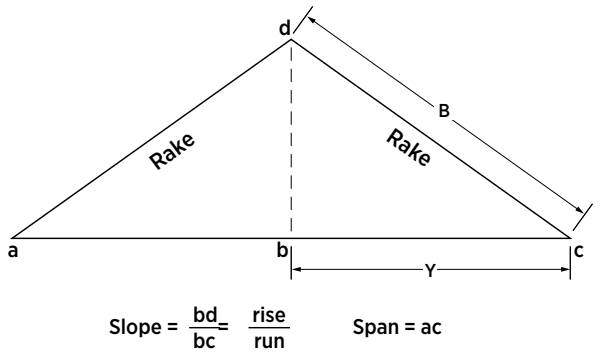


Figure 3-3

The slope of the roof is defined as the rise of the roof (bd in Figure 3-3) divided by the run of the roof. (bc in Figure 3-3). A 5″ rise with a 12″ run is said to have a 5/12 slope. The slope measures how steep the roof is. If we know the rise of the roof and the run of the roof, we can calculate B (B=Y x slope factor) – which is the actual rake length – from Y, and easily figure the area.

Below is a table of slope factors to make the calculation of the rake length (B) easy. If we know the rise in elevation of the roof for every foot of run, then we multiply the area of the horizontal plane (2Y x A in Figure 3-2) by the corresponding slope factor in Table 1 to get the actual area.

TABLE 1

Rise inches/ft	Slope factor
4	1.054
5	1.083
6	1.118
7	1.157
8	1.202
9	1.250
10	1.302
11	1.356
12	1.414

For example, if the rise is 5 inches per foot, then the area of the roof in Figure 3-2 is: Area = (Area on plan view) x (5 inch rise slope factor) = (2 Y x A) x (1.083)

Let us calculate the area of a simple gable roof like Figure 3-4.

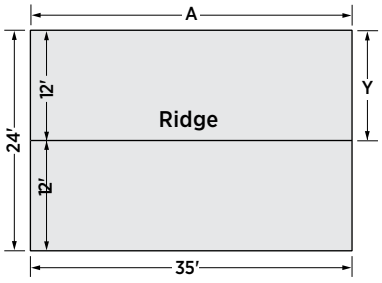


Figure 3-4: Plan view with dimensions.

Area = 2 x Y x A x (5 inch slope factor)

= 24 ft. x 35 ft. x 1.083
= 909.72 square ft. (910 sq. ft., shaded area in Figure 3-4)

Three other measurements required to estimate materials for the gable roof are:

- ridge length
- eaves length
- rake length

We know the ridge and eaves length (35 ft. each).
To find the length of the rake, multiply the run (y) by the slope factor:

12 x 1.083 = 12.9 ft.

To calculate drip edge:

Rakes: 4 x 12.9 = 51.6 ft.
Eaves: 2 x 35.0 = 70.0 ft.
121.6 ft.

Keep in mind that .6 ft. is NOT 6″, but rather 6/10 of a ft., or just over 7″.

NOTE: While these calculations can provide the total length of rake and eave to receive drip edge, the installer needs to reconcile the total calculated length of 121.6 feet with the lengths of commercially available drip edge. Most drip edge is sold in lengths of 10 feet. Allowing for overlaps, and minimizing the number of joints, one might need to purchase 14 pieces of drip edge for the example given.

HIP ROOFS

The second roof discussed is the hip roof shown in a horizontal plan projection in Figure 3-5. All four sides of a conventional hip roof have the same slope. Note how the plan view is made up of two end triangles and two trapezoids. The trapezoid can be broken into two triangles and a rectangle. By breaking up the trapezoid, you can determine the length of the ridge. (See “Useful Estimating Techniques” on the next page to find the “run” of a hip.)

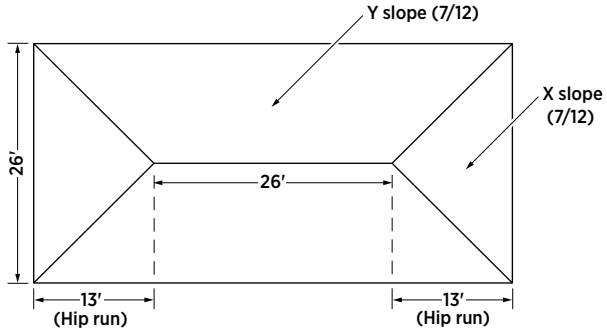


Figure 3-5: Conventional Hip Roof Plan View.

The slope for this roof is 7 inches per foot.

To calculate the total area of this roof, multiply the length x the width x the slope factor:

Area = (13 ft. + 26 ft. + 13 ft.) x 26 ft. x (7” rise slope factor)

= 1352 ft. x 1.157

= 1564 square ft.

SLOPE FACTOR FOR HIPS AND VALLEYS

Finding the hip length in *Figure 3-5* is a different matter. To find a hip length, we must multiply the “run” of the hip (13 ft. in *Figure 3-5*) by the appropriate hip/valley factor in **Table 2**.

Here's a Tip...

Always order one extra square of material per job in case some of the material becomes damaged due to rough transportation or rough handling on the job during loading and unloading.
(Thanks to Martin Kuypers of Sunderland, Ontario, Canada)

TABLE 2

Rise inches/ft	Hip/Valley factor
4	1.452
5	1.474
6	1.500
7	1.524
8	1.564
9	1.600
10	1.642
11	1.684
12	1.732

Therefore we find one hip length as follows:

One hip length = (Run of the hip) x (Hip/Valley factor for a 7 inch slope)

= 13 ft x 1.524

= 19.8 ft. (20 ft,)

Total hip length = 4 x 20 ft = 80 ft.

USEFUL ESTIMATING TECHNIQUES

When estimating the area of a hip roof, it is important to know the base of the hip triangle. It is also important to be able to determine the slope of the hip roof.

ESTIMATING TRIANGULAR SHAPES FROM THE GROUND

Here are two methods for finding the length of triangular shapes

A. TO FIND THE "RUN" OF A HIP

METHOD 1 can be used on a bare deck or a shingled roof.

- Stand on the ground, far enough back from the roof so that you can see the triangular shape easily.
- Take a plumb bob and align the end of the string with the top of the hip or peak of the triangular shape.
- Note where the bob hangs in relation to objects on the side of the house. Use window or shrubbery locations as a marker.
- Measure the actual distance from this marker to the position of the corner of the building plus the overhang (the lower corner of the triangular shape).

METHOD 2 can be used when there are shingles on the roof.

- From the top of the hip, follow the nearest tab cutout or shingle joint down the roof slope to the eaves edge.
- Count tabs across the lower hip edge.
- Calculate length based on the length of the tabs (12 inches for a three tab shingle or 36 inches for a no cut-out shingle).

B. DETERMINING ROOF SLOPE FROM THE GROUND:
The Sight Card is used to determine roof slope from the ground. To find the slope:

- Hold card so that the side with arrows is facing you.
- Hold card at arm's length and, standing in line with the roof peak, align an arrow with the roof peak.
- For gable roofs, hold the card vertical. For hip roofs, slant card toward the building with the same slant as the roof.
- Rotate the card from arrow to arrow until the sides of the card coincide with the sloping edges of the roof. The slope is listed under the arrow.

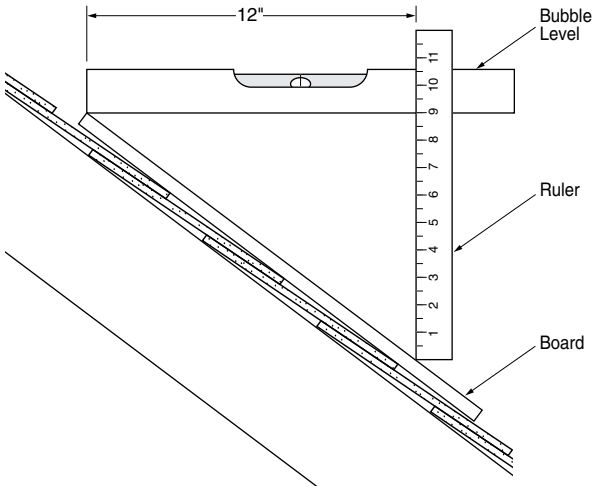


Figure 3-6: 9/12 slope.

ON THE ROOF: This method uses simple tools: a flat board, a bubble level and a ruler (*Figure 3-6*).

- Place board on slanted roof.
- Locate one edge of the bubble level on board at high, up-slope end.
- Mark bubble level one foot from up-slope end.
- Center bubble in level.
- Place ruler vertically at the one foot mark of the bubble level (down-slope end).
- Measure distance in inches from roof to bottom of the bubble level.
- The slope is then the rise (9") ÷ the run (12"), i.e. 9/12.

VALLEYS IN ELL ROOF

In Figure 3-7 we show an ell roof in plan view. This plan presents two common estimating problems when you work from plan dimensions.

1. The ell roof forms two valleys between roof planes with different slopes. The common approach to calculate valley lengths between roof planes with different slopes is to figure lengths for each slope and then average the two.
2. To find the roof area of the ell that joins the main roof we have to break the plan view into a rectangle and a triangle. To find the area of the triangle we have to use some basic geometry.

You will see that using plan view measurements makes it easy to figure different slope situations.

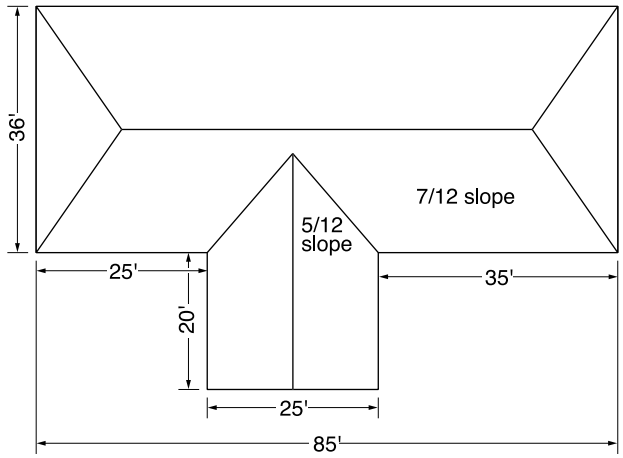


Figure 3-7

NOTE: The slope of the hip roof is 7/12, the slope of the ell is 5/12.

MAIN ROOF

It's a fairly simple matter to calculate the area of the main roof (length x width) except that you must subtract the portion of the main roof, a triangle, that is overlapped by the ell. So, let's work on that triangle first.

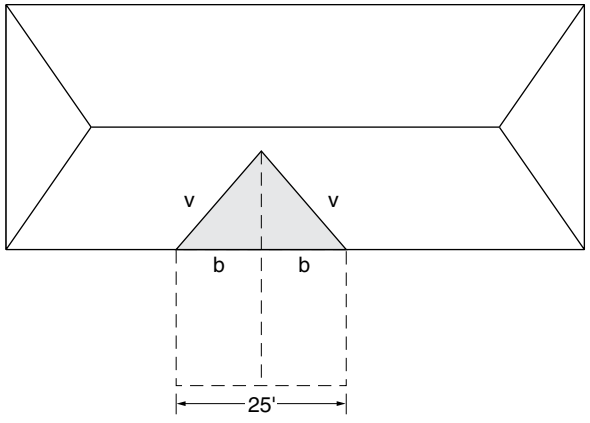


Figure 3-8: Valley Length (v), ell roof

To find the length of one valley:

1. Measure the front of the ell (25').
   Divide by 2 to find b (b = 25/2 = 12.5).
2. Calculate for the ell roof with a 5/12 slope.
   v = 12.5 x 1.474 = 18.425
3. Calculate for the main roof with a 7/12 slope.:
   v = 12.5 x 1.524 = 19.05
4. Average the two slopes. v = (18.425 + 19.05)/2 = 18.74

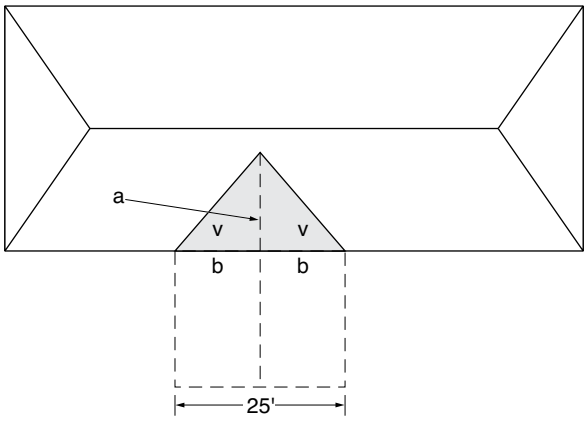


Figure 3-9

To find "a" Use this formula: $a^2 = v^2 - b^2$

(The formula for a right angle triangle is $v^2 = a^2 + b^2$, or $a^2 = v^2 - b^2$)

$a^2 = (18.74)^2 - (12.5)^2$

$a^2 = 351.19 - 156.25$

$a^2 = 194.94$

a = the square root of a^2. (Most hand calculators can do this.) = 13.96'

a = 14' (rounded up)

The area of the triangle is (a x 2b)/2

(14 x 25)/2 = 175 sq. ft.

We will use this area when we calculate the ell roof, too.

Now, calculate the plan area of the main hip roof.

= (36 x 85) – plan area of the triangle = 3,060 – 175 = 2,885 sq. ft.

Convert plan area to actual area.

= 2,885 sq. ft. x slope factor (7/12)

= 2,885 sq. ft. x 1.157

= 3,338 sq. ft. (rounded up)

Remember: on a complex roof, if the slopes on the hips were not all the same, you would have to calculate each separately.

ELL ROOF

By doing the initial calculations in the plan view, conversion to 5/12 slope is not difficult.

Calculate plan area of the ell roof without the triangle.

= (25 x20)

= 500 sq. ft.

Add the plan area of the triangle we figured above.

500 + 175 = 675 sq. ft.

Figure actual roof area of the ell.

= 675 sq. ft. x 1.083 (5/12 slope factor) = 731 sq. ft.

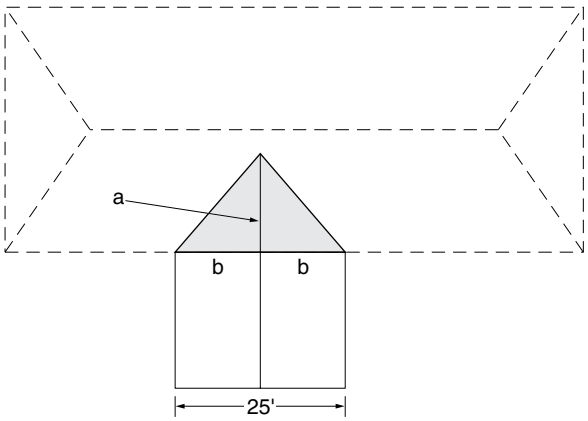


Figure 3-10

Roof area of ell and main roof:

Main roof	3,338 sq. ft.
Ell roof	731 sq. ft.
Sum	4,069 sq. ft. = 41 sqs. (1 sq. = 100 sq. ft.)

SHINGLES

The total quantity of shingles required includes shingles for:

- The starter course
- The hip and ridge sections
- The cutting-waste at rakes, hips and valleys
- The waste due to crew error

STARTER COURSE

Number of starter shingles = Total length of eaves in feet ÷ length of starter shingle.

NOTE: Each CertainTeed Starter packaging will include coverage information.

Carefully include the required starter shingles in your total order for shingles. Underestimating can cause extra expense and delay on the job.

CUTTING WASTE AND SALVAGE (RAKES, HIPS & VALLEYS)

Assuming the use of 3 ft. x 1 ft. strip shingles, the cutting waste at rakes in square feet per linear foot of rake is calculated using the waste factor in Table 3. Other style shingles will have different waste and salvage factors.

TABLE 3
WASTE AND SALVAGE FACTORS FOR 3-TAB SHINGLES (SQ. FT/FT)

NOTE: On hip roofs you will require more shingles than will be salvaged. On the other hand, on gable roofs you will salvage more shingles than needed. This result requires that the salvaging is done very carefully.

CALCULATING WASTE

Type	Waste Factor	Salvage factor
Rake	0.3	1.0
Hip	0.7	0.5
Open Valley	1.5	2.0
Closed Valley	2.2	1.0
Woven Valley	3.0	0

A. GENERAL PRACTICE: One way to avoid detailed calculations is to add 10% to the quantity of shingles for a gable roof and 15% for a hip roof. However, since the waste varies with size of the roof, 10% (or 15%) will be too high for larger roofs.

B. IMPROVED GENERAL PRACTICE: However, a more accurate estimate of waste, which depends on the size of the roof, can be made with Table 4.

TABLE 4
APPROXIMATE PERCENT TO USE FOR WASTE

SAMPLE ESTIMATES

GABLE ROOF (SIMPLE)

Area of roof (sq. ft)	Gable Roof percent	Hip Roof percent
600	8	17
1200	6	13
1500	5	11
2000	4	9
3200	3	8

Consider estimating the shingles required for the gable roof shown in *Figure 3-11*. The slope is 6 inches per foot.

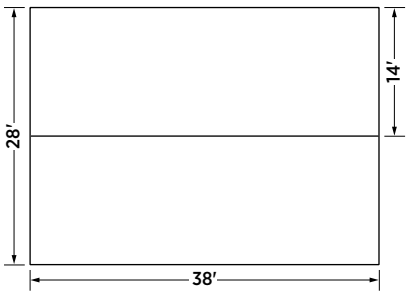


Figure 3-11

Roof Area = 38 ft x 28 ft x slope factor, 6 in/ft
= 38 ft x 28 ft x 1.118 = 1190 sq. ft (rounded up)

Additional Area = Starter course + Rake Cutting Waste + Allowance (ridge)

= 76 ft starter course + Rake Cutting Waste + (Salvage – Required at ridge)

Rake Cutting Waste = rake length x slope factor x waste factor

= 56 ft x 1.118 x 0.3

= 19 sq. ft (rounded up)

Allowance = Salvage at rakes – Required at ridge

= 56 ft x 1.118 x 1.0 sq. ft/ ft – 38 ft x 1 sq. ft/ft

= 24.6 sq. ft

Total Area = 1190 sq. ft + 76 ft Starter Course + 19 sq. ft (Rake Waste) + 24.5 sq. ft Allowance

= 1233.6 sq. ft + 76 ft Starter Course

This is equivalent to 1233.6 sq. ft (or 12.34 squares) plus the 76 ft Starter Course.

NOTE: This approach is an approximation – always round up to be safe.

HIP ROOF (CONVENTIONAL)

Next we estimate the number of shingles required for the conventional hip roof shown in Figure 3-12. The roof slope is 5/12.

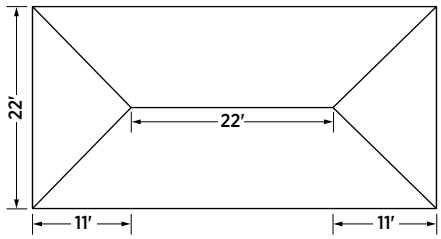


Figure 3-12

Roof Area = 44 ft x 22 ft x 1.083 = 1048 sq. ft

Length of Hip = 11 ft x Hip Factor = 11 ft x 1.474 = 16.21 ft
Total Length of Hips = 4 x 16.21 = 65 ft (rounded up)
Cutting Waste at Hips = 65 ft x 0.7 sq. ft/ft
= 46 sq. ft (rounded up)

Hips and Ridge Before Waste and Salvage
= (Hips Length + Ridge Length) x 1 sq. ft./ft
= (65 ft + 22 ft) x 1 sq. ft/ft = 87 sq. ft

Tabs salvaged at hips = 65 ft x 0.5 sq. ft./ft = 33 sq. ft

Allowance = Waste at Hips and Ridge
= Required Hip & Ridge Shingles – Salvage
= 87 sq. ft – 33 sq. ft = 54 sq. ft

Total Shingle Requirement
= starter course + roof area + cutting waste + Allowance
= 132 ft starter course + 1048 sq. ft + 46 sq. ft + 54 sq. ft
= 1148 sq. ft ÷ 100 sq. ft/ square + 132 ft starter course
= 12 squares x 3 bundles/square + 132 ft starter course
= 36 bundles + 132 ft starter course

HIP ROOF WITH VALLEYS (SIMPLE)

The roof depicted in Figure 3-13 has six hips and two valleys with a 6/12 slope. We assume an open valley construction. This example demonstrates the use of waste factors.

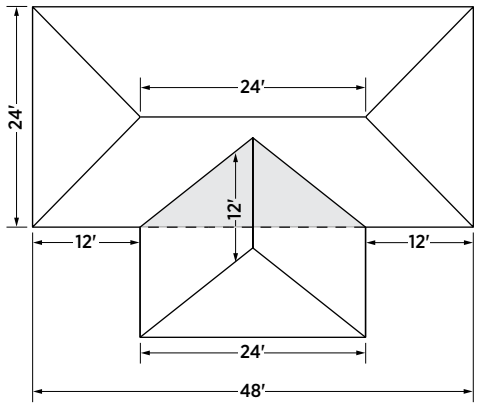


Figure 3-13

The roof area, since the slope is 6 inches/ft, is

Roof Area = [main roof plan view area – ell triangle roof plan-view area + ell roof plan-view area] x slope factor.

A Note for the geometrically challenged: This is an unusual roof because all slopes are equal and they are all hip roofs. Sometimes you get lucky. When this is the case the underlying triangle on the main roof is equal to the overlaying ell triangle. The result being we can ignore the separate calculation of the ell triangles because they cancel each other.

Roof Area = plan view area x slope factor (6/12 in/ft)
= (48 ft. x 24 ft. + 24 ft. x 12 ft.) x 1.118
= 1609.92 sq. ft

To calculate the starter course, find the total length of the eaves.
Total length of eaves = 2 x 48 ft + 2 x 24 ft + 2 x 12 ft = 168 ft
So the starter course is a 168-ft long starter course.

Length of a hip = length of a valley
= 12 ft x Table 2 hip/valley factor (6 in/ft)
= 12 ft x 1.5 = 18 ft

Cutting Waste (hips & valleys)
= hips waste + valleys waste
= 6 x 18 ft x Table 3 hip waste factor + 2 x 18 ft x Table 3 valley waste factor
= 108 ft x 0.7 sq. ft/ft + 36 ft x 1.5 sq. ft/ft
= 130 sq. ft

Ridge length = 24 ft + 12 ft = 36 ft
Hips length = 6 x 18 ft = 108 ft

Shingles required for hips & ridge
= Length of hips and ridge x 1 sq. ft/ft
= (6 x 18 ft + 36 ft) x 1 sq. ft/ft
= (108 ft + 36 ft) x 1 sq. ft/ft = 144 sq. ft

Salvage at hips = 108 ft x 0.5 sq. ft/ft (Table3) = 54 sq. ft
Salvage at open valleys = 36 ft x 2.0 sq. ft/ft (Table 3)= 72 sq. ft

Total Shingles Required
= roof area + cutting waste + hips & ridge shingles – salvage + starter course
= 1609.92 sq. ft + 130 sq. ft + 144 sq. ft – (54 + 72) sq. ft + 168/3 starter shingles
= 1758 sq. ft + 56 starter shingles
= 18 squares + 56 starter shingles

ESTIMATING WORKSHEET SAMPLES

Below are two worksheet samples. On the next page is a blank worksheet including all four Tables provided in this chapter. The "General Practice" method is shown below the tables. The results are about the same in these cases when rounded up. (*The percentages used are extrapolated from Table 4 as appropriate to the actual square feet.)

CONVENTIONAL HIP ROOF

Notes	length	width	sub total	factor	sub total	extension	Square Ft.	Squares
Roof area	44	22	968	1.083	1048.344		1048.344	10.48344
Starter course lineal feet	44	22	66	2	132			0
Hip shingles 1 sq/sq ft.	11			1.474	16.214	4	64.856	0.64856
Ridge shingles	22					1	22	0.22
Hip waste	16.214			0.7	11.3498	4	45.3992	0.453992
Valley waste none								
Hip salvage	16.214			-0.5	-8.107	4	-32.428	-0.32428
Total							1148.1712	11.481712
Order 12 sqs. plus 44 (132/3) starter shingles								

Improved General Practice Method	sq ft	hip roof factor	adj sq/ft	Order
(see page 26)	1048.344	12%* = 126 sq.ft.	1174.344	12 sqs. (rounded up)

HIP ROOF WITH ELL (VALLEYS)

Notes	length	width	sub total	factor	sub total	extension	Square Ft.	Squares
Roof area Main	48	24	1152	1.118			1287.94	12.88
Ell	24	12	288	1.118			321.98	3.22
Starter course (Lineal Ft.)	168							0
Hip shingles 6" rise	12			1.5	18	6	108	1.08
Ridge shingles Main	24						24	0.24
Ell	12						12	0.12
Hip waste	18			0.7	12.6	6	75.6	.76
Valley waste	18			1.5	27	2	54	0.54
Hip salvage	18			-0.5	-9	6	-54	-0.54
Valley salvage	18			-2.0	-36	2	-72	-0.72
Total							1757.52	17.58
Order 18 sqs. plus 56 (168/3) starters								

Improved General Practice Method	sq ft	hip roof factor	adj sq/ft	Order
(see page 26)	1609.92	10%* = 161 sq.ft.	1771	18 sqs. (rounded up)

★ *A formula for Dual Valley/Hip Calculation from Andy Petrin from Barrington, NH:*
Roof plane 1: Eave or ridge measurement x hip/valley factor = X
Roof plane 2: Eave or ridge measurement x hip/valley factor = Y
(X+Y) divided by 2 = dual hip/valley length

A simplified method for calculating the area and waste for a hip roof:
Consider a hip roof section with the following dimensions: 40′ eave, 20′ ridge, and 30′ from eave to ridge. The average of the eave and ridge is 30 ft. (40 ft plus 20 ft divided by 2 equals 30 ft.) The area for this hip section is then 30 ft. times 30 ft or 900 square ft. (9 squares.) For waste we add one shingle for each three feet of hip. The hip length is the square root of 1000 (100 plus 900) or approximately 32 ft. Therefore we add 32/3rds (10.67) shingles for each hip. Thanks to Scott Wilson from Westerville, OH.

ESTIMATING WORKSHEET

Notes	length	width	sub total	factor	sub total	extension	Square Ft.	Squares
Roof area								
Starter course (L/Ft.)								
Hip shingles								
Ridge shingles								
Hip waste								
Valley waste								
Hip salvage								
Valley salvage								
Total								
Order								

TABLE 1

Rise inches/ft	Slope factor
4	1.054
5	1.083
6	1.118
7	1.157
8	1.202
9	1.250
10	1.302
11	1.356
12	1.414

TABLE 2

Rise inches/ft	Hip/Valley factor
4	1.452
5	1.474
6	1.500
7	1.524
8	1.564
9	1.600
10	1.642
11	1.684
12	1.732

TABLE 3
Waste and salvage factors for 3-tab shingles (sq. ft/ft)

Type	Waste Factor	Salvage factor
Rake	0.3	1.0
Hip	0.7	0.5
Open Valley	1.5	2.0
Closed Valley	2.2	1.0
Woven Valley	3.0	0

TABLE 4
Approximate percent to use for waste

Area of roof (sq. ft)	Gable Roof percent	Hip Roof percent
600	8	17
1200	6	13
1500	5	11
2000	4	9
3200	3	8

SECTION 3 SELF-TEST

3-1. Roof area can be broken down into three basic shapes: rectangle, triangle, and trapezoid.

A. True.

B. False.

3-2. If you know the rise and run of a gable roof, you can calculate the rake length and area using slope factors.

A. True.

B. False.

3-3. If we project the area of a hip roof onto a horizontal plane, it will appear as two triangles and two trapezoids.

A. True.

B. False.

3-4. If a hip roof has a slope of 6 inches per foot (hip slope factor = 1.5) and a hip run of 14 feet, the length of the hip in feet will be:

A. 15.

B. 21.

C. 22.

D. 28.

3-5. A gable roof with a slope of 9 inches per foot has a rake slope factor of 1.25. If the run is 10 feet and the eaves length is 30 feet. What is the roof area in square feet?

A. 300.

B. 450.

C. 750.

D. 800.

Test on-line @ www.certainteed.com/samtest

The Roof Deck and Tearing Off or Roofing Over 4

YOUR OBJECTIVE:
To understand (1) How building design, deck construction and deck materials affect the entire roofing system and the warranties on the roofing products, and
(2) To be able to recognize and predict deck-related problems.

Roof deck performance can have a strong affect on shingle performance. A bad deck can be a real headache. The causes for many of the complications that a problem deck creates can usually be traced back to the design of the building, the materials used to make the deck, or the way the deck was installed. CertainTeed suggests that you make it your business to learn how to properly install shingles over all the various types of decks discussed in this chapter. And, as your knowledge of the roofing business continues to grow, you'll eventually be in a good position to recognize when a serious roofing problem is in the making. If nothing else, when you see what you think may be a potential problem, be sure to bring it to the attention of your supervisor. By doing this, it's possible that you could save your employer from a lawsuit and the homeowner from a lot of future roofing system headaches.

WHAT IS A ROOF DECK?

The roof deck is the structural surface over which the roofing materials are applied. The roof deck should be a stable, smooth, solid surface which will permit the shingles to be securely fastened. The deck must be strong enough to:

- Support the roofing materials and workers.
- Safely resist impact loads, such as a pile of shingles.
- Hold uniform loads, such as heavy snow.
- Provide resistance to wind force.
- Anchor the nails.

All five of these capabilities must remain effective during the service life of each application of shingles that may be installed on the deck now and in the future.

If you apply a shingle roof over a deck surface that is unacceptable to the shingle manufacturer and damage results, the warranty might not be honored. The manufacturer will not take the responsibility for:

- Poor deck design that contributes to damage to the roofing system or other parts of the house.
- Defects or damage caused by materials used as a roofing base, over which the roofing shingles are applied.
- Damage to the shingles caused by settlement, distortion, failure, or cracking or delamination of the roof deck.
- Defects, damage or failure of shingles caused by applications that are not in strict adherence with the written instructions of the manufacturer.
- Application over wood that is not dry or which has hard projections, such as partially driven nails, which can cause damage to the shingles or underlayment applied above.

NOTE: When CertainTeed's SureStart PLUS warranty includes workmanship coverage, any and all defects, damage or failure of shingles caused by application of shingles over decks not in accordance with applicable building code or acceptable building practices or not in accordance with the written instructions of CertainTeed are excluded.

EXPANSION AND SEISMIC-CONTROL JOINTS

When applying shingles near a joint that is designed to move, the shingles must be isolated from the joint movement. One way to accomplish this is to build a curb tall enough to allow for the installation of wall flashing (base and counter flashing). Typically, expansion and seismic-control joints use a flexible rubber material like EPDM or neoprene to absorb the movement and remain waterproof. For more information on curbs and expansion joints, consult the SMACNA or NRCA manual.

ACCEPTABLE DECKS

HOW DO YOU KNOW WHEN YOU'RE APPLYING SHINGLES TO A DECK ACCEPTABLE TO THE SHINGLE MANUFACTURER?

CertainTeed has found that most exterior plywoods, non-veneer oriented-strand board (OSB), non-veneer wafer board, COM-PLY panels, and certain types of wood boards make acceptable deck surfaces. These materials have proven to be very effective over the years. They all perform well if they meet certain specifications, including minimum thickness requirements and if the deck manufacturer's application guidelines are followed.

Here's a Tip...

When installing or repairing a plywood deck, to set the APA recommended 1/8" gap between the panels, use eight-penny nails as temporary spacers. This will give you the 1/8" gap.

If decking has been installed with less than 1/8" spacing, this spacing can be created by cutting a 1/8" wide saw kerf down the center of each panel and re-nailing before applying the underlayment and shingles.

These decks are acceptable for direct application of asphalt shingles. Permission from CertainTeed is not required to use these types of deck materials if they meet the other standard requirements mentioned below.

PLYWOOD AND FRT (FIRE RETARDANT-TREATED) PLYWOOD

To be acceptable to CertainTeed, a plywood deck must be built with plywood that is at least 3/8" thick and supported by rafters spaced 16" or 24" on center. Thicker plywood will make a better deck. The plywood must have The Engineered Plywood Association (APA) stamp or equivalent of either "Exposure 1" or "Exterior."

Plywood panels should be installed with a 1/8" spacing between them or as specified by the manufacturer.

- Use shingle underlayment to ensure that the UL Solutions fire ratings are maintained.
- Fire Retardant Treated ("FRT") plywoods are treated with fire-retardant chemicals, and may be more heat and moisture sensitive than standard plywood. Therefore, if the deck is made from FRT plywood, it is especially important to follow the plywood manufacturer's instructions for ventilation requirements, shingle application requirements, and to keep the material dry at the job site. Heed any other special requirements the manufacturer may have for use with this material.

NON-VENEER ORIENTED-STRAND BOARD (OSB) AND NON-VENEER WAFER BOARD (WB)

For the non-veneer OSB/WB decks to be acceptable to CertainTeed, the panels must be at least 7/16" thick and supported by rafters spaced 16" to 24" on center. Naturally, a thicker panel is better. Look for products approved by the APA or an industry recognized agency.

The non-veneer OSB/WB panels should be installed with a 1/8" spacing between them. If you are installing these panels, remember they can be extremely dry when they leave the factory. The Engineered Wood Association recommends that you give the panels time to become "conditioned" by absorbing some moisture and expanding before installation. If they have not expanded or swelled to accommodate ambient humidity, buckling, "picture framing" ridging, or sagging may occur.

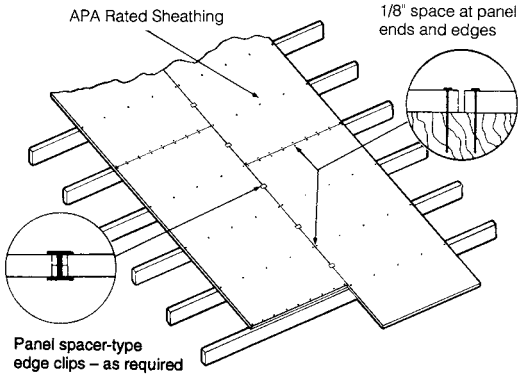


Figure 4-1: Proper installation of APA-rated sheathing for roof applications.

COM-PLY PANELS

COM-PLY panels are composite panels made of wood veneer on the face and back, with an inside core of compressed wood strands.

The COM-PLY panels must be at least 7/16" thick, supported by rafters spaced 16" to 24" on center, and have a minimum rating of "Exposure 1."

Just as with non-veneer panels, remember, COM-PLY panels are extremely dry when they leave the factory. It is best if they have had time to absorb some moisture, and adjust to local moisture conditions, before installation. If they have not adjusted, buckling, ridging and sagging may occur.

COM-PLY panels should be installed with 1/8" spacing, or as specified by the manufacturer.

WOOD BOARD DECK SHEATHING

- Wood boards must be a minimum of 1" thick (nominal thickness).
  - Wood board decks should have a maximum of 1/4" gap in between the boards; if spacing is 1/8" to 1/4", install a double layer of water-resistant underlayment such as CertainTeed's RoofRunner™ or DiamondDeck™ (or where appropriate, a waterproofing underlayment that meets ASTM D1970 such as CertainTeed's WinterGuard™ or VYCOR® series).
  - Take special care while installing the underlayment and shingles to ensure that the fasteners are not placed into the gaps, but still fall within CertainTeed's specified target fastening areas to ensure solid, adequate nail-holding power.
  - If the spacing is greater than 1/4", CertainTeed deems this as an unacceptable deck that requires the application of a layer of plywood or OSB panels over the existing wood board deck.
- Solid wood boards continuously expand and contract as humidity and moisture levels change. Boards wider than 6" may have large gaps between them and may move more than the shingles can

Here's a Tip...

Be sure to determine what type of decking or sheathing is in place when you're inspecting older homes prior to making a cost estimate. If you discover wide wood board decking that needs to be cut or covered over to avoid potential buckling problems, be sure to take this cost into account. Tell the prospective customer what you intend to do and why. This bit of information may help set your proposal apart from a competitor who overlooked this important consideration.

permit. The result can be unsightly buckling of the deck or shingles, or damage to shingles due to deck movement (cracking or splitting, for instance).

- Each board must be fastened with at least two 8d nails in each rafter.
- SPACED BOARDS: When applying an acceptable deck over spaced boards (i.e. purlins or lath boards), use minimum 3/8″ plywood or minimum 7/16″ non-veneer (OSB, WB) decking applied with the long dimension aligned vertically up the slope. This situation can arise when tearing off an old wood shake roof.

WIDE BOARDS MAY CAUSE SHINGLE BUCKLES

Years ago the use of 1x6, 1x8, 1x10, and 1x12 wood board decking was common in roof construction. If the wood board decking has a high moisture content, it may shrink, causing horizontal buckling of the shingles. Wood decking with a low moisture content may pick up moisture and expand, resulting in the same problem. Today, because of cost efficiency derived from using larger plywood panels, this practice has become nearly obsolete. However, when performing tear-off work, a contractor may encounter existing wood board decking.

What's a contractor supposed to do? To reduce the risk of shingle buckling, you can cover the boards with 4′ x 8′ nailable decking which could be plywood, OSB or COM-PLY, or cut through the center of the entire length of each wide board with a hand-held power saw, being careful not to cut into the rafter more than 1/8″. This will create a new joint in the center of each board, resulting in wood decking that is narrower than 6″. Fasten each side of the boards next to the new joint at every rafter using 8d nails.
NOTE: For wood board decks that are greater than 6″ nominal width, the roofing contractor and/or design professional must determine if the boards provide a smooth structural substrate upon which shingles can be applied (e.g., boards are not warped, buckled or rotted) and if the wood board deck meets local building code requirements. If the boards do not provide an acceptable substrate or meet building code, then either install an acceptable deck over the wood board deck or cut the boards in half lengthwise as described above. In some cases installing a power fan with a thermostat and humidistat can help minimize buckling. Now you're ready to go forward with the roofing job.

TIPS FOR REDUCING THE PROBLEM OF BUCKLED SHINGLES

Buckles in shingles are caused by the movement in the roof deck or the underlayment applied to it. Consider the following tips to reduce the likelihood of the appearance of buckles.

- Ventilate the attic properly. This reduces the amount of moisture absorption by deck panels and thereby reduces the amount of swelling and shrinking of the wood. It is this wood movement that causes much of the buckling. If the roof is over a cathedral ceiling, it may be necessary to add a ventilated deck over the existing deck. Consult with an expert regarding alternatives such as vapor retarders, insulating materials, and beneath-the-deck ventilation.
- If roof sheathing panels (plywood, OSB) will be stored at the site for a time before installation, place at least three stringers between each panel to allow them to acclimate to local humidity levels. Keep them off the ground. This reduces swelling after panels are installed. Panel swelling will produce buckles.
- Space deck panels 1/8″ apart on all sides when fastening them to the roof framing. Space nails 6″ on center along the panel ends. Always be sure the framing is properly aligned before fastening the roof panels.
- Cover the roof panels with underlayment as soon as possible after installation to keep the wood dry. Remove or repair wrinkled underlayment before applying shingles.
- Heavy duty shingle underlayment, if not manufactured to high standards, can be a cause of serious buckling. A high quality standard shingle underlayment manufactured to meet ASTM standards is superior, and less likely to seriously wrinkle.
- Apply heavier shingles and/or dimensional shingles. They will resist buckling or disguise its effects better than lightweight shingles.

WARRANTY ON UNVENTED, INSULATED DECKS AND RADIANT BARRIERS

CertainTeed's Asphalt Shingle Residential Products Limited Warranty, including SureStart™ coverage, will remain in force when its fiber glass asphalt shingles manufactured to meet ASTM D3462 are applied to roof deck assemblies having certain types of insulation installed beneath an approved roof deck (OSB, plywood, or 1″x wood board deck) or are applied to an approved roof deck having a "radiant barrier" installed beneath it. Roof slope must be no less than 2:12.

Insulated/Unventilated Decks
Acceptable forms of insulated decks include:

- Nail-Board Insulation (NBI) – Examples are rigid polyisocyanurate (ISO) or polystrene (PS) with the foam insulation factory-adhered to the underside of OSB or plywood.
- Rigid ISO or PS Foam Insulation – Installed over a solid deck and covered with an approved deck (OSB, plywood, etc.)
- Spray Polymer Foam (SPF) – Available in Closed-Cell and Open-Cell foams. Typically, SPF is sprayed directly to the underside of the deck (OSB, plywood, 1″x wood boards and rafters/trusses leaving no air space for ventilation(i.e., an unventilated condition).

Radiant Barriers

Acceptable roof deck surfaces must consist of either minimum 3/8″ thick plywood, minimum 7/16″ thick OSB, or 1″x wood board deck.

The design professional is responsible for ensuring 1) proper quality and application of the insulation and/or radiant barrier, 2) provision of adequate structural ventilation and/or vapor retarders as determined to be necessary, and 3) that all local codes are met (particularly taking into account local climate conditions).

Special attention must be taken if cellular foam, fiber-glass, or cellulose insulations, or other highly-permeable insulation will be used in an unventilated system, or if the insulation/rafter or

Here's a Tip...

Snow is an insulator. Thick snow cover increases heat accumulation below. This can lead to melting and then ice-dam formations at the eaves. The thicker the snow, the more airflow is needed to dilute and remove the heat to prevent ice dams.

insulation/joist planes may create an air leak that could lead to moisture transmission and condensation problems. All these important factors and decisions, while not the responsibility of CertainTeed, are critical to assure proper deck system performance.

CertainTeed shall not have any liability or responsibility under its warranty for a) Damage to or defects in its shingles caused by settlement, movement, distortion, deterioration, delamination, cracking, or other failure of the roof deck or of the materials used as a roofing base over which its shingles are applied, b) Damage caused by the growth of mold or mildew, or c) Defects, damage, or failure caused by application of its shingles not in strict adherence with CertainTeed's written instructions.

INADEQUATELY VENTILATED AND NON-VENTILATED DECKS

Any shingles applied to an inadequately ventilated or non-ventilated decks, other than the shingles and deck systems described in the section titled "Insulated Decks and Radiant Barriers", are subject to a reduced limited warranty period of ten (10) years and do not qualify for SureStart protection. SureStart protection and the Warranty Period applicable to the shingle are available if the shingle damage was caused exclusively by a defect that is unrelated to the inadequate roof system ventilation (see Asphalt Shingle Residential Products Limited Warranty for details).

VENTILATED NAIL-BASE ROOF INSULATION

Ventilated Nail-Base Roof Insulation products consist of rigid insulation (typically foam board) and some sort of material to provide air space above the insulation and below a nailable deck (which is typically minimum 7/16" thick OSB or minimum 3/8" plywood). These products can be a satisfactory way to provide soffit-to-ridge ventilation over cathedral-type ceilings, and their proper use will allow CertainTeed's Asphalt Shingle Residential Products Limited Warranty to be unreduced. It is important to follow the deck manufacturer's instructions and ensure that sufficient ventilation is achieved. CertainTeed offers FlintBoard™ CV — cross-ventilating insulation boards with 1", 1-1/2" and 2" air channels.

VENTILATION SPACING

CertainTeed defines unventilated, insulated decks as those lacking sufficient ventilation between the underside of the deck and the insulation. Ventilation spaces of less than 3/4" are considered underventilated. Manufactured ventilated deck composites with 3/4" spacing appears to be adequate on slopes of 6/12 and higher. We recommend that space should be at least 3/4" in most cases. On slopes below 4/12 and areas that commonly experience snow loads of 12" and more should maximize ventilation space – 31/2" of clearance is not too much. It is important to seek the recommendations of a design engineer when unusual conditions exist.

A good rule is to use a minimum of 9 square inches Net Free Ventilation Area per foot of run, which calculates to about 3/4" space. More ventilation space is almost always better, especially at low slopes and long rafter lengths. (also see figure 4-3).

"PERMISSION-REQUIRED" DECKS

DECKS THAT REQUIRE CONSENT FROM CERTAINTEED BEFORE THE SHINGLES ARE APPLIED

Certain other types of materials used for roofing decks are acceptable to CertainTeed, but it is required that the building designer or contractor first contact CertainTeed's Roofing Technical Services Department and receive permission, **in writing**, to use them.

DECKS THAT REQUIRE SPECIAL APPLICATION PROCEDURES

Reviewing the installation specifications for these decks before granting permission to use them gives CertainTeed the opportunity to tell the roofer or designer that special application instructions available from the deck manufacturer should be considered, or to supply CertainTeed's supplementary application instructions regarding the need for ventilation, vapor retarders, special fasteners, and so on.

Call CertainTeed if you intend to use either of the materials listed below. They require some type of special shingle application, defined by the deck manufacturer. When the deck manufacturer's application method is followed, the application of CertainTeed shingles is permitted.

LOADMASTER®

Nailable Double Board Assembly: A trademarked roof decking composed of a double layer of "mineral board," placed over a rigid insulation board (optional), and fastened to a steel deck. If rigid insulation board is used, contact CertainTeed regarding the shingle warranty duration. It is satisfactory for shingle application when installed according to Loadmaster's instructions and when the shingles are fastened with 1-3/8" EG "Hardened Do-All Loc Nails." 1-3/4" EG "Hardened Do-All Loc Nails" are required for Grand Manor®, or Carriage House® applications.

HOMASOTE®

Roofing Decking: This is a high density wood fiberboard. It is acceptable to CertainTeed only when installed according to Homasote's instructions and when the shingles are fastened with Homasote #2125 nails. These nails have a 3/8" head, an annular thread, and are galvanized.

Here's a Tip...

Strike vertical lines to correct out-of-square decks or crooked rakes. (Thanks for this tip goes to Bernard Bower of Leopold, Indiana.)

UNACCEPTABLE DECKS

DECKS THAT REQUIRE THE ADDITION OF AN ACCEPTABLE NAILABLE SURFACE

The materials listed in this section are not acceptable for use as a roof deck for direct application of CertainTeed's roofing products. These surfaces must be covered with an acceptable decking material, with ventilation as required, prior to the application of CertainTeed shingles. All of the following products are not likely to provide a proper surface for fasteners to hold and seal properly for the warranted life of the shingle. Direct shingle application can lead to over-driven or under-driven fasteners. Over-driven fasteners can damage the shingle, increasing the chances of wind blow-off and leakage due to wind-driven rain or ice-dam backup. The heads of under-driven fasteners, or of those that back out, may prevent shingles from sealing, reduce the wind blow-off resistance, and puncture the shingle tabs above, leading to leaks. Also, fasteners will not consistently seal and may leak if water reaches fasteners due to an ice dam or wind-driven rain.

Cementitious Wood Fiber: This material is made of shredded wood (excelsior) bonded with portland cement or magnesium oxychloride cement and formed into boards without a nailable surface.

Gypsum: This deck material is made of either poured-in-place gypsum or of gypsum planks, reinforced with wire mesh cast, in a tongue-and-groove frame.

LightWeight Concrete: This is composed of portland cement and either expanded vermiculite or expanded perlite mixed with water, and smoothed to desired thickness over a base of vented steel decking.

Insulation Boards: Rigid insulation products like Urethane, Isocyanurate, Polystyrene, Fiber Glass, and Phenolic Foam Boards; Perlite Board, Fiber Boards, and Fiber Glass Boards.

Decking Over an Unacceptable Deck: The proper installation of an acceptable deck material over top of the unacceptable material described above is required to achieve an acceptable roof deck surface onto which CertainTeed roofing shingles may be applied. Fastening of the acceptable deck should be done in accordance with instructions provided by the manufacturer of the deck into which fasteners will be driven. (see figure 4-2)

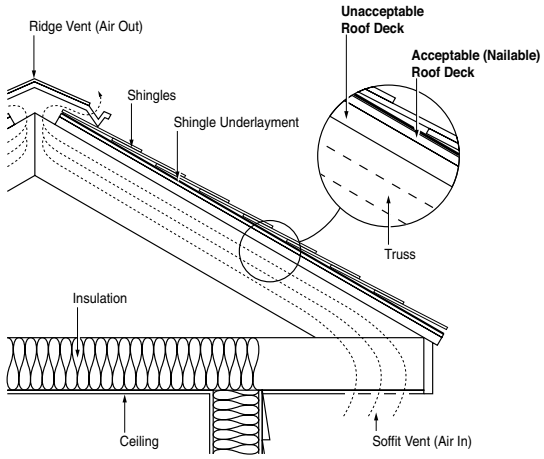


Figure 4-2: An acceptable deck applied over an unacceptable deck.

Figures 4-2 and 4-3 are construction schematics depicting examples of roofing systems that provide for isolation of the materials deemed "unacceptable" for direct shingle application and that are designed to provide an adequate surface to apply the shingles.

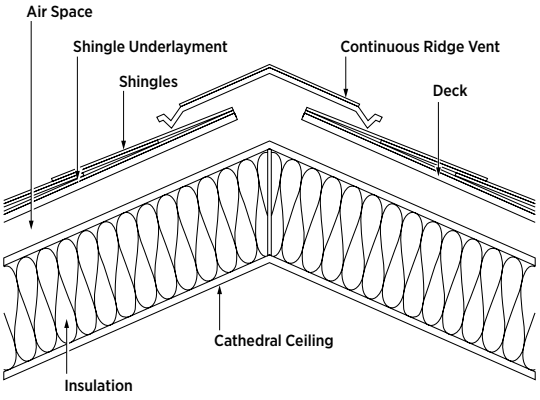


Figure 4-3: Preferred application method for a cathedral ceiling.

Figure 4-2 illustrates an application method where an acceptable deck is applied over an unacceptable deck which is properly ventilated beneath. Figure 4-3 illustrates a preferred application method for a cathedral ceiling, incorporating a soffit-to-ridge ventilation space beneath the top nailable deck and above the insulation of an "unacceptable" deck.

These system schematics do not contain all the necessary provisions for ventilation, vapor retarders, deck fastening, etc., but these features are important and should be considered by a design professional.

For Permission-Required decks and other information, call CertainTeed's Roofing Technical Service department at 800-345-1145.

Here's a Tip...

When tearing off shingles, use a leaf blower to remove loose debris (loose granules, dirt, etc.) from the roof. (Thanks to Erick Green from Virginia Beach, VA.)

EFFECTS OF ROOF SLOPE ON APPLICATION AND MATERIAL SPECIFICATIONS

LOW SLOPE (BELOW 4/12 TO A MINIMUM OF 2/12)

Because water drains slowly from these slopes, there is a greater chance of water back-up and damage from ice-dams. The application instructions for each CertainTeed roofing product indicate the minimum slope below which the product must not be applied, and a range of slopes where "low slope" application instructions must be followed. These instructions call for the use of a waterproofing shingle underlayment, such as CertainTeed WinterGuard® or VYCOR® Series, or it's equivalent. Refer to the chapter on underlayments for more details. However, careful consideration of local weather and the use of a waterproofing shingle underlayment meeting ASTM D1970 are thought to be a good practice and recommended by CertainTeed. Follow the application instructions for the particular shingle. Note the special low slope application requirements for the products below:

- Landmark TL and Presidential TL shingles: Low slope application requires a layer of WinterGuard or VYCOR® Waterproofing Shingle Underlayment or an equivalent product over the entire roof deck. A **double layer of asphalt felt or synthetic underlayment is not an acceptable alternative** when applying these products.

STEEP SLOPE (EXCEEDING 21/12)

Roofing applications on steep slopes create some areas of risk that must be handled. Steep slopes tend to reduce the effectiveness of the factory-applied self-sealing adhesive (sealant), which could lead to shingle blow-off. In addition, shingles or their laminated tabs may slip out of place. Immediately following the application of roofing shingles on steep slopes, cement each tab in place with asphalt roofing cement meeting ASTM D4586 Type II.

Refer to the chapter on fastening and the application instructions for the particular shingle. Note that some types of shingles require extra fasteners for steep slope application.

INSPECTING THE ROOF

A thorough inspection of the roof to determine whether the roofing must be removed before applying new roofing should include the following:

1. Check the condition of the rafters and sheathing in the space under the roof. If the rafters are sagging or if the sheathing is sagging between the rafters, the roofing must be removed and the conditions repaired before new roofing is applied.
2. Check for evidence of leakage into the area under the roof, such as patches of dry rot or fungus, or the presence of carpenter ants. If signs of rotting or moisture are widespread, it is best to remove the roofing and repair any damage before re-roofing.
3. Check the condition of the shingle roofing itself. Replace old roofing if it is severely deteriorated or damaged to the extent that the new roofing applied to it would have its appearance or performance negatively affected. However, there are many cases where new shingles can be successfully applied over old shingles.
4. If the old roof consists of architectural, lock-type, dutch lap or wood shingles other than sawn square-butt style, remove the existing roofing, repair decking and/or install new decking.
5. Check whether there is already a second roofing layer on the deck. Building codes in some localities do not permit a third layer of roofing.

NOTE: CertainTeed shall not have any liability or responsibility under its warranty for a) Damage to or defects in its shingles caused by settlement, movement, distortion, deterioration, delamination, cracking, or other failure of the roof deck or of the materials used as a roofing base over which its shingles are applied, b) Damage caused by the growth of mold or mildew, or c) Defects, damage, or failure caused by application of its shingles not in strict adherence with CertainTeed's written instructions.

ROOF-OVER INSTALLATIONS MAY BE CONSIDERED WHEN:

1. No more than one layer of shingles (not including a layer of sawn, square butt wood shingles if local codes approve this as a substitute roof deck) are in place on the existing roof.
2. After careful inspection, the roof deck is found to be strong and will provide a good nailing base.
3. The combined weight of the first and to be installed second layers of shingles will not exceed the rated carrying capacity of the deck.
4. The contractor is certain all roof system components, especially flashing and valleys, can be properly repaired or adapted to the roof-over installation.
5. Manufacturer's instructions do not prohibit roof-over installations.

NOTE: The Integrity Roof System™ requires tear-off.

WHEN ROOFING OVER EXISTING SHINGLES

If old roofing will not be torn off, check local building codes for the maximum number of roofing layers allowed and maximum weight per unit area. Check the underlying deck to be sure it is sound and will provide good anchorage for nails. Here are the requirements for specific types of shingles:

- Shingles weighing more than 350 lb/square: If the old roof consists of two or more layers of standard-weight shingles or one layer of heavyweight shingles, it is required to tear off existing roofing, repair decking and/or install new decking.
- Other asphalt roofing shingles (except lock-type or dutch lap): Make the old roofing surface as smooth as possible by replacing missing shingles, and splitting, nailing flat and securing all buckles, raised tabs, and curled shingles. It is recommended to cut old shingles back flush to the rakes and eaves. Another recommendation is to apply corrosion-resistant drip edge along the rakes and eaves to cover the edges of the old shingles. Use no underlayment over the old roof, and apply roofing in accordance with product application instructions.
- Square-butt, sawn-wood shingles: Apply beveled wood strips to all courses to obtain an even base.
- Lock-type, dutch lap or wood shingles (other than sawn square-butt style): Remove the existing roofing, and follow tear-off instructions.

PREPARING THE ROOF AND SURROUNDING AREAS FOR TEAR-OFF

Before the first shingle is removed, it is important to protect the building and surrounding areas from damage and dirt that can result from tear-offs. It is also necessary to prepare safe, convenient access to the roof and ensure a safe working environment on the roof. These preliminary tasks include:

1. Protect the windows, doorways, surrounding grounds and shrubbery with tarps or with temporary protective structures. If possible, attach a large tarp that covers the entire side of the structure from the roof to the ground.
2. Have extra tarps or rolls of roofing felt ready to cover exposed areas of the roof deck in case of sudden rainstorms.
3. Cover the entire contents inside the attic area under the roof with plastic or tarps to collect dirt and debris that will fall through openings in the roof deck.
4. Locate a dumpster or prepare a place where roofing debris can be safely and conveniently contained before it is hauled away. Cover the debris each night during the course of the job. Cordon off the trash area and place signs prohibiting entry due to possible harm from sharp and heavy materials.
5. Prepare staging between the ground and the roof, or set planks on ladder brackets.
6. Research indicates that securing the tops of ladders prevents accidents. Figures 1-1 and 1-2 show one good way to do this. To learn about ladder safety see Chapter 1, "Safety First."
7. Planks supported by metal roof brackets, nailed to the rafters every 6′ up the roof, are useful on any sloped roof and are a necessary safety feature for steep slopes.
8. Take care to be in compliance with current OSHA safety standards. (See OSHA regulations in Chapter 1.)

TEARING OFF THE ROOFING

SAFETY: Special attention should be given to avoiding injury. For example:

1. Workers on the roof should use rubber-soled footwear that reduces the possibility of slipping, avoid stepping on debris that might slide out from under them, and use fall protection.
2. Workers on the ground should wear hard hats, eye protection, and boots with thick soles and steel toes.
3. Workers involved in any part of the tear-off project should wear gloves.
4. Besides moving debris out of the way promptly, sweep or use a blower to remove loose shingle granules from the work area to avoid creating slippery surfaces.
5. Build perimeter barriers at the eaves to prevent material from becoming a danger to individuals and property below.

ORGANIZATION: Starting at the peak of the roof and working down toward the eaves, the actual tear-off operation consists of three separate tasks that occur more or less simultaneously:

1. Ripping up the shingles.
2. Moving debris out of the path of the rippers and off the roof.
3. Putting debris in a dumpster or a safe accumulation area. If there are four people involved in the operation, an efficient division of labor is to have two rippers; one person below them on the roof moves debris out of the way and off the roof, and one person on the ground puts debris in the dumpster, being ever alert for falling objects.

Here are some Tips...

If a roof is out of square at the ridge, hold tape at an angle when measuring the short side and snapping chalk lines. This helps recover when the ridge is not parallel with the eaves. (Thanks to Ken Ronchie from N. Kingstown, RI.)

Always cover the top of the plumbing vents when tearing-off (use a tin can with holes or even your hat!.) It only takes one disk or piece of felt to disrupt your customer's plumbing. (Thanks to Greg Hansen from Lincoln, NE.)

RIPPING: The actual ripping and tearing is pretty straightforward once an area of the deck is exposed. Here are some suggestions:

1. To avoid working with many small clumps of material, push the shingle ripper under as many layers as possible and try to spring the nails loose.
2. Work with sections about three feet square for greatest safety and efficiency. Be careful not to pull up too much of the roofing at once, because it is unsafe to move large sections off the roof.

FLASHING: Problem areas involving damaged sheathing and where damage can be caused during the ripping process are often found near flashing around chimneys, vents, skylights, roof-to-wall joints, valleys, etc. It is best to use a pry bar and hammer to remove shingles from these areas. Here are more tips for dealing with these problem areas:

1. Chisel away old roofing cement (e.g., around chimneys) and bend up the counter flashing, being careful not to damage it if it's to be reused.
2. At walls and skylights, it might be possible to save the counter flashing if it is in good condition. Just pry up the edges and clean under it. The new roof can often be installed above and below it. However, keep in mind that reused flashing should last for the life of the new shingle roof.
3. Even though valley flashing may appear to be sound, plan to remove and replace it. Small cracks in old valley flashing are hard to detect, and it is not worth risking a possible leak because of it.
4. Waterproofing Shingle Underlayment (WSU) cannot be removed. It adheres permanently to the roof decking. Under some circumstances, it can be covered by new WSU. In other cases, the decking will need to be replaced.

NOTE: WSU product compatibility should be reviewed prior to determining if existing WSU can be covered with new or if WSU covered decking replacement is required.

CLEANUP: When the sheathing is exposed and most of the debris is stowed in the dumpster or in a safe place ready to be hauled away, it's time to clean up as follows:

1. Use a blower or sweep the roof deck.
2. Pull up or pound in all remaining nails.
3. Clean out all gutters. Aluminum gutters might buckle under the load of debris.
4. Rake the yard and the bushes, and sweep the driveway.
5. Use a rolling magnetic bar to pick up stray nails.
6. Leave the attic plastic sheet in place to catch additional debris if removal or repair has not been completed.

SECTION 4 SELF-TEST

4-1. CertainTeed requires that the minimum thickness for a plywood deck be 1/2" and an OSB deck be 7/16".

A. True.

B. False.

4-2. Ventilated nail-base roof insulation can be used over cathedral-type ceilings.

A. True.

B. False.

4-3. CertainTeed allows the application of a nailable deck over an unacceptable deck.

A. True.

B. False.

4-4. The slope of a deck effects the materials specified for the roof.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Shingle Underlayments 5

YOUR OBJECTIVE:
To learn the differences between the various underlayments available.
(1) To learn when a particular type of underlayment is the best choice for a particular situation,
(2) Learn how to correctly install the different types of underlayments.

There are two major types of shingle underlayment: water-resistant and waterproofing. Within these types are many variations both between brands and within brands.

UNDERLAYMENT SPECIFICATIONS

WATER RESISTANT UNDERLAYMENT

Two common grades of water resistant shingle underlayment are available; #15, also known as standard shingle underlayment, and #30, also known as heavy duty shingle underlayment. However, within those grades there are many choices. For example, among standard shingle underlayment (#15), the following can be found:

- Unrated shingle underlayment. Generally the lowest priced and having the most unpredictable levels of asphalt saturation. Quality may vary from batch to batch.
- ASTM D4869 (Type 1). All ASTM rated materials should be superior to "unrated" underlayment. However, an ASTM rating is not enforced by any independent organization. This rating is the "standard" specification for asphalt saturated organic felt shingle underlayment used in roofing." It covers standard #15 shingle underlayment, also known as "Type 15" or "Type 1." Because of a higher saturation level this product can be subject to serious wrinkling.
- ASTM D6757 Shingle Underlayment. This underlayment is an organic felt reinforced with fiber glass fibers and saturated with asphalt. Generally, they demonstrate a higher resistance to tearing than any other #15 type underlayment and are very resistant to wrinkling. They typically carry a UL classification, meet the ASTM D6757 standards and all performance requirements of ASTM D4869 and ASTM D226.

There is also a wide selection among heavy duty underlayment products:

- Unrated Heavy Duty shingle underlayment (#30). These heavy duty products are built using a heavier weight of organic felt; however, as mentioned above, unrated products are subject to wide variation in saturation. Under-saturated underlayments are subject to severe wrinkling. Under-saturated #30 underlayment has been known to wrinkle even after shingles are installed, telegraphing the wrinkles through the installed shingles after the job is finished.
- ASTM D4869 (Type II). A more predictable quality of heavy duty underlayment, much more resistant to wrinkling.
- ASTM D226 (Non-perforated). This is a heavier felt normally used in built-up roofing systems. These felts have a greater asphalt content and exhibit superior strength and resistance to wrinkling.
- Synthetic underlayment. There are a variety of these underlayments made from different synthetic components. All are light-weight and claim superior resistance to tearing and wrinkling. Most of these underlayments carry one or more performance or approval ratings (i.e. meets one or more of the ASTM performance standards above, or has one or more industry recognized code-body approval).
  - **DiamondDeck®** is a synthetic, scrim-reinforced, water-resistant underlayment that can be used beneath shingle, shake, metal or slate roofing.
  - **RoofRunner™** is a lightweight synthetic polymer-based water-resistant underlayment for use beneath asphalt shingles.
  - **RoofRunner® AIR** is a breathable synthetic roof underlayment with a multilayer coated structure that promotes rapid roof deck drying for use beneath asphalt shingles.

All 3 synthetics listed above have exceptional dimensional stability compared to standard felt underlayment and special top surface treatment that provides excellent slip resistance, even when wet.

WATERPROOFING SHINGLE UNDERLAYMENT

Waterproofing Shingle Underlayment (WSU) is a very different kind of material. It is used in vulnerable locations on the roof deck that are most likely to leak during storms with high winds or when ice dams develop. Along the eaves, around roof penetrations and in the valleys are just some of the areas most likely to require waterproofing shingle underlayment.

CertainTeed's fully-adhered product offerings in this category include WinterGuard series and VYCOR® series.

- **WinterGuard® Sand/ Granular**: A composite material of asphalt polymers, formed into a rolled sheet. It seals around nails driven through it while retaining excellent elasticity. Available in sand or granular top surfaces to provide traction during installation.
- **WinterGuard® PRO**: An advanced film surfaced waterproofing underlayment specifically formulated to resist high roof temperatures under metal roofs. It seals around nails, delivering top-notch performance.
- **VYCOR® SELECT™ ("Select"), VYCOR® ICE & WATER SHIELD® ("Ice & Water Shield") and VYCOR® ICE & WATER SHIELD HT ("Ice & Water Shield HT")**: Film surfaced with anti-skid coating treated with the industry's best performing waterproofing adhesive.
- **VYCOR® ULTRA™ ("Ultra")**: Butyl adhesive. Compatible with EPDM and TPO. In-service temperature up to 300F.

WHEN UNDERLAYMENTS ARE REQUIRED

The installation of water-resistant underlayment beneath shingles is required by many shingle manufacturers. Generally, CertainTeed recommends that underlayment be installed but does not require it except as noted below.

Low Slope: All roof shingles applied to a low slope deck (2″ to below 4″ per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the product packaging and individual shingle application instructions for details.

IMPORTANT: Because water drains slowly from these slopes and the Pacific Northwest region is known for its above average annual precipitation, there is a greater chance of water back-up. Therefore, after careful consideration of local weather and the application of Landmark™ Series shingles on a low slope, CertainTeed is requiring a layer of either WinterGuard, Select, Ice & Water Shield, Ice & Water Shield HT or ULTRA over the entire roof deck. A double layer of asphalt felt underlayment or synthetic underlayment is not an acceptable alternative when applying these products in the Pacific Northwest region on low slopes. For added protection, CertainTeed recommends doubling the end and side laps.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR® include:

1) waterproofing shingle underlayments meeting ASTM D1970;

2) in areas not prone to snow or ice, two layers of CertainTeed DiamondDeck® or RoofRunner™ in shingle fashion (half lap) per the low-slope application instructions.

3) in areas not prone to snow or ice, two layers of 36″ (915 mm) wide felt shingle underlayment lapped 19″ (485 mm).

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I (except when applying LandMark® TL or Presidential® TL Shake shingles).

Note the special low slope application requirements for the products below:

- Landmark® TL and Presidential® TL shingles: Low slope application requires a layer of WinterGuard or VYCOR® or an equivalent product over the entire roof deck. A **double layer of asphalt felt underlayment is not an acceptable alternative** when applying these products.

Cold Weather Climates (all slopes): Application of CertainTeed Waterproofing Shingle Underlayment or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

Valley Flashing: Line valley by centering 36″ (915 mm) wide CertainTeed Waterproofing Shingle Underlayment, or equivalent,*** in the valley and applying directly to deck. Consult the Waterproofing Shingle Underlayment and individual shingle application instructions for details.

*** For valley liner, the equivalents to WinterGuard and VYCOR® include:

1) waterproofing shingle underlayments meeting ASTM D1970;

2) one layer of 50 lb. or heavier asphalt coated roll roofing;

3) one layer of mineral-surfaced roll roofing;

4) two layers of 36″ (915 mm) wide felt shingle underlayment.

5) in areas not prone to snow or ice, a synthetic water-resistant underlayment lapped at 20″ and extending through the valley by at least 36″. (Coated roll roofing should meet ASTM D224; shingle underlayment should meet ASTM D6757, ASTM D4869 or ASTM D226.)

REQUIREMENTS BY UL SOLUTIONS (UL) FOR FIRE-RATED PREPARED ROOFING

- UL classified underlayment is required under Class A fire-resistant shingles when plywood or non-veneer (OSB, WB, etc.) APA sheathing is at least 3/8″ thick but less than 15/32″.
- When sheathing thicker than 15/32″ is used under fiber glass-type shingles, shingle underlayment is not required for a UL Class A fire rating.

WATER-RESISTANT UNDERLAYMENTS

Water resistant underlayment is a product that consists of organic felt impregnated with asphalt saturant. Some water-resistant underlayments also contain a fiber glass reinforcement which increases tear strength and reduces wrinkling.

There are a variety of these underlayments made from different synthetic components. All are light-weight and claim superior resistance to tearing and wrinkling.

Water-resistant underlayment was originally invented to keep the roof decking dry until shingles could be applied. Applying this underlayment was originally called "drying-in the roof." It was also useful as a separation sheet between the roof sheathing boards (before OSB and plywood sheets were used as roof decking) and the pine planks because resin pockets in the pine planks caused the asphalt to degrade prematurely unless the underlayment separated the resin and asphalt from each other.

Water-resistant underlayment is made to shed most of the water that falls on it unless it is torn or punctured. Its ability to be water-resistant is temporary. As the sun degrades the exposed asphalt, the materials begin to dry, absorb more moisture, lose its strength and eventually begin to tear. The less asphalt used to saturate the underlayment sheet during manufacturing, the shorter its life. Since asphalt is the most expensive component of shingle underlayment, lower priced materials will have less asphalt and a shorter life when exposed to the sun. Lower priced shingle underlayment, for the same reason, is also subject to severe wrinkling when it gets wet or even just damp.

Underlayment is used under asphalt shingles for a variety of reasons, such as providing:

- Backup for water-shedding protection of the deck if shingles fail from wind-driven rain. The lower the slope, the more important underlayment is, since water flows more easily under shingles on low slopes.
- A protective barrier to the elements between the time the old shingles have been torn off and prior to the new shingle being applied. However, the underlayment should not be relied on as a temporary roof system, especially when the drip edge flashing is not yet in place. It is unlikely to prevent leaking in the event of heavy wind and rain.

- An agent to hide minor imperfections of the decking material and reduce "picture framing" of deck panels.
- Fire ratings (Class A) when used in conjunction with shingles.

INSTALLATION GUIDELINES FOR WATER-RESISTANT UNDERLAYMENTS

The following is a general guide for the installation of water-resistant shingle underlayment. These guidelines can be used regardless of the weight of the underlayment. However, always be sure to consider the local codes.

OVERNIGHT EXPOSURE

If underlayment has been exposed overnight, moisture from dew should be allowed to completely dry before shingling over. If this does not happen, the moisture will become trapped beneath the shingles. Wrinkling can telegraph through the shingle and make a good shingle job look terrible. The worst part is that the job can look good when you leave in the evening but the wrinkles can reappear the next morning when the homeowner will notice them.

While we have discussed underlayment being exposed overnight, it is suggested that whenever possible the roofing contractor only tear off what can be shingled over that same day. This prevents the most common underlayment installation problems.

APPLYING UNDERLAYMENT BETWEEN SHINGLE LAYERS

CertainTeed advises against applying underlayment over existing roofing. The underlayment may cover or create soft areas in the roof surface. These soft spots can cause shingle fasteners to be under- or over-driven, thereby weakening the shingle hold-down strength (potential blow-offs) or tearing holes in the shingles that can allow water intrusion (potential leaks). Underlayment applied over existing roofing interferes with the ability to nest the new shingles into the old. Nesting is an accepted and time-proven method of applying same-size new shingles over old ones.

So, if the old shingles are to be left in place and the new shingles can be nested into the old, then no additional underlayment is required. There are some who believe that the introduction of an additional vapor retarder between the roofing layers can cause moisture collection and deterioration.

FASTENER TYPE

CertainTeed recommends using nails rather than staples. Nails provide more resistance against underlayment tear out. It is very important, whether hand nailing or using a pneumatic gun, that the fasteners be driven flush.

INSTALLATION METHOD:

When applying underlayment the key is to keep the product as wrinkle free as possible.

1. Unroll the underlayment parallel with the eaves. The eaves edge of the underlayment should go over the drip edge eaves flashing, but go under the drip edge flashing along the rake.
2. Around the perimeter of the underlayment, place the nails approximately 6 inches apart and about 1 inch in from the edge. In the main area of the underlayment, two rows of nails are used. The first is placed 12″ up from the bottom edge and the second is 24″ from that same edge (or in fact 12″ from the upper edge). This nicely separates the 36″ wide underlayment sheet into thirds. Nail along these two rows 12-15″ apart. Nail placement should be alternated so that one row places the nail opposite the open area of the first, creating a sort of zigzag pattern. This will result in a simple pattern with all nails being approximately 12-15″ apart. (See tips above.)

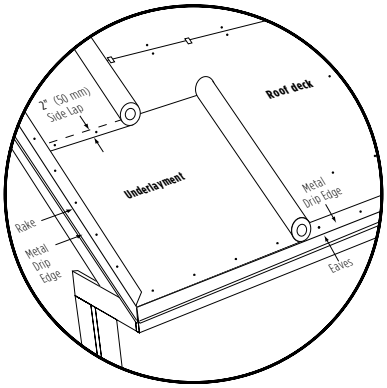


Figure 5-1: Applying Water-Resistant Underlayment Along The Eaves And Rake

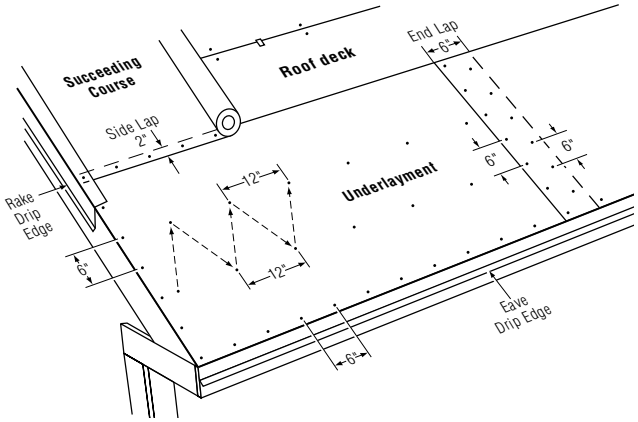


Figure 5-2: Standard Nailing Pattern For Water-Resistant Underlayment

3. Succeeding courses should be unrolled in a similar manner overlapping the previous course by 2″. Be careful to roll it out straight as the underlayment will tend to slide down the pitch of the roof and end up crooked. The spacing of nails in this overlap area should be approximately 6″ apart, centered in the 2″ area. (See tips below.)
4. If the length of the roll is not sufficient to complete the entire run, an end lap of 6″ is required. We recommend two rows of nails 6″ apart to hold the lapped edges in place. End laps should be located 6-8′ from any other end lap that may be in the preceding underlayment course.
5. Apply underlayment a minimum of 6″ over hips and ridges, approximately 4″ over valley liners and up 4″ or more where the roof meets a vertical surface.

WARNING

When installing underlayment where hot vent stacks protrude (from wood burning stoves etc.), it is important to allow a minimum 2″ clearance. Local fire codes should be reviewed to ensure compliance.

High Wind / Overnight Recommendations:

If planning to leave water-resistant underlayment exposed overnight, or for a longer period of time, or if high winds are expected, any of the following suggestions or a combination of them can be used for additional protection:

- Use cap nails or tin caps.
- Decrease the nailing spacing recommended above, using additional fasteners.
- Nail 2x4 stringers across lap areas.

DEALING WITH WRINKLES AND BUCKLES

Organic felts expand when wet. They can wrinkle after being applied to a wet deck or if moisture is absorbed from dew, rain, or snow. If shingles are applied over an uneven underlayment surface, some of the wrinkles may "telegraph" (show) through on the finished roof. Of course, wrinkles and buckles can also result from incorrect installation.

If these problems appear, several approaches are available to eliminate them. First, the underlayment can be replaced. Second, the wrinkles can be cut and repaired with patches and asphalt plastic cement. Third, wet and wrinkled underlayment can be allowed to dry out naturally from exposure to the sun. As the underlayment dries, the wrinkles often "pull down" and disappear.

The best solution for wrinkled underlayment is prevention. Applying a high quality underlayment will eliminate many wrinkling type problems. Ask your supplier for the highest quality. Do not assume the underlayment in stock is the best available. Be willing to pay more for a superior product. The cost of high quality underlayment adds very little to the cost of a job and can often be offset by the savings from reduced rework and repair. Installers who insist on the lowest prices for underlayment are the cause of the low quality underlayment generally found in supplier warehouses.

DiamondDeck® INSTALLATION METHOD:

Apply DiamondDeck® only to a clean, smooth nailable deck. DiamondDeck acts like a vapor retarder; therefore, CertainTeed strongly recommends that it be installed over adequately ventilated attic spaces. Application method is dependent on roof slope, anticipated exposure time, anticipated wind speeds, and climate. If the roof is in a climate where ice damming may occur, then first apply an ASTM D1970 or AC48-compliant underlayment such as CertainTeed's WinterGuard® or VYCOR® Waterproofing Shingle Underlayment to all eaves.

Do not install DiamondDeck as ice dam protection along eaves. Two layers of DiamondDeck cemented together is not an equivalent to WinterGuard or VYCOR.

- **Standard Slope Roofs (4:12 or Greater):** Starting at the lower edge of the roof, apply DiamondDeck horizontally (parallel to the eave) with printed side facing up. When necessary, overlap vertical side/end joints a minimum 6″ and "weather lap" horizontal joints a minimum 3″. Offset end laps from course to course at least 36″. Fasten as described below.
- **Low Slope Roofs (2:12 to <4:12):** Starting at the lower edge of the roof, apply DiamondDeck horizontally (parallel to the eave) with printed side facing up. Apply two layers (double coverage) of DiamondDeck in "shingle fashion" as follows:
  - Install a full 25.5″ starter strip along the eaves
  - Install a full 48″ wide sheet over the starter strip
  - Apply each succeeding 48″ wide course up the roof overlapping each previous course a maximum of 22.5″ exposure (or 25.5″ overlap) in traditional "half-lap" installation or in "shingle fashion".
  - Overlap 12″ at all end lap seams and offset from adjacent end laps by 36″ minimum. Fasten as described below.

Fastening (all slopes): DO NOT USE STAPLES!

- When the finished roofing will be installed within two days of underlayment application and high winds are not forecast, standard roofing nails with 3/8″ diameter heads may be used. Attach the underlayment at each diamond (◆) printed on the underlayment by nailing a fastener through each diamond (◆) and tight to the surface. Proper fastener spacing is 15″ On-Center (O.C.) vertically and 12″ O.C. horizontally. On vertical side/end laps install 8 fasteners equally spaced (6″ O.C.) centered up the lap to hold the underlayment in place. If wind or rain is expected prior to finished roofing application, it is recommended that 1″ diameter plastic or steel cap nails be used in place of standard roofing nails, as described below.
- When the finished roofing will be installed later than two days, CertainTeed strongly recommends using low-profile plastic or steel cap nails with 1″ diameter heads to fasten DiamondDeck in place. Attach the underlayment at each diamond (◆) printed on the underlayment by nailing a fastener through each diamond (◆) and tight to the surface. Proper fastener spacing is 15″ O.C. vertically and 12″ O.C. horizontally. On vertical side/end laps install 8 fasteners equally spaced (6″ O.C.) centered up the lap to hold the underlayment in place. All nails and plastic or steel caps must lie flat and tight with the underlayment surface.

Exposure Limitations

DiamondDeck® is not designed to be permanently exposed to sunlight and weather or used as a waterproofing underlayment. DiamondDeck is tested for UV resistance for up to 6 months; do not expose it for more than 6 months prior to installing finished roofing.

Note: ...

The plastic release film on WinterGuard and VYCOR is slippery. Avoid stepping on the release film after it has been removed, or on the product itself when the release film is still attached.

Here's a Tip...

In addition to being used for ice-dam protection and valley liners, it is good practice to use WinterGuard® or VYCOR® to seal around pipes, skylights, chimneys, sidewalls, dormers, roof transitions and other roof areas vulnerable to leaks.

Lap Sealing
Where laps or joints require sealant or adhesive, use a high quality asphalt roofing cement meeting ASTM D4586 Type II or cements/caulks based on butyl rubber or urethane. It is particularly important to seal all lap seams in areas where the underlayment will be exposed to wind-driven rain.

ROOFRUNNER™ INSTALLATION METHOD:

Apply RoofRunner only to a clean, smooth nailable deck. RoofRunner acts like a vapor retarder; therefore, CertainTeed strongly recommends that it be installed over adequately ventilated attic spaces. Application method is dependent on roof slope, anticipated exposure time, anticipated wind speeds, and climate. If the roof is in a climate where ice damming may occur, then first apply an ASTM D1970 or AC48-compliant underlayment such as CertainTeed's WinterGuard® or VYCOR® Waterproofing Shingle Underlayment to all eaves. Do not install RoofRunner as ice dam protection along eaves. Two layers of RoofRunner cemented together is not an equivalent to WinterGuard or VYCOR.

- **Standard Slope Roofs (4:12 or Greater):** Starting at the lower edge of the roof, apply RoofRunner horizontally (parallel to the eave) with printed side facing up. When necessary, overlap vertical side/end joints a minimum 6" and "weather lap" horizontal joints a minimum 3". Offset end laps from course to course at least 36". Fasten as described below.
- **Low Slope Roofs (2:12 to <4:12):** Starting at the lower edge of the roof, apply RoofRunner horizontally (parallel to the eave) with printed side facing up. Apply two layers (double coverage) of RoofRunner in "shingle fashion" as follows:
  - Install a full 25.5" starter strip along the eaves
  - Install a full 48" wide sheet over the starter strip
  - Apply each succeeding 48" wide course up the roof overlapping each previous course a maximum of 22.5" exposure (or 25.5" overlap) in traditional "half-lap" installation or in "shingle fashion"
  - Overlap 12" at all end lap seams and offset from adjacent end laps by 36" minimum. Fasten as described below

Fastening (all slopes): DO NOT USE STAPLES OR ROOFING NAILS! CAP NAILS WITH 1" HEADS ARE REQUIRED.

- Attach the underlayment at each circular target printed on the underlayment by nailing a fastener through each circle and tight to the surface. Proper fastener spacing is 15" On-Center (O.C.) vertically and 12" O.C. horizontally. On vertical side/end laps install 8 fasteners equally spaced (6" O.C.) centered up the lap to hold the underlayment in place.

Exposure Limitations
RoofRunner is not designed to be permanently exposed to sunlight and weather or used as a waterproofing underlayment. RoofRunner is tested for UV resistance for up to 3 months; do not expose it for more than 3 months prior to installing finished roofing.

Lap Sealing
Where laps or joints require sealant or adhesive, use a high quality asphalt roofing cement meeting ASTM D4586 Type II or cements/caulks based on butyl rubber or urethane. It is particularly important to seal all lap seams in areas where the underlayment will be exposed to wind-driven rain.

WATERPROOFING SHINGLE UNDERLAYMENT (WSU)

CertainTeed's waterproofing shingle underlayments include the WinterGuard® series and the VYCOR series. All products in these series are warranted against leaks and not destroyed when nails are driven through it because it seals around nails as they are driven. Designed to seal to the roof and prevent water from getting inside a structure due to ice dams and/or wind-driven rain, CertainTeed has products that can be installed beneath metal, shingle, slate or mechanically fastened tile roofs.

The WinterGuard series is comprised of self-adhering waterproofing membranes composed of a tough reinforcement that is impregnated and coated with SBS-modified asphalt. WinterGuard Sand and Granular have top surfaces consisting of mineral matter (sand or granules) to enhance traction during application. WinterGuard HT X has a film surface and is specifically formulated to resist high roof temperatures. The adhesive bottom surface of WinterGuard Sand and Granular is protected with a disposable silicone-coated release film, which is split longitudinally down the middle for easier application. In all cases the product must be applied to a clean dry roof deck.* The VYCOR series includes SELECT, ICE & WATER SHIELD and ICE & WATER SHIELD HT which are manufactured with an aggressive rubberized asphalt adhesive backed by a layer of coated, high-density, cross-laminated polyethylene film as their top surface. A foldless release paper with RIPCORD technology exists on the underside to promote ease of application. VYCOR ULTRA is manufactured with an aggressive 100% butyl rubber adhesive also backed by a layer of coated, high- density, cross-laminated polyethylene film as its top surface. A split-release film exists on the underside to promote ease of application. VYCOR series has a slip-resistant film surface designed to improve foot traction and resist high temperatures generated by metal roofs.

* Miami-Dade County acceptance requires the application of WinterGuard over mechanically fastened #30 felt or #43 base sheet, and not directly to the deck. Such application is acceptable only when required by local code in areas where ice damming does not occur. Doing so will not affect the product's limited warranty.

Here's a Tip...

Using the "Fly-In" Method, place your thumbs down. It makes the job easier in hot weather, to let go of the sticky WinterGuard®. (Thanks to Mike Dempsey of Eagle River, WI.)

WHERE IS WATERPROOFING SHINGLE UNDERLAYMENT USED?

Used on both new or existing decks, installed beneath shingles, slate, tile or cedar shakes. Easy to apply and an excellent underlayment for low-slope shingle applications. It is commonly used to protect against water backup caused by ice dams at the roof eaves. It is also used in critical areas such as valleys, and as concealed flashing around roof penetrations and up sidewalls (See Figure 5-3).

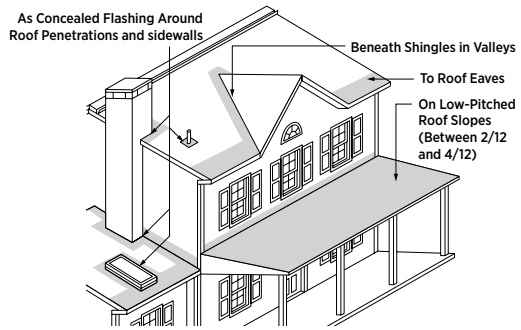


Figure 5-3: WSU's many uses

In addition, WSU is very useful on roofs exposed to occasional high winds where wind-driven rain can penetrate beneath shingles.

For metal roofs, please see the table below:

	max 200°	max 260°	max 300°	**Copper, zinc & COR-TEN in high altitudes (SW & Mountain)
VYCOR ICE & WATER SHIELD, HT, ULTRA or WinterGuard HT X	✔			
VYCOR HT, ULTRA or WinterGuard HT X		✔		
VYCOR ULTRA			✔	✔

THE APPLICATION OF WATERPROOFING SHINGLE UNDERLAYMENT OVER OLD SHINGLES

CertainTeed WSU must be applied over a clean, dry deck. Any other application, such as over old shingles, will void the CertainTeed Waterproofing Underlayments Limited Warranty.

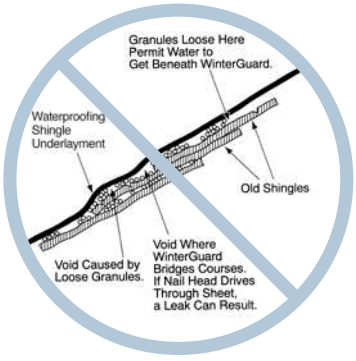


Figure 5-4: Problems with Waterproofing Shingle Underlayment application over old roof.

WHAT IS THE DIFFERENCE BETWEEN WATERPROOFING SHINGLE UNDERLAYMENT AND STANDARD UNDERLAYMENT?

All the No. 15 and No. 30 underlayment products will wrinkle somewhat when dampened. Some will wrinkle very badly. All felt underlayments can leak, especially if they are cut to make them lie flat after they have wrinkled, and they can leak around nails driven through them.

Waterproofing shingle underlayments do not wrinkle from moisture absorption. They do not need to be cut to flatten wrinkles, because when properly installed, there are no wrinkles. Once adhered, they will not blow off the roof. They do not leak around nails driven through them, because their composition is designed to be sticky and flexible, sealing around the nails that puncture it. Therefore, these underlayments are not just water-resistant, they are waterproof. But they must be applied fully adhered to a clean, dry deck, in accordance with the manufacturer's specifications, in order to get the promised performance.

HOW IS WINTERGUARD MADE AND HOW DOES IT WORK?

WinterGuard is a composite material of asphalt and elastomeric polymers reinforced with a fiber glass membrane. It is formed into a rolled sheet. The rubberized asphalt provides the waterproofing. The polymers make the asphalt elastic and sticky all the way through the membrane. This means WinterGuard has the ability to both stretch and cling, and not rip when stressed. It seals like a gasket around nails driven through it. It sticks to a clean roof deck like glue and is warranted to remain effective for the life of the new asphalt shingle system applied over it, up to 50 years.

HERE ARE SOME OTHER FACTS ABOUT WINTERGUARD

- WinterGuard® is available in two different surface styles – sand and granular. WinterGuard® HT X has a film surface. It is more flexible than sand or granular surfaced WinterGuard and can withstand high temperature roof applications, including metal or tile.
- The standard roll of WinterGuard is 65′ in length and 3′ wide. One standard roll contains 195 square feet of material. Sand-surfaced WinterGuard also comes in a handy "Short Roll" that is 32-1/2′ long and 3′ wide. It contains 97-1/2 square feet of material.
- During installation, an initial light "tack" (stickiness) makes WinterGuard easy to lift if you accidentally put it in the wrong place. The aggressive "tack" of WinterGuard® PRO (formerly WinterGuard HT) is not as forgiving.
- Once WinterGuard is installed, however, it seals tightly after being warmed by the sun. If an immediate seal is desired, press overlaps firmly with a roller. A heavy-duty wallpaper seam roller or "J" roller works well.

CAUTION:

- To help prevent shingles from fusing to the waterproofing shingle underlayment, you can cover sand or granular-surfaced WinterGuard with a layer of felt or synthetic underlayment or use film-surfaced WinterGuard HT X. Although not required, adopting this practice will serve the property owner and your fellow roofing contractor well when it comes time for the next re-roof.
- WinterGuard may not come in contact with excessive amounts of petroleum solvent-based cements, such as asphalt plastic cement. For use with WinterGuard, CertainTeed recommends urethanes or polymer-modified cements. Use such materials sparingly.
- Do not apply over shingles. With the exception of certain roof penetration flashing details do not apply over water-resistant underlayment.*
- If necessary, you may apply new WinterGuard over an older existing piece of WSU; however, be sure the following conditions are met in order for the WinterGuard warranty to remain in force:
  - The underlying roof deck must be acceptable and in good condition.
  - The existing WSU must have a smooth, clean surface. Nail holes can be present, but all shingles, nails, etc. must be removed and the existing WSU surface swept clean.
  - The surface of the existing WSU must be primed with an ASTM D41 asphalt primer in order to achieve proper adhesion when applying all surface style versions of WinterGuard®.
  - All laps must be offset between the existing WSU and new WinterGuard by at least 8″.
  - "Feather" the high edge of the WinterGuard over the existing WSU to avoid telegraphing its double thickness.

NOTE: CertainTeed is not responsible for and disclaims any and all liability for any damage caused by incompatibility of its WinterGuard products when applied over WSU from other manufacturers.

- Do not use WinterGuard as a permanently exposed roofing surface because it will begin to degrade after too much exposure to ultraviolet light. However, after being properly applied to an acceptable deck, WinterGuard can be left exposed for three to six months (depending on the weather) prior to the installation of the roofing shingles – without significantly damaging WinterGuard's performance in the finished system. When exposing WinterGuard for more than one day, we strongly recommended that you:
  - Press down all laps with a wallpaper seam roller to assure immediate adhesion. End laps should be 6″. Side laps for film and granular surfaced should be 4″; sand surfaced requires a 6″ side lap.
  - Use additional fasteners to hold the sheet in place (especially if cool, windy weather is anticipated).
  - Seal all penetrations and joints in the roofs, since the finished roofing system and its flashing components will not be in place to prevent leakage.
  - Prior to roofing over the exposed WinterGuard, inspect it for damage and replace or recover any worn areas. If any fasteners are removed, the WinterGuard must be replaced or the holes must be filled with one of the adhesives mentioned above so that it remains watertight.

* Miami-Dade County acceptance requires the application of WinterGuard over mechanically fastened #30 felt or #43 base sheet, and not directly to the deck. Such application is acceptable only when required by local code in areas where ice damming does not occur. Doing so will not affect the product's limited warranty.

WARNINGS

- Always remember that roofing activity can be dangerous. All necessary precautions and safety guidelines should be observed in accordance with proper roofing trade practices.
- Film-surfaced WinterGuard HT X can be slippery when walked on.
- When sand-surfaced WinterGuard is left exposed for long periods of time, the sand embedded in its top surface will gradually come loose, possibly creating a slippery condition. Be sure to sweep the loose sand off "long-exposed" WinterGuard before walking on it. If, for any reason, you must leave WinterGuard exposed for a long period of time, you can possibly avoid the "loose-sand" situation by completely covering the WinterGuard with a standard water-resistant underlayment such as #15.
- WinterGuard's release film can be slippery. We suggest that you get the release film off the roof immediately after pulling it off each section of WinterGuard.
- WinterGuard is applied along the eaves and up the roof no less than 24″ beyond the interior wall line to protect against leaks caused by ice dams. In areas of severe icing, it must be applied at least up to the highest water level that might conservatively be expected to occur from ice dams. This will vary by climate, amount of ventilation and insulation, and roof slope. For additional information on ice dams, visit www.certainteed.com.
- WinterGuard® is a vapor retarder. If you apply it over the entire roof, special care must be taken to ensure there is sufficient ventilation beneath the roof deck to prevent condensation. Refer to Chapter 7 for more information on ventilation.
- WinterGuard will temporarily lose most of its sticky nature at temperatures under 40°F or even at higher temperatures, depending on its age. We recommend that it be applied in fair weather, at temperatures above 40°. If you need to apply it at colder temperatures, we suggest that you:
  - Nail it in place with fasteners. Nailing, however, cannot provide protection from ice dams.
  - Seal the laps with a heat gun or use one of the caulks/adhesives mentioned above. Installed according to instructions, WinterGuard will become sticky again and adhere when temperatures rise.

DECK PREPARATION

- Remove all roofing material down to a clean, dry, and smooth deck.
- Get rid of anything that is sticking up, such as nails or wood splinters. Also eliminate dust, dirt, loose objects, and moisture.
- If you are covering a concrete or masonry roof surface, prime the surface first with an asphalt primer meeting ASTM D41 requirements. Follow the manufacturer's instructions for applying the primer. The primer must be dry before installing WinterGuard.

THREE INSTALLATION METHODS FOR WINTERGUARD SAND AND WINTERGUARD GRANULAR

(1) THE "ROLL-OUT" APPLICATION METHOD

NOTE: This method requires two workers.

1. Can be applied in any length convenient to the applicator.

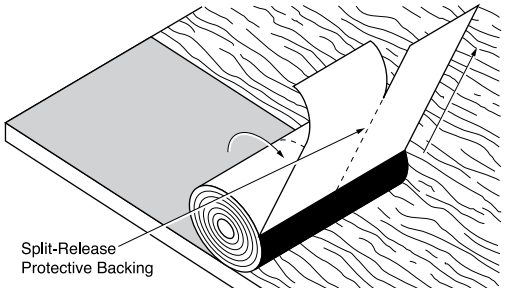


Figure 5-5: Application using the "Roll-Out" method

2. First, unroll the material (keeping protective release film in place), line up with the lower edge of the roof, and hold it in place.
3. Lift the starting-end of the material (approximately 1'), peel back, and fold under at least 6" of both protective release film sections.
4. Carefully return the exposed adhesive surface to the deck and press it firmly in place. It is recommended that you to walk over the sheet to set it firmly to the deck.
5. If it's cold and the material does not stick immediately, tack in place with a few fasteners.
6. Reroll the material from the other end until the peeled and folded-back film is exposed.
7. Beginning with the already peeled release film, continue to peel both sections of film from the roll, pulling the roll parallel to the eaves (Figure 5-5). Be sure the underlayment lays flat and is sticking well.
8. Press overlaps firmly into place with a hard roller.

(2) THE "PEEL AND FLOP" APPLICATION METHOD

Note: This method is recommended for one-worker applications.

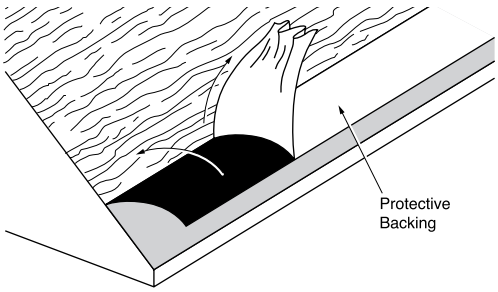


Figure 5-6: Application using the "Peel and Flop" Method.

Use the "two-piece, split-sheet, release-film" feature to adhere the longitudinal halves, one at a time. This feature allows one person to position the sheet before removing the protective plastic sheeting on the underside, then flop it back, peel off the release film, and set it, all without help. Press overlaps firmly into place with a hard roller. It is best to cut the product into manageable lengths of about 12'.

(3) THE "FLY-IN" APPLICATION METHOD

Note: This method requires two workers.

1. Cut to a convenient length and dry-fit to its proper location before removing the plastic release film.
2. Turn the entire sheet over and remove all the protective release film.
3. Pick up the sheet from both ends and turn it over. Be careful that the wind doesn't catch the sheet when it's raised off the roof. In fact, don't even try this method on a windy day.

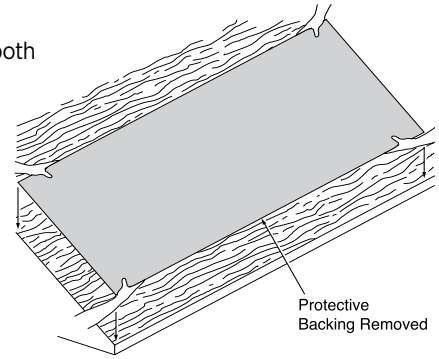


Figure 5-7: Application using the "Fly-In" Method.

4. Drop or "fly" the sheet into place, using great care to assure correct placement (Figure 5-7).
5. Press the sheet firmly against the deck to be sure of complete adhesion. It is recommended that you walk over the sheet to set it firmly to the deck.

HERE ARE SOME OTHER FACTS ABOUT VYCOR®

◆ Seals around fasteners, resisting leakage caused by water back-up behind ice dams, or from wind driven rain.

◆ The self-adhesive membrane provides superior adhesion to the roof deck without need for heat or special adhesives.

◆ Easily forms water-tight laps without special treatment.

◆ Protects under all standard sloped roof coverings — including slate, tile, cedar shakes or metal, as well as under conventional asphalt shingles.

◆ **RIPCORD** — Split Release on demand feature makes VYCOR underlayments (Not applicable for Ultra) easy to apply; Faster application of the membrane in straight-aways, as well as ease of membrane positioning in detail areas (valleys, around dormers, etc.).

◆ Reroofable — VYCOR underlayments will not adhere to the underside of the exposed roof covering and can be applied over existing VYCOR self-adhered underlayments in retrofit applications, making re-roofing easier and environmentally friendly.

NOTE: Contact CertainTeed's Technical Services & Warranty Department for warranty eligibility.

◆ Membrane will not crack, dry out or rot — VYCOR underlayments resist attacks from fungus and bacteria maintaining its integrity for long lasting protection.

TWO INSTALLATION METHODS FOR VYCOR® SERIES

(1) THE CONVENTIONAL METHOD INCLUDING RIPCORD

1. Cut the membrane into manageable lengths and re-roll loosely. Peel back 1 -2 ft. (300-600 mm) of release liner, and align membrane in place.
2. Peel the release liner from the membrane. Press the membrane in place with heavy hand pressure.
3. Side laps must be a minimum of 3.5 in. (90 mm) and end laps a minimum of 6 in. (150 mm).

RIPCORD® Split Release on Demand

1. Locate RIPCORD at center of membrane.
2. Create a notch in release paper at mid-center. Pull back release paper and extract RIPCORD.
3. Pull RIPCORD, splitting release paper in half.
4. Valleys: Roll out membrane; cut to required lengths. Extract RIPCORD following instructions above. Position membrane aligning on the center of the valley. Remove one side of the release paper. Press membrane into place working from the center outward towards the edge. Repeat on other side of valley.

(2) THE BACK-ROLL METHOD

1. Start by positioning the membrane in place. Use 2 fasteners to secure the end of the membrane to the deck and roll out a manageable length in the intended direction of application.
2. Carefully cut the release liner on top of the roll in the cross direction, being careful not to cut into the membrane.
3. Peel back about 6 in. (150 mm) of the release liner in the opposite direction of the intended membrane application, thus exposing the black adhesive.
4. Hold the release liner with one hand and pull the roll along the deck, leaving the applied membrane behind.
5. Stop frequently to press the membrane in place with heavy hand pressure, smoothing the membrane from the center toward the outer edge.
6. When finished with the roll, go back and remove 2 fasteners and the remaining release liner. Smooth to the edge.

APPLYING DRIP EDGE

1. Drip edge must be applied so that the higher pieces will overlap the lower pieces.
2. At the rake, drip edge may be installed under or over CertainTeed Waterproofing Shingle Underlayment. When drip edge is installed over CertainTeed Waterproofing Shingle Underlayment, the CertainTeed Waterproofing Shingle Underlayment must cover the top of rake board.
3. At the eaves, if there is a chance of snow or ice build-up in the gutters, install drip edge over CertainTeed Waterproofing Shingle Underlayment. CertainTeed Waterproofing Shingle Underlayment must cover top of fascia board. In severe ice dam regions, CertainTeed Waterproofing Shingle Underlayment can be wrapped over the fascia board and, if desired, onto the soffit. Cover all exposed CertainTeed Waterproofing Shingle Underlayment with drip edge, gutter, wood or other weather-resistant material to protect it from damage. If there is no chance of snow or ice build-up in the gutters, install drip edge under the CertainTeed Waterproofing Shingle Underlayment.

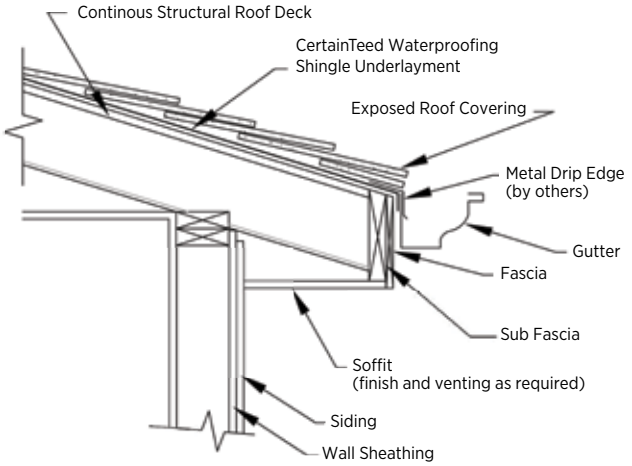


Figure 5-8: Application down the fascia to protect against ice build-up in gutters.

DEFEATING ICE BUILD-UP IN GUTTERS: Ice build-up in gutters will often allow meltwater to intrude behind fascia boards. Depending on construction of the eaves, deterioration of soffits or even interior damage can occur that looks like a roof leak. One method to solve this problem is shown in Figure 5-8. Another method is to wrap CertainTeed Waterproofing Shingle Underlayment down the fascia onto the soffit, and nail a furring strip to hold CertainTeed Waterproofing Shingle Underlayment tightly in place. This strip also serves as a UV block. Install the gutter in front of the CertainTeed Waterproofing Shingle Underlayment-covered fascia. Then install the drip edge on the eaves over CertainTeed Waterproofing Shingle Underlayment. Make sure the drip edge extends well into the rain gutter as shown in Figure 5-8, so UV rays are prevented from reaching the CertainTeed Waterproofing Shingle Underlayment . If the fascia is wider than about 6", CertainTeed Waterproofing Shingle Underlayment must be stopped behind the gutter to prevent exposure to UV. This approach may not be compatible with vinyl fascia systems due to the chemical reaction which may cause the asphalt to bleed onto the vinyl.

APPLYING WATERPROOFING SHINGLE UNDERLAYMENT ON VALLEYS

1. In valleys, the width of the material must be 36" minimum.
2. Apply Waterproofing Shingle Underlayment using the "Peel and Flop" method or The Conventional Method using RIPCORD described earlier. This time, however, be sure to use two workers to handle the sheet.
3. Be sure you're getting good adhesion down the valley centerline. Waterproofing Shingle Underlayment must conform smoothly to the valley. If fasteners are required (because of cold weather or a steep slope), they must be no closer than 6" to the valley centerline.

4. In valleys, start the application at the low point and work upward.
5. To assure waterproofing, overlap all Waterproofing Shingle Underlayment sheets 6″ at lap joints. The uppermost portion must overlap the lower portion. A hard roller is recommended to roll and press Waterproofing Shingle Underlayment in place at the laps.
6. Do not use Waterproofing Shingle Underlayment as a permanent weathering surface in open valleys (or elsewhere).

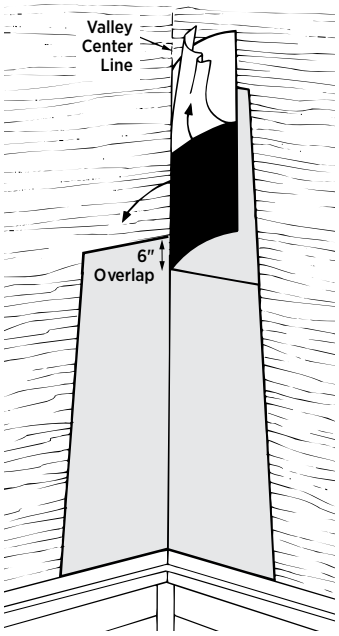


Figure 5-9: Valley application using the two-person "Peel and Flop" Method.

APPLYING CERTAINTEED WSU ON LOW SLOPES

1. CertainTeed WSU can be applied under shingles to provide protection against wind-driven rain water on low-slope applications.
2. The minimum approved slope for CertainTeed WSU application is 2/12. If applied to cover the entire roof, ensure sufficient ventilation to avoid condensation.
3. It is especially important to assure adhesion at the laps by pressing all overlaps into place with a hard roller.

★ CERTASEAM™ ROOF DECK JOINT TAPE

CertaSeam™ Roof Deck Joint Tape is a premium solution for sealing roof deck joints and seams. Ideal for use beneath slate, tile, cedar shakes, metal, and asphalt shingles. Meeting the requirements of ASTM D1970, CertaSeam seals around fasteners as they are driven through it while also providing protection against wind driven rain. CertaSeam adheres to roof decks and itself without the need for heat or adhesives. CertaSeam' s embossed, slip-resistant surface delivers improved traction for safer application.

APPLICATION

Ensure deck is clean, dry, and sound. Acceptable deck surfaces include wood, plywood and oriented strand board. (For additional deck types, please contact CertainTeed's Roofing Technical Services Department). Application temperature is 25°F and rising.

Position CertaSeam so that it is centered on the deck joint. Remove a manageable length of release film from the underside and adhere to the deck. Apply uniform pressure with hand or hand roller to ensure CertaSeam is applied unwrinkled and fully adhered. Remove release film from the remaining portion of the roll and continue application. CertaSeam will adhere to itself without need for adhesives or primer. Overlaps should be installed in a weather-lapped fashion and uniform pressure should be applied to ensure adhesion. In applications where adhesion is marginal, apply FlintPrime QD or comparable asphalt primer meeting the requirements of ASTM D41 to the surface where CertaSeam will be applied.

VYCOR® Installation Video

DiamondDeck® Installation Video

RoofRunner™ Installation Video

WinterGuard® Installation Video

SECTION 5 SELF-TEST

5-1. Typically, when installing water-resistant underlayment, side laps should be at least two inches and end laps at least six inches.

A. True.

B. False.

5-2. Joint overlaps for DiamondDeck® and RoofRunner™ are different than felt and vary by roof slope.

A. True.

B. False.

5-3. All shingles applied to a low slope deck require the use of WinterGuard® or VYCOR® or its equivalent applied over the entire deck.

A. True.

B. False.

5-4. At the eaves, if there's a chance of snow or ice buildup in the gutters, if possible, install WinterGuard or VYCOR under the drip edge.

A. True.

B. False.

5-5. For ice dam protection, WinterGuard or VYCOR must be applied along the eaves and up the roof no less than 24″ beyond the interior wall line.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Flashing: Valleys, Walls, Chimneys, etc.

6

YOUR OBJECTIVE:
To learn CertainTeed-recommended flashing installation methods and ways to apply shingles at the valleys.

FLASHING INSTALLATION

As you can well imagine, a good place for a leak to develop is anywhere the roof joins with walls and/or chimneys. To help prevent these leaks from occurring, corrosion-resistant metal flashing is typically applied. Metal flashing is effective, because when properly installed, it can help accommodate roof, chimney, wall, or structural movements due to settling, expansion, and contraction.

Roof flashing works like shingles: it overlaps and sheds water. Flashing is always constructed in a system to work with the effect of gravity. When correctly designed and installed, flashing can only be defeated by water running uphill. This can happen in the presence of snow, ice or wind-driven rain.

Thus, all flashing systems recommended in this chapter should be reviewed by installers with an eye to local weather extremes, especially the aforementioned elements. The best backup security for flashing systems at this time is the presence of waterproofing shingle underlayment beneath it. However, local experience may call for other flashing modifications to withstand weather-related conditions.

Flashing typically consists of (1) "step" flashing, which is attached to the roof, (2) "cap" flashing, which is attached to the chimney or a wall (Figure 10-2), (3) "drip edge" flashing, and (4) "valley" flashing. Step flashing is sometimes called "base flashing" and cap flashing is sometimes called "counter flashing." Often, exterior wall siding serves as cap flashing.

DRIP EDGE

Drip edge is the simplest flashing. It is used at the rakes and eaves. There are two basic styles of drip edge, generally known as C and "Extended." C-style drip edge does not have an overhang, while the "Extended" profile has a hemmed overhang at the edge of the roof deck.

On rakes, drip edge is installed on top of the underlayment to prevent wind-driven rain from getting beneath it. On eaves, it is installed beneath the underlayment to allow water to shed smoothly off the roof if it gets under the shingles.

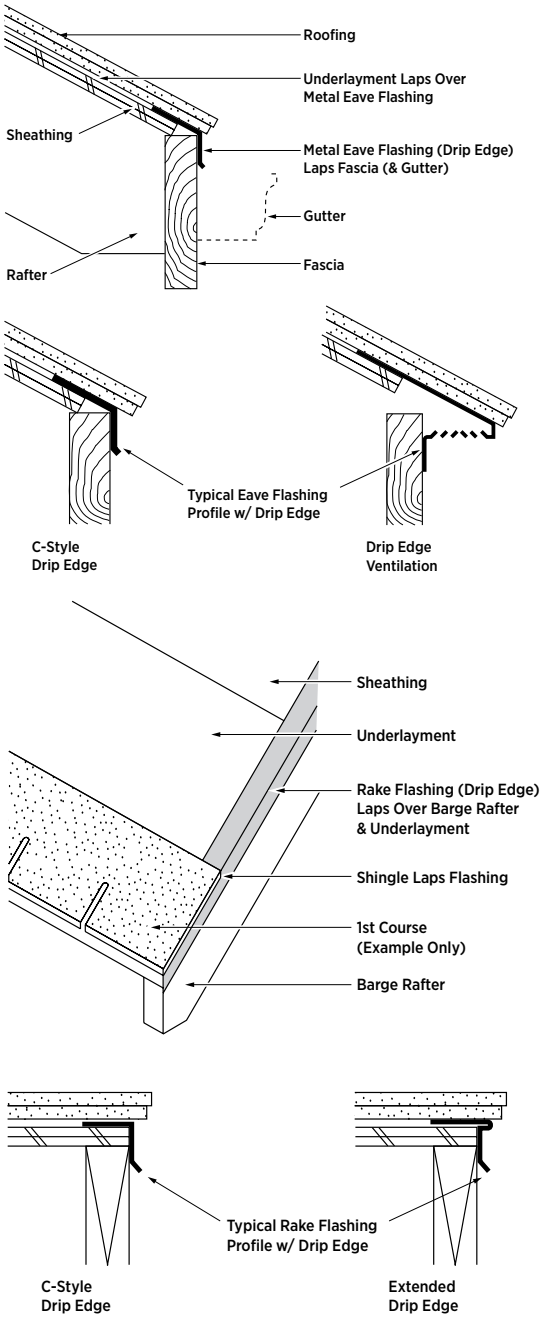


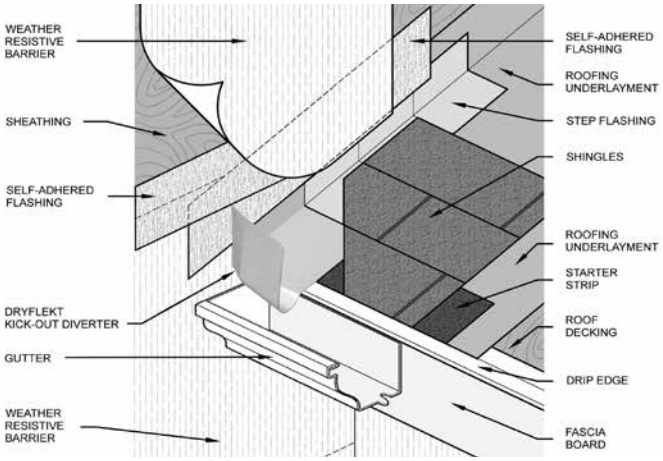
Figure 6-1: Typical eaves and rake flashing profiles with drip edge

IMPORTANT: Please check your building codes for drip edge requirements and specifications. Most codes now require drip edge. The 2018 IRC specifies the following in Section R905.2.8.5: "A drip edge shall be provided at eaves and rake edges of shingle roofs. Adjacent segments of drip edge shall be overlapped not

Here's a Tip...

You may want to install a kick-out diverter at the eaves's edge of the sidewall to direct water away from the roof to wall intersection. Diverters can be fabricated from metal or pre-fab diverters can be purchased. You can visit www.dryflekt.com to view their diverter diagrams and products. Another product called the J'D Out Kickout is available from americanflashings.com

less than 2 inches. Drip edges shall extend not less than 1/4 inch below the roof sheathing and extend up back onto the roof deck not less than 2 inches. Drip edges shall be mechanically fastened to the roof deck at not more than 12 inches on center with fasteners as specified in Section R905.2.5 [roofing nails with minimum 12-gauge shank and 3/8-inch-diameter head]. Underlayment shall be installed over the drip edge along the eaves and under the drip edge along the rake edges.



Kick-out Diverter

FLASHING AGAINST A SIDEWALL

IMPORTANT: Please check your building code requirements for step flashing dimensions. The 2018 IRC specifies that step flashing be at least 4″ in height and 4″ in width. CertainTeed recommends that step flashing be replaced when re-roofing (unless the flashings are in like-new condition.) There are three things to keep in mind when installing flashing. First, don't fasten the cap flashing to the roof deck or to the step flashing, since they are meant to move independently of each other to accommodate any structural movement. Second, each metal step flashing piece (sometimes called a flashing shingle) is to be placed slightly up the roof from where the exposed edge of the next overlapping shingle will be located (that's why it's called step flashing). This will help keep the flashing out of sight while maintaining a water-tight fit. Third, the material used for step flashing must be corrosion resistant.

CertainTeed MINIMUM lengths for step flashing shingles

Roofing Product	Minimum Length
Highland Slate® Grand Manor® Carriage House® Belmont® *(NOTE: For Carriage House, the first piece of step flashing must be 12″)*	10″
Presidential® and Presidential TL	6″
Landmark® Series, Patriot and all Three-Tab Strip Shingles	7″ (7⅝″ for metric dimension shingles)

The minimum dimensions for applying step flashing shingles against vertical sidewalls are listed below. All of the following minimums apply when installing any CertainTeed shingles (see also Figure 6-2).

1. The width of the step flashing on the deck must be at least 4″ wide.
2. The height of the step flashing installed against the vertical surface should be at least 4″ high; however, refer to the Note above regarding the height of step flashings. Generally, higher step flashings provide better protection from water infiltration.
3. For a step flashing application, the pieces of flashing must overlap each other by at least 2″.
4. The length of the step flashing pieces depends on the type of shingles being applied. The following table compares these different lengths:

NOTE: As a general rule, the minimum length of flashing should be 2″ more than the shingle exposure. For instance, metric shingles installed with a 5-5/8″ exposure require flashing of at least 7-5/8″ in length. ARMA recommends that step flashing be 5″ high and 5″ wide, while NRCA recommends that step flashing be 4″ high by 4″ wide. CertainTeed's minimum recommendation of 4″ x 4″ provides protection against normal water back-up; for additional protection in areas that experience heavy rain or snow storms, or on low slope roofs, step flashing with greater height should be used since 2″ may not be adequate.

When installing step flashing against a vertical sidewall (Figure 6-2), place the first flashing piece over the end of the starter strip and, finally, position it so that when the tab of the end shingle in the first course is applied, the flashing will be covered completely. Fasten the part which sits on the roof with one nail.

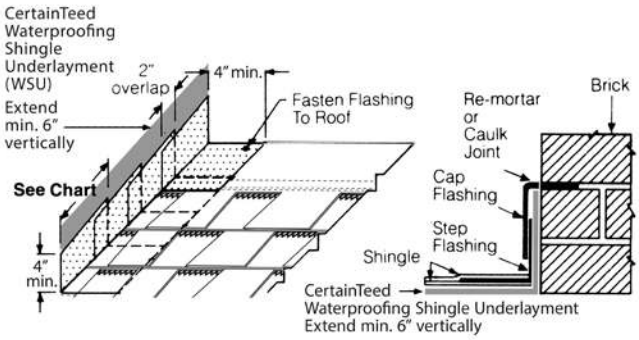


Figure 6-2: Sidewall step flashing (see also Figure 6-10).

Next, apply the first-course shingles up to the wall. Position the second step flashing piece over the first-course shingle and against the wall, 5″ up from the bottom edge of the first-course shingle. This will permit the tab of the shingle in the second course to cover it completely. As before, only fasten that part of the step flashing piece which sits on the roof. Step flashing fastener(s) should be placed in the uppermost 2″ area of the step flashing piece, to avoid leaks.

Continue up the roof or sidewall area in a similar manner until complete.

Here's a Tip...

Avoid driving nails through metal flashing that covers two sides of adjoining underlaying materials, such as different pieces of roof decking or between vertical and horizontal planes. It is very difficult to permanently seal the punctures in these situations and, over time, expansion and contraction of the flashing can cause the flashing to buckle.

FLASHING AGAINST VERTICAL FRONT WALLS

To apply base flashing against a vertical front wall:

1. Apply the shingles up the roof until a course must be trimmed to fit at the base of the vertical wall. By planning ahead you can adjust the exposure slightly (and evenly) in the previous courses, so that the last shingle is at least 8″ (vertically) wide. This allows a minimum 5″ exposure of the top course and a 3″ headlap.

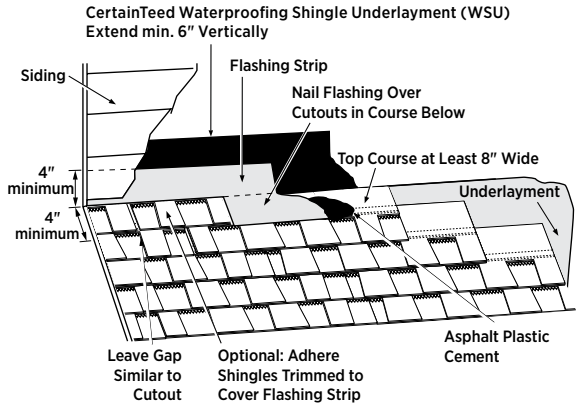


Figure 6-3: Front wall flashing.

2. The metal flashing strip should be bent, using a metal brake, to extend at least 4″ up the vertical wall and at least 4″ onto the last shingle course; that is, to the top of the cutout.
3. Apply the metal flashing, which can be 8′ to 10′ in length, over the last course of shingles. Embed the metal flashing in asphalt roofing cement, or another appropriate adhesive, and nail it to the roof every 12″. Do not nail the strip to the wall.
4. If side laps are necessary, overlap the pieces at least 6″. Do not fasten in this joint area.
5. If desired, apply an additional row of shingles over the metal flashing strip, trimmed to match the vertical width of the metal flashing strip on the shingle surface. Fasten shingles with face nails sealed over with a small dab of roofing cement, and sprinkle shingle granules on to the cement.
6. Next, if there is siding, bring it down over the vertical part of the step flashing to serve as cap flashing. Do not nail the siding into the vertical flashing.

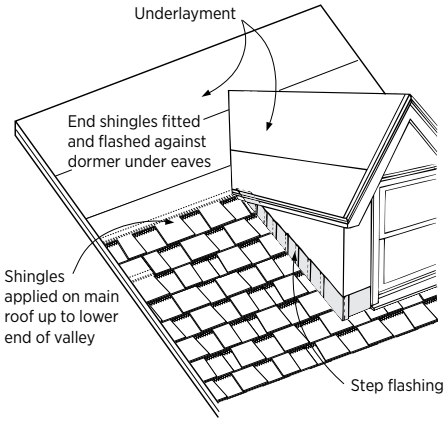


Figure 6-4: Front/side wall flashing.

7. If the vertical front wall meets a sidewall, as in dormer construction, cut the front flashing so that it extends at least 7″ around the corner. Then continue up the sidewall with step flashing as described earlier. A good quality caulk, or asphalt roofing cement, may be useful to fully seal behind corner joints, if they will not be soldered.

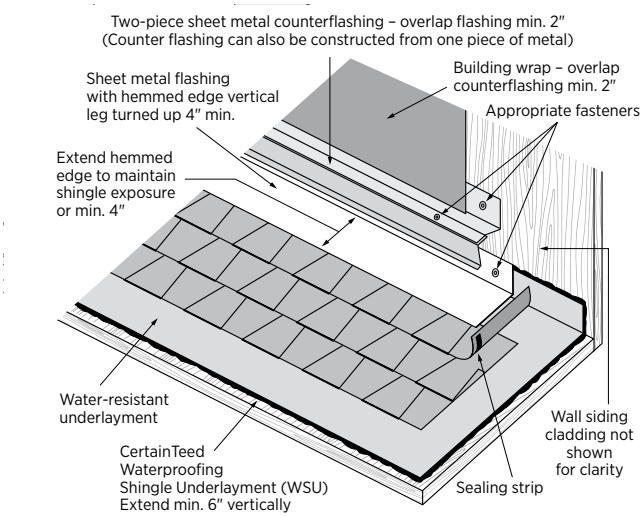


Figure 6-4a: An alternate front wall flashing method.

SOIL STACKS AND VENT PIPES

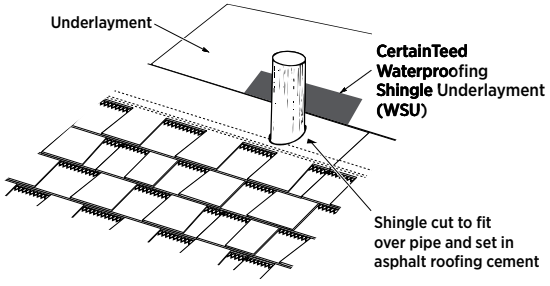


Figure 6-5: Cutting shingle to fit around vent pipe.

Here's a Tip...

To make a temporary repair to a damaged vent collar or to prolong the life of a newly installed collar, you can remove the neoprene from another new collar and install it over the existing vent collar to function as a "counter-flashing." (Thanks to Vince Hee from Ambler, PA.)

Practically all homes have circular vent pipes or ventilators projecting through the roof. Before installing the flashing, apply WinterGuard or VYCOR around the penetration as follows: Cut a square piece and center the piece over the pipe's top and cut an X into it slightly smaller than the inside diameter of the pipe's opening. Remove the release film, then lower around the pipe and seal it to the deck and underlayment. After that, install the shingles up to the vent pipe. Then cut a hole in the shingle that will go over the pipe and install the shingle setting it in asphalt plastic cement. For laminated shingles an alternate installation method can be used as shown in Figure 6-5a (**NOTE:** this method cannot be used with 3-tab shingles). This method diverts any water away from the roof penetration and out over the shingle. Next, place a preformed flashing flange, sized to fit snugly over the pipe, over the vent pipe and set it in asphalt roofing cement. Be sure the flange is seated squarely on the roof.

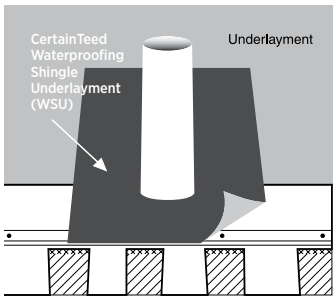


Figure 6-5a

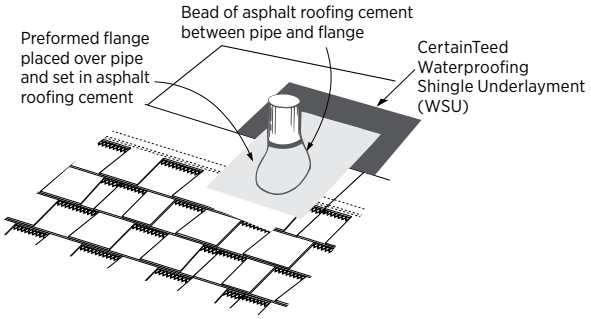


Figure 6-6: Placement of flange over vent pipe.

After the flashing is in place, continue applying the shingles. Cut the shingles in the succeeding courses to fit around the pipe, and embed them in asphalt roofing cement where they overlap the flashing flange.

The completed installation should appear as shown in Figure 6-7, with the lower part of the flange overlapping the lower shingles, and the side and upper shingles overlapping the flange.

Follow the same procedure where a ventilator or exhaust stack is located. If the ventilator, exhaust stack, or soil pipe is near a ridge, bring the shingles up to the protrusion from both sides and bend the flashing flange over the ridge to lie in both roof planes, overlapping the roof shingles at all points. Ridge shingles are then positioned to cover the flange. Embed the ridge shingles in asphalt roofing cement where they overlap the flange.

Flexible neoprene boots are also commonly used to flash around vent pipes.

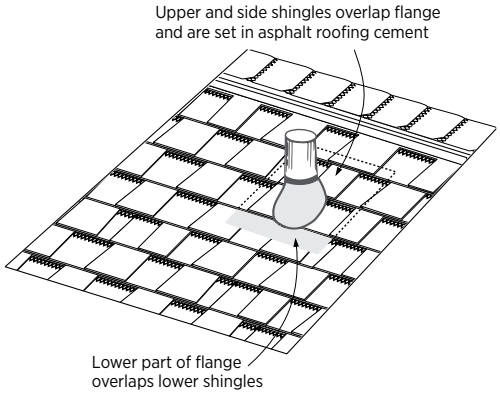


Figure 6-7: Applying shingles around flange.

FLASHING AROUND CHIMNEYS

Because chimneys are usually built on an independent foundation that is separated from the main house foundation, the chimney can move independently of the rest of the house. To allow for chimney/ deck movement, the base flashing is secured to the roof deck and counter or cap flashing is secured to the chimney. When movement occurs, the step-cap flashing system will act as a moveable joint.

In moderate to severe climates that experience heavy snow, ice or high winds, WinterGuard or VYCOR Waterproofing Shingle Underlayment is recommended for installation around the base of the chimney. Prime the masonry surfaces and run the WinterGuard or VYCOR Waterproofing Shingle Underlayment up the sidewall a minimum of 6". It is a flexible material that will accommodate the differential movement of chimney and deck.

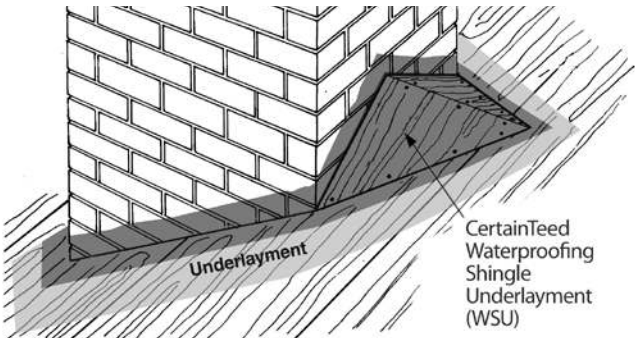


Figure 6-8: Chimney through the roof deck.

For chimneys projecting through the roof surface, we recommend that a "cricket" be installed at the intersection of the uppermost face of the chimney and the roof deck. The cricket, sometimes called a wood saddle, is an important element in preserving the integrity of the flashing that will be installed because it prevents

Here's a Tip...

Thoroughly clean the groove with water to remove all dust. Wet-cleaning of the masonry joint is the best way to remove dust that can prevent proper adhesion of caulking material. Compressed air, vacuuming, or use of a wire brush are not as thorough as cleaning with water. Allow to dry completely.

Here's a Tip...

When flashing at a wall or chimney where the two points meet, place an extra piece of step flashing on each side with a horizontal cut about 3" at the bend on both pieces. Interlock them together for an extra water-tight fit. (Thanks to Marty Holley from Gahanna, OH.)

the build-up of ice and snow at the rear of the chimney and diverts water runoff around the chimney. It also prevents water from "ponding" and backing up under the shingles during winter freeze/thaw periods.

The cricket should be in place before roofing installation begins, because all roofing materials from the felt underlayment to the roofing shingles are applied over it.

A cricket consists of two triangular sections of plywood joined to form a level ridge that extends from the centerline of the chimney back to the roof deck. Nail the sections to the deck and to each other along their meeting edge, customizing as necessary to get a tight fit.

Crickets are recommended when a chimney is wider than 24", the roof pitch is 6/12 or greater, and where snow and ice accumulations are likely.

Apply shingles up to the front vertical edge of the chimney. Apply base flashing against the front vertical wall as shown in Figure 6-9. Apply step flashing to the side and back walls as described previously for side walls.

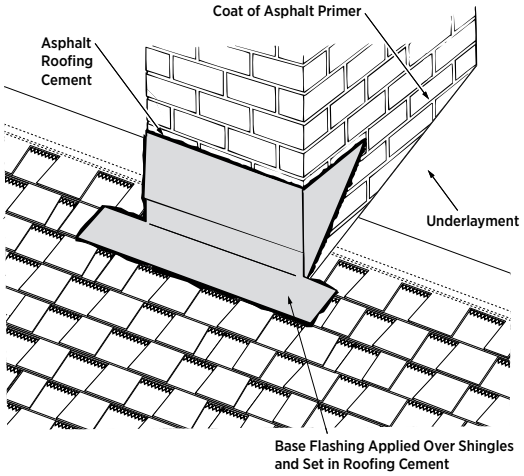


Figure 6-9: Chimney base flashing application.

Cap flashing techniques will vary with the type of chimney finish, such as stucco or brick. In general, for positive exclusion of water from the chimney joint, begin by setting the metal cap flashing, typically copper, aluminum, or galvanized, into the brickwork as shown in Figure 6-10. This is done by cutting out a mortar joint to a depth of 1-1/2" and inserting the bent edge of the flashing into the cleared joint. Once in place and being under a slight amount of spring tension, the flashing cannot be dislodged easily. Refill the joint with portland cement mortar, silicone caulk, or use a soft metal wedge and polyurethane sealant. Finally, bend the flashing down to cover the base flashing, or pre-bend it so it will lie snugly against the masonry.

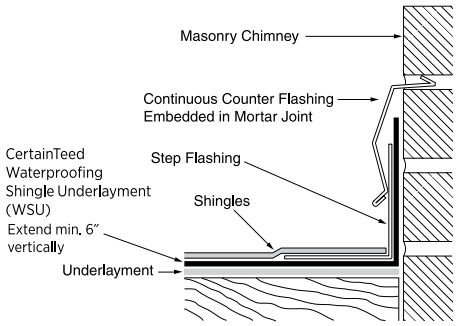


Figure 6-10: Through-wall metal counter flashing embedded in masonry.

Use one continuous piece of cap flashing on the lowermost and uppermost sides of the chimney as shown in Figure 6-11. On the sides of the chimney, use several pieces of similar-sized flashing, trimming each to fit the particular location of brick joint and roof pitch. Start the side units at the lowest point and overlap each at least 3" side-to-side. If the sides of the chimney have a continuous surface, such as a stucco finished chimney, use a continuous piece of cap flashing.

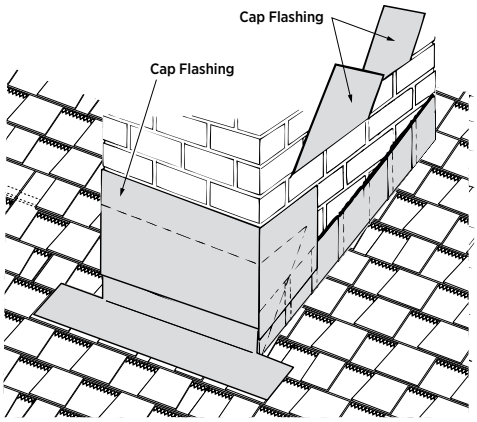


Figure 6-11: Applying cap flashing.

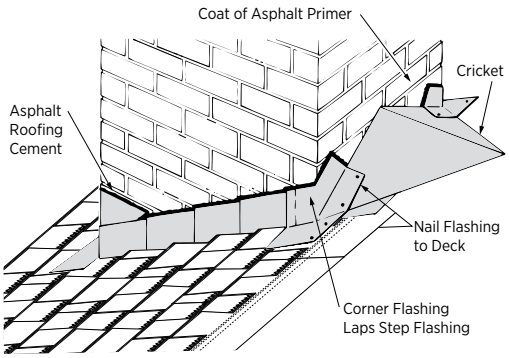


Figure 6-12: Applying corner flashing.

Here's a Tip...

If flashed incorrectly, corner locations are the most likely areas for leaks to occur.

Here's a Tip...

Pre-measure all counter flashing dimensions to allow a 3⁄4" separation from the step flashing corner bend to the bottom edge of the counter flashing. This distance allows sufficient space to account for applied shingle thickness over the step flashing. Pre-fit pieces as necessary for corners, etc.

If a cricket is not used (Figure 6-13), the vertical sidewall base flashing should be pre-bent and extend up the chimney at least 6" and up the roof deck at least 18", with appropriately formed sides and corners. The first course of shingle material to cross the roof deck on the uppermost side of the chimney should be trimmed back a minimum of 2" from the chimney vertical flashing bend and set in asphalt plastic cement. This 2" setback allows quick water drainage, prevents water from working up under the shingles, and promotes a natural cleaning of debris from the high side of the chimney.

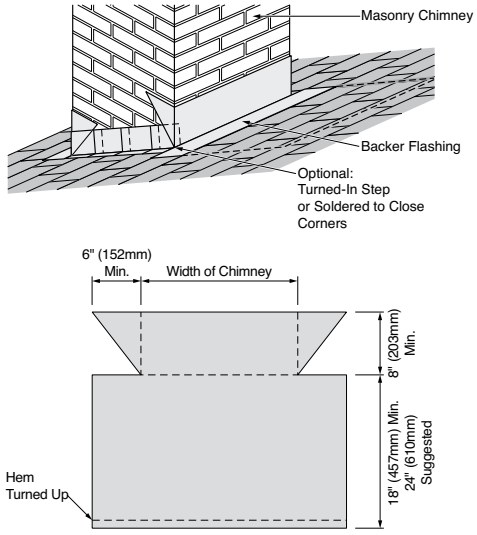


Figure 6-13: Example of sheet metal back flashing for upslope portion of masonry chimney.

MASONRY CHIMNEYS AND WALLS

CONTINUOUS COUNTER FLASHING: This optional counter flashing technique uses a continuous metal piece instead of the typical staggered (stepped) counter flashing along the side of a chimney or wall with mortar joints. It is an alternative to stepped counter flashing, which can lead to water leaks along the vertical joints in high wind or permit the entry of wind-driven, fine-grained snow. With continuous counter flashing, the apron flashing is continuous over the shingles and up the masonry wall. The vertical wall portion is then covered with counter flashing (Figure 6-14).

BEFORE CUTTING THE "REGLET":

1. Mount a guide or ledger on the side of the chimney or wall to be cut.
2. With a dry masonry or diamond wheel on a circular saw or grinder, cut a groove (also known as a "reglet" or "raggle") in a straight line parallel to the roof slope. The groove should be a minimum of 1" deep into the masonry (1-1/4" to 1-1/2" is preferred).

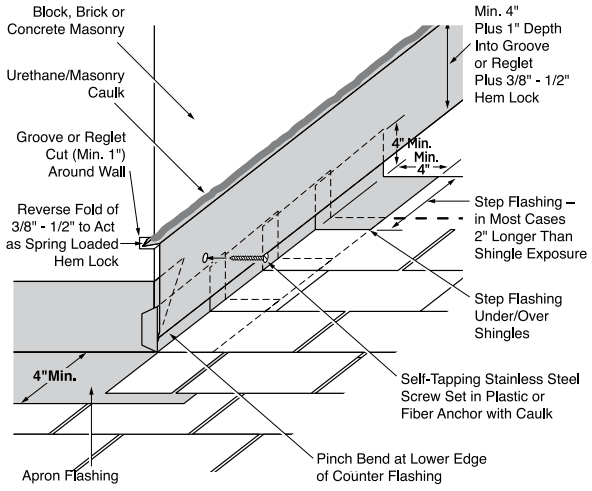


Figure 6-14A: Continuous counter flashing.

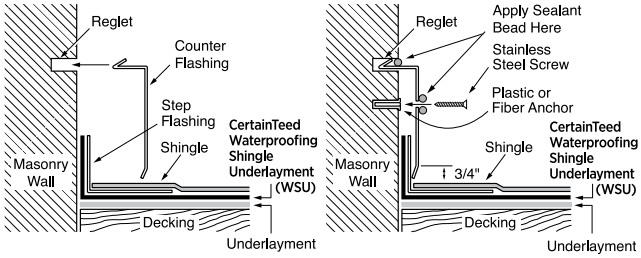


Figure 6-14A: Continuous counter flashing against masonry chimneys and walls.

Apply shingles and step flashing to the roof at the joint with the masonry chimney or wall. Pay particular attention to any metal corner bends and joints (Figure 6-14A).

Choose the appropriate length and width dimensions of metal to be used for continuous counter flashing. Plan your sequence of bends in advance, and form the metal. A metal brake is preferred for accurate bends. Also, don't forget to allow extra length to accommodate each bend (obviously, this depends on the thickness of the metal used).

Here's a Tip...

Wherever two different metals or metal alloys are in contact or can be linked by electroconductivity, such as occurs through water, there is a danger of galvanic corrosion. Therefore, use fasteners of the same metal as the flashing material they will penetrate. For example, use only copper nails with copper flashing. Use aluminum (or galvanized) nails with aluminum flashing. Also, do not combine dissimilar metals in your flashing system.

In forming the metal continuous counter flashing, pay particular attention to:

1. The reverse fold of 3/8" to 12", which will act as a spring-loaded hem lock in the groove.
2. The depth of metal into the groove.
3. The pinch bend, which will ensure a tight fit against step flashing and add rigidity to continuous metal counter flashing.

Run a bead of sealant or caulking into the reglet prior to installing the counter flashing. Choose a sealant/caulking that is specifically designed for use with masonry. Urethane-based materials are well-suited for masonry/metal applications.

Set the continuous metal flashing into the reglet with the pre-applied sealant/caulk and allow to cure. After this sets up, run a final bead of sealant/caulk on the exposed area of the reglet to seal the metal-to-masonry joint.

SURFACE MOUNTED COUNTER FLASHING

Installing a surface mounted metal counter flashing as shown in Figure 6-14B is also an alternative method to that shown in Figure 6-14A.

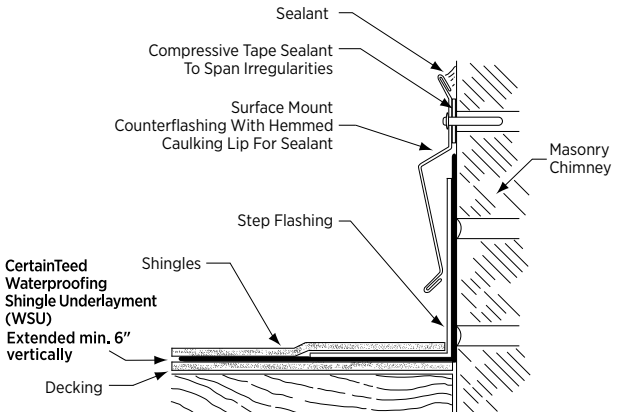


Figure 6-14B

DORMER

The junction of a dormer with a sloping roof requires a base or apron flashing below the window sill. Figure 6-15 illustrates the two systems that are usually encountered.

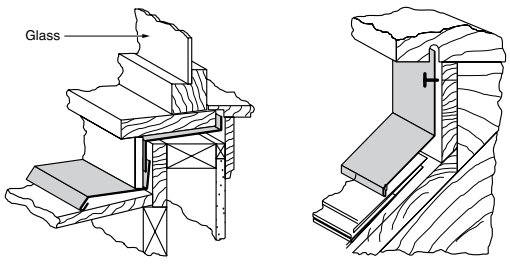


Figure 6-15: Two examples of base flashing below the window sill of a dormer.

SINGLE PITCH RIDGE

Occasionally, shingles are installed on a single pitch ridge. Figure 6-16 illustrates how to finish off flashing on a single pitch ridge.

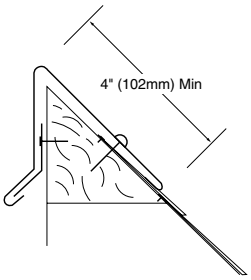


Figure 6-16: Topping off flashing on a single pitch ridge.

GALVANIC ACTION

Dissimilar metals in contact with each other will undergo a reaction in the presence of water. This is called galvanic action, which results in the corrosion of one of the metals. The following is the galvanic scale. When any two of the metals noted are in direct contact, the metal lowest on the list will corrode. The farther apart the metals are on the list, the faster corrosion occurs.

GALVANIC SCALE

Lowest	Resistance to Galvanic Corrosion	Highest
Aluminum		
Zinc		
Steel		
Stainless Steel		
Tin		
Lead		
Brass		
Copper		
Bronze		

For example, if you attach copper with steel nails, the nails will corrode. To prevent dissimilar metals from contacting each other, they must be isolated with underlayment, bituminous paint or another non-conducting material.

METAL VALLEY MATERIALS

The materials listed below are considered "equivalent" to 16 oz. copper in open valley applications.

Material	Gauge*	Nominal Thickness
Galvanized Steel	26	0.022 in. (0.56mm)
Aluminum	22	0.025 in. (0.63mm)
Terne (Painted)	22	0.023 in. (0.58mm)
Stainless Steel	24	0.024 in. (0.61mm)
Copper (16 oz/ft^2)	23	0.022 in. (0.56mm)

*Units differ by material type.

Here Are Some Tips...

When cutting shingles at valleys, I have found that using medium size tin snips works better than using a hook knife. (Thanks to Barry Butrymowicz from Mountain, WI.)

When using the alternate closed valley application in cold weather, I hand nail all triple layered areas with 2" nails for a secure application. (Thanks to Brent Schneider from Oshkosh, WI.)

VALLEY INSTALLATION

Open valleys are strongly recommended for Grand Manor®, Carriage House®, Belmont, Highland Slate, LandMark® TL, Presidential® Shake and Presidential TL. Because of the thickness and multiple-layer construction of these types of shingles, they are not designed to conform easily with the angle or shape of a valley. Note that when installing open valleys, only metal valleys are recommended. Mineral-surfaced roll roofing is not considered to be sufficiently durable to last for the warranted life of today's shingles.

Valley Flashing: Line valley by centering 36" (915 mm) wide CertainTeed WinterGuard or VYCOR Waterproofing Shingle Underlayment ("WSU") or equivalent,*** in the valley and applying directly to deck. Consult the product packaging and individual shingle application instructions for details.

*** For valley liner, the equivalents to WinterGuard or VYCOR include:

1) waterproofing shingle underlayments meeting ASTM D1970;
2) one layer of 50 lb. or heavier asphalt coated roll roofing;
3) one layer of mineral-surfaced roll roofing;
4) two layers of 36" (915 mm) wide felt shingle underlayment.
5) in areas not prone to snow or ice, a synthetic water-resistant underlayment lapped at 20" and extending through the valley by at least 36". (Coated roll roofing should meet ASTM D224; shingle underlayment should meet ASTM D6757, ASTM D4869 or ASTM D226.)

CLOSED-CUT VALLEY

This is the valley application preferred by CertainTeed for all installations except as noted above; however, open or woven valleys are also acceptable depending upon the types of shingle installed. Prior to shingle application, line the valley by centering and applying 36" wide CertainTeed WinterGuard or VYCOR Waterproofing Shingle Underlayment, or its equivalent, directly to the deck.

Begin the closed-cut valley application method using shingles in the following manner:

1. Lay the first shingle course along the eaves of the first roof plane and across the valley, onto the adjoining roof plane, at least 12". Press the shingles well into the valley prior to fastening.

NOTE: The shingles on the deck with the least area of watershed are the shingles which should be applied first, to go under the other shingles on the adjoining deck. The shingles on the adjoining deck (the deck with the greatest amount of watershed) are the shingles which should be cut.

2. Follow standard fastening instructions, with the exception that fasteners may not be installed within 6" of the valley's centerline.
3. Follow the same procedure for succeeding courses, going up the valley from one side.
4. Apply the first course of shingles along the eaves of the adjoining roof area, extending it over previously applied shingles. Follow the same procedure for succeeding courses. When complete, snap a chalk line 2" back from the centerline of the side just installed (which is the greater watershed). Neatly cut 2" back from the centerline, following the chalk line as a guide.
5. Cut 2" diagonally off the upper corner of each trimmed shingle (at an approximate 45˚ angle) to direct water into the valley. Take care not to cut into the shingles below.
6. Embed each shingle in a 2" wide strip of asphalt roofing cement.

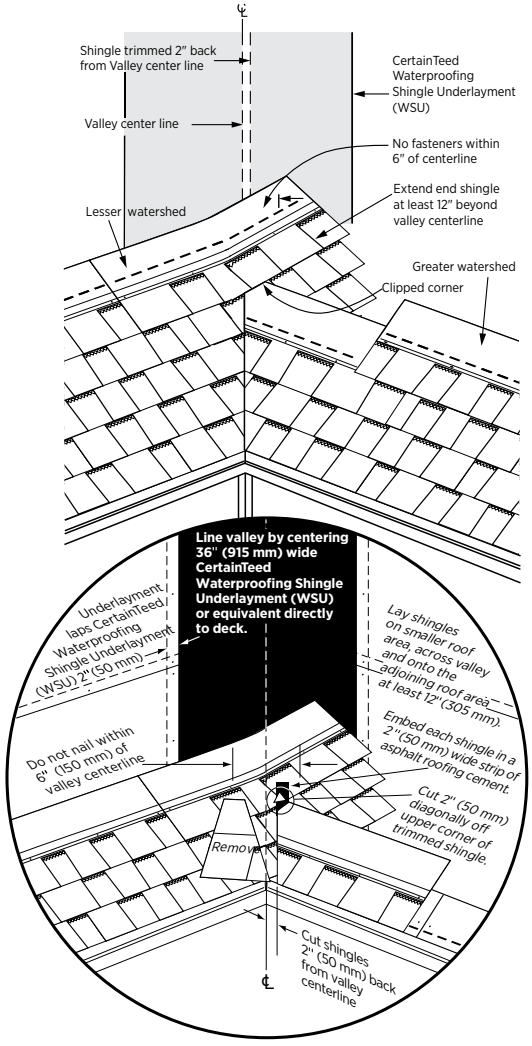


Figure 6-17: Closed-cut valley application.

Here's a Tip...

In open valleys, after you strike your 3" chalk lines, use the top edge of a shingle as a straight edge for your hook blade cuts. Your cuts will be straighter and you can trim three shingles at a time. (Thanks for this tip go to Kirk Kapel of Cleveland, Ohio)

Here Are Some Tips...

For alternate closed-cut valleys, cut every 4th shingle running horizontal in half to minimize possible patterning. (Thanks to Tom K. of Rosemount, MN).

ALTERNATE CLOSED-CUT VALLEY

Prior to shingle application, line the valley by centering and applying 36" wide CertainTeed WinterGuard or VYCOR Waterproofing Shingle Underlayment,or its equivalent, directly to the deck. Begin the valley application using shingles in the following manner:

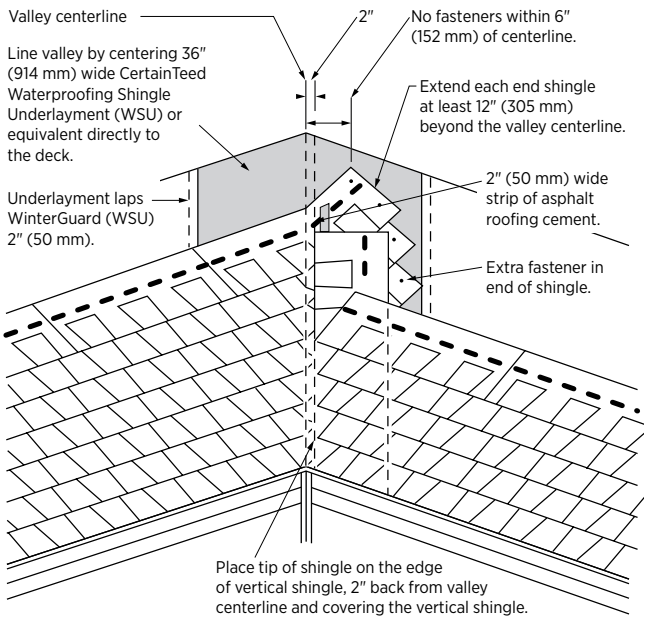
1. Lay the first shingle course along the eaves of the first roof plane and across the valley, onto the adjoining roof plane, at least 12". Press the shingles well into the valley prior to fastening.

NOTE: Always start applying the shingles on the deck with the least area of watershed.

2. Follow standard fastening instructions, with the exception that fasteners may not be installed within 6" of the valley's centerline.
3. Follow the same procedure for succeeding courses, going up the valley on the first side.
4. On the adjoining roof plane, snap a chalkline 2" back from the valley centerline. Apply shingles "vertically" facing the valley and 2" back from the valley centerline (use chalkline as a guide.)
5. Apply the shingles on the adjoining roof plane by positioning the lower left corner of the shingle of each row 2" back from the centerline (flush with the edge of the vertical shingle.) and over the top of the "vertical shingle." See Figure 6-18.

CAUTION: This application cannot be used with shingles that have cut-outs.

Figure 6-18: Alternate closed valley application.



MAKING THE JUDGEMENT CALL

Making decisions about cutting shingles in valleys often requires some careful thinking. Here are two "tough" calls:

1. If a 10/12 roof section forms a valley with a 4/12 roof section, and the 10/12 section is one-third the area (water volume) of the 4/12 section, you should cut the shingles on the 10/12 side.
2. If an 8/12 roofing section forms a valley with a 10/12 roofing section and the 8/12 roof has one-third the area (water volume) of the 10/12 section, put the cut on the 8/12 side.

WOVEN VALLEY

Prior to shingle application, line the valley by centering and applying 36" wide CertainTeed WinterGuard or VYCOR Waterproofing Shingle Underlayment, or its equivalent, directly to the deck. Shingles on the intersecting roof surfaces may be applied toward the valley from both roof areas simultaneously or each roof area may be worked separately up to a point about 3' from the center of the valley and the gap closed later.

Regardless of which procedure is followed, apply the first course along the eaves of one roof area up to and over the valley with the last shingle extending at least 12" onto the intersecting roof. Then apply the first course onto the intersecting roof along the eaves and extend it across the valley over the top of the shingles already crossing the valley and at least 12" onto the other roof surface. Apply successive valley shingles over each other as shown in (Figure 6-19). Press each shingle tightly into the valley and follow the same nailing procedure as the closed valley.

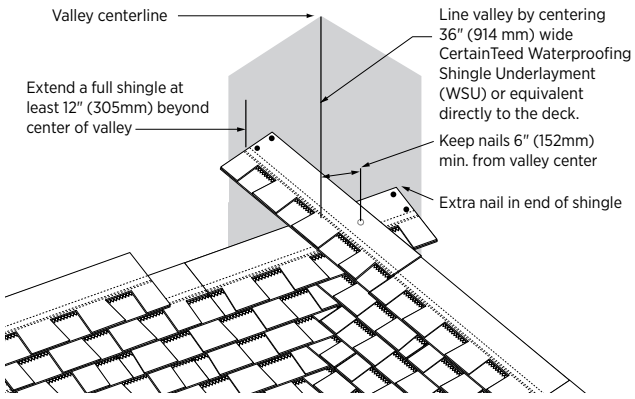


Figure 6-19: Woven Valley Application.

Here's a Tip...

Although many roofing manuals call for a traditional tapered valley (taper out 1" for every eight feet), CertainTeed recommends a straight open valley for composition shingles (3" exposure on each side of the centerline), because debris is less likely to become trapped in this low profile valley and because it makes a good appearance.

Here Are Some Tips...

Use caulks and sealants designed for the materials involved. Urethanes are suited for metal and masonry applications. SBS, SBR or rubber-based caulks are ideal for shingles and metal flashing. CertainTeed FlintBond™ is an SBS adhesive.

When reroofing, always check the existing flashing for cracks and other breaks. Repair or replace damaged or weak flashing before reroofing. To judge whether the flashing should be repaired or replaced, ask yourself whether the existing flashing will last at least 20 years. If not, replace it.

Before putting step flashing in place, bend it "open" a little so it will sit tight against the wall and be easier to work around. (Thanks to Jacob Church from Moscow, ID.)

OPEN VALLEY

1. Prior to shingle application, line the valley by centering and applying 36" wide CertainTeed WinterGuard or VYCOR Waterproofing Shingle Underlayment, or its equivalent, directly to the deck. If the shingle underlayment is used on the remainder of the roof, it should overlap the CertainTeed WSU by 4".
2. Next, apply an 18" – 20" wide sheet of metal valley flashing over the CertainTeed WSU in 8' to 10' lengths. Use a narrow band of roofing cement to fasten shingles that lap the metal. Preformed "W" style valleys are preferred.

CAUTION: Due to the expansion and contraction, a granular-surfaced valley liner under a metal flashing can cause abrasion to the metal from the friction. Alternatives to consider include sand or film-surfaced liners.

3. Secure the metal flashing every 24" along both edges either with metal cleats or large-headed nails. If using large-headed nails without cleats, place the shanks immediately adjacent to the metal edge so as not to restrict the movement of the metal (Figure 6-22).
4. If you need to use more than one piece of metal flashing for a valley, the high piece must overlap the lower piece by at least 4". Because of expansion and contraction of the two metal sheets, do not drive fasteners through both sheets in the overlapping areas.
5. Strike chalk lines 3" from the valley centerline, on each side of the metal valley. As shingles are applied, trim them back to the chalk lines. Use a buffer beneath the shingles to be trimmed to avoid scoring the metal valley liner with the knife blade.
6. Set the valley edge of each shingle in a 3" wide band of asphalt roofing cement.

CAUTION: In some areas of the country it is common to start the application of shingles at the valley centerline. This method is not approved for Super Shangle® products due to the possibility that objectionable patterns may result in the finished roof.

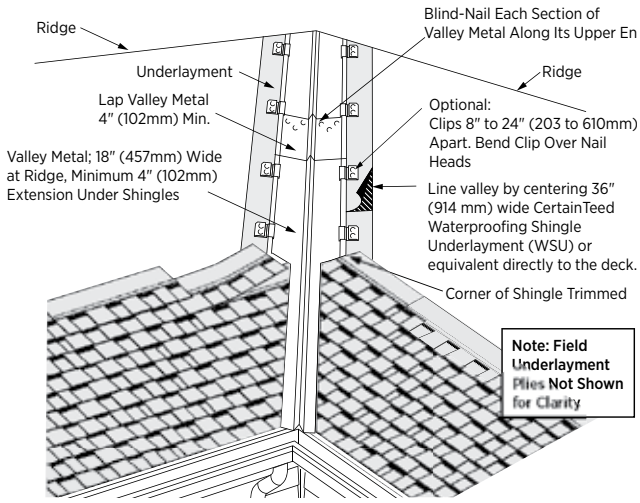


Figure 6-20: Typical open valley attached by cleats.

ALTERNATE OPEN VALLEY

CertainTeed also approves a valley detail that includes: lining the valley with a 36" wide piece of CertainTeed WSU, applying a 24" preformed W-style valley metal, (OPTIONAL – apply a 12" minimum wide layer of CertainTeed WSU over the valley metal along both sides). Apply bleeder shingles "vertically" facing the valley, 2" from the valley centerline and set in a 2"-3" wide bead of asphalt roofing cement. Apply "field shingles" over the vertical bleeder shingles by positioning the lower corner of the shingle of each course 2" back from the centerline of the valley (flush with the edge of the vertical shingle). This detail is similar to the "Alternate Closed Valley Application" shown previously.

CAUTION: This application cannot be used with shingles that have cut-outs, such as a typical 3-tab shingle.

Figure 6-21: Secure metal valley flashing with metal cleats.

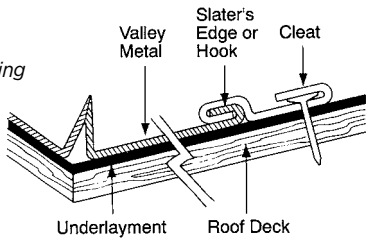
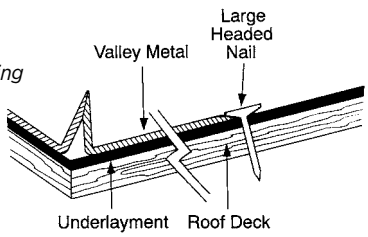


Figure 6-22: Secure metal valley flashing with large-headed nail.



ROOF PITCH TRANSITIONS

The flashing used for pitch transitions is essentially the same whether the steep pitch is on the high side, as in a transition to a porch, or on the low side, as on a mansard roof. The problem area is the termination of the lower course of shingles. Face nailing is necessary. Therefore, the flashing must lay under the shingles of the high slope, and lap the fasteners on the face of the terminated shingle in the course below the transition. Figures 6-23-A and B illustrate two ways to apply flashing at roof pitch transitions.

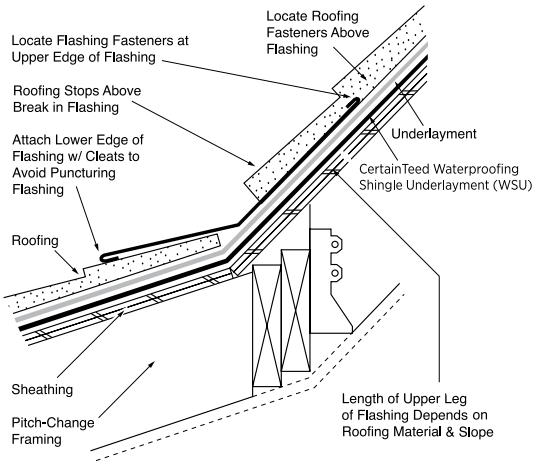


Figure 6-23-A

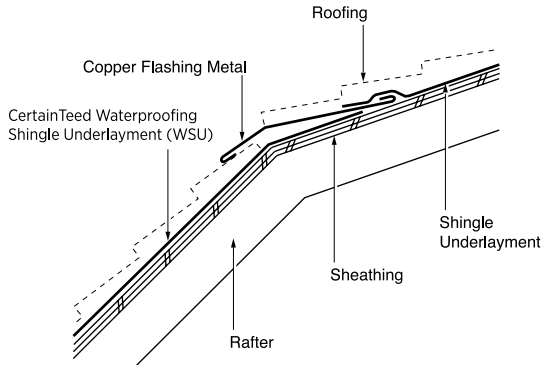


Figure 6-23-B

TWO METHODS OF APPLYING ROOFING MATERIALS AT THE ROOF PLANE CHANGE OF A GAMBREL ROOF

1. Shingles Only: Measure and adjust shingle application exposure over the last 6 to 8 feet of the lower roof to have the last shingle course exposed 4-1/2″ to 5″ for 12″ x 36″ shingles or 7-1/2″ to 8″ for 18″ x 36″ shingles. Gently bend and fasten these last shingles on the upper roof using roofing nails and on the lower roof with asphalt roof cement. If necessary, mechanically hold the lower portion of the shingles in place using small head siding nails (aluminum, painted in a matching color).
   CAUTION: Laminated and other stiff shingles may crack or buckle when applied in this fashion. If warming the shingles does not help, consider using the second method described below.
2. Drip Edge or Gutter: Apply shingles on the lower roof plane up to the joint and cut off excess shingle material flush to the deck joint. Apply WinterGuard or VYCOR Waterproofing Shingle Underlayment over the joint in the deck planes to help provide a waterproof barrier. The waterproofing underlayment should be applied directly to the upper deck plane and overlap the shingles on the lower deck plane by about 5″. Install a 1″ x 6″ painted fascia board, (the waterproofing underlayment must be totally covered by the fascia board), at the very top of the lower roof and then install either drip edge or gutter onto the fascia. Apply shingles to the upper plane per standard application technique, letting the starter and first course shingles over hang the drip edge or gutter about 1/2″ to 3/4″. Refer to Figure 6-24.

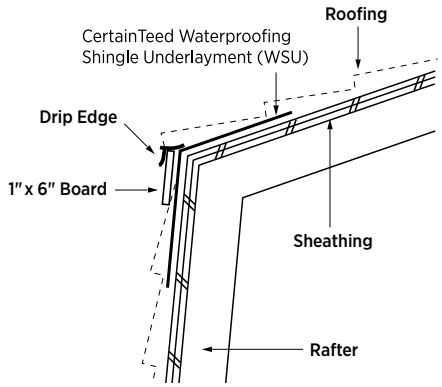


Figure 6-24

COMMON ROOF DECK SEPARATION JOINT

For dwellings with a common roof deck covering multiple units or owners, such as townhouses, duplexes, twin or row homes where only a sector of the common-roof is being replaced and the other portion will remain, the separation joint in the diagram below can be used. As the name implies, this separation joint delineates two different units/owners or roofing materials on the same roof deck and is similar in construction to that of an Open Metal Valley. Figure 6-25 illustrates how to separate common roofs.

Cut the existing roof materials the length of the separation line. On the side where the existing roof is not being replaced, carefully remove sufficient roof material to allow the application of a 36″ wide piece of WinterGuard or VYCOR Waterproofing Shingle Underlayment to the roof deck, centered along the separation line.

Apply "W" style metal with outside edges rolled for a Slater's Hook over the WinterGuard or VYCOR Waterproofing Shingle Underlayment and centered on the separation line from bottom to top. The metal must be at least 18″ wide and is typically applied in 8′ to 10′ lengths to allow for expansion and contraction. When overlapping more than one length of metal, the high piece of metal must overlap the lower piece by 4″ or more. Fasten the metal to the deck with clips installed 8″ to 24″ apart.

On the side where the existing roof is being replaced, apply new roof material. On the side where the existing roof is not being replaced, trim and reapply the previously removed roofing materials; if they are not reusable, apply similar new roofing material to match the existing roof. On both sides, the roofing materials are installed butted up against or close to the "raised peak" in the metal all the way up the roof.

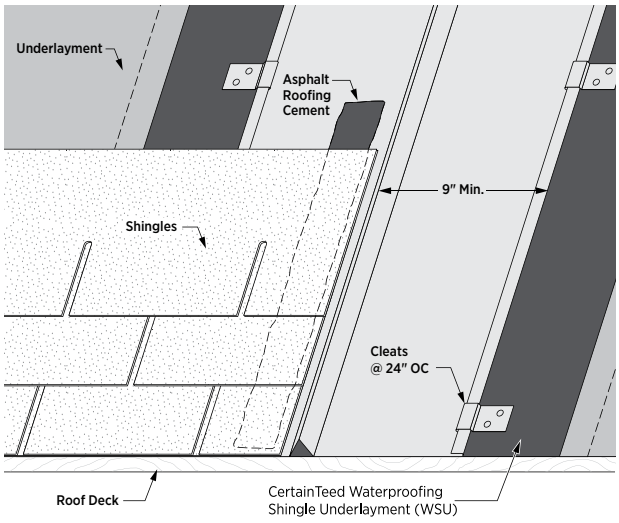


Figure 6-25 Thanks to Joe Fick from Baltimore, MD for this suggestion and help with this figure.

SKYLIGHTS

Skylights of various design are available in the marketplace. Most provide their own instructions for flashing the curb on which the skylight is mounted. The skylight curb is flashed much like a chimney. Install WinterGuard or VYCOR Waterproofing Shingle Underlayment around the entire deck and bring the underlayment up onto the curb. An apron flashing with a hemmed lower edge is installed on the base. Step flashing is installed on the sides; base flashing is installed upslope, holding one course of shingles away from the curb to encourage rain to wash away dirt and debris. The skylight itself provides the counter flashing or cap. As skylight design and installation methods change over time, it is best to follow the installation instructions of the skylight manufacturer.

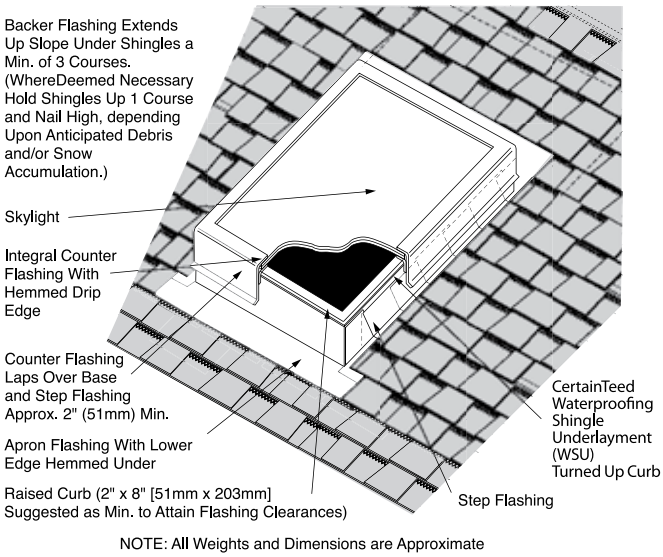


Figure 6-26: Basic sheet metal components used at skylight.

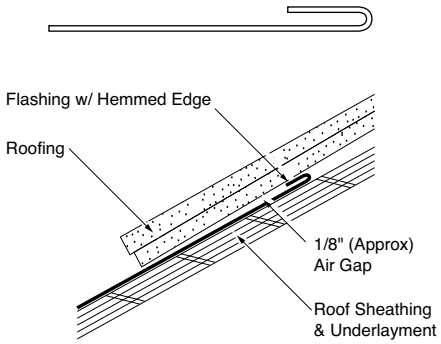
Here's a Tip...

You can prevent a possible leak by allowing the metal valley to overhang the fascia board. Hold the 3″ marks parallel to the valley center – that is, the point where the shingles stop – even with the fascia boards at the top roof edge. This gets the water out past the fascia board (Figure 6-28). (Thanks for this tip go to John Berman of Pashtigo, Wisconsin.).

HEMMED EDGES

Hemmed edges are used on most metal flashing systems. The hem or fold makes the flashing strong at the hem and helps control water flow. The hem can be turned up or down. Hems turned up are used at the high edge of flashing installed around roof penetrations, such as skylights, soil pipes and chimneys. Upturned hems are also used on the roof side of continuous sidewall flashing and on the vertical edge of open metal valleys. An upturned hem creates an air gap that resists the capillary migration of moisture from the metal to the roofing. They should never be hammered flat. Upturned hems also serve as hooks for attaching cleats. Downturned hems are used when flashing is lapped over the top of roofing or other materials, such as skylight glass.

A.



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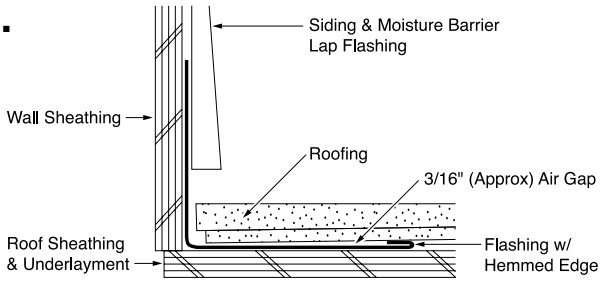

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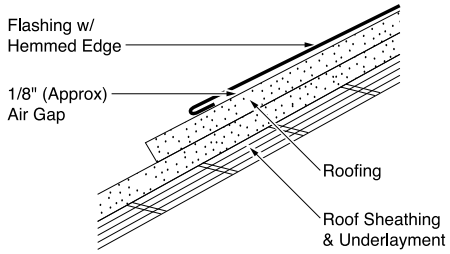

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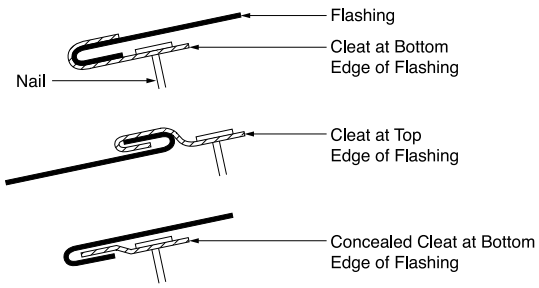

Figure 6-27: The hemmed edge is a very important detail or roof flashing.

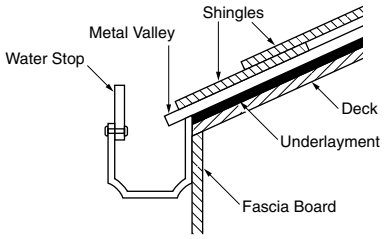

Figure 6-28: Valley side view

SECTION 6 SELF-TEST

6-1. The 2018 IRC specifies that drip edge must be installed at the roof eaves and rake edges.

A. True.

B. False.

6-2. The base flashing used against a vertical front wall (head wall) must:

A. Be a continuous piece of metal up to 10′ in length.

B. Be embedded in asphalt plastic cement.

C. Extend up the wall at least 4″.

D. All of the above.

6-3. Cap flashing, continuous counter flashing and surface mounted counter flashing are three flashing methods used on chimneys.

A. True.

B. False.

6-4. When installing a closed-cut valley, first lay the shingles from the roof with the lesser area across the valley and on to the adjoining roof area at least 24 inches.

A. True.

B. False.

6-5. Winterguard or VYCOR or an equivalent is recommended as a valley liner.

A. True.

B. False.

6-6. Flashing a skylight curb requires apron flashing on the base, step flashing on the sides, base flashing on the upslope side, and a kick-out diverter.

A. True.

B. False.

6-7. The 2018 IRC specifies (and CertainTeed recommends) that step flashing should be at least 4″ high by 4″ wide.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Ventilation Standards and Systems

7

YOUR OBJECTIVE:
To learn how different attic ventilation systems are designed
(1) Learn which designs are the most effective.
(2) Understand how ventilation affects the roofing system, as well as the entire house.

WHAT VENTILATION DOES

Ventilation is a system of intake and exhaust that creates a flow of air. Effective attic ventilation provides year-round benefits, creating cooler attics in the summer and drier attics in the winter, protecting against damage to materials and structure, helping to reduce energy consumption and helping to prevent ice dams.

With poor ventilation, summer sunshine can cause a terrific build-up of heat in the attic space. In a home with poor ventilation, the heat in the attic may eventually reach 140°F on a 90° day. If the unventilated attic is heavily insulated, that heat will stay there much of the night, perhaps slowly migrating to the home's interior. An overheated attic, combined with moisture, can also be damaging to roof decking and roofing shingles, causing them to distort and deteriorate prematurely.

In the winter, again in a house with poor ventilation, moist, warm air from the lower portions of the home will tend to rise through the ceiling area into the attic, especially through bypasses where electrical and plumbing fixtures are installed. In a cold attic, the warm, moist air condenses on the cold surfaces of the rafters, the nails and other metal, and the attic side of the deck. This water can create several problems.

First, the condensation can swell the deck, causing waviness and buckling of both the deck and the shingles. Second, the water can rot the roof deck, destroying its ability to carry loads (like a roofing crew) and its nail-holding capability. Third, severe condensation can drip onto the insulation, reducing its effectiveness and possibly seeping through to the ceiling below.

Another winter problem caused by poor ventilation is the formation of ice dams. Ice dams form in cooler climates in winter when heat collects in a poorly ventilated and/or inadequately insulated attic. Built-up attic heat combines with the sun's warmth to melt snow on the roof, even though outside temperatures may be below freezing. Then the flow of melting snow refreezes at the eaves and gutters. This freeze – thaw cycle can result in a pool of water that can back up under roof shingles and behind fascia boards, soaking roof decking and wall sheathing, damaging exterior and interior walls, peeling paint and ruining ceilings. Soaked lumber and building materials lead to secondary problems: wood rot, bug infestation, mold and degradation of structural integrity.

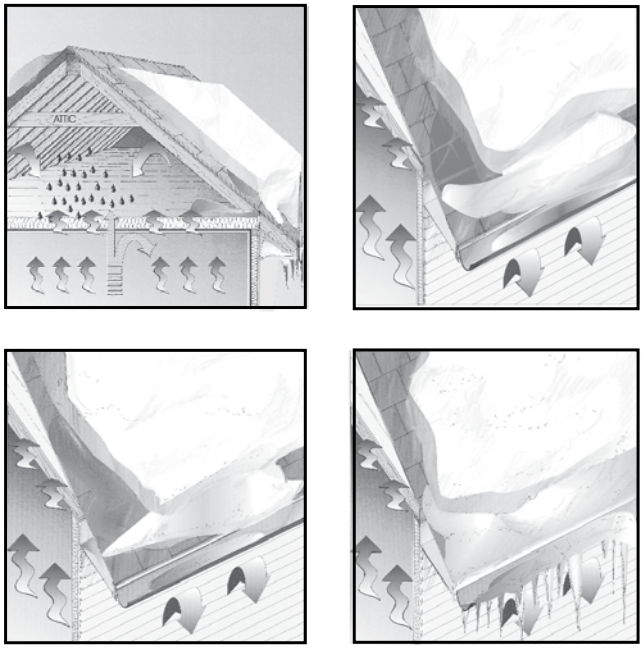

Figure 7-1

In a four-phase cycle of freeze and thaw, snow begins to melt when heat in the attic warms the underside of the roof deck and causes snow to melt and run down the roof. The melting snow refreezes at gutters and soffits. Pools of water and ice back up and soak decking and wall sheathing, then refreeze again to further damage all building materials (Figure 7-1).

Good ventilation will move the hot air next to the roof deck out of the attic in the summer, and it will dilute and remove the moist air in the winter, before it can cause damage. Also, proper ventilation, in combination with sufficient insulation, helps keep a more uniform temperature on the underside of the deck in the winter, and that can eliminate one of the principal causes of ice dam formation.

WHAT ARE THE BENEFITS OF ATTIC VENTILATION?

An effective attic ventilation system provides year-round benefits. During warmer months, ventilation helps keep attics cool. During colder months, ventilation reduces moisture to help keep attics dry. It also helps prevent ice dams. This results in:

- added comfort inside the house
- protection against damage to roof materials and structure
- reduced energy consumption throughout the year

VENTILATION DURING WARM WEATHER

You appreciate the effects of ventilation when you look at the temperatures involved. These are typical temperatures for a home with no attic ventilation, on a sunny day, with an outdoor temperature of 90˚F (32˚C):

- Temperature at roof sheath: as high as 170˚F (77˚C).
- Temperature at attic floor: up to 140˚F (60˚C).
- Temperature in rooms directly beneath attic: uncomfortable.

An unventilated — or inadequately ventilated — attic seldom loses enough heat overnight to compensate for the heat gained during the day. Ironically, the effect is magnified in modern homes with heavier insulation. Over time excess attic heat can cause premature failure in some shingles.

HOW VENTILATION HELPS SOLVE ATTIC HEAT PROBLEMS

Ventilation can't eliminate the transfer of heat from roof to attic, but it can minimize its effect. To do that, a well-designed system must provide a uniform flow of air along the underside of the roof sheathing. That steady flow of air carries heat out of the attic before it can radiate to the attic floor.

It's critical that this airflow is distributed uniformly. That means intake and exhaust vents must be balanced — for both position and airflow capacities. Otherwise, "hot spots" can develop under roof sheathing, drastically reducing the efficiency and effectiveness of whatever ventilation is installed.

VENTILATION DURING COLD WEATHER

When temperatures plunge, you might think the movement of heated air would no longer cause problems in attics. But that's not true. With seasonal changes, the conditions just reverse. Heat doesn't travel from an attic into the living quarters. Instead, heated indoor air travels from the home into the attic — along with moisture.

Figure 7-2 illustrates how this process of moisture transfer takes place. Furnace-warmed air circulates through the house, picking up water vapor generated by activities such as cooking, bathing, and the washing of clothes and dishes. The average family of four generates between 2-4 gallons a day through such activities. The use of humidifiers, common in many homes, provides an abundant and continual source of moisture.

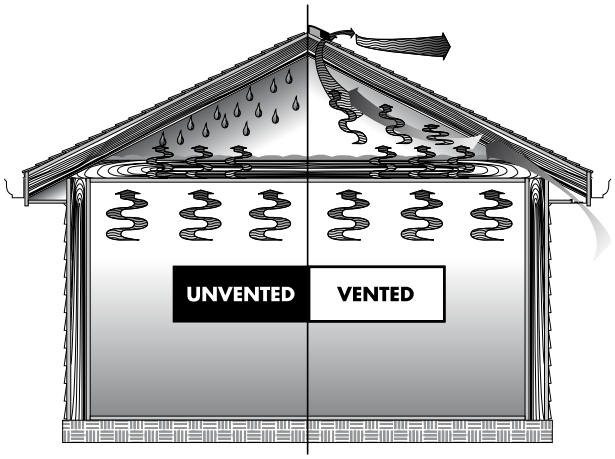

Figure 7-2: Unvented: Moisture rising up through the house condenses in the attic, causing damage to studs, insulation, and other materials. Vented: A vented attic allows moisture to escape.

The problem is especially acute in homes with electric heating. Most of these homes were built since the mid-1970s, using advanced insulation materials and methods. As a result, most are "tight," allowing minimal infiltration of outside air. In addition, electric heat sources do not require air for combustion, so another common source of outdoor air has been eliminated. The positive side of these super-insulated homes is, of course, the greater energy efficiency. But because cooler, drier outdoor air is kept out, the indoor air holds greater amounts of moisture.

The warm, moist air from the living quarters moves toward the attic, where the air is cooler and drier. That moist air is drawn to the attic in two ways:

- **vapor diffusion** – water vapor naturally travels from high-humidity conditions to low-humidity conditions. The force of vapor diffusion is so great that moisture even travels through building materials such as drywall panels. Even vapor barriers/retarders, for all their effectiveness, cannot totally stop this process.
- **air movement** – through openings such as recessed ceiling boxes and attic entries cut into a vapor barrier.

Troubles start when moist air hits cooler rafters, trusses and roof sheathing. The moisture condenses as water droplets or frost. Eventually, the condensation drips on the insulation below. If too much water soaks into the insulation, its volume can be compressed and its effectiveness reduced.

The structural elements of the house absorb some moisture, leading to wood rot and the deterioration of roofing materials. Moisture is likely to soak into the attic floor and eventually into ceiling materials in the rooms below.

HOW VENTILATION HELPS SOLVE ATTIC MOISTURE PROBLEMS AND ICE DAMS

Although the problems of heat and moisture accumulation in the attic have different causes, they share a common solution: a high-efficiency ventilation system. In warmer months, a ventilation system exhausts hot air from an attic; in the colder months, it exchanges warm, moist air with cooler, drier air.

Winter creates a special attic ventilation problem in areas where snowfall and cold temperatures are common occurrences. The problem begins with the formation of ice dams which prevent melt water from running off a roof.

Ice dams can form when:

- **Warm air accumulates in the attic.** Normally, the pocket of warm air in the upper portion of an attic won't result in problems — unless the following conditions occur as well:
- **Lower areas of the roof remain cold.** Especially near the eave, where temperatures may not be much higher than the ambient outdoor air. If the outdoor temperature is well below freezing, conditions are favorable for the formation of an ice dam.
- **A heavy snow cover accumulates on the roof.** Snow provides the necessary moisture and it also acts as a layer of insulation, preventing heat loss through the roof sheathing. As a result, attic temperatures are typically warmer than they are on days when the roof is free of snow.

Under these conditions, ice dams form quickly. Heat high in the attic causes snow to melt near the roof peak. The water from the melting snow flows toward the eave area, where colder roof temperatures allow it to freeze. If conditions persist over several days, this refreezing of snowmelt can form an ice dam.

The weight of a falling ice dam can damage gutters, fascia or shrubbery below. Roof damage occurs when the water pooling against the dam begins to back-up under shingles. The shingles get damaged or destroyed. Far more serious, however, is the damage caused at the plateline area. Insulation can be soaked, reducing its effectiveness. Plus, water can infiltrate into both exterior and interior walls, leading to structural damage. At the very least, mold spores and mildew can form, creating unpleasant odors and poor indoor air quality.

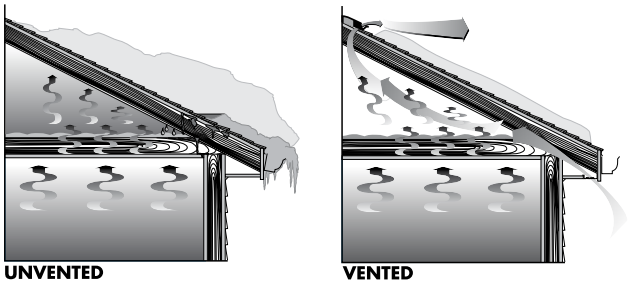

Figure 7-3: Unvented: Heat entering attic from the home melts the snow on the roof and forms destructive ice dams. Vented: Heat is vented out of the attic creating a cold roof.

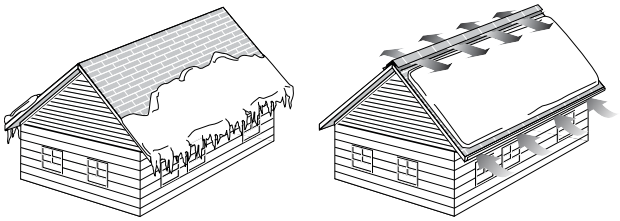

Figure 7-4: (Left) Ice dams, besides being unsightly, are destructive. (Right) Vented attic with even snow distribution is much more desirable.

No amount of insulation, if used alone, can eliminate the formation of ice dams. An efficient attic ventilation system must be part of any solution.

A properly designed ventilation system creates a "cold roof" – a condition where the roof temperature is equalized from top to bottom. An equalized roof temperature helps eliminate the conditions that lead to the formation of ice dams.

Ventilation alone isn't a complete solution either. Ventilation must be used with a waterproofing shingle underlayment and insulation. (Note: It's difficult to say precisely how much insulation will be required. Many factors, from house design to its orientation to the weather, enter into the equation. A general rule, however, is to provide at least 10 to 12 inches of insulation. That's the equivalent to an R-value of 38.)

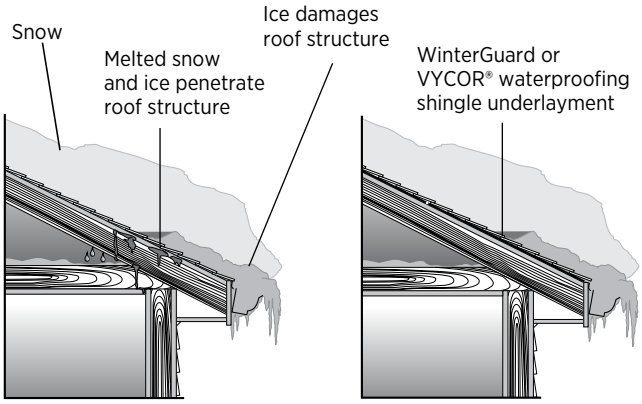

Figure 7-5: (Left) Water can penetrate to an unprotected roof sheathing causing the roof sheathing to rot. (Right) WinterGuard and VYCOR® is a waterproofing shingle underlayment that prevents water from penetrating to the roof sheath.

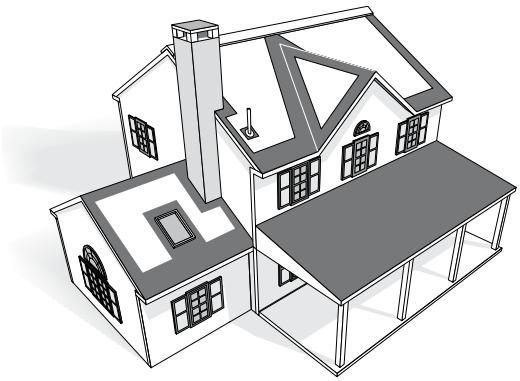

Figure 7-6: The dark shaded areas are the places that WinterGuard or VYCOR® helps protect from the melting water coming off the ice dam.

A DEFENSE AGAINST ICE DAMS

To reduce the possibility of ice dams, use a three-step approach:

1. **Install adequate attic ventilation.** The most effective way to equalize temperatures is to create a "cold roof." One of the most efficient and cost effective systems uses ridge vents and evenly positioned intake vents to distribute airflow from peak to eave.

2. **Install adequate attic insulation.** Attic insulation serves two purposes:
- it reduces heat loss, which is a key factor contributing to the creation of ice dams
- adequate attic insulation diminishes the energy impact of having cold air flowing through the attic.

Be sure there is adequate insulation around electrical fixtures, and wiring and plumbing chases. These areas often contribute to significant heat loss. Check existing insulation for water damage and for areas compressed by foot traffic or stored objects. Finally, make certain existing insulation meets today's R-value requirements.

3. **Specify waterproofing shingle underlayment (WSU) where possible.** A WSU barrier can minimize or eliminate water infiltration into the building structure. WSU must be installed along the eaves and up the roof at least two feet beyond the interior wall line. Many contractors say more is always better. Closed valleys should be lined with a 36" wide piece of WSU.

HOW VENTILATION WORKS

"Ventilate" comes from the Latin word for "to fan," the action of causing air to move. And that's exactly how ventilation works: It provides the conditions that allow air to move. There are many types of attic ventilation systems in use today. Some systems use all natural forces to move the air, such as the wind and "thermal convection" (rising warm air). Other systems use mechanical fans to move the air. And still other systems use some combination of natural and mechanical forces.

Efficient ventilation requires a very specific type of air movement to provide year-round benefits.

A flow of air must be established to produce air changes – a steady, high volume of air movement. That means the system components must be correctly sized and positioned to provide constant airflow, moving in a constant direction.

We can create air movement in one of two ways: natural ventilation or mechanical ventilation. Two key forces create natural air movement: thermal effect and wind. Mechanical ventilation relies on a power source such as electricity.

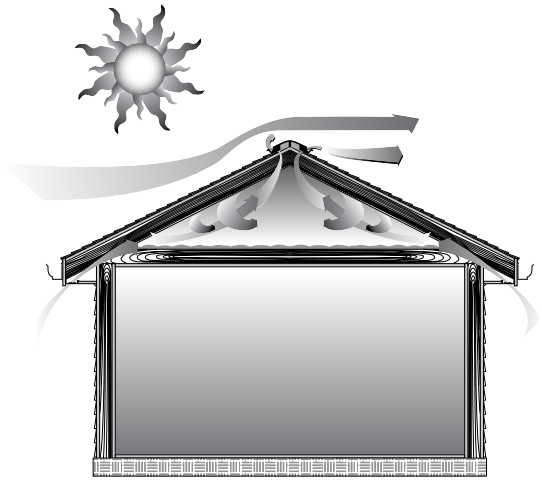

Figure 7-7: Thermal Flow (effect whereby cooler air falls, warmer air rises) and Natural Flow (effect due to wind) come together to ventilate an attic.

THERMAL EFFECT

Thermal effect is the inherent property of warm air to rise. A well-designed system takes advantage of that movement in two ways:

- **Exhaust vents at or near the ridge since warm air rises.** That placement allows the hottest air to be removed from the attic most efficiently.
- **Thermal effect creates a natural circulation of air, because as warm air rises, cooler air falls.** A well-designed system assists this momentum by placing intake vents at the lowest point in the attic, typically in the soffit or near the roof's edge. The cooler air entering these vents speeds this circulation of air.

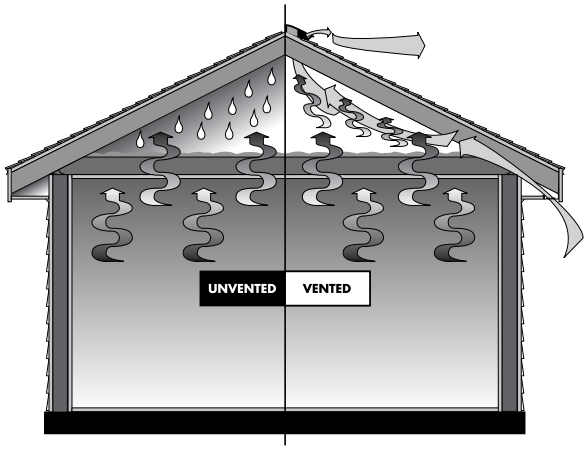

Figure 7-8: Attic ventilated by thermal effect.

WIND

By itself, however, thermal effect cannot create the high volume of air movement needed for effective ventilation. That's why the influence of wind is the key element in designing a non-powered ventilation system. You want to make the wind work to your advantage.

Here's how wind force affects ventilation. It isn't the velocity of the wind by itself that causes air to move through an attic. Instead, it's the wind's speed as it moves against and over a home's exterior surfaces. A wind-driven flow of air creates areas of high and low air pressure (see Figure 7-9). High pressure forces air into the attic, while low pressure pulls air out.

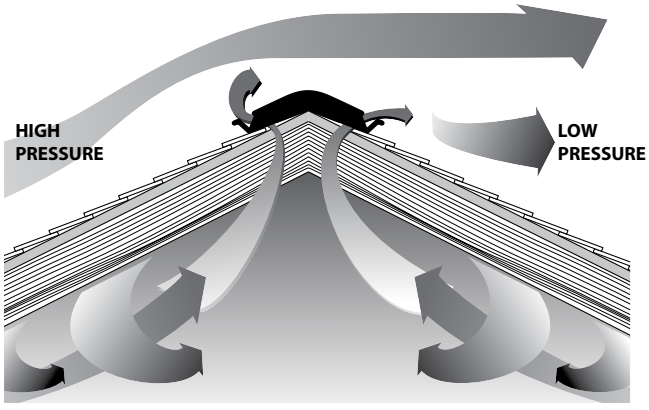

Figure 7-9: Wind passing over the externally baffled Ridge Vent creates low pressure at the vent's openings, which causes air to be "lifted" or pulled out.

HOW TO PUT THESE NATURAL FORCES TO WORK

A properly designed ventilation system requires balance, which is achieved in two ways:

1. **Airflow capacity must be balanced between intake and exhaust vents.**

In general, the net free area of intake venting should be equal to or greater than the net free area of exhaust venting. (Note: Net free area means the total unobstructed area through which air can enter or exit a vent, measured in square inches.)

2. **Intake and exhaust vents must be positioned to create a proper high-low balance.**

That balance is achieved when: Half the vent area must be high in the attic (exhaust), with the other half low in the attic (intake). Without that balance, the area of effective ventilation is limited to the lesser of the two vent areas. For example, if 75 percent of the venting is high and 25 percent low, ventilation is limited to the air moving through the lower vents. For maximum efficiency, the net free area of the intake vents should be equal to or greater than the net free area of exhaust vents.

Proper placement of exhaust/intake vents assures a continuous flow of air, moving in the desired direction.

In planning the location of intake and exhaust vents, two factors must be considered:

1. Intake and exhaust vents must be positioned so they assure continuous airflow along the underside of the roof sheathing.
2. Intake vents must be located so there is little possibility of rain or snow infiltration. Conventional intake products require installation in the soffit. However, there are other intake products that allow roof-top installation such as CertainTeed Intake Vent.

NOTE: To assure optimum performance of intake vents, you must make certain the area above the intake opening isn't blocked by dirt, building debris or attic insulation.

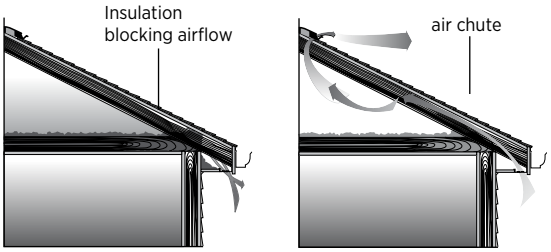

Figure 7-10: (Left) Insulation should not be installed over the soffit/undereave intake area or proper airflow into the attic will be impeded. (Right) An unblocked vent allows a passage for air to move through the attic.

CATHEDRAL OR VAULTED CEILINGS: Warm air which moves from the inside of the house to the roof might be moist because of a furnace humidifier, a wet basement, a wet crawl space, or some other moisture source. This can be the cause of serious sheathing deterioration in cathedral ceilings if they are not protected by an effective vapor barrier. Sometimes a vapor barrier is not enough. Therefore, the addition of a ridge vent and intake vent system, with air spaces (e.g., air chutes) of at least 1″ (more on roofs with lower slopes) positioned beneath the sheathing, above the insulation is recommended. However, if ridge ventilation is used on a cathedral ceiling roof without balanced intake ventilation, the problem can be made worse by pulling moist air from the living area upward, where it then saturates the wood and promotes mold growth on the sheathing. If deteriorated decking is found above a cathedral ceiling, do not replace the decking without addressing the root of the problem by installing proper ventilation and by installing an effective vapor barrier. You should be aware that the best clearance for air spaces has not been determined. Some literature recommends 11⁄2″, but clearances of 3⁄4″ and as much as 3″ have also been recommended. Greater clearance will be the safer choice.

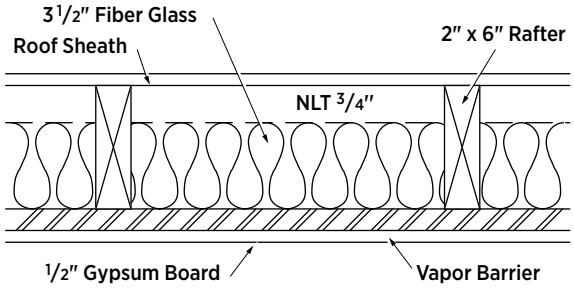

Figure 7-11: Ventilated cathedral ceilings (illustration is drawn horizontally for convenience).

HIP ROOFS: Venting options for hip roofs are:

- Shingle-over ridge vents designed specifically for the diagonal hips of a roof balanced with intake vents around the perimeter of the house.
- Venting with a short ridge vent and four sides of soffit vents. To satisfy code requirements, measure the length of both the ridge and soffit vents. You'll probably achieve sufficient ventilation if 40 percent of the vent area is at the ridge and you maximize venting in the soffit.
- Power vents located at the upper portion of the roof with adequate intake venting at the eaves.

ROOFS WITH UNUSUAL SHAPES: Roof shapes such as "L," "T," cone and octagonal, have an impact on the type of venting required for proper performance. Continuous ridge vents in combination with intake vents can be used effectively with "L" or "T" shaped roofs, if installed properly. Vents should run across both the long and short ridges as long as all attic areas are open to each other. If ridge heights vary by more than 3 feet and the attics are connected, vents should be placed only along the highest ridge. This design prevents snow infiltration and eliminates a potential "short-circuiting" problem where vented ridges at various heights limit the airflow to that level and compromise the "whole house" effectiveness of the ridge intake vent arrangement. Or, use plywood to separate the attics and then it is allowable to install ridge vents on the varying height ridges.

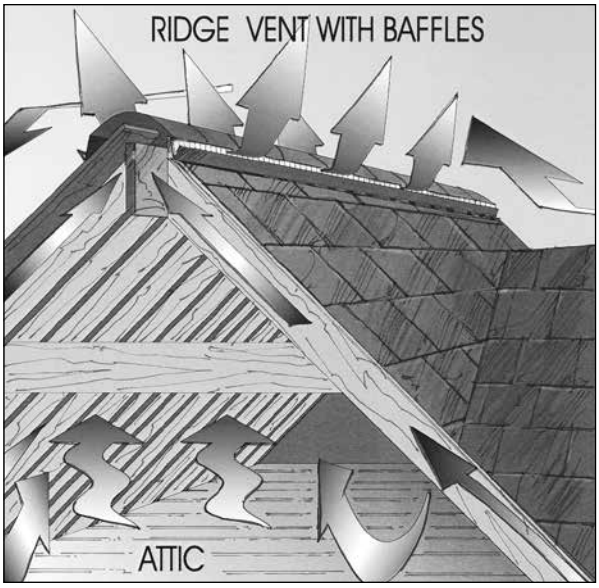

Figure 7-12: In L- or T-shaped roofs, vents should run across both the long and short ridges as long as areas are open to each other. If roof heights vary by more than 3 feet, vents should be placed only along the highest ridge or separate the attics.

METAL CONSTRUCTION MATERIALS CAN AFFECT ATTIC VENTILATION

As a better conductor than wood, metal framing and metal duct work in the attic can speed condensation, which in turn breeds problems of mold, rot and poor indoor air quality, to name a few. Metal framing, therefore, may increase the need for ventilation, insulation, vapor retarders and other materials.

DETERMINING ATTIC VENTILATION REQUIREMENTS

Before the mid-1970s, few people thought about establishing precise requirements for attic ventilation. Homes were not built as air tight as they are today. If a home had any attic ventilation at all, it usually consisted of some undereave vents. In some warmer areas of the country, one or more louvers might supplement those vents (the purpose being, "to catch the breeze"). In especially warm regions, an attic fan might be installed (even though there might not be sufficent intake venting to assure proper functioning).

Even if designers and specifiers had wanted to calculate specific requirements for temperature or moisture reduction, they had little research-based information to guide them.

The Federal Housing Administration tried to close that information gap with minimum property standards for buildings with one or two living units. Since then, other standards have been developed. An example of current minimum requirements for ventilation comes from the 2018 International Residential Code (IRC) Section R806:

R806.1 Ventilation required. Enclosed attics and enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow.

R806.2 Minimum vent area. The minimum net free ventilation area shall be 1/150 of the area of the vented space.

Exception: The minimum net free ventilation area shall be 1/300 of the vented space provided both of the following conditions are met:

1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
2. Not less than 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space. The balance of the required ventilation provided shall be located in the bottom one-third of the attic space.

R806.3 Vent and insulation clearance. Where eave or cornice vents are installed, blocking, bridging and insulation shall not block the free flow of air. Not less than 1-inch (25 mm) space shall be provided between the insulation and the roof sheathing and at the location of the vent.

R806.4 Installation and weather protection. Ventilators shall be installed in accordance with manufacturer's instructions. Installation of ventilators in roof systems shall be in accordance with the requirements of Section R903. Installation of ventilators in wall systems shall be in accordance with the requirements of Section R703.1.

If you want to install an effective, year-round ventilation system use the 1/150 ratio. This ratio takes into account that today's homes are built with – or remodeled with – materials (doors, insulation, windows, etc.) that are more energy efficient. Consequently, these homes are more airtight and need more attic ventilation.

VENTILATION STANDARDS AND SHINGLE WARRANTIES

Standards For Ventilation: The Housing and Urban Development agency, model building codes and ASHRAE have set standards for attic ventilation. Most shingle manufacturers have adopted these standards as minimum acceptable ventilation requirements in their shingle warranties. The standards require a minimum of 1 square foot of net free ventilation area for every 150 square feet of attic floor space. However, if approximately half of the open ventilation area is in the upper portion of the roof, such as at the ridge, and half is in the lower area, such as at the soffits or eaves, the standard reduces to 1 square foot of net free ventilation for every 300 square feet of attic floor space. A balanced system allows a less restricted, even flow of air through the attic space. When in-and-out ventilation cannot be equally balanced, research indicates that it is better to have somewhat more ventilation area at the lower part of the roof.

Warranties: Shingle manufacturers require that roof systems in which its shingles are installed meet HUD or local building code standards for ventilation. If not, the shingle warranty terms may be void in whole or in part.

GENERAL VENTILATION REQUIREMENTS FOR CERTAINTEED SHINGLE WARRANTY COMPLIANCE

- If full intake to ridge ventilation is installed, the ratio of Net Free Ventilation Area (NFVA)/attic floor space must be at least 1/300.
- In most other cases the ratio required is 1/150.
- If the 1/150 cannot be obtained, the shingle roof warranty for any CertainTeed asphalt composition shingle will be reduced to a maximum of 10 years without SureStart protection, with respect to shingle problems related to the absence of adequate ventilation (see warranty for details).

CALCULATING REQUIREMENTS FOR AN EFFICIENT FIXED VENT SYSTEM

If you want to install an effective, year-round ventilation system follow the steps below which are based on the 1/150 ratio. This ratio takes into account that today's homes are built with – or remodeled with – materials (doors, windows, insulation, etc.) that are much more airtight than ever before and need more ventilation.

Note: The following process is used to calculate requirements for non-powered ventilation systems.

1. Determine the square footage of attic area to be ventilated. Multiply the length of the attic (in feet) by its width.

Example: For this and the following calculations, we'll assume a project involving a home that has a 40′ by 25′ attic area.

Calculation:
40′ x 25′ = 1,000 sq. ft. of attic area.

2. Determine the total net free area required. Once the attic square footage is known, divide by 150 (for the 1/150 ratio). That determines the total amount of net free area needed to properly ventilate the attic.

Calculation:
1,000 sq. ft. ÷ 150 = 6.6 sq. ft. of total net free area.

3. Determine the amount of intake and exhaust (low and high) net free area required. For optimum performance, the attic ventilation system must be balanced with intake and exhaust vents. This is a simple calculation: just divide the answer from Step 2 by 2.

Calculation:
6.6 ÷ 2 = 3.3 sq. ft. of intake net free area and 3.3 sq. ft. of exhaust net free area.

4. Convert to square inches. The net free area specifications for attic ventilation products are listed in square inches. Therefore, let's convert our calculation in Step 3 from square feet to square inches. To do this simply multiply by 144 (which is the number of square inches in a square foot.)

Calculation:
3.3 sq. ft. x 144 = 475 sq. in. of intake net free area and 475 sq. in. of exhaust net free area.

5. Determine the number of units of exhaust and intake venting you'll require. To make these calculations you'll need to know the net free area specifications of the exhaust and intake vents being specified/installed for the project. As a guide, the Table on page 69 lists the net free area specifications, in square inches, of Air Vent intake and exhaust vents.

To perform the calculations, divide the net free area requirement from Step 4 by the appropriate figure from the Net Free Area Table. For our example, we will use the figures for Air Vent's ShingleVent® II ridge vents and undereave vents.

Calculation:
(for 4-foot length of ridge vent)
475 sq. in. ÷ 72 = 6.6 pieces of vent (or seven 4-foot lengths of ridge vent)
(for 16″ x 8″ undereave vent)
475 sq. in. ÷ 56 = 8.5 pieces of vent (or nine 16″ x 8″ vents)

MEET MINIMUM CODE REQUIREMENTS

To determine how many square feet of NET FREE VENTILATION AREA (NFVA) you need for a balanced soffit to ridge vent system, use this formula:

$$\frac{\text{Sq. ft. of attic floor space}}{300} = \text{Sq. ft. of NFVA needed}$$

(Note: "300" will be changed to 150 for homes without balanced airflow.)

To determine how many linear feet of Air Vent Ridge Vent you need, use this formula:

1/2 NFVA needed x 144 ÷ 18 = feet of ridge vent needed.

To determine how many linear feet of AIR VENT CONTINUOUS SOFFIT VENTS you need, use this formula:

1/2 net-free area x 144 ÷ 9 = feet of soffit vent needed.

NOTE: soffit vents must be installed evenly along all soffits.

CALCULATING REQUIREMENTS FOR POWER ATTIC VENTILATORS

If you plan on installing a power fan, you can calculate intake and exhaust requirements using the following formulas:

1. Determine the fan capacity needed to provide about 10 to 12 air exchanges per hour. The formula is: Attic square feet x 0.7 = CFM capacity

For example, using the same dimensions as the previous example:

Calculation:
1,000 sq. ft. x 0.7 = 700 CFM.

The steeper a roof the greater its "volume" thus it needs more airflow – code does not require it, however. Note: For roofs with a 7/12 to 10/12 roof pitch, you may want to add 20% more CFM; and for roofs 11/12 pitch and higher add 30% more CFM to handle the larger volume of attic space.

2. Determine the amount of intake venting required.

The formula is: CFM rating of fan ÷ 300 = square feet of intake ventilation needed.

Calculation:
700 CFM ÷ 300 = 2.3 square feet.

3. Convert to sq. in. by multiplying by 144 (which is the number of sq. inches in a sq. ft.).

The formula is: sq. ft. of intake ventilation net free area x 144" sq. in. of intake ventilation net free area needed.

Calculation:
2.3 sq. ft. x 144 = 331 square inches of net free intake area

To find the number of intake vents required, use the Net Free Area Table as explained earlier in Step 5.

NET FREE AREA TABLE

Type of Vent	Net Free Attic Vent Area (sq. in. — approximate)
High Vents – Exhaust	
ShingleVent® II (4′ length)	72
Hip Ridge™ Vent (4′ length)	48
Roof louver	50
Wind turbine (12″)	95
Rectangular gable vents	
12″ x 12″	40
12″ x 18″	59
14″ x 24″	92
18″ x 24″	119
24″ x 30″	324
Low Vents – Intake	
16″ x 8″ undereave vent	56
16″ x 6″ undereave vent	42
16″ x 4″ undereave vent	28
Continuous soffit vent & vented drip edge: 8′ length	72
CertainTeed Shingle-over intake vent: 4′ length	36
Lanced aluminum soffit: One square foot	4–7

Be sure to check specifications for individual products to determine actual net free vent area.

TYPES OF ATTIC VENTILATION PRODUCTS

In general, ventilation components can be divided into two main categories: intake vents and exhaust vents.

INTAKE VENTS

The best location for intake vents is in or near the roof eave or low at the roof's edge, placed on both sides of the roof.

Intake vents are available in many designs. In choosing the right unit for a particular job, you have to consider the structure of the home, the area where the units will be located and the net free area provided by each unit.

The most common types of intake venting are:

- Undereave vents, which are mounted in the soffit. Units vary in size from 16″ x 8″ to 16″ x 4″. Net free area varies according to unit size.
- Continuous soffit vents, which are also mounted in the soffit. These units vary in length, with the typical length being 96″.
- Vented drip edge, which is used on homes without an eave area.
- The CertainTeed shingle-over Intake Vent which is a roof-top installed vent available in 4′ lengths.
- Mini-louvers, which are typically used with other types of intake venting; they're too small by themselves to provide sufficient net free area of intake. In most applications, they're installed in an exterior wall to help eliminate moisture that collects in the wall cavity. To be effective, mini-louvers must be installed below the source of humidity (such as a bathroom or laundry area). That placement allows a flow of air to collect the humidity and carry it into the attic.
- Vented soffit panels, which are vinyl or aluminum soffits with vent openings already cut into the panels. Be sure to check the net free area of the panels to assure they provide enough ventilation to balance the system.

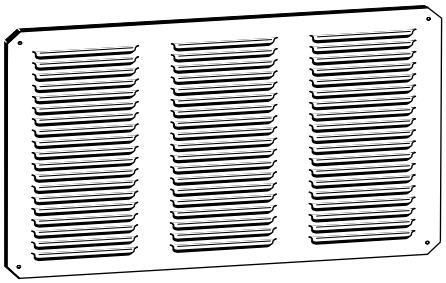

Figure 7-13: The undereave vent, an intake vent, allows needed air to enter the attic. It is located on the underside of the eave.

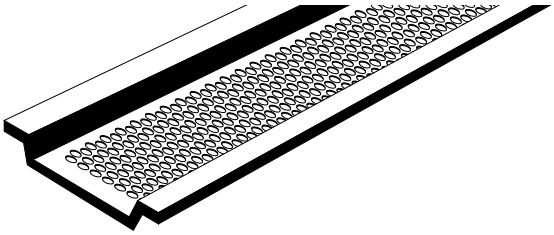

Figure 7-14: A continuous soffit vent takes in outside air and is located on the underside of the eave.

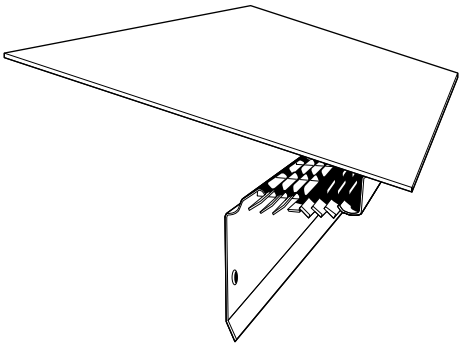

Figure 7-15A: For soffitless applications vented drip edge combines a drip edge with intake louvers.

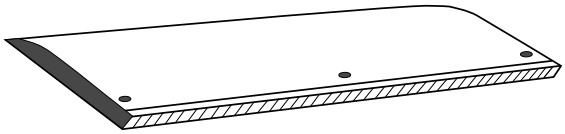

Figure 7-15B: While conventional intake vents require installation in the soffit for maximum weather protection, the CertainTeed shingle-over Intake Vent has been designed for roof-top installation and maximum weather protection.

Here's a Tip...

When installing ridge vent with equal soffit ventilation, all other exhaust vents should be removed or blocked with plywood or plastic. Attic fans should also be removed and the decking replaced where the fan was installed. (Thanks to Vincent Hee of Oreland, Pennsylvania.)

EXHAUST VENTS

Exhaust vents are designed to permit an efficient, unobstructed outflow of attic air. These units must be designed to prevent (or at least minimize) rain and snow infiltration. Exhaust vents must be used with intake vents to provide proper high/low balance and thus an adequate flow of air through an attic. Exhaust vents are available in different designs:

Roof louvers

Roof louvers (also called roof pots or box vents) are installed as close to the roof ridge as possible to allow maximum release of moisture and overheated air. They are available in round, square and slant-back styles. Because they're installed near the ridge, they provide a continuous airflow along most of the underside of the roof sheathing. The airflow pattern isn't uniform, however, so for maximum effectiveness, vents should be spaced equally along the roof.

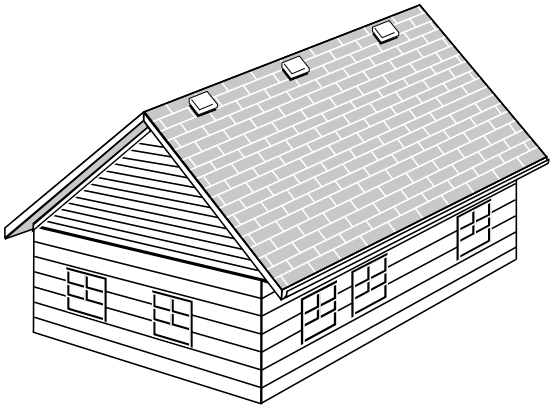

Figure 7-16: A roof louver is an exhaust vent located near the ridge.

Gable louvers

Gable louvers are typically installed in the gable ends of the house. Two types are available: rectangular and triangular. In most installations, a unit is placed at each gable end.

Figure 7-17: The gable-louver, an exhaust vent, allows unwanted air to flow out of the attic. These are located at the ends of the attic.

NOTE: Sometimes louvers are installed in opposite gable ends, without intake venting, in the mistaken assumption that a good "cross flow" of air can provide adequate ventilation. What typically happens, however, is illustrated in Figures 7-18 and 7-19. If wind direction is perpendicular to the ridge, the louvers act as both intake and exhaust vents, providing ventilation only in the areas near the vents. If the wind direction is parallel to the ridge, a cross flow of air is established, although the flow tends to dip toward the attic floor, leaving the hottest air still at the underside of the roof sheathing. Of course, if absolutely no intake venting can be installed at low points in the attic, a louver-only installation is preferable to no ventilation at all.

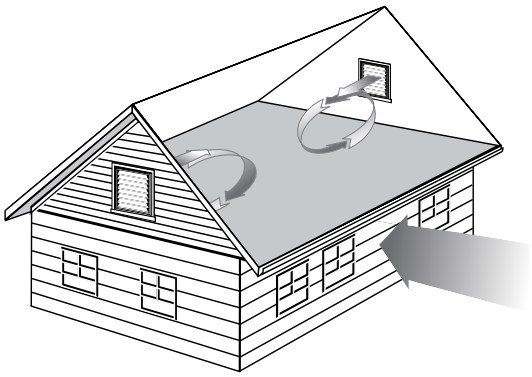

Figure 7-18: With wind blowing perpendicular to the ridge, the louvers act as both intake and exhaust vents.

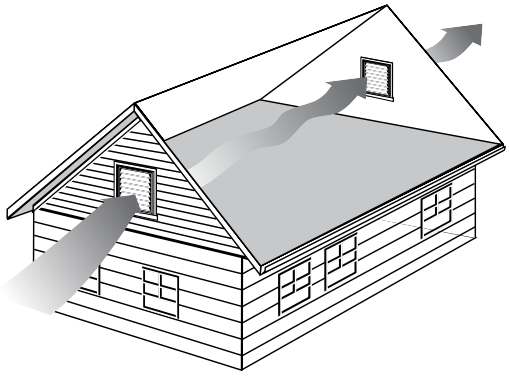

Figure 7-19: With wind blowing parallel to the ridge, airflow dips toward the attic floor leaving the hottest air still on the underside of the roof sheathing.

NEVER MIX TWO TYPES OF EXHAUST VENTS

When ridge-and-soffit ventilation is added to an attic with other vents in place, such as gable end vents, roof louvers, wind turbines or power fans, you must remove or block off the other ventilators. When installed properly, ridge and soffit systems draw air in the bottom (soffits) and out the top (ridge). Other open ventilator holes in the roof or gable will shortcut the low-to-high draft and diminish the ventilation effectiveness. It can also lead to weather infiltration.

RIDGE VENTS

Ridge vents offer unique advantages compared to other types of exhaust vents. Those advantages include:

- **Maximum efficiency.** The best ridge vents use an external baffle designed to draw heated air from an attic regardless of wind direction or force. Figure 7-20 shows how that happens.

Figure 7-20: A baffled CertainTeed Ridge Vent creates an area of low pressure on both sides of the ridge vent. It literally lifts air out of the attic through both sides of the vent.

When wind direction is perpendicular to the ridge, it strikes the external baffle and jumps over the ridge. That movement creates a Bernoulli effect, causing low pressure to develop on both sides of the vent. When that happens, air from the attic is "lifted" out, in much the same way low pressure created above an airplane wing gives "lift" to the plane (refer also to Figure 7-9).

The same thing happens when the wind direction is parallel to the ridge. It moves up and over the ridge, creating a low pressure area.

In addition, when little wind force exists, ridge vents take full advantage of the thermal effect to maintain air circulation across the underside of the roof sheathing. Warm air rises to the ridge and exhausts through the vent. That allows a continuous flow of cooler air to enter at intake vents. Only ridge vents use thermal effect efficiently and effectively, because only ridge vents provide continuous and uniform air movement along the full length of a roof.

NOTE: For best results, intake venting should be divided equally along both sides of a structure.

- **Maximum air movement.** Ridge vents with an external baffle provide a higher volume of airflow per square foot of attic area than any other fixed non-powered vent system. That conclusion is based on a series of independent tests that measured — and compared — the volume of air movement provided by ridge vents and other fixed vent systems. Externally baffled ridge vents work better because they take advantage of two natural forces: the thermal effect (the fact that warm air rises) and low air pressure that is created as air is deflected by the baffle up and over the ridge vent to create an area of low pressure on both sides of the ridge vent *(see Figure 7-9)*.
- **Uniform air movement.** Because ridge vents run the entire length of a roof, they provide a uniform flow of air along the underside of the roof sheathing. That air movement helps eliminate "hot spots" that can develop with other types of exhaust vents — even powered vents. No other exhaust vent provides this type of airflow pattern.
- **Maximum visual appeal.** Most ridge vents offer a low-profile design that minimizes its appearance on a roof. Shingle-over designs allow optimum blending with other roof materials.

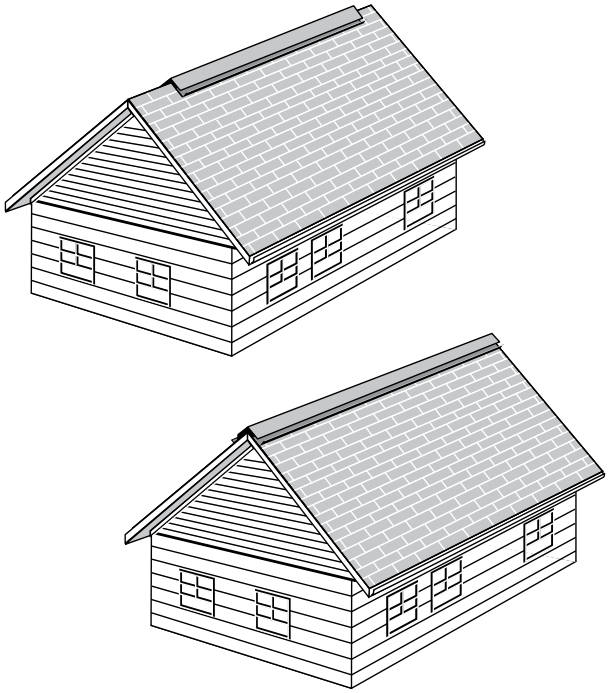

Figure 7-21: (Top) Ridge vent shorter than the ridge length presents an unattractive "broken" appearance. (Bottom) A ridge vent should extend all the way from one end of the roof to the other end of the roof for a smooth "unbroken" roof line.

It's important to emphasize that the advantages listed above apply only to ridge vents that use an external baffle design. A series of independent tests has concluded that only an external baffle can direct the wind up and over the vent. That's significant, because it's that controlled flow of air that creates the area of low pressure that causes air to be drawn or pulled from an attic.

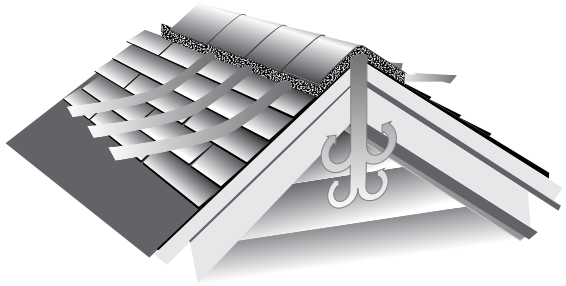

Figure 7-22: A roll vent with an internal baffle, or without any baffle at all, does not "pull" air from the attic through both sides of the vent.

Figure 7-23: An externally baffled vent "pulls" air from the attic through both sides of the vent.

Ridge vents without an external baffle were ineffective, failing to create the low air pressure needed to exhaust attic air through both sides of the vent. As a result, testers concluded that "an external baffle was the most significant contributor to the performance of a ridge vent."

WIND TURBINES

Wind turbines use a moving part to help exhaust air from an attic. That moving part consists of a series of specially shaped vanes that turn wind force into a rotary motion. As the spinning vanes gain velocity, they create an area of low air pressure. That low pressure, in turn, pulls air from an attic.

Although not as effective as ridge vents, wind turbines provide a low-cost alternative in areas where consistent wind speeds of at least 5 mph are typical. Without that minimal wind speed, wind turbines act essentially as roof louvers.

When the wind is blowing, however, wind turbines can be effective air movers.

To provide maximum ventilation benefits, wind turbines, like roof louvers, must be equally spaced along a roof. Otherwise, ventilation will be focused in the area surrounding the wind turbine, allowing hot spots to develop in other areas of the attic.

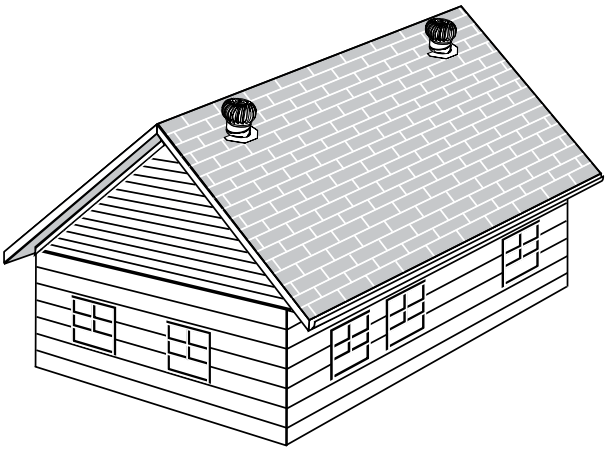

Figure 7-24: Wind turbines are located near the ridge and are used to exhaust air from the attic.

POWER ATTIC VENTILATORS

Like a wind turbine, a power fan uses the rotary motion of blades to draw hot air from the attic. But instead of using wind power to drive the blades, power fans use electricity to drive high-efficiency motors or sunlight if they are solar powered.

Unlike a wind turbine, however, the effectiveness of a power fan isn't dependent on wind force. Instead, a power fan is turned on and off as needed, automatically, with thermostat and humidistat controls. (In some models, an integral humidistat control is standard; in most models, however, a humidistat is an add-on option. Generally, solar powered fans do not have thermostat or humidistat controls.)

Depending on the size of the motor and the efficiency of the blade design, power fans can move more than 1,500 cubic feet of air per minute. That high volume of air movement is critical. To ensure adequate ventilation, power fans must provide at least 10 changes of attic air every hour.

Although a power fan can move a large volume of air, typically a single unit cannot "vacuum" all hot air from an attic. Usually, to provide uniform air movement along the underside of roof sheathing, a series of power fans must be spaced equally along a roof. When using a series of power fans to ventilate the same attic space they should operate simultaneously. Otherwise, when one fan is activated, it can draw in fresh air through the opening of the other fan(s), thus short-circuiting the eave-to-ridge ventilation path and also preventing the other fan(s) from activating. Remember to provide proper intake ventilation for each fan.

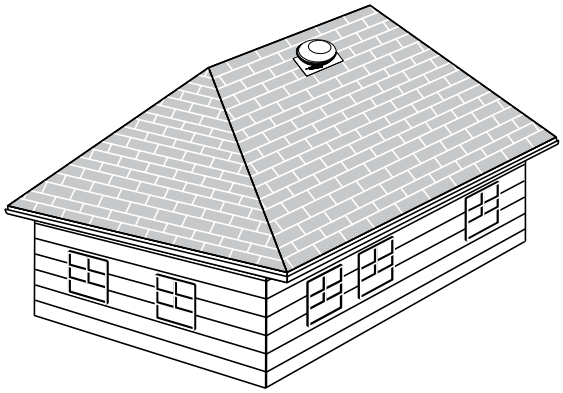

Figure 7-25: Power fans are used to move large volumes of air — a good option for hard-to-vent hip roofs.

When evaluating the feasibility of using power fans, it's important to evaluate one factor which is considered to be a major disadvantage: namely, that power fans cannot vent away moisture during the winter unless they are equipped with humidistat controls.

If this is a problem in your climate, it can be solved, by using a power fan that has a humidistat control. When that's done, power fans do offer key benefits. They ensure a high volume of airflow, even on days when outside air is virtually still (a common occurrence in inland areas on hot summer days).

SECTION 7 SELF-TEST

7-1. A well-designed ventilation system will:

A. Make the roof cooler in the summer.

B. Make the attic drier in the winter.

C. Help keep a more uniform temperature on the underside of the deck.

D. All of the above.

7-2. The minimum net free ventilation area shall be 1/300 of the vented space provided both of the following conditions are met:

1. In climate zones 6, 7 and 8, a class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.

2. At least 40% and not more than 50% of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter space, with the balance of the required ventilation provided by eave or cornice vents.

A. True.

B. False.

7-3. A hip roof can usually be adequately vented if 40 percent of the vent area is at the ridge and if venting at the soffits is maximized.

A. True.

B. False.

7-4. When eave vents are installed, ensure at least a 1" space between the insulation and the roof sheathing.

A. True.

B. False.

7-5. Vapor barriers will:

A. Prevent some, but not all of the warm moist air inside the house from entering the attic or exterior walls.

B. Cause the warm moist air inside the house to condense on the ceilings.

C. Cause condensation that will damage the insulation surrounding items penetrating the barrier.

D. Cause condensation that will corrode metal items such as switch boxes.

7-6. If ridge heights vary by more than 3 feet and the attics are connected, the ridge vents should be installed on the highest ridge, or separate the attics.

A. True.

B. False.

7-7. Never mix two types of exhaust vents.

A. True.

B. False.

7-8. You can determine the fan capacity needed to provide about ten to twelve attic air exchanges per hour by multiplying the number of square feet of attic floor space times 0.7.

A. True.

B. False.

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Correct Fastening

8

YOUR OBJECTIVE:
To learn CertainTeed's recommended methods for fastening shingles.

GENERAL FASTENING GUIDELINES

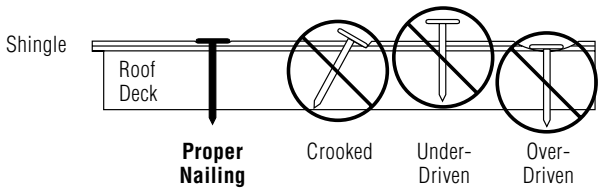

Figure 8-1: Fastening.

- Proper placement of fasteners is important for shingle performance and warranty protection. Ideally, placement of fasteners should be as specified according to the precise locations shown for each shingle. However, in practice some variation (dimensional tolerance) is acceptable.
- Nailing locations vary by shingle style and by roof slope. It is critical to fasten the shingles in the proper locations in order to achieve designed performance. Improperly fastened shingles may blow off or slip out of place. The use of asphalt roofing cement in small quarter-size dabs to hold the shingle down is required on most shingles when applied to steep slopes exceeding 21/12 (60 degrees). Consult individual shingle application instructions for details on the above, including fastening points.
- Fastening a heavier and thicker premium shingle requires longer nails.
- Nails with a barbed or rough shank are recommended. Smooth pneumatic nails are also acceptable.
- Nail shanks must be either 11- or 12-gauge.
- Nail head diameter must be at least 3/8".
- Nail shanks must be long enough to penetrate the roofing and then go 3/4" into solid wood, plywood or non-veneer wood decking, or through the thickness of the decking, whichever is less.
- Be sure fasteners are driven straight, with nail heads flush with the shingle surface and never cutting into the shingle (Figure 8-1).
- All nails must be corrosion resistant; for example, double-dipped galvanized steel, electro-galvanized steel, aluminum, copper or stainless steel.
- When installing shingles on low-slopes, double-dipped galvanized or stainless steel nails are recommended to withstand the moisture in areas prone to rain and snow.
- To prevent shingle distortion, do not attempt to realign a shingle by shifting the free end after two fasteners are in place.
- Fasteners should not go into, above, or between the self-sealing strips (except for Highland Slate). If they do, the shingles may not seal properly and will be more likely to blow off.
- If a nail is underdriven, be sure that it is hammered down flush.
- Seal overdriven nails with asphalt roofing cement and install another nail nearby.
- Fasteners must not be exposed; i.e., visible on the finished roof.

ARE STAPLES ACCEPTABLE?

Both ARMA and CertainTeed strongly recommend that properly driven and applied roofing nails be used as the fastening system for asphalt shingles. Staples ***might*** perform acceptably if properly applied, but proper alignment and application is more difficult with staples than with nails, making shingle damage and blow-offs more likely. For those reasons, nails MUST be used for CertainTeed shingles.

Here's a Tip...

To keep air compressor hoses neat and un-tangled, use a regular garden hose reel. Attach all the hoses together when winding them up. You can take them off one at a time, for however many you need. — Renee Velzka, Massillon, Ohio

USING PNEUMATIC GUNS

Pneumatic nail guns are widely used. However, in cold weather it can be difficult to keep the pressure properly regulated to drive the nail correctly (flush with the shingle surface). With improper pressure, nails can be driven completely through shingles or underdriven. For this reason, many roofers switch to hand-nailing during cold weather. In addition to cold weather, numerous factors can affect the air pressure of pnuematic guns; such as temperature changes throughout the day, the number of guns per air compressor, the length of the air hose, etc. It is advisable for installers to periodically check the air pressure and adjust it as necessary for these factors, as well as for the thickness of the roof deck and the particular shingles being installed.

APPLYING SHINGLES IN HIGH-WIND AREAS

The term "storm nailing," refers to the fastening procedure that employs six nails per shingle instead of the usual four. CertainTeed produces a large variety of shingle products designed to withstand high-winds using standard fastening methods. Nails must be used as fasteners and staples are not allowed.

Although not required, in areas where wind frequently exceeds 60 mph, you may want to apply a quarter-size (1" diameter) spot of cement, sealant or caulk under each shingle tab corner, or as specified in the shingle application instructions. Acceptable caulks and sealants should meet the performance requirements of ASTM D4586 Type II.

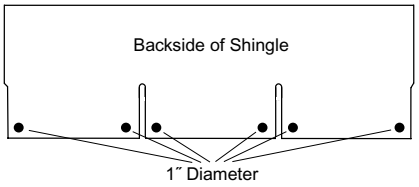

Figure 8-2: Applying roofing cement under a tab corner.

HAND SEALING

The following hand sealing procedure is based on Asphalt Roofing Manufacturers' Association (ARMA) recommendations:

1. Choose a sunny day because warm shingles are more easily raised enough to apply the cement without damaging the shingles. In cool weather, the cement should be stored in a heated area so it can easily be applied. The cement may be applied with a caulking gun if tubes are used, or with a small trowel or putty knife if used from a pail.
2. The amount and position of the cement are typically the most important features for a good seal. Seal the tabs by carefully lifting the tab just high enough to apply two spots of cement, each about the size of a quarter, near the corner of each tab. The spots should be located so that when the tab is pressed into place, the cement is not exposed. Each shingle chapter of the SAM provides guidance on cement position as well as visual guides.

CAUTION: Avoid excessive use of cement so as to prevent the formation of blisters or a lumpy appearance on the roof.

3. To make certain that all tabs are sealed, decide upon a predetermined pattern of sealing before starting the job. A recommended pattern to follow in sealing three-tab shingles is to start at one rake or hip of the roof, and beginning at the eaves, seal three tabs. Then seal the three tabs of the course above it, and continue in this manner until the ridge or hip is reached. Repeat this procedure starting at the eaves with three tabs adjacent to the ones just sealed. Continue until all tabs are sealed.

Here Are Some Tips...

After applying the last cap on a ridge, put a tab of asphalt roofing cement on the nail heads and sprinkle some loose granules over the cement. When done, you can't see the spots where you face-nailed. (Thanks to John McAvoy Jr. from Troy, NY.)

Avoid driving nails through metal flashing that covers two sides of adjoining underlaying materials, such as different pieces of roof decking or between vertical and horizontal planes. It is very difficult to permanently seal the punctures in these situations and, over time, expansion and contraction of the flashing can cause the holes to enlarge and/or the flashing to buckle.

OPEN SOFFITS

When installing CertainTeed shingles on roof decking that spans an open overhanging soffit area and fasteners protruding through the underside of the deck would be aesthetically objectionable, CertainTeed allows the use of shorter fasteners that do not penetrate through the deck. This exception to the CertainTeed fastener requirements applies only in the CertainTeed North West and South West regions (ID, OR, WA, NM, WY, CA, AK, HI, UT, AZ, NV, CO).

The CertainTeed Asphalt Shingle Residential Products Limited Warranty covering its shingles will remain in force if the shingles have been installed on an acceptable deck with appropriate fasteners, even if they do not penetrate to the full depth specified in the shingle's application instructions, if the following conditions are met:

IMPORTANT: Two extra fasteners per shingle are required and the fasteners must penetrate into the roof deck at least 3/8" and seat firmly against the shingle surface. Due to the shortness of the fasteners, they must be either ring-shanked or hot-dipped galvanized in order to resist back-out. Refer to the steep slope application instructions for nail placement (no asphalt roofing cement is required). This exception applies only to those areas of the roof deck that spans an open overhanging soffit.

Fasteners used in all other areas of the roof deck must be applied according to CertainTeed application instructions and fastener requirements. In addition, CertainTeed shall not have any liability or responsibility for (a) Damage to the shingles caused by fasteners that back out of the roof deck or are not applied properly, or (b) Nail-pops or blow-offs resulting from fasteners that are under-driven (standing up).

Caution: Check your local Building Code for applicable fastener requirements.

Note: Conduct a "field test" to ensure that the minimum penetration is met or exceeded. The best fastening performance results when fastener points just barely splinter the underside of the deck.

FASTENING RIDGES AND HIPS

- When capping ridges and hips, be sure fasteners are long enough to penetrate and hold the deck properly. Installing caps requires longer fasteners than those used to apply field shingles.
- When installing the last cap in a row of hip or ridge shingles, face-nail this piece and protect the nail heads with nickel-size spots of asphalt roofing cement.

FASTENING STARTER SHINGLES

When installing starter shingles it is important to position fasteners at the lowest possible location along the eave and ensure that they penetrate into the roof deck.

SECTION 8 SELF-TEST

8-1. CertainTeed does not allow staples to be used as fasteners on six specific shingle products.

A. True.

B. False.

8-2. Quarter size dabs of asphalt roofing cement are needed to hold most shingles when applied to slopes exceeding 60 degrees.

A. True.

B. False.

8-3. The term "storm nailing" refers to the use of six nails per shingle and CertainTeed does not require storm nailing for upgraded wind warranty coverage.

A. True.

B. False.

8-4. The proper nail length varies by the type of shingle and should:

A. Be long enough to penetrate the roofing and then go 3/8" into the decking or through the thickness of the decking, whichever is less.

B. Be long enough to penetrate the roofing and then go 3/4" into the decking or through the thickness of the decking, whichever is less.

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Installing Shingles on Special Shaped Roofs

9

YOUR OBJECTIVE:

To learn how to apply shingles to roof shapes other than the standard straight gable.

The application instructions for each of the CertainTeed products in the middle chapters of this manual are intended for a standard straight gable roof. You will encounter other roof shapes where the methods for the standard roof will not be entirely appropriate. This chapter contains supplementary instructions that will enable you to handle the special problems encountered in hip roofs, cone- or turret-shaped roofs, and dormers. There is also a discussion of how to finish a dormer ridge cap that ties into the field of a roof.

HIP ROOF APPLICATION

METHODS

Most shingles can be applied to hip roofs by employing either of two methods — the racking method or the diagonal method. The choice depends on the application instructions for the shingle being applied. The racking method is the only recommended method for some shingles and is designated as an alternative method for others. At the same time, the diagonal method is the only method recommended for other shingles. Refer to the approved application method(s) in the chapter for the specific shingle being installed.

THE DIAGONAL METHOD

A. Underlayment and the Starter Course

1. It is recommended that WinterGuard or VYCOR® Waterproofing Shingle Underlayment ("WSU") be used across the hips. Apply centered on the hips before applying water resistant underlayment to the rest of the roof. (If a WSU is used along the eaves for protection against ice dams, apply it first, and then lap the WSU from the hip over it.)
2. Strike a chalk line perpendicular to the eaves from the ridge to the eaves to serve as a vertical reference. Strike horizontal lines as necessary to ensure course alignment. (The vertical reference should be on the left side of the roof in the vicinity of where the hip meets the ridge.)
3. Install starter as directed in the application instructions for the shingle being applied. Overlap the vertical reference line by the measured half tab-length portion of the shingle instead of cutting it off. The starter strip should extend the entire length of the eaves (see Figure 9-1).

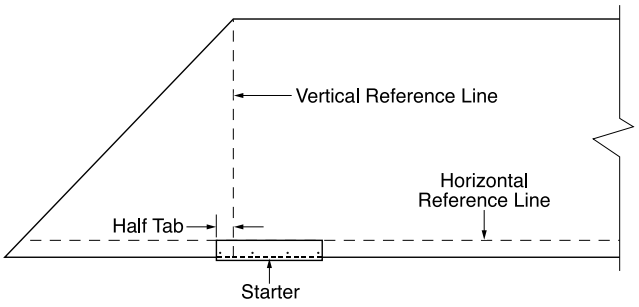


Figure 9-1: Starter strip overlapping the vertical reference line.

B. Installing the First Diagonal Section

1. Install the first shingle of the first course with the left edge aligned with the vertical reference line (see Figure 9-2).

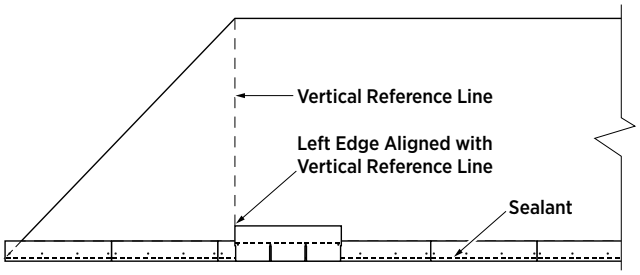


Figure 9-2: Installing the first shingle of the first course with the left edge aligned with the vertical reference line

2. Apply the first shingle of each course above the first course by overlapping the reference line by the required amount as directed by the application instructions for the shingle. Do not nail the left end of these shingles at this time. (There will be a total of four or six courses per diagonal section depending on the product being installed.) (See Figure 9-3).

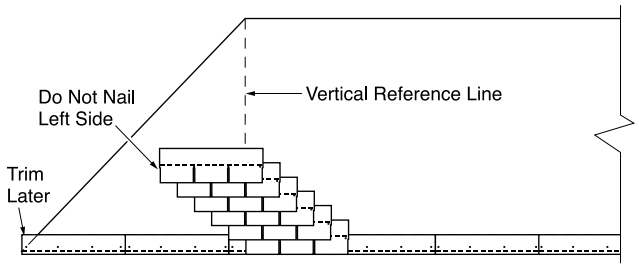


Figure 9-3: Section 1-A

3. Before continuing up the roof section, apply one shingle immediately to the right of each shingle of the completed first section (see Figure 9-4, Section 1B).

C. Installing Diagonal Sections Above the First Section

1. Install the first shingle of the first course of each diagonal section the same as in the first diagonal section: with the left edge aligned with the vertical reference line.
2. Continue up the roof using the same offset method used in the first diagonal section.
3. Before beginning each diagonal section, apply one shingle immediately to the right of each shingle of all courses already installed on the roof (as in Figure 9-4, Section 1-B).
4. Continue installing diagonal sections and shingles to the right of the sections as described above up to the ridge and to the right-edge gable or hip.
5. Trim shingles that extend beyond the right edge flush with the hip line or with proper overhang at a gable edge.

D. Filling In to the Left of the Vertical Reference Line

Install a full shingle to the left of the shingle in the first course at the vertical reference line and along the edge of the roof. Slide the end of this shingle under the portion of the first shingle of the second course that extends to the right of the vertical line. Install the nail in the overlying portion of the second-course shingle.

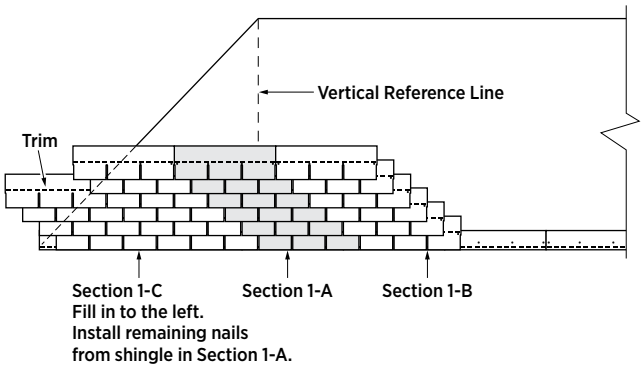


Figure 9-4: Filling in the area to the left of the vertical reference line.

1. Install a full shingle next to the just-nailed second-course shingle, sliding it under the overhanging portion of the third-course shingle and installing the nail in the overlying portion of the third-course shingle. Do not nail the left end of this shingle at this time.
2. Continue installing shingles in this manner, starting to the left of the existing diagonals at the vertical reference line and continuing up and to the left until reaching the hip in both directions. Nail the left edge of shingles when a shingle further left is inserted beneath them.
3. Pieces cut from the right of the roof area, whether a straight gable or another hip, can be used to fill in the missing segments at the left hip. Be alert to the necessity of installing the nail that was left out of the left end of the overlying shingle.

E. Shingling the Other Sides of Hips and Cap Installation

Complete the roof by similarly installing shingles on the other sides of the roof, then install the hip and ridge caps.

THE RACKING METHOD

A. Underlayment and the Starter Course

1. It is recommended that WinterGuard or VYCOR Waterproofing Shingle Underlayment ("WSU") be used across the hips. Apply centered on the hips before applying water resistant underlayment to the rest of the roof. (If a WSU is used along the eaves for protection against ice dams, apply it first, and then lap the WSU from the hip over it.)
2. Strike a chalk line perpendicular to the eaves from the ridge to the eaves to serve as a vertical reference. Strike horizontal lines as necessary to ensure course alignment. (The vertical reference should be on the left side of the roof in the vicinity of where the hip meets the ridge.)
3. Install starter as directed in the application instructions for the shingle being applied. Overlap the vertical reference line by the measured half tab-length portion of the shingle instead of cutting it off. The starter strip should extend the entire length of the eaves (Figure 9-2).

B. Installing the Single-Column Rack (Figure 9-5)

1. Install the first shingle of the first course with the left edge aligned with the vertical reference line.
2. Install the first shingle of the second course by overlapping the vertical reference line by half a tab length. This overlap is the same portion that would be cut off when starting at a rake. Do not nail the left end of the shingle at this time.
3. Install the first shingle of the third course by the left edge along the vertical reference line. Do not nail the right end of the shingle at this time.
4. Install the first shingle of subsequent courses by alternating the pattern of the second and third courses. For even-numbered courses, overlap the vertical reference line by half a tab and omit the left most nail. For odd-numbered courses, position the shingle flush with the line and omit the rightmost nail (Figure 9-5).

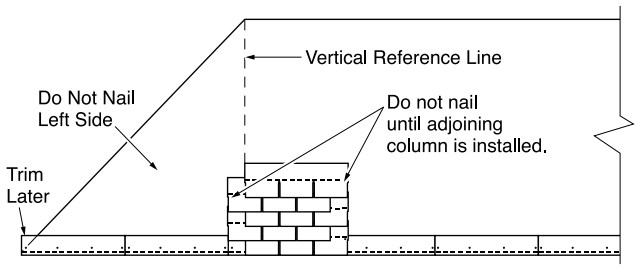


Figure 9-5: The Single-Column Rack

5. When the single rack reaches the ridge, install shingles to the left and right of the installed rack by inserting them under the loose ends of previously installed shingles. Be sure to install previously omitted nails as shingles are inserted under loose ends and temporarily omit end nails where a shingle will have to be inserted.
6. When the shingles that overlap the hip edge are being installed, the portion that overlaps must be trimmed along the hip line. (These pieces can be used at the opposite hip.)

C. Shingling The Other Sides Of The Hip Roof and Cap Installation

Complete the roof by similarly installing shingles on the other sides of the roof, then install the hip and ridge caps.

CONES AND TURRETS

Rounded, cone, or turret-type roofs are labor intensive because of the many cuts, joints, and unique workmanship involved. While final results can be quite impressive, there is a significant labor cost associated with rounded-roof applications: approximately five times the labor required for a normal roof. The special technique involved is to trim the shingles on an angle so that the sides butt together smoothly:

1. Begin by applying CertainTeed WinterGuard or VYCOR Waterproofing Shingle Underlayment ("WSU") directly to the deck according to application instructions provided with the product. CertainTeed's Waterproofing Shingle Underlayments seal around fasteners and help prevent leaks that can result from the increased number of joints characteristic of rounded-roof applications.
2. Depending on the circumference of the roof, use full or partial shingles, whichever conform to the curvature and lie flat. The minimum width should be no smaller than half a tab.
3. Shingles at the eaves may be trimmed to fit the rounded edge. The length of the shingle depends on the circumference.
4. Snap chalk lines from the peak center point to the eaves at intervals of one-half tab measured at the eaves. Gauging size to ensure that the shingles lay flat and uniform, fit the shingles between the chalk lines.
5. Shingle portions get progressively smaller as the rounded arc gets smaller further up the roof. Applied pieces will still maintain a staggered side offset; i.e., cutouts will align every other course if chalk lines are followed.

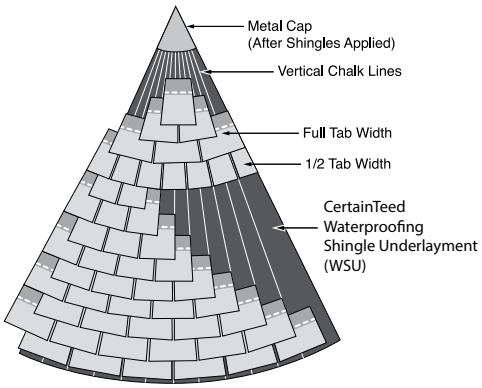


Figure 9-6: Shingles applied to the rounded portion of a roof.

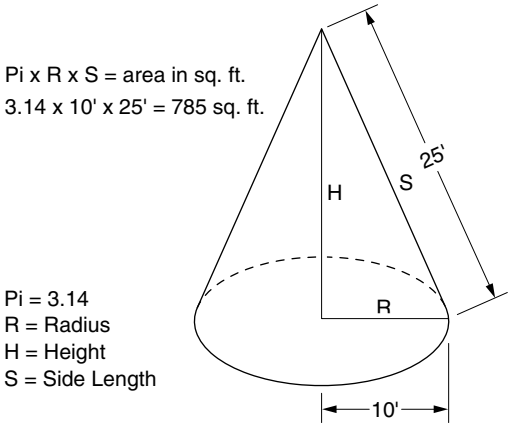


Figure 9-7: Determining the surface area for a cone in square feet.

6. Cut trapezoidal sections from shingles to fit between narrowing vertical lines until the shingles are a minimum of one-half of one tab wide at the lowermost edge of the shingle piece. Each shingle section should span four chalk lines. Continue up the roof using wider sections when pieces become less than one-half of one tab wide.
7. Taper shingles to a narrower width in the top portion of the headlap by following the chalk line to cut the taper. Individual pieces will be pie-shaped. Cuts should be straight to ensure that no gaps occur between joints. (For a pie-shaped Carriage House,® it may look better to trim the lowermost edge to approximate the original chamfered corners or scallop-edged finish. Use a hook blade knife to trim shingles from the granule side.
8. Cap the peak: The normal method is to fabricate a copper cap that fits snugly onto the pointed area overlapping the shingles headlap area sufficiently to prevent leakage. Use spots of roofing cement to set the metal cap into place.

OTHER ROOF SHAPES

Dome and barrel roofs often have areas with slopes that fall below the 2/12 range where roofing shingles cannot be applied. Such areas must be covered with roofing material such as metal, built-up roofing, or modified bitumen roll roofing.

Geometric shapes such as hexagon (six-sided), octagon (eight-sided) and the like can be treated like a multiple-hip roof. The typical hip roof is a rectangle (four-sided). Usually, however, all hips are treated the same.

DORMER RIDGE CAP INSTALLATION

Because dormers and "L" shaped roofs project out of the field of the roof, there is a need to finish their ridge caps by tying them into the field of the roof. A smooth transition makes for the best appearance and is also necessary to prevent leaks

1. If closed-cut valleys are employed, complete the dormer roof by extending the dormer shingles across the centerline of the valley. Start the ridge cap at the rake, and complete to within one cap of the field of the roof.
2. Complete the main roof up the left side of the dormer into the valley. Cut back the valley shingles on the main roof 2″ from the valley centerline to create a closed cut valley.

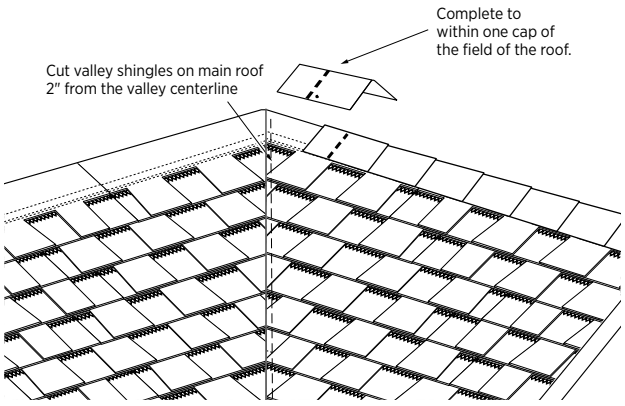


Figure 9-8: Dormer shingles extending across the valley with main roof shingles cut back two inches from the center line.

3. Cut into the first shingle that crosses above the ridge of the dormer a V-shaped notch that fits over the ridge of the dormer. The sides of the notch should match the cut of the shingles on the field of the roof that were cut back at the valley centerline. Cut this notch into the headlap area of the shingle. Shingles on the right side of the dormer should be applied so that course pattern and horizontal alignment conform to the position of the V-notched shingle (Figure 9-9).

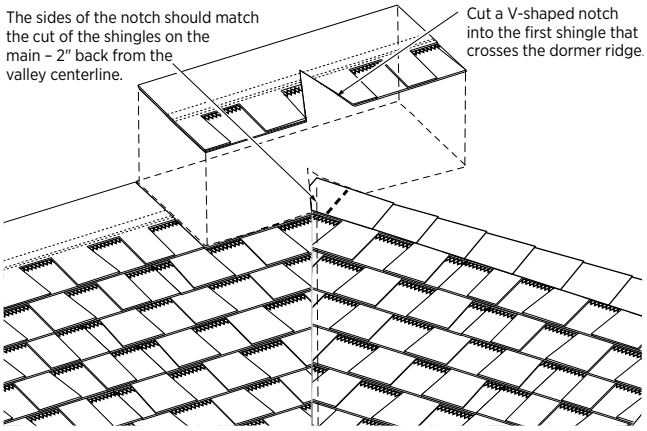


Figure 9-9: The V-notched shingle being fitted over the dormer ridge.

4. Install a ridge cap on the dormer with a portion of its headlap extending onto the main roof. Cut a slit in the headlap just long enough for the cap to be folded over the dormer ridge and for the upper corners to be pressed flat against the main roof.
5. A V-notch will again be required for the next course of shingles above the dormer ridge. Cut this notch to fit snugly around the cap shingle.
6. The next ridge cap shingle will also require a slit in its headlap to permit shaping it to the ridge contour as well as to the main roof.
7. The next course of shingles may still require a small notch to enable the tab to lie flat.
8. The next ridge-cap shingle should complete the ridge cap, and it will have to be split again to conform to both the dormer surface and the main roof surface. Fill the opening created by the slit with roofing cement, and seal under the cut edges also.
9. The slit in the ridge cap must be covered completely by the shingle over it in the next course. If cutouts or butt joints are closer than 4" to the slit, a scrap piece of shingle at least 8" wide by 12" high should be installed over the cut before the full shingle is applied (Figure 9-10).

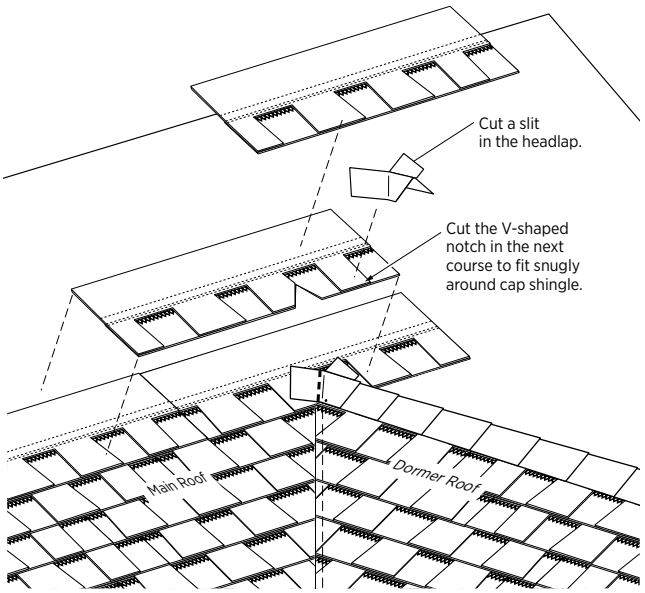


Figure 9-10: "Exploded" view of the entire assembly where the dormer ridge meets the main roof.

NOTE: The layers of shingle material from the ridge cap under the shingle courses may shift the cutout alignment of the shingles to the right of this area; check and correct if necessary.

SHINGLING AROUND A DORMER

On the main roof, snap chalk lines horizontally and vertically on both sides of and above the dormer to ensure proper alignment and exposure of shingle courses. Snapping chalk lines on the dormer roof, helps ensure the courses from both roof planes are in line with each other.

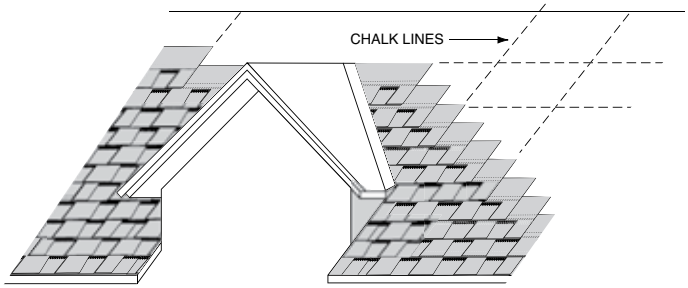


Figure 9-11: Ensure shingles on the main roof continue the same alignment pattern on both sides of the dormer as shown.

Here's a Tip...

Pound a large spike in the dead center of the top of the cone and cut the nail head off. Place a spare air hose and air fitting over the cut nail so that a "compass" is formed. Use duct tape to fold over the hose to keep the compass radius consistent. Check the cone for continuity, run the compass around the bottom edge to make sure you placed the spike in the perfect center. Adjust the location if required. Put duct tape on the air hose to keep track of each row of shingles. This way, multiple rows can be shingled on at a time without error (like a legend pole).
(Thanks for this tip go to Jason Laflamme)

Here's a Tip...

Thanks to Scott Wilson from Westerville, OH.

Two-Man, Pyramid Method For Covering a Hip Roof

1. Install the starter course along the eave. Apply the first shingle of the first course in the middle of the hip roof. Install the second shingle to the right of the first shingle. (Shingles 1 and 2 in the drawing below.)

2. Install the next shingle (Shingle 3) on the second course, offset by seven inches, from the left edge of Shingle 2. Thus, we have started in the shape of a pyramid.

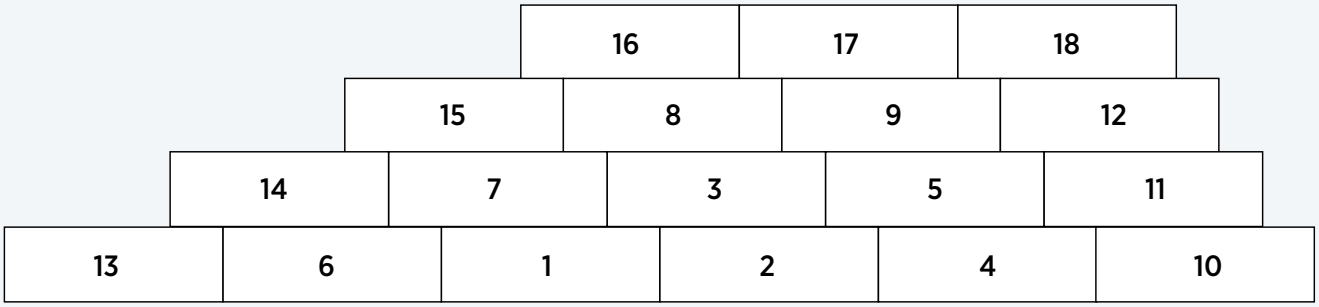
3. Install adjoining shingles on the first two courses: Shingles 4, 5 are installed to the right of Shingles 2 and 3. Shingles 6 and 7 are installed to the left of Shingles 1 and 3.

4. Begin the third course by installing Shingle 8, offset by seven inches from the left edge of Shingle 3. To the right of Shingle 8, install Shingle 9.

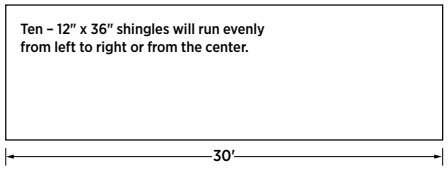
5. Install adjoining shingles on the first three courses: Shingles 10, 11, and 12 are installed to the right side of Shingles 4, 5, and 9. Shingles 13, 14, and 15 are installed to the left of Shingles 6, 7, and 8.

6. Begin the fourth course by applying Shingle 16, offset by seven inches from the left edge of Shingle 8. Install Shingles 17 and 18 to the right of Shingle 16.

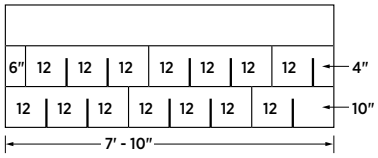
7. Continue in this same fashion to complete the roof.



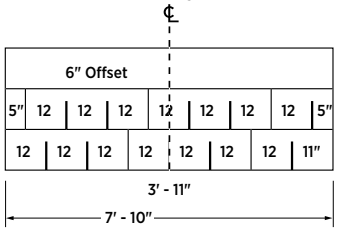
a tip from Mark Featherman. To achieve a "balanced pattern" and to avoid a potential blow-off problem from "small tabs" along the rake, it sometimes makes sense to start a shingle application in the center of a roof. To show us, Mark has provided the following illustrations:



When applying standard 36" shingles on a 30' roof – there is no problem



When applying shingles from left to right along some roofs, it's often possible to have a "short tab" along the rake. In this situation, the roof will not look symmetrical and the small tab might blow off.



When starting from the middle, as shown here, it's easy to calculate a "safe" and uniform tab size at either end of every course. Plus the roof appears symmetrical.

SECTION 9 SELF-TEST

9-1. When applying waterproofing shingle underlayment on a hip roof, apply it along the eaves first, then cover the hips.

A. True.

B. False.

9-2. When applying shingles to a roof with a dormer, and closed-cut valleys are involved, each course of dormer shingles should be:

A. Started at the valley center line and finished at the rake.

B. Cut two inches from the valley center line.

C. Left unfinished until the main roof surface has been completed.

D. Extended across the center line of the valley.

Test on-line @ www.certainteed.com/samtest

XT™ 25

10

YOUR OBJECTIVE:
To learn the correct procedures for installing three-tab type strip shingles.

ENGLISH DIMENSIONS: XT™ 25

All CertainTeed three-tab shingles are made to have a dimensional tolerance size of ± 1⁄16".

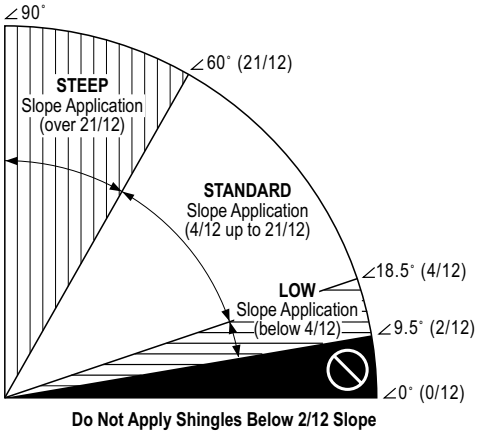


Figure 10-1: Slope definitions.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

*For low slopes, equivalents include:

1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm) wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner™ in shingle fashion (half lap) per the low-slope application instructions.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

THE ROOF DECK MUST BE AT LEAST: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1"(25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

NOTE: Some roofers choose to apply shingles at 4" exposure (vs. standard 5") at slopes less than 4/12 in order to increase the wind-driven rain resistance. In some cases, this can be an acceptable practice, but there are risks for which CertainTeed will not take responsibility. A shortened exposure can harm the appearance of the applied roofing, especially those with shadow lines, and it can reduce shingle ability to resist wind blow-offs by shifting the adhesive seal line away from the bottom edge of the shingles.

For technical questions, information on acceptable alternative application methods and materials, or a copy of the product warranty, contact the sources listed below:		**Warranty**	**Alternative Instructions**	**Technical Questions**
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

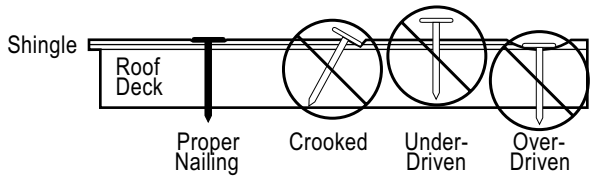


Figure 10-2: Proper and improper nailing.

IMPORTANT: For decks 3/4" (19 mm) thick or thicker, nails must go at least 3/4" (19 mm) into the deck. On thinner decks, nails must go at least 1/8" (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8" (9.5 mm) heads, and at least 1" (25 mm) long.

LOW AND STANDARD SLOPE

Use **four** nails for every full shingle.

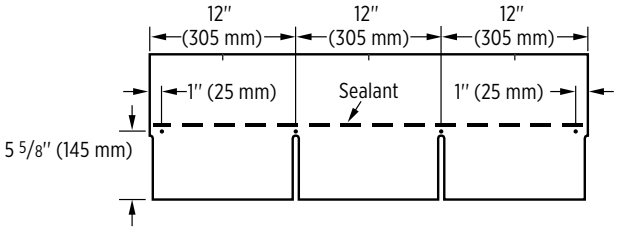
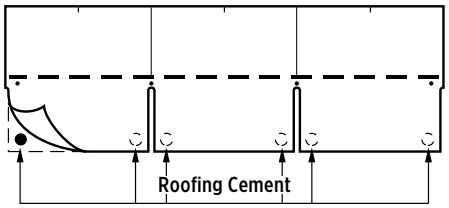


Figure 10-3: Use four nails for every full shingle.

STEEP SLOPE

Use **four** nails and six spots of asphalt roofing cement* for every full shingle (Figure 10-4). Asphalt roofing cement meeting ASTM D4586 Type II is suggested.



Apply 1" (25 mm) spots of asphalt roofing cement under each tab corner.

*Figure 10-4: Use **four** nails and six spots of asphalt cement on steep slopes.*

***CAUTION:** Excessive use of roofing cement can cause shingles to blister.

HIGH WIND AREAS

DO NOT USE STAPLES.

"Storm nailing" is not required by CertainTeed; however, the installer can use six nails to secure each shingle. In addition, the installer can also seal each shingle with four quarter-sized spots of asphalt roofing cement meeting ASTM D4586 Type II as shown in Figure 10-4.

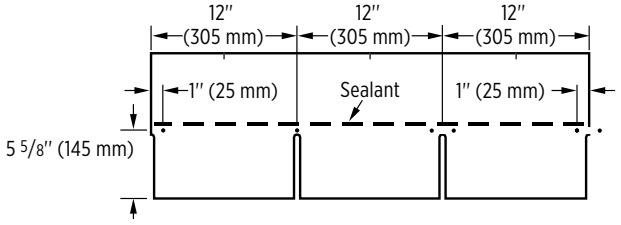


Figure 10-5: Six nails can be used for high wind applications.

THREE CLEAN-DECK APPLICATION METHODS

Install on new roofs and tear-offs using the following methods:

- The standard "Six-Course, Six-Inch, Stepped-Off Diagonal Method";
- The alternate "Five-Inch, Stepped-Off Diagonal Method"; or
- The alternate "Six-Inch, Single-Column, Vertical Racking Method."

(1) SIX-COURSE, SIX-INCH, STEPPED-OFF DIAGONAL METHOD ("SIX UP, SIX OFF")

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap horizontal and vertical chalklines to ensure shingles will be correctly aligned. Expose all shingles 5" (125 mm).

STARTER COURSE:

1. Use CertainTeed SwiftStart® or a starter course consisting ofthe shingles from which the lower 5" tabs have been removed (Figure 10-6). Remember, the sealant on starter courses should lie as close as possible to the eaves edge of the roof.

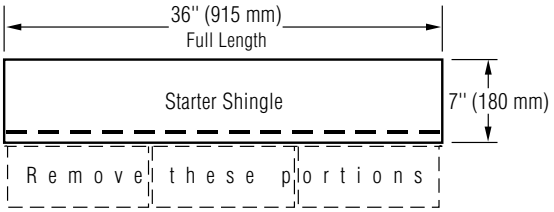


Figure 10-6: Make starter shingles by removing the lower 5" tabs.

2. For the first starter, cut 6" from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2" overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4". **NOTE:** Overhang should not exceed 1".
4. Use full length starter shingles for the rest of the course.

1ST COURSE: Apply a full shingle at the lower left corner of the roof. Make tabs lie flush with the edges of the starter course. In this way, sealant on the starter strip will adhere to the first-course tabs and help keep them from lifting in high winds (Figure 10-7).

2ND THROUGH 6TH COURSES:

1. Cut 6″ off the left side of a shingle and install the 30″ piece over and above the first-course shingle, in line with the left edge of the starter course. Leave the 5″ tabs of the first-course shingle exposed (Figure 10-7).
2. Cut 12″ off the first shingle of the third course, 18″ off the first shingle of the fourth course, 24″ off the first shingle on the fifth course, and 30″ off the first shingle of the sixth course. Apply each with its left edge in line with the previous course (Figure 10-7).
3. Install full shingles flush against the six applied courses (Figure 10-9 – see A).

SUCCEEDING COURSES: As you go up the rake, repeat the same pattern used to start the first six courses (Figure 10 -9 – see B).

Finish the courses with full shingles, working from the eaves up the roof.

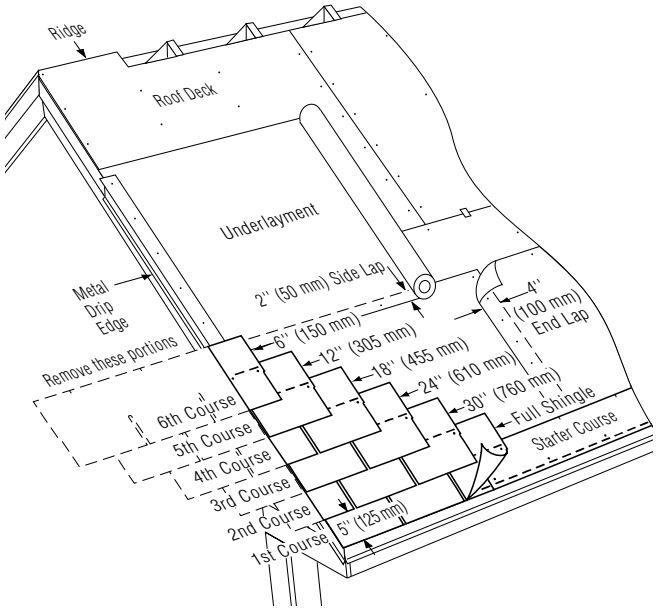


Figure 10-7: Applying the first 6 courses on a standard slope.

(2) FIVE-INCH, STEPPED-OFF DIAGONAL METHOD ("TWELVE UP, FIVE OFF")

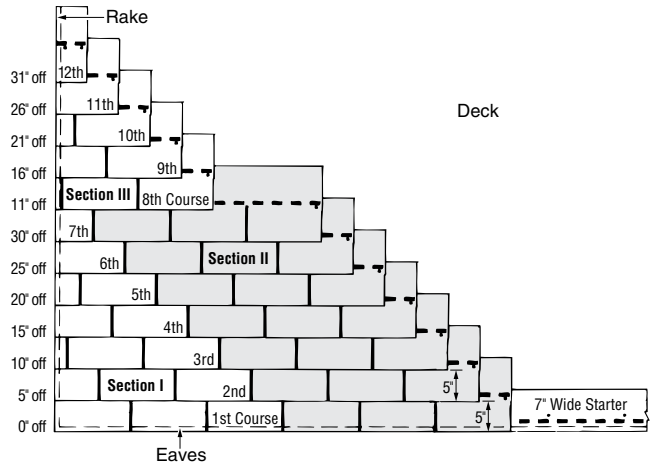


Figure 10-8: Five-Inch, Stepped-Off Diagonal Method.

STARTER COURSE:

1. Use CertainTeed Swiftstart® or a starter course consisting of the shingles from which the lower 5″ tabs have been removed (Figure 10-6). Remember, the sealant on starter courses should lay as close as possible to the eaves edge of the roof.
2. For the first starter, cut 5″ from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2″ overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4″. **NOTE:** Overhang should not exceed 1″.
4. Use full length starter shingles for the rest of the cours

1ST COURSE: Begin "Section I" by applying a full shingle at the lower left corner of the roof, tabs flush with the starter course.

2ND TO 7TH COURSE:

1. Begin the second course by cutting 5″ off the left end of a shingle and applying the 31″ piece over the first-course shingle, flush with the left edge of the first-course shingle, and exposing the first course 5″ (Figure 10-8).
2. Each succeeding course, up to and including the seventh course, should start with a shingle 5″ shorter (off the left end) than the previous course. Expose each course 5″. This completes "Section I" and establishes the first seven courses of the 12-course repeating cycle.
3. Install "Section II" as shown in Figure 10-8 using full shingles against the seven courses in "Section I." This must be done before continuing with courses eight through 12 ("Section III"). These "Section II" shingles are to be butted-up against the "Section I" shingles that started courses one through seven. Fasten all shingles in the normal fashion.

Here's a Tip...

Always try to use full shingles for the last shingles going into a closed valley. This will help avoid the problem of nailing too close to the centerline. (Thanks for this tip go to Dave Mulholland of Ohio.)

Figure 10-9: "Six Up, Six Off" installation schematic.

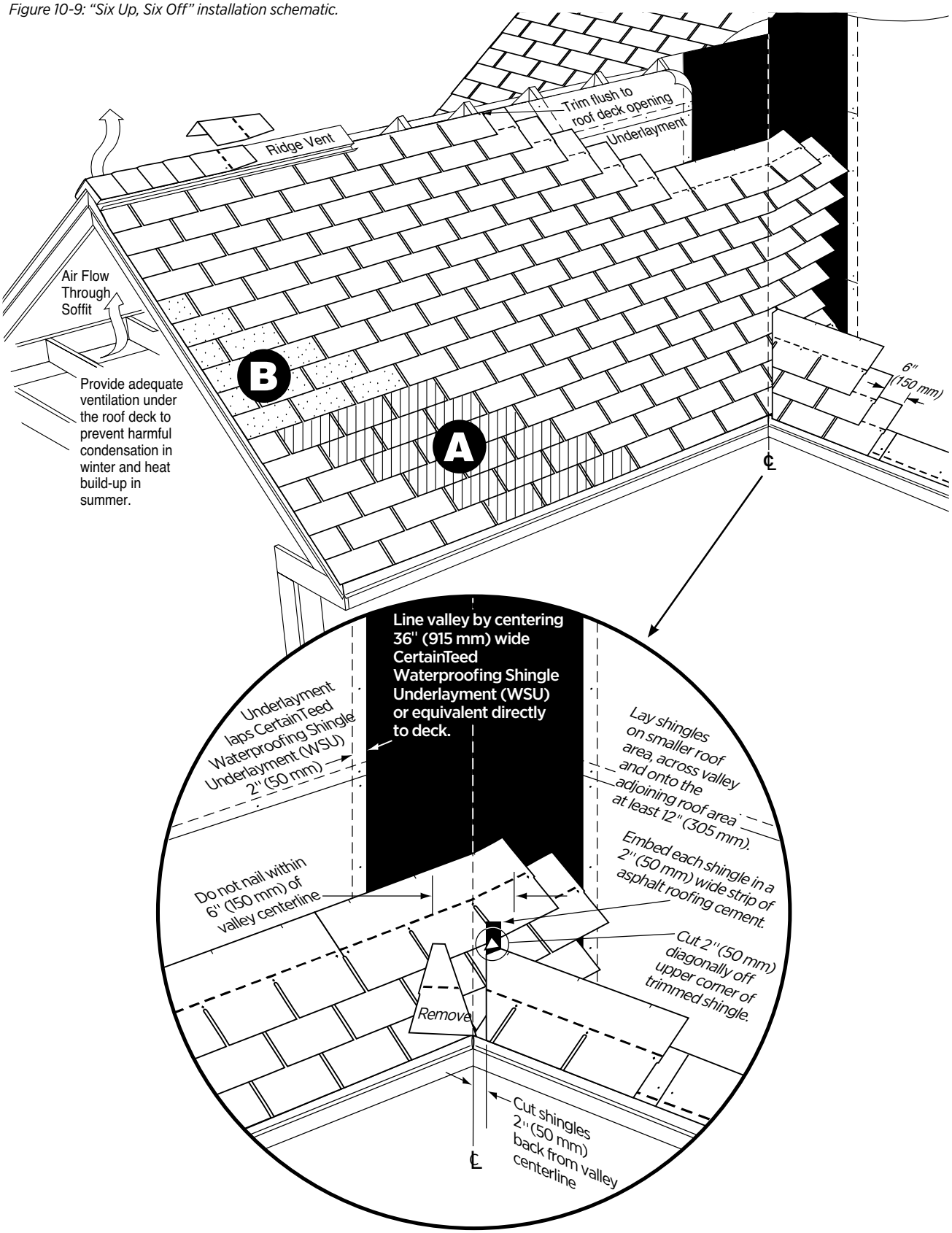


Figure 10-10: Highlight of closed-cut valley details.

8TH THROUGH 12TH COURSES:

1. Begin the eighth course by cutting 11″ off the left end of a shingle and applying the 25″ piece over the seventh-course shingle, flush with the left edge of the seventh-course shingle, and exposing the seventh course 5″ (Figure 10-8).
2. Start each succeeding course, up to and including the twelfth course, with a shingle 5″ shorter (off the left end) than the previous course. Expose each course 5″.
3. Installation of the pieces for courses eight through twelve completes "Section III" and establishes the final five courses of the two-part (twelve-course) pattern.
4. Continue working away from the twelve courses just applied by installing full shingles (not shown on the diagram).

SUCCEEDING COURSES:

1. Repeat the above two-part, twelve-course procedure, alternating the seven- and five-course sections up the roof. Start each subsequent seven-course section with a full shingle and start each five-course section with a 25″ shingle (11″ cut off the left end).
2. Complete courses across the roof using full shingles.

(3) SIX-INCH, SINGLE-COLUMN, VERTICAL RACKING METHOD ("RACKING")

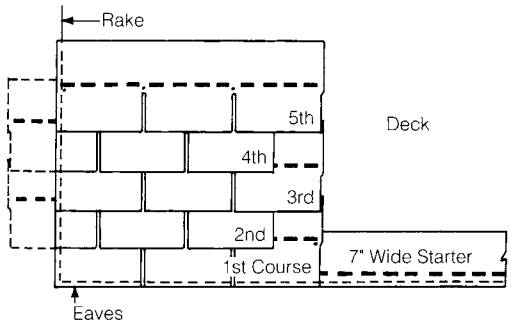


Figure 10-11: Vertical Racking Method.

STARTER COURSE:

1. Use CertainTeed Swiftstart® or a starter course consisting of the shingles from which the lower 5″ tabs have been removed (Figure 10-6).Remember, the sealant on starter courses should lay as close as possible to the eaves edge of the roof.
2. For the first starter, cut 6″ from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2″ overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4″. **NOTE:** Overhang should not exceed 1″.
4. Use full length starter shingles for the rest of the course.

1ST COURSE: Apply a full shingle at the lower left corner of the roof, tabs flush with the starter course (Figure 10-11).

2ND COURSE: Cut 6″ off the left end of a shingle and apply the 30″ piece over the first-course shingle, flush with the left edge and exposing the first course 5″ (Figure 10-11).

SUCCEEDING COURSES:

1. Begin the application of the remaining courses by alternating the use of full shingles and 30″ (6″ cut off the left end of a full shingle) shingles all the way up the rake in a single column. Expose each course 5″.
2. Fasten the full shingles with three fasteners, leaving the right-hand tab edge unfastened until later.
3. Fasten the 30″ pieces of shingle using four fasteners.
4. This method will establish the Six-Inch Offset Vertical Racking pattern.

COMPLETING THE INSTALLATION:

1. Full shingles are to be butted against the right side of applied shingles in each course. Work up the roof from the eaves, one vertical column at a time, maintaining the 5″ exposure.
2. In the courses where the right-hand shingle tab in the course above was purposely left unfastened, carefully lift the loose shingle tab so as not to cause damage by tearing or sharply bending, especially at the top of the cutout tab "keyway," and slip the next shingle underneath to butt the hidden shingle edge.
3. Apply all four fasteners to the newly placed shingle and one fastener to the free end of the shingle tab above it.
4. In alternate courses where new shingles butt against the visible shingle tabs, initially apply only three fasteners, leaving the right edge free.
5. Repeat this procedure (applying one vertical column at a time) to complete courses across the roof.

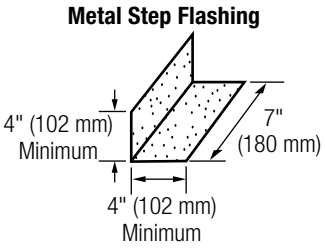
CAUTION:

1. This "single column" method is approved for applying some types of CertainTeed shingles. However, "double column" vertical racking (in which two shingles are laid side by side up the roof) is **NOT** recommended because it can result in unattractive patterns.
2. It is very important to fasten the ends of shingles properly. Nailing high or leaving nails out can result in an unattractive rack-line pattern.

Here's a Tip...

Use all the shingles from one bundle before using shingles from another bundle. This will result in the most pleasing color blends on the finished roof.

CHIMNEY FLASHING



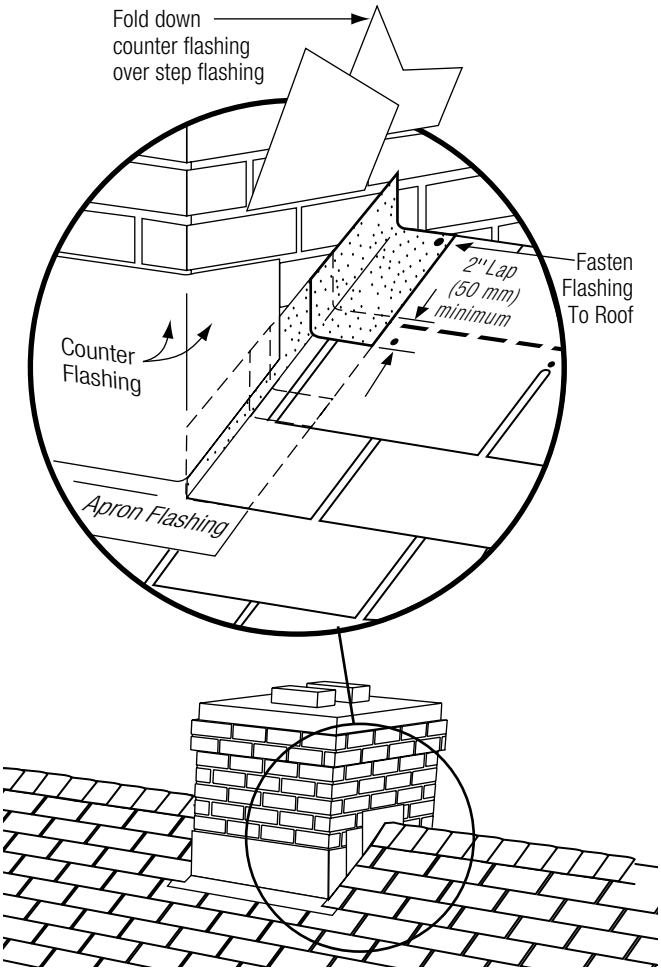


Figure 10-12: Flashing around a chimney.

THREE ROOF-OVER METHODS

Reroofing over existing square-tab asphalt strip shingles with 5″ tabs using the following methods:

- The standard approach of "nesting," sometimes called "butt and run," combined with the "Six-Course, Six-Inch, Stepped-Off Diagonal Method"; or
- The alternate approach of "nesting," combined with the "Five-Inch, Stepped-Off Diagonal Method"; or
- The alternate approach of "nesting," combined with the "Six-Inch, Single-Column Vertical Racking Method."

NOTE: Nesting is preferred over "bridging" methods when reroofing because nesting sheds water best and looks better. Nesting, as described below, is an easy application process over square-tab asphalt strip shingles with a 5″ exposure. If you are covering a different type or size shingle, you may need to cut back the tabs so that nesting is possible. To do this, simply cut off the leading edge of all the old shingle tabs if they would be lapped less than 2-1/2″ by the new shingles. This permits a flat nested application that avoids lifted edges and slumps.

PREPARING THE ROOF SURFACE FOR REROOFING

- Make the surface of the old roof as smooth as possible by replacing missing shingles. Split and nail flat all buckled, raised tabs and curling shingles.

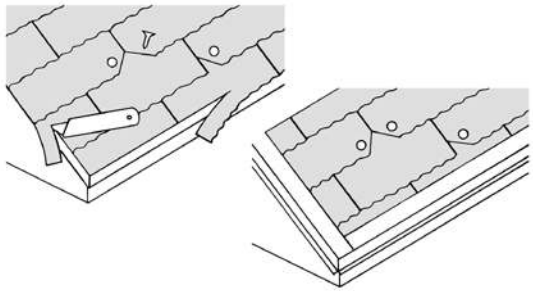


Figure 10-13: Preparing an old roof for reroofing.

- It's a good idea to cut old shingles back flush to the rakes and eaves.
- We suggest that you apply corrosion-resistant drip edge along the rakes and eaves, covering the edges of the old shingles. This will provide a uniform and straight edge that will help prevent water seepage under the shingle edges.

SPECIAL NOTE: The instructions that follow assume that the roof surface is dry and has been properly cleaned and prepared before reroofing.

NESTING METHOD COMBINED WITH THE SIX-COURSE, SIX-INCH, DIAGONAL METHOD ("SIX OFF, SIX UP")

Cut old shingles back flush to rakes and eaves. Apply drip edge along rakes and eaves if recommended.

The Six-Course, Six-Inch, Stepped-Off Diagonal Nesting method of application described below is suggested for roofing over square-tab asphalt roofing shingles of 5″ ± 1/8″(125 mm ± 3.2 mm) exposure.

Here's a Tip...

Stack all the pieces of shingles that you trimmed to step the shingles up the roof. Use these pieces to fill in at the rakes or valley at the other end of the course. Never use pieces shorter than 4" at the rakes or 18" in the valley.

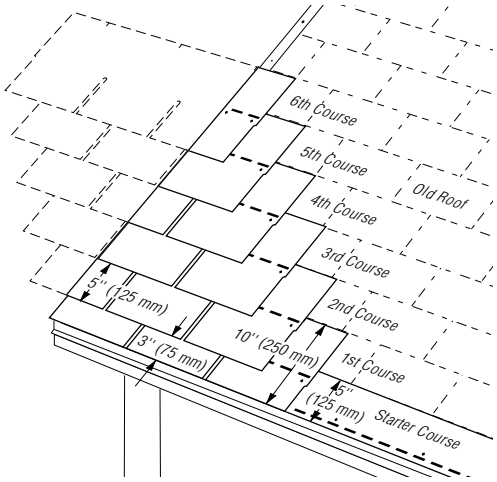


Figure 10-14: Six Off, Six Up, Nested.

STARTER COURSE:

1. Use 5" by 36" shingles for the starter course. To make a starter shingle, first cut the tabs off of a standard three-tab shingle, then cut off a strip 2" across the top of the same shingle.
2. Cut 6" off either side of the first starter shingle and install it over the first course of the old shingles, at the lower left corner (Figure 10-14).
3. Remember, the sealant on this starter course must lie as close as possible to the eaves edge of the roof. This will help hold the first-course shingles down and provide good protection against wind blow-offs, which could start at the roof edge.
4. If you are using drip edge, let the starter shingle extend out over the edge of the rake and eaves by 1/2". If you are not using drip edge, let the starter shingle extend over the rake and eaves by 3/4".
5. Finish the course using similarly prepared starter strips.

1ST COURSE:

1. The first course is made of 10" by 36" shingle strips made by cutting 2" off the bottom of the tabs of regular shingles (Figure 10-14).
2. Align the top edge of the strips so they butt up (nest) against the tabs of the shingles in the old third course. Make the left edge align with the starter course.

2ND COURSE:

1. Cut 6" off the left end of a full shingle. Butt the top edge of this 12" by 30" piece of shingle up against the bottom edge of the shingle in the old fourth course. Make the left edge align with the first-course left edge (Figure 10-14).
2. Exposure of the first course (only) is 3". All succeeding course exposures will duplicate exposures of the existing roof (approximately 5").

3RD AND SUCCEEDING COURSES:

1. For the third course, cut 12" off the left side of a full shingle (a whole tab).
2. Apply this 24" piece of shingle over the second course, leaving the 5" tabs of the second course exposed. The top edge of the new shingle in this course should butt up against the bottom of the fifth course of old shingles (Figure 10-14).
3. Cut an additional 6" off the first shingle of each higher course until you have to start with a full shingle again on the seventh course. In other words, cut 18" off the first shingle of course four, 24" off the first shingle in course five, 30" off the first shingle in course six. On course seven, start over with a full 36" shingle.
4. Install full shingles against the six applied courses.

REMAINING COURSES:

1. As you go up the rake, repeat the pattern used to start courses one through six.
2. Finish the courses with full shingles, working from the eaves up the roof.

COMBINING THE "NESTING METHOD" WITH THE ALTERNATE 12-COURSE, FIVE-INCH, STEPPED-OFF DIAGONAL METHOD ("FIVE OFF, TWELVE UP")

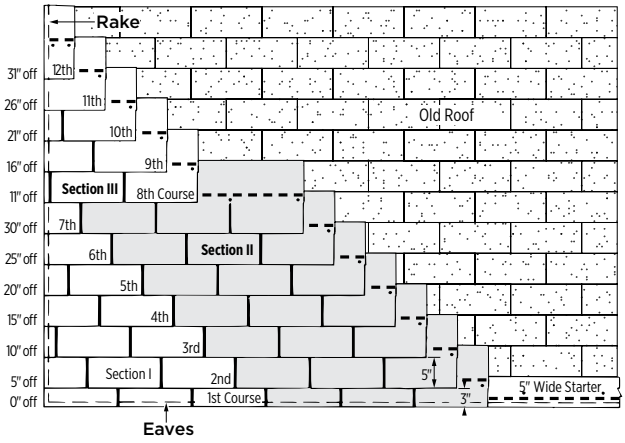


Figure 10-15: Five Off, Twelve Up, Nested.

STARTER COURSE:

1. Use 5" by 36" shingles for the starter course. To make a starter shingle, first cut the tabs off of a standard three-tab shingle, then cut off a strip 2" across the top of the same shingle.
2. Cut 5" off the length of the first starter strip, and align the 31" piece over the first course at the lower left corner of the existing roof.
3. This starter strip should overhang the rakes and eaves 1/2" when drip edge is used, or 3/4" when no drip edge is used.
4. Continue with full lengths of starter strips along the eaves.

Here's a Tip...

Save the tabs that you cut off starter shingles for use as a vertical front wall base flashing cover. (Thanks for this tip go to both Darren L. Burke of Montclair, New Jersey, and Dave Mulholland of Ohio.)

1ST COURSE:

The first course is made of 10″ by 36″ shingle strips made by cutting 2″ off the bottom of the tabs of regular shingles. Align the top edge of the strips so they butt up against the tabs of the shingles in the old third course (Figure 10-15).

2ND THROUGH 7TH COURSES:

1. Begin the second course by cutting 5″ off the left end of a shingle and aligning the top edge with the butt edge of the shingle in the old fourth course (Figure 10-15).
2. Exposure of the first course (only) is 3″. All succeeding course exposures will duplicate the exposure of the existing roof (approximately 5″).
3. Start each succeeding course, up to and including the seventh course, with a shingle 5″ shorter (off the left end) than the first shingle of the previous course.
4. Align the top edges with butts of old shingles.
5. This completes "Section I" – the first seven courses of the 12-course repeating cycle.
6. Install full shingles against these seven courses.

8TH THROUGH 12TH COURSES:

1. Begin the eighth course by cutting 11″ off the left end of a shingle and applying the 25″ piece over the seventh course shingle, aligned with the left edge of the seventh course (Figure 10-15).
2. Each succeeding course, up to and including the twelfth course, starts with a shingle 5″ shorter (off the left end) than the previous course.
3. Align all top edges with butts of old shingles. Exposure of each course will duplicate the exposure of the existing roof.
4. Install full shingles against all 12 courses.

SUCCEEDING COURSES:

Going up the rake, repeat the 12-course pattern, alternating Sections "I" and "III" up the roof. Complete courses across the roof using full shingles working from the eaves up the roof.

COMBINING THE "NESTING METHOD" WITH THE ALTERNATE SIX-INCH, SINGLE-COLUMN, VERTICAL RACKING METHOD ("RACKING")

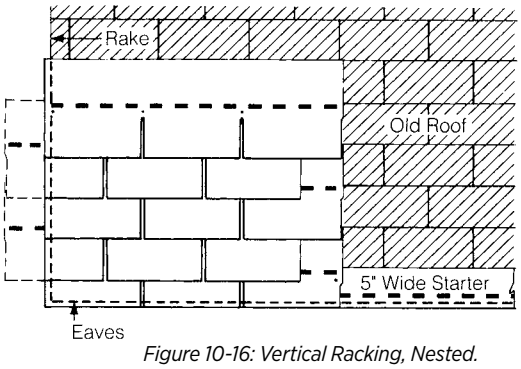


Figure 10-16: Vertical Racking, Nested.

STARTER COURSE:

1. Use 5″ by 36″ shingles for the starter course, made by first cutting the tabs off of a standard three-tab shingle, then cutting off a strip 2″ across the top of the same shingle.
2. Cut 6″ off one side of the first starter shingle and install the 30″ piece over the first course of the old shingles, at the lower left corner. This, and all other shingles, must nest with the butt edges of the old shingles (Figure 10-16).
3. Remember, the sealant on this starter course must lay as close as possible to the eaves edge of the roof. This will help hold the first-course shingles down and provide good protection against wind blow-offs, which could start at the roof edge.
4. If you are using drip edge, let the starter shingle extend out over the edge of the rake and eaves by 1/2″. If you are not using drip edge, let the starter shingle extend over the rake and eaves by 3/4″.
5. Finish the starter course along the eaves using the prepared starter strips.

1ST COURSE:

1. The first course is made of 10″ by 36″ strips made by cutting 2″ off the bottom of the tabs of regular shingles.
2. Align the top edge of the 10″ strips so they butt up (nest) against the tabs of the shingles in the old third course (Figure 10-16).

2ND COURSE:

1. Cut 6″ off the left end of a full shingle. Nest the top edge of this new 12″ by 30″ piece of shingle up against the bottom edge of the shingles in the old fourth course (Figure 10-16).
2. Exposure of the first course (only) is 3″. All succeeding course exposures will duplicate exposures of the existing roof (approximately 5″).

3RD AND SUCCEEDING COURSES:

1. Begin the application of succeeding courses by alternating the use of full shingles and 30″ shingles (6″ off the left end) up the rake in a single column (Figure 10-16).
2. Fasten the full shingles with three fasteners, leaving the right-hand tab edge unfastened until later.
3. Fasten the 30″ pieces of shingle using four fasteners.
4. Align all top edges with butts of old shingles.

COMPLETING THE INSTALLATION:

1. Work up the roof from the eaves one vertical column at a time. Butt full shingles against the right-hand side of applied shingles in each course, maintaining the 5″ exposure.
2. In courses where the right-hand shingle tab in the course above was purposely left unfastened, carefully lift the loose shingle

tab so as not to cause damage by tearing or sharply bending, and slip the next shingle underneath to butt the hidden shingle edge. Apply all four fasteners to the newly placed shingle and one fastener to the free end of the shingle tab above it.

3. In alternate courses where the new shingles butt against the visible shingle tabs, initially apply only three fasteners, leaving the right-hand edge free.
4. Repeat this procedure to complete columns and courses across the roof.

INSTALLING ENGLISH OVER METRIC

Metric shingles are bigger by about 20 percent than standard size shingles. In inches, they measure 13-1/4″ by 39-3/8″. The main advantage of metric shingles compared to standard shingles is the possibility of covering a little more of the roof in a little less time. The main disadvantage for reroofing is that the nesting method for covering the common 12″ by 36″ shingles uses more material because it does not take advantage of the full metric tab exposure.

The installation of an English-dimension shingle over a metric shingle is a little more labor-intensive than the typical English-over-English reroofing job, but it's not a very difficult process.

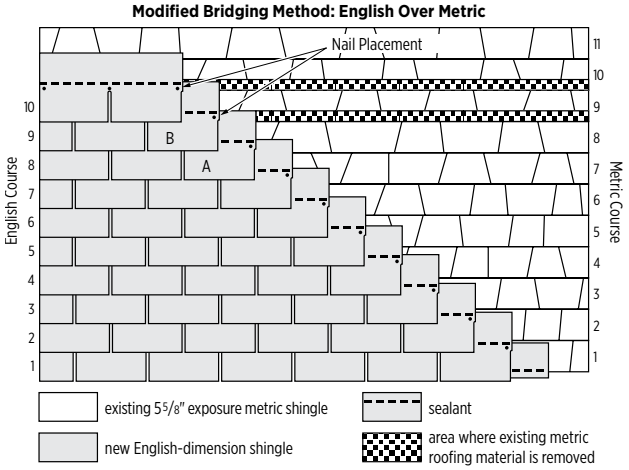


Figure 10-17: Reroofing using standard 12″ x 36″ shingles over metric shingles.

A standard metric shingle is typically exposed 5-5/8″ to the weather. Figure 10-17 shows an idealized method used to reroof with a 12″ by 36″ English-dimension shingle.

If the existing shingles have been cut back to the eaves, a 5-5/8″ starter course is suggested. This enables the tabs of the first-course shingles to be sealed, and also helps reduce unevenness. A starter course is also helpful because the headlap of the first-course English shingle will likely butt against the bottom edge of the third course of the existing metric laminate. This provides a 3/4″ overhang at the eaves.

Apply succeeding courses (Nos. 2-8) with 5″ exposure to the weather, as is typical in English-dimension shingle installation.

Notice that each course gradually drops farther away from the leading edge of the shingle above. The English-dimension shingle can bridge that gap.

But when you reach the metric shingle's ninth course (the English shingle's eighth), the gap should not be bridged because the correct nail placement would be below the leading edge of the metric shingle underneath. Nailing in this area would draw down and warp the shingle on top, causing a hump. To eliminate the problem, you must cut and remove, at the metric shingle's eighth course, approximately 2″ of the leading edge of the next metric shingle up the roof, so that the English-dimension shingle nests smoothly. Do the same for the metric shingle's ninth course; the 10th course may naturally meet the butt edge of the shingle above (Figure 10-17). Repeat this method on every eighth and ninth metric course up the roof. Counting from the first metric course, this means the 17th and 18th courses would also be cut back, as would the 25th and 26th, and so on.

NOTE: On an actual roof the course exposures will vary, so the directions above may need to be modified. Remember this: Each time the top edge of the English shingle overlaps the bottom edge of a metric shingle course by less than 1-1/2″, as shown by shingles "A" and "B" in Figure 10-17, cut that metric shingle back by 2″ (or to fit) to allow the top edge of the English shingle to nest smoothly below it.

TIPS FOR ROOFING OVER SMOOTH- OR DIMENSIONAL-BASE METRIC SHINGLES

In an English-over-metric roof-over, there are two different cases to consider: the smooth-surface base shingle and the dimensional-base shingle.

In both cases the common problem is the presence of gaps created between the new roof surface to be installed and the existing roof surface. The gaps occur as a function of the shingles being different sizes; they don't line up or "nest" exactly as they would in an English-to-English or metric-to-metric roof-over. Bridging the gaps over a thick, dimensional shingle is even more difficult than doing so over a smooth-surface shingle because of the uneven dimensional surface.

SOLVING BRIDGING PROBLEMS: TWO RULES TO REMEMBER

1. IN BRIDGING A GAP, A STIFFER SHINGLE ON TOP IS ALWAYS BETTER THAN A SOFTER SHINGLE: Shingle stiffness depends on the type of shingle. For example, fiber glass three-tab shingles with a longer warranty duration are usually stiffer than those with a shorter duration.

The stiffest shingles are the heavyweight and super-heavyweight premium shingles.

2. CHOOSE A DESIGN THAT MASKS UNEVENNESS: An uneven shingle surface will tend to visually intrude through the shingle surface above it, creating small humps in the new roof. So when you choose a shingle for a roof-over, it is best to choose one with a design that masks or disguises the uneven surface below.

HIPS AND RIDGES

1. First, apply the shingles up to the hip or ridge on both sides, then trim flush.
2. Make the caps by cutting full-length shingles at the tab cutouts. Trim the back end of the caps as shown in Figure 10-18.

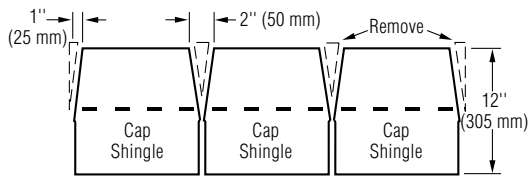


Figure 10-18: Cut tabs, then trim back to make cap shingles (English dimensions shown).

3. Start installing the caps at the bottom of a hip or at either end of a ridge.

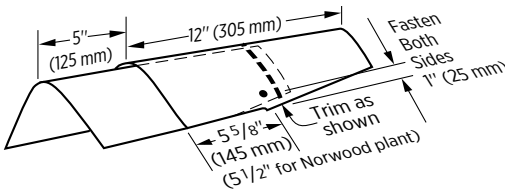


Figure 10-19: Installation of caps along the hips and ridges.

4. To prevent cracking, make sure the caps are warm enough to permit proper forming over the ridge or hip.
5. Fasten each cap shingle with two nails installed at 5-5⁄8″ from the bottom edge and 1″ in from each side.
6. Leave only the 5″ tab exposed to the weather. Do not expose fasteners.
7. You can improve the appearance of the roof by applying two layers. The thick double cap creates a richer-looking roof. However, be sure double caps have been estimated into the job price before you install them.
8. To add more definition and visual appeal to the rooflines, use CertainTeed's ShadowRidge® or one of CertainTeed's enhanced profile hip and ridge caps.

XT™ 25 Installation Video

SECTION 10 SELF-TEST

10-1. You can start a rack in the middle of the roof and snap chalk lines to reduce the chances of keyways getting out of alignment.

A. True.

B. False.

10-2. For a Six Up, Six Off application, cut 6″ off the left end of a full shingle to start the second course.

A. True.

B. False.

10-3. The three clean-deck application methods 3-tab shingles are "Six Up, Six Off," "Twelve Up, Five Off," and Single-Column "Racking."

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Patriot® XL

11

YOUR OBJECTIVE:
To learn the correct procedure for installing Patriot® XL shingles.

★ PATRIOT® XL

Patriot XL shingles have the installer-friendly TRACKNAIL ZONE, which provides a 1-1/2" wide nailing area.

Closed-cut valleys are preferred by CertainTeed when applying any Patriot XL shingles; however, open and woven valleys are also acceptable.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult product packaging and individual shingle application instructions for details.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR® include:

1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm) wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner in shingle fashion (half lap) per the low-slope application instructions.

IMPORTANT: Because water drains slowly from these slopes and the Pacific Northwest region is known for its above average annual precipitation, there is a greater chance of water back-up. Therefore, after careful consideration of local weather and the application of Patriot XL shingles on a low slope, CertainTeed is requiring a layer of either WinterGuard, VYCOR® Select, VYCOR® Ice & Water Shield®, VYCOR® Ice & Water Shield® HT, or VYCOR® ULTRA™ over the entire roof deck. A double layer of asphalt felt underlayment or synthetic underlayment is not an acceptable alternative when applying these products in the Pacific Northwest region on low slopes. For added protection, CertainTeed recommends doubling the end and side laps.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. (One layer of shingle underlayment meeting ASTM D4869 applied over the required CertainTeed Waterproofing Shingle Underlayment is also recommended.)

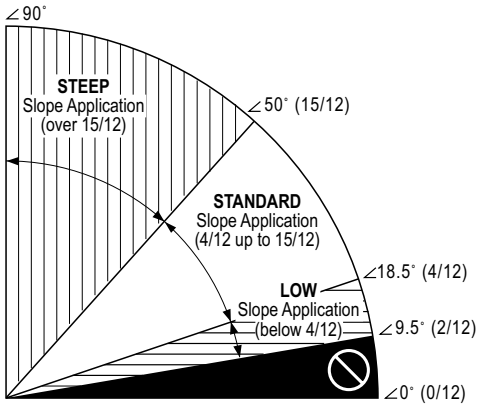


Figure 11-1: Slope definitions.

The roof deck* must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects that cause leaks and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative application methods and materials, or a copy of the product warranty, contact the sources listed below:		**Warranty**	**Alternative Instructions**	**Techinical Questions**
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

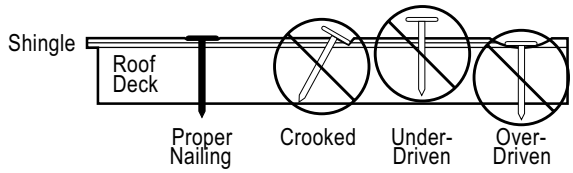


Figure 11-2: Proper and improper nailing.

IMPORTANT: For decks 3/4" (19 mm) thick or thicker, nails must go at least 3/4" (19 mm) into the deck. On thinner decks, nails must go at least 1/8" (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8" (9.5 mm) heads, and at least 1" (25 mm) long.

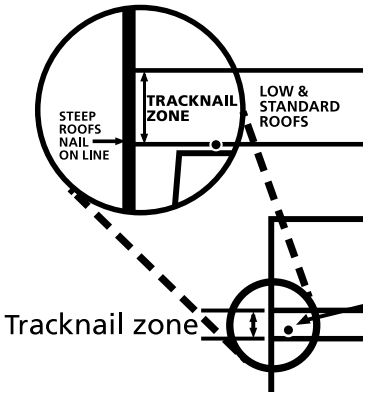


Figure 11-3: TRACKNAIL ZONE features a wider nail area .

LOW AND STANDARD SLOPE

Use four nails for every full shingle as shown below.

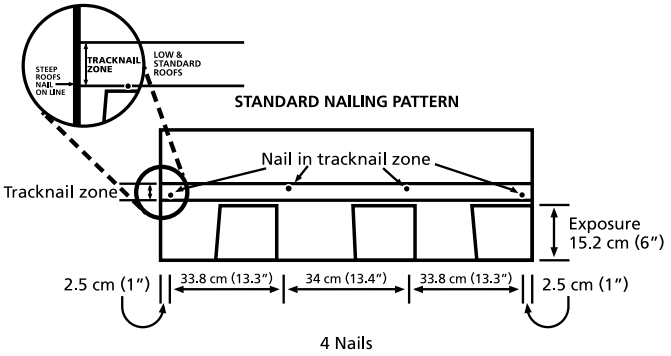


Figure 11-4: Use four nails for every full shingle.

IMPORTANT: When "six nailing" a full shingle, follow the nail pattern shown in figure 11-5, nails are placed in the 1-1/2" TRACKNAIL ZONE.

STEEP SLOPE

Use six nails and four spots of asphalt roofing cement for every full shingle as shown below. Asphalt roofing cement should meet ASTM D4586 Type II. Apply 1" spots of asphalt roofing cement under each corner and at about 12" to 13" in from each edge.

CAUTION: Excessive use of roofing cement can cause shingles to blister.

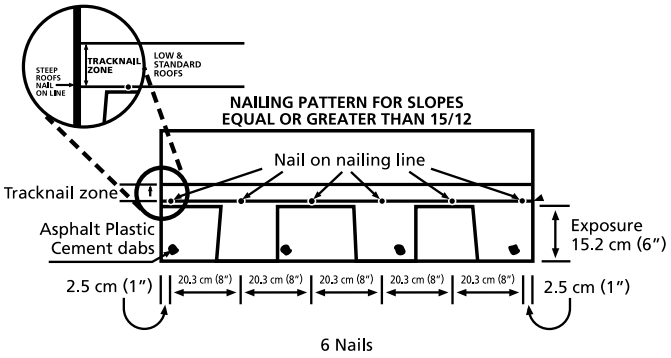


Figure 11-5: Use six nails and four spots of asphalt roofing cement on steep slopes.

IMPORTANT: Failure to follow these steep slope instructions can void the warranty in the event of a shingle delamination.

ONE CLEAN-DECK APPLICATION METHOD

FOUR-COURSE DIAGONAL METHOD (10-1/2" AND 21")

CAUTION: Use of other installation methods may result in an objectionable pattern.

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap chalklines to ensure shingles will be correctly aligned.

STARTER COURSE:

1. Use CertainTeed Swiftstart® Starter.
2. For the first starter, cut 6″ from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2″ overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4″. **NOTE:** Overhang should not exceed 1″.
4. Use full length starter shingles for the rest of the course.

Alternatively,

1. Position SwiftStart SA parallel to the roof edge, granule side up, with the sealing strip closest to the roof edge.
2. Overhang eaves and rakes by 1/4″ to 3/4″ (6 mm to 19 mm). If a drip edge extends beyond the eave/rake edge, install flush to drip edge.
3. Drip edge must be primed with FlintPrime QD or equivalent ASTM D41 asphalt primer and allowed to dry prior to application of SwiftStart SA.
4. Remove release liner and roll into place. Apply uniform pressure with hand or hand roller to ensure SwiftStart SA is applied unwrinkled and is fully adhered.
5. When starting a new roll, overlap by a minimum of 6″ (152 mm).

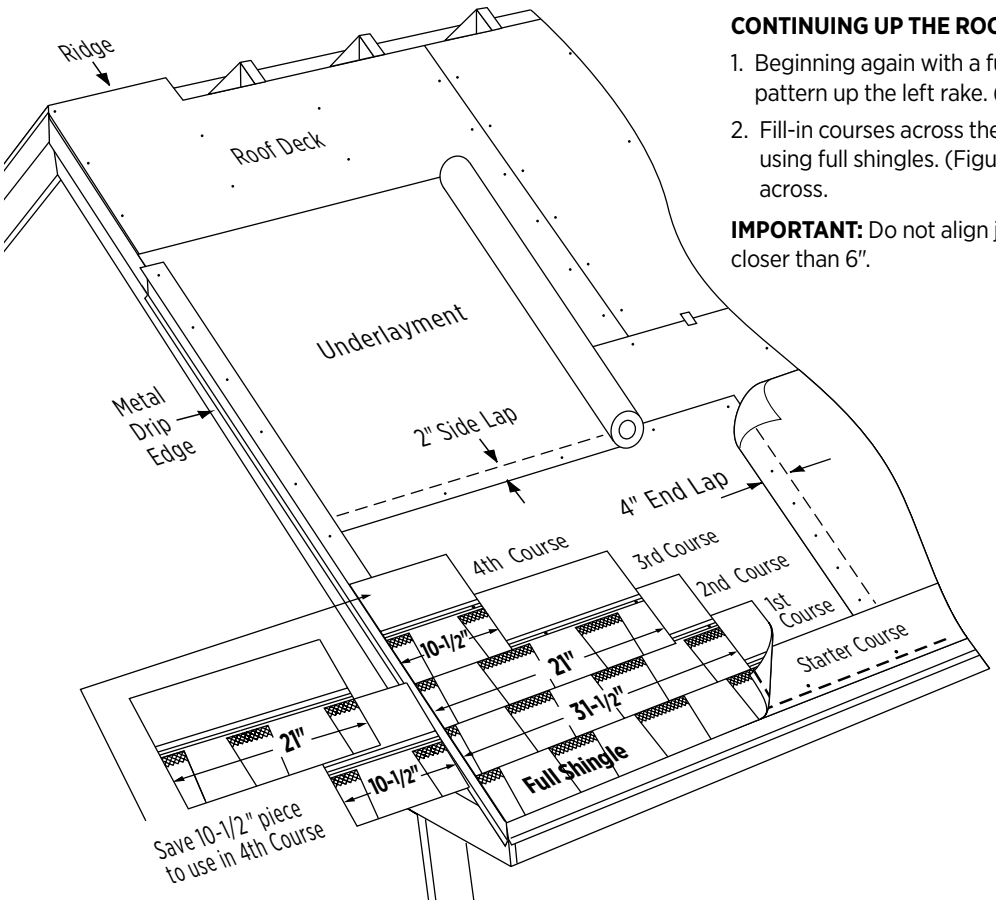


Figure 11-6: Applying the first 4 courses of Patriot XL.

SwiftStart SA General Notes:

Only install as much SwiftStart SA as will be covered by shingles same day. If applied in temperatures below 40° (4°), spot nailing may be required until adhesion strengthens as temperatures rise.

SwiftStart SA butt joints must be offset a minimum of 4″ (101.6 mm) from the butt joints of the first course of shingles.

When installed on rake, position SwiftStart SA to overlap eave starter course a minimum of 3″ (76 mm).

1ST COURSE: Apply a full shingle at the lower left corner of the roof. Make the lower edge and left edge lie flush with the edges of the starter course (Figure 11-6).

2ND THROUGH 4TH COURSES:

CAUTION! Failure to follow instruction steps 1-4 below will bring joints too close together and may cause unattractive patterns! Expose all shingles 6″ (152 mm)

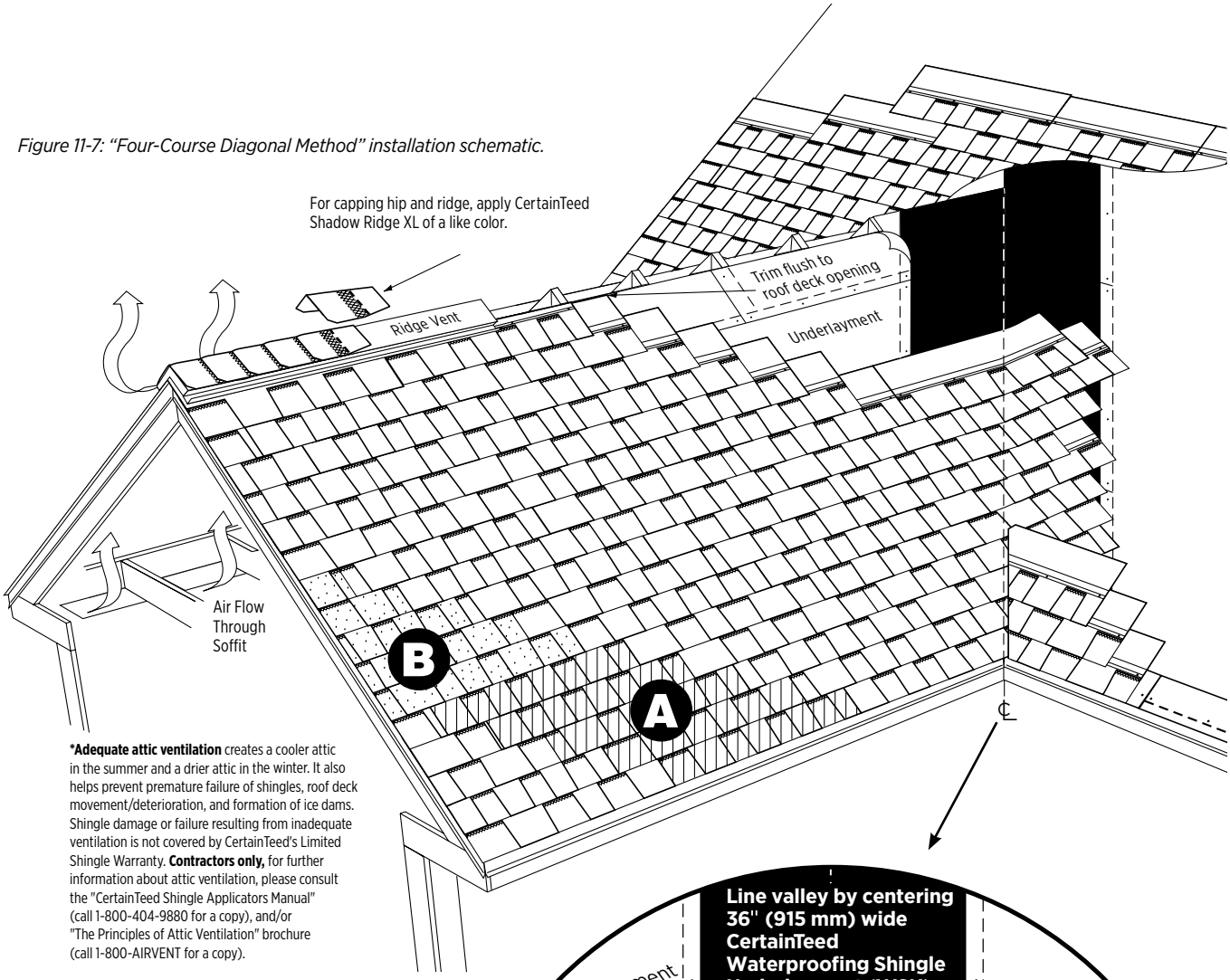
1. Cut 10-1/2″ off the left end of the first shingle and save this piece for later use. Apply the 31-1/2″ long piece over and above the first-course shingle. Leave the bottom 6″ tab portion of the first-course shingle exposed.
2. Cut 21″ off the first shingle of the third course. Install the 21″ long piece over and above the second-course shingle.
3. Apply the previously removed 10-1/2″ long piece over and above the third-course shingle.
4. Install a full shingle against the right edge of each shingle in courses one through four.

CONTINUING UP THE ROOF:

1. Beginning again with a full shingle, repeat the four-course pattern up the left rake. (Figure 11-7, B).
2. Fill-in courses across the roof in a stepped diagonal fashion using full shingles. (Figure 11-7, A). Do not run courses straight across.

IMPORTANT: Do not align joints of Patriot XL shingles closer than 6″.

Figure 11-7: "Four-Course Diagonal Method" installation schematic.



***Adequate attic ventilation** creates a cooler attic in the summer and a drier attic in the winter. It also helps prevent premature failure of shingles, roof deck movement/deterioration, and formation of ice dams. Shingle damage or failure resulting from inadequate ventilation is not covered by CertainTeed's Limited Shingle Warranty. **Contractors only,** for further information about attic ventilation, please consult the "CertainTeed Shingle Applicators Manual" (call 1-800-404-9880 for a copy), and/or "The Principles of Attic Ventilation" brochure (call 1-800-AIRVENT for a copy).

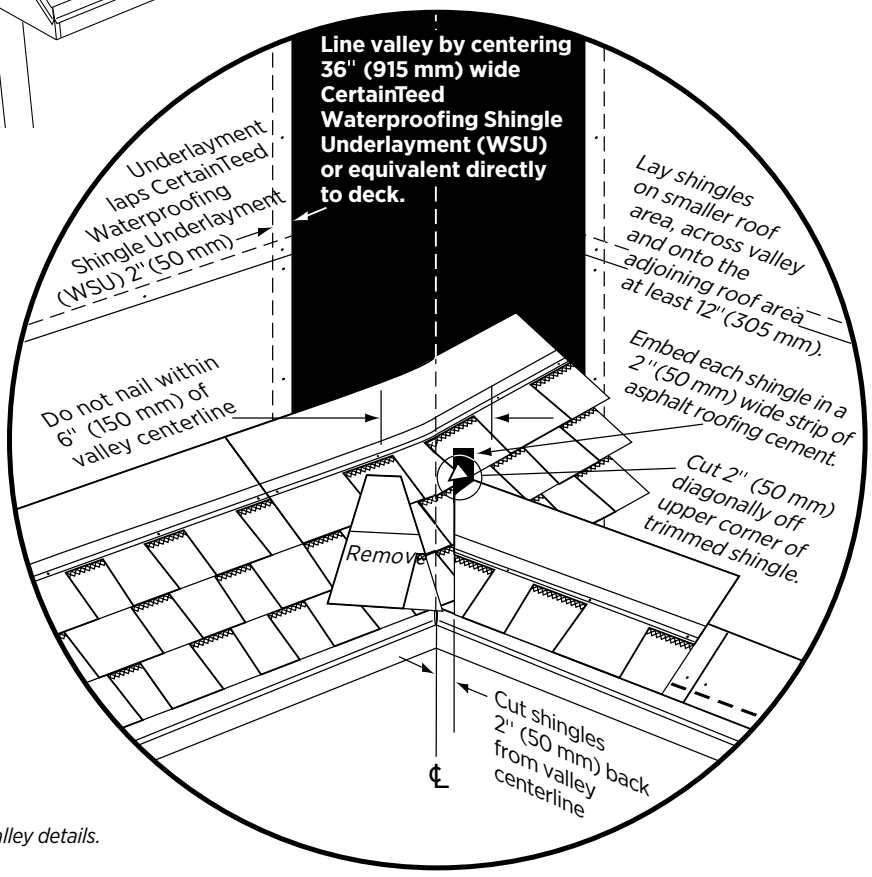


Figure 11-8: Highlight of closed-cut valley details.

CHIMNEY FLASHING

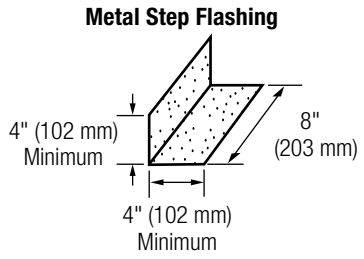


Figure 11-9: Step flashing minimum dimensions.

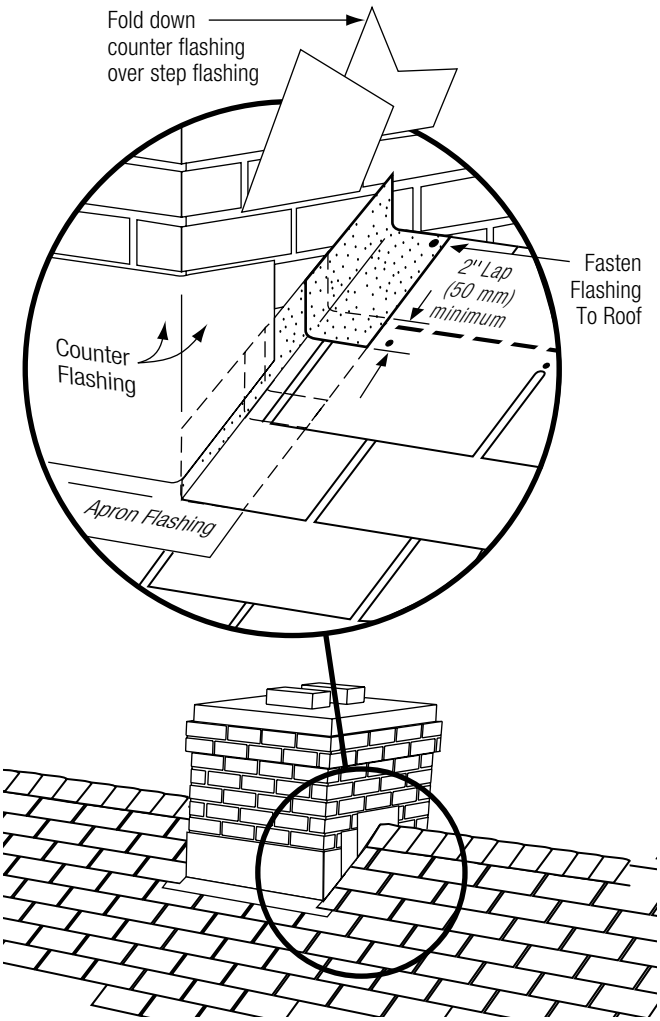


Figure 11-10: Flashing around a chimney.

HIPS AND RIDGES

SHADOW RIDGE XL ACCESSORY SHINGLES

Shadow Ridge XL is a hip and ridge shingle. It is prescored with easy-to-tear tabs to allow the installer to quickly split the shingles in 3 tabs without the use of a knife. Its E-Z FOLD design allows for a beautiful, even layered application for an impeccable 3-D finish. Shadow Ridge XL shingles are made of a stable glass fiber mat coated with asphalt on both sides and covered with mineral granules. Shadow Ridge XL can be installed as a single-layer hip and ridge or the tabs can be superimposed to form a double layer hip and ridge. To maximize the dimensional accent of Shadow Ridge XL, the shingle can be folded on itself to form a triple layer hip and ridge shingle (Figure 11-11).

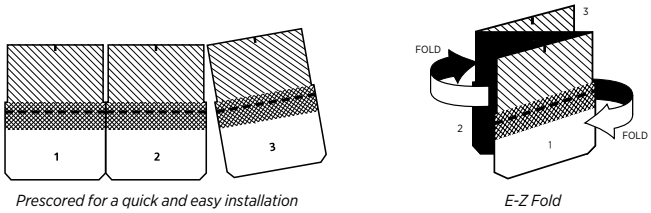


Figure 11-11: Shadow Ridge XL accessory shingles.

ONE-LAYER INSTALLATION

STARTER COURSE:

Cut 5 5/8″ (143 mm) off the exposure portion of one piece of the hip and ridge shingle. Align butt edge to the bottom of the hip or to either end of the ridge. Fasten with two (2) fasteners 6″ (152mm) from the top of the shingle and 1″ (25mm) from each side of the shingle (Figure 11-13).

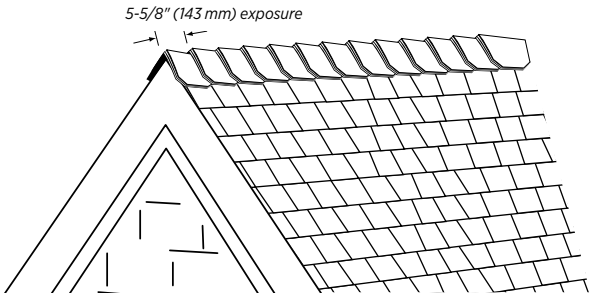


Figure 11-12: Apply a full cap shingle over the starter piece, flush with the bottom and side edges of the starter.

APPLICATION:

For the first row, starting with one complete piece of a hip and ridge shingle, cover the starter course shingle by lying flush to the bottom and sides of the starter course and fasten as per 11-14. All subsequent rows are formed by bending the hip and ridge shingle along the centerline leaving 5 5/8″ (143 mm) exposure. (Figure 11-12).

Make sure fasteners used to apply caps penetrate at least 3/4″ into or through the decking.

TWO-LAYER INSTALLATION

STARTER COURSE:

Cut 5-5/8" (143 mm) off the exposure portion of two (2) pieces of the hip and ridge shingle. Apply this double-layer shingle (one on top of the other), aligning butt edge to the bottom of the hip or to either end of the ridge. Fasten with two (2) fasteners 6" (152mm) from the top of the shingle and 1" (25mm) from each side of the shingle (Figure 11-13).

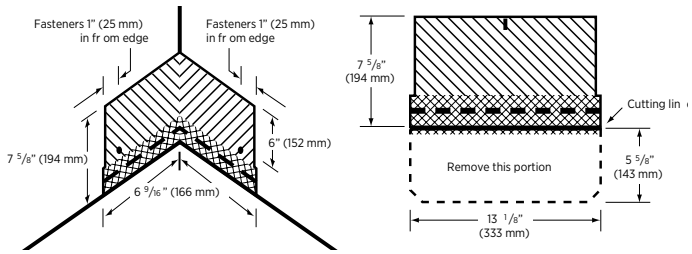


Figure 11-13: Shadow Ridge XL Starter Course Fastening

APPLICATION:

For the first row, starting with two (2) complete pieces of hip and ridge shingles placed one on top of each other, cover the starter course shingles and fasten as per Figure 11-14. For all subsequent rows, apply two complete pieces of hip and ridge shingles placed one on top of each other over the previous row while ensuring a 5-5/8" (143 mm) exposure (Figure 11-12).

Make sure fasteners used to apply caps penetrate at least 3/4" into or through the decking.

NOTE: To assist in proper alignment when ridge vent is not used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap shingles should be.

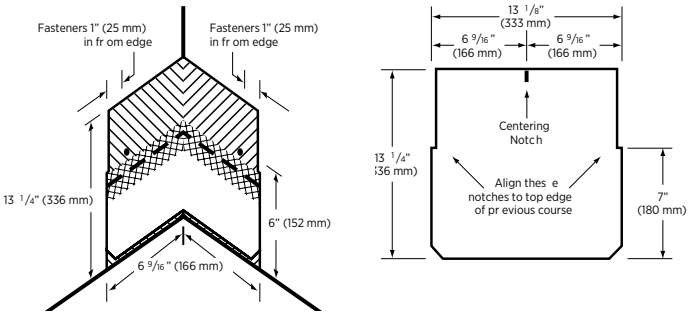


Figure 11-14: Shadow Ridge XL Fastening

E-Z FOLD THREE-LAYER INSTALLATION

For three-layer applications, instead of detaching individual pieces from a full shingle, simply fold the shingle onto itself as shown in Figure 11-11. Always ensure shingles are stacked straight in multi-layer applications.

STARTER COURSE:

Cut 5-5/8" (143 mm) off the exposure portion of three (3) pieces of the hip and ridge shingle. Apply this three-layer shingle (one on top of the other), aligning butt edge to the bottom of the hip or to either end of the ridge. Fasten with two (2) fasteners 6" (152mm) from the top of the shingle and 1" (25mm) from each side of the shingle (Figure 11-13).

APPLICATION:

For the first row, starting with three (3) complete pieces of hip and ridge shingles placed one on top of each other, cover the starter course shingles and fasten as per Figure 11-14. For every subsequent row, apply three complete pieces of hip and ridge shingles placed one on top of each other over the previous row while ensuring a 5-5/8" (143 mm) exposure (Figure 11-12).

Make sure fasteners used to apply caps penetrate at least 3/4" into or through the decking.

IMPORTANT: When installing Shadow Ridge XL hip and ridge shingles over ridge vents, follow ridge vent manufacturer's instructions carefully. Do not allow primary shingles and/or roofing underlayment to block air movement through the ridge line.

Patriot® XL Installation Video

SECTION 11 SELF-TEST

11-1. For steep slope applications, ___ nails and ___ spots of asphalt cement are required.

A. 6, 4
B. 4, 6
C. 6, 6
D. 4, 8

11-2. Mountain Ridge XL should be installed for hips and ridges.

A. True.
B. False.

11-3. Patriot XL should be installed with 6" and 11" offsets.

A. True.
B. False.

11-4. SwiftStart SA is an acceptable starter when installing Patriot XL.

A. True.
B. False.

Test on-line @ www.certainteed.com/samtest

Patriot®

12

YOUR OBJECTIVE:
To learn the correct procedure for installing Patriot® shingles.

★ PATRIOT®

Patriot shingles have the installer-friendly NailTrak® feature, which provides 1-1⁄2" wide nailing area and specially formulated QuadraBond laminating adhesive (See Figure 12-3).

Closed-cut valleys are preferred by CertainTeed when applying any Patriot® shingles; however, open and woven valleys are also acceptable.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult product packaging and individual shingle application instructions for details.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR® Ice & Water Shield include:

1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm) wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner in shingle fashion (half lap) per the low-slope application instructions.

IMPORTANT: Because water drains slowly from these slopes and the Pacific Northwest region is known for its above average annual precipitation, there is a greater chance of water back-up. Therefore, after careful consideration of local weather and the application of Patriot® shingles on a low slope, CertainTeed is requiring a layer of either WinterGuard, VYCOR® Select, VYCOR® Ice & Water Shield®, VYCOR® Ice & Water Shield® HT, or VYCOR® ULTRA™ over the entire roof deck. A double layer of asphalt felt underlayment or synthetic underlayment is not an acceptable alternative when applying these products in the Pacific Northwest region on low slopes. For added protection, CertainTeed recommends doubling the end and side laps.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. (One layer of shingle underlayment meeting ASTM D4869 applied over the required CertainTeed Waterproofing Shingle Underlayment is also recommended.)

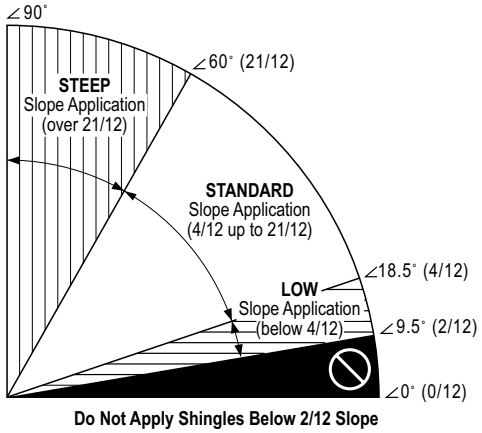


Figure 12-1: Slope definitions.

The roof deck* must be at least: 3⁄8" (9.5 mm) thick plywood, or 7⁄16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® Ice & Water Shield or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative application methods and materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Techinical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

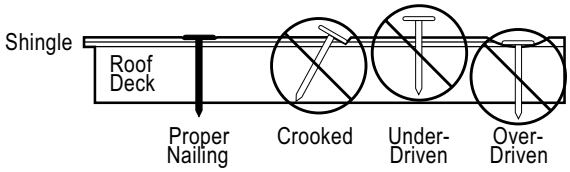


Figure 12-2: Proper and improper nailing.

IMPORTANT: For decks 3/4″ (19 mm) thick or thicker, nails must go at least 3/4″ (19 mm) into the deck. On thinner decks, nails must go at least 1/8″ (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8″ (9.5 mm) heads, and at least 1″ (25 mm) long.

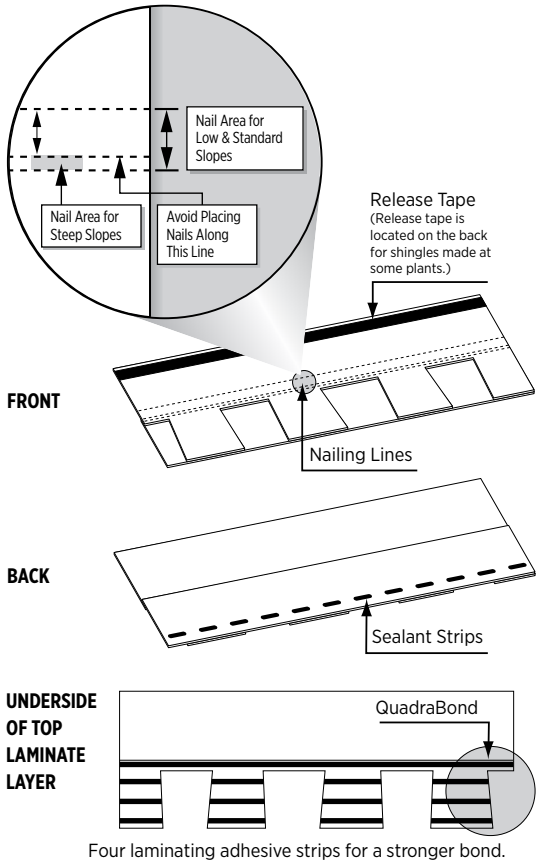


Figure 12-3: NailTrak® features a wider nail area and QuadraBond® technology features a four-layer adhesive system.

LOW AND STANDARD SLOPE

Use four nails for every full shingle as shown below.

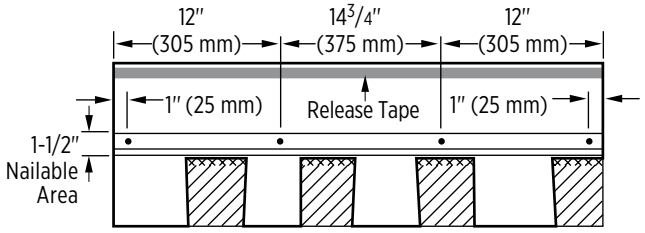


Figure 12-4: Use four nails for every full shingle.

IMPORTANT: When “six nailing” a full shingle, follow the nail pattern shown in Figure 12-5, nails are placed in the 1-1/2″ nailable area.

STEEP SLOPE

Use six nails and four spots of asphalt roofing cement for every full shingle as shown below. Asphalt roofing cement should meet ASTM D4586 Type II. Apply 1″ spots of asphalt roofing cement under each corner and at about 12″ to 13″ in from each edge.

CAUTION: Excessive use of roofing cement can cause shingles to blister.

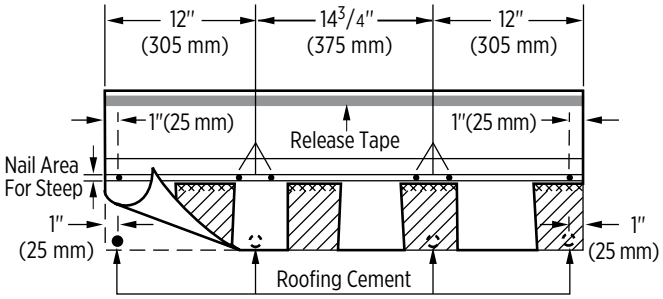


Figure 12-5: Use six nails and four spots of asphalt roofing cement on steep slopes.

IMPORTANT: Failure to follow these steep slope instructions can void the warranty in the event of a shingle delamination.

TWO CLEAN-DECK APPLICATION METHODS

FIVE-COURSE DIAGONAL METHOD (6″ AND 11″)
FIVE-COURSE DIAGONAL METHOD (5 5/8″ AND 11 1/4″)

NOTE: The 6″ and 11″ method is shown below. The 5-5/8″ and 11-1/4″ method follows the same application instructions as the 6″ and 11″ method except the dimensions of the shingle cut-offs in the second and third courses are 5-5/8″ and 11-1/4″ respectively.

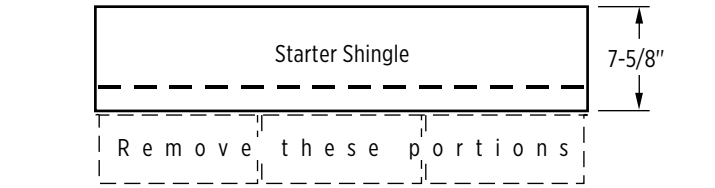
CAUTION: Use of other installation methods may result in an objectionable pattern.

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap chalklines to assure shingles will be correctly aligned.

STARTER COURSE:

1. Use CertainTeed Swiftstart® Starter or three-tab self-sealing shingles with the lower tab portions removed. Be sure that the starter shingles are a minimum 7-5/8″ in height. (Figure 12-6).



Fastening: Use 4 nails, located as shown below

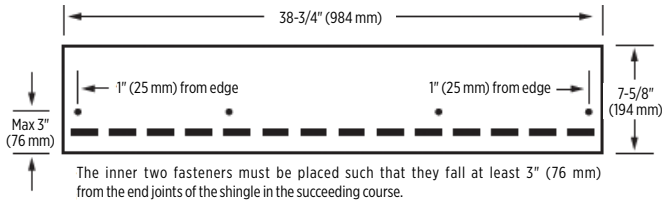


Figure 12-6: Make starter shingles that are minimum 7-5/8″ in height.

2. For the first starter, cut 6″ from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2″ overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4″. **NOTE:** Overhang should not exceed 1″.
4. Use full length starter shingles for the rest of the course.

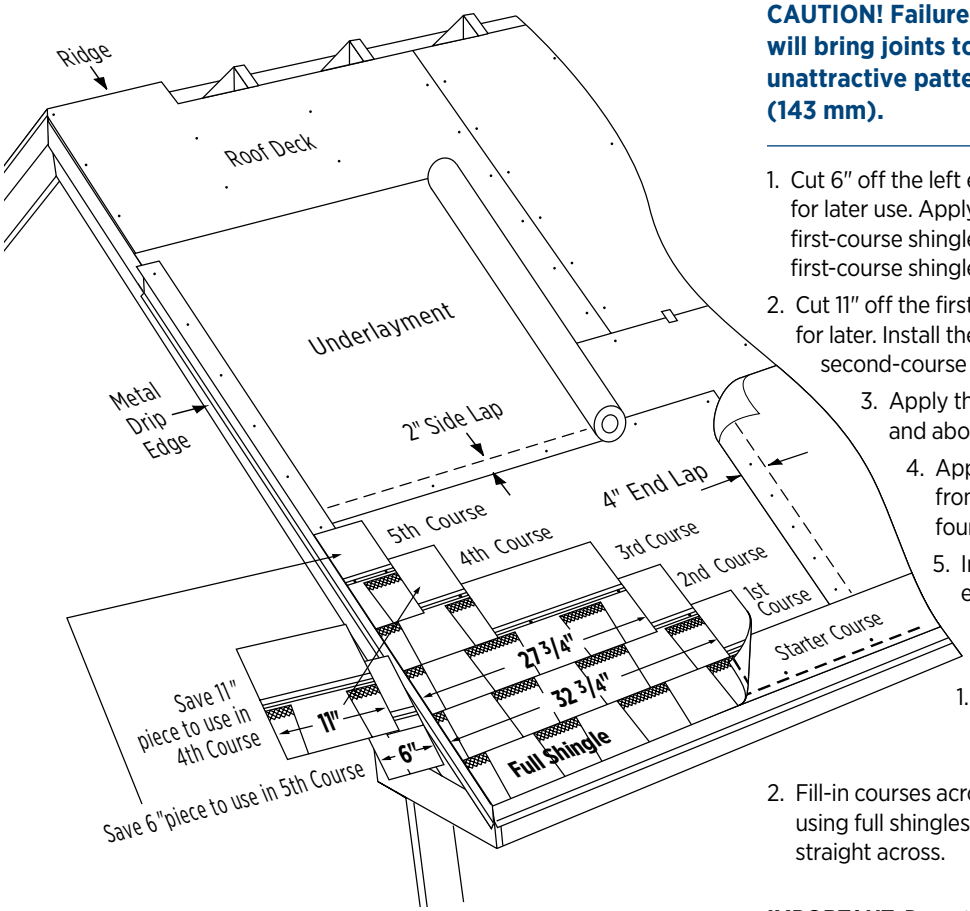


Figure 12-7: Applying the first 5 courses of Patriot®.

★ **Alternatively,**

1. Position SwiftStart SA parallel to the roof edge, granule side up, with the sealing strip closest to the roof edge.
2. Overhang eaves and rakes by 1/4″ to 3/4″ (6 mm to 19 mm). If a drip edge extends beyond the eave/rake edge, install flush to drip edge.
3. Drip edge must be primed with FlintPrime QD or equivalent ASTM D41 asphalt primer and allowed to dry prior to application of SwiftStart SA.
4. Remove release liner and roll into place. Apply uniform pressure with hand or hand roller to ensure SwiftStart SA is applied unwrinkled and is fully adhered.
5. When starting a new roll, overlap by a minimum of 6″ (152 mm).

SwiftStart SA General Notes:

Only install as much SwiftStart SA as will be covered by shingles same day. If applied in temperatures below 40° (4°), spot nailing may be required until adhesion strengthens as temperatures rise. SwiftStart SA butt joints must be offset a minimum of 4″ (101.6 mm) from the butt joints of the first course of shingles. When installed on rake, position SwiftStart SA to overlap eave starter course a minimum of 3″ (76 mm).

1ST COURSE: Apply a full shingle at the lower left corner of the roof. Make the lower edge and left edge lie flush with the edges of the starter course (Figure 12-7).

2ND THROUGH 5TH COURSES:

CAUTION! Failure to follow instruction steps 1-5 below will bring joints too close together and may cause unattractive patterns! Expose all shingles 5-5/8″ (143 mm).

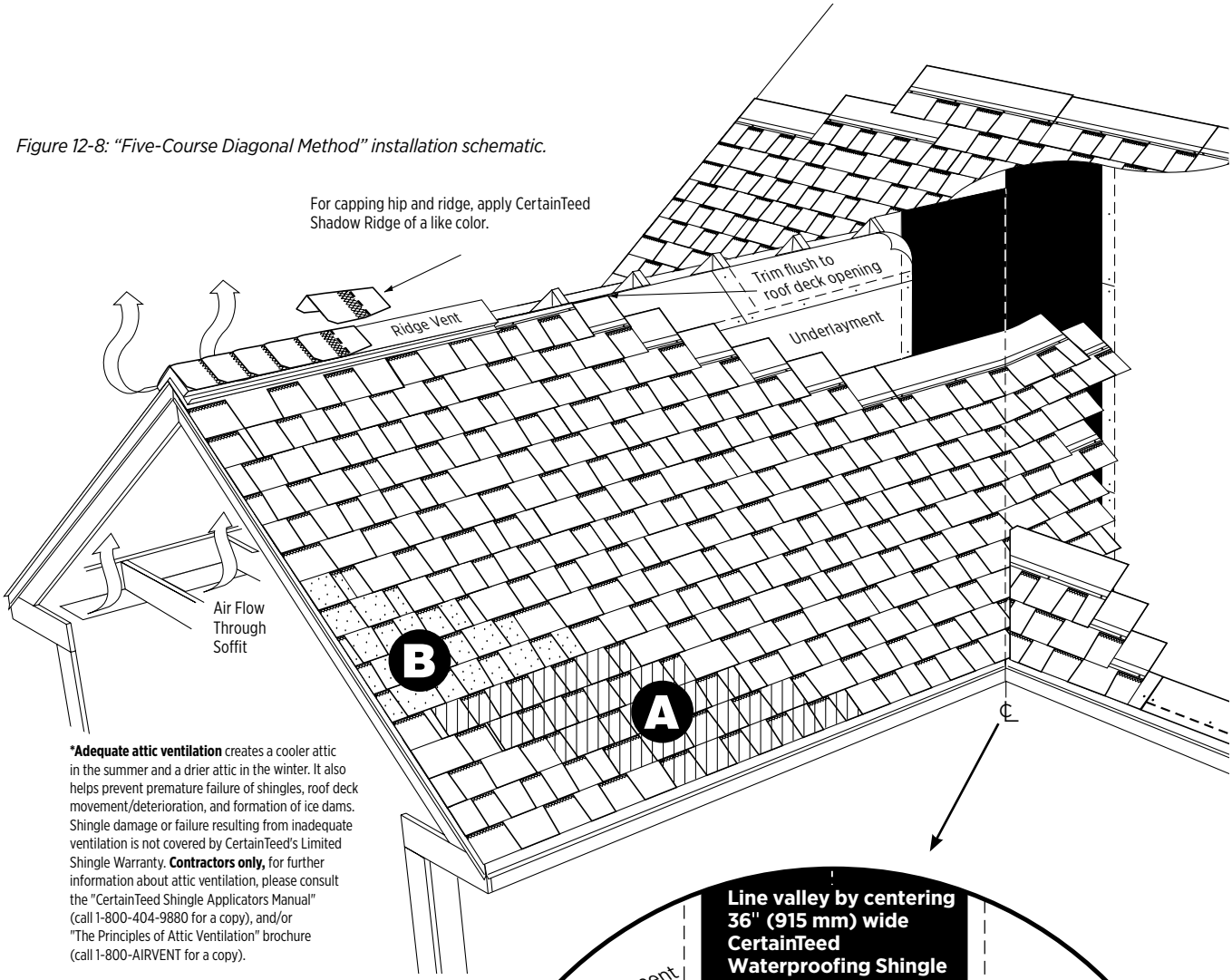
1. Cut 6″ off the left end of the first shingle and save this piece for later use. Apply the 32-3/4″ long piece over and above the first-course shingle. Leave the bottom 5-5/8″ tab portion of the first-course shingle exposed.
2. Cut 11″ off the first shingle of the third course and save this for later. Install the 27-3/4″ long piece over and above the second-course shingle.
3. Apply the previously removed 11″ long piece over and above the third-course shingle.
4. Apply the previously removed 6″ long piece from the second course over and above the fourth-course shingle.
5. Install a full shingle against the right edge of each shingle in courses one through five.

CONTINUING UP THE ROOF:

1. Beginning again with a full shingle, repeat the five-course pattern up the left rake. (Figure 12-8, B).
2. Fill-in courses across the roof in a stepped diagonal fashion using full shingles. (Figure 12-8, A). Do not run courses straight across.

IMPORTANT: Do not align joints of Patriot® shingles closer than 4″.

Figure 12-8: "Five-Course Diagonal Method" installation schematic.



***Adequate attic ventilation** creates a cooler attic in the summer and a drier attic in the winter. It also helps prevent premature failure of shingles, roof deck movement/deterioration, and formation of ice dams. Shingle damage or failure resulting from inadequate ventilation is not covered by CertainTeed's Limited Shingle Warranty. **Contractors only,** for further information about attic ventilation, please consult the "CertainTeed Shingle Applicators Manual" (call 1-800-404-9880 for a copy), and/or "The Principles of Attic Ventilation" brochure (call 1-800-AIRVENT for a copy).

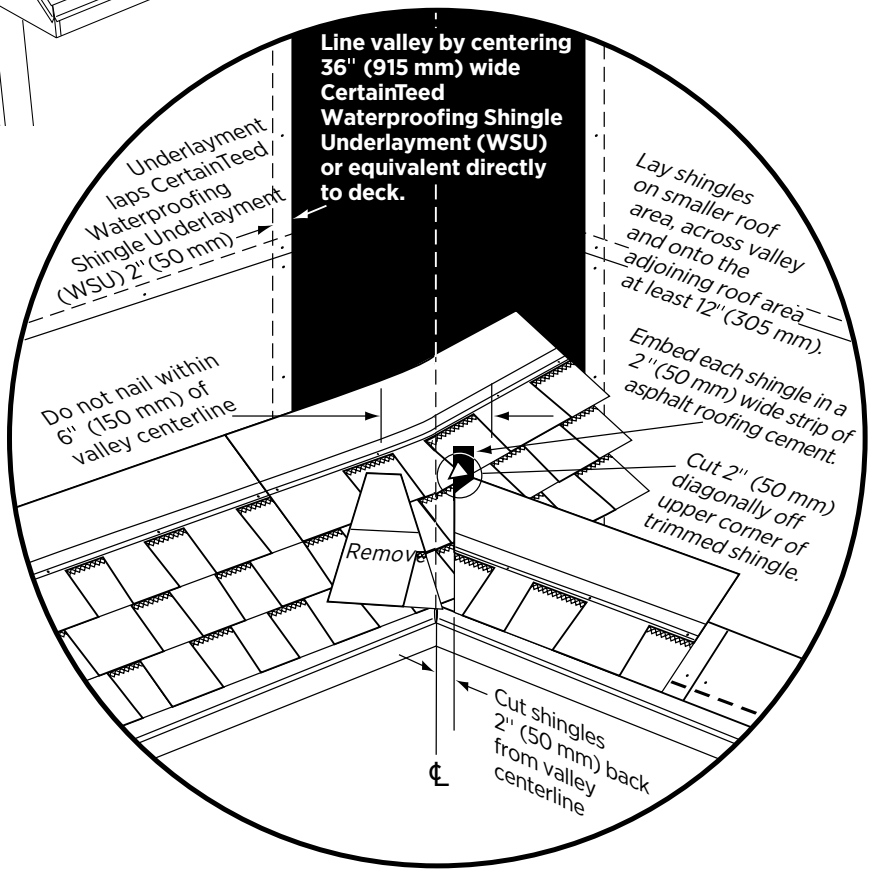


Figure 12-9: Highlight of closed-cut valley details.

CHIMNEY FLASHING

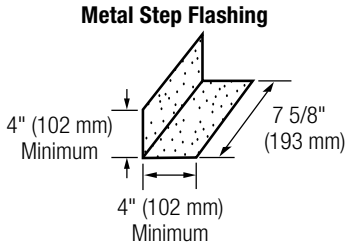


Figure 12-10: Step flashing minimum dimensions.

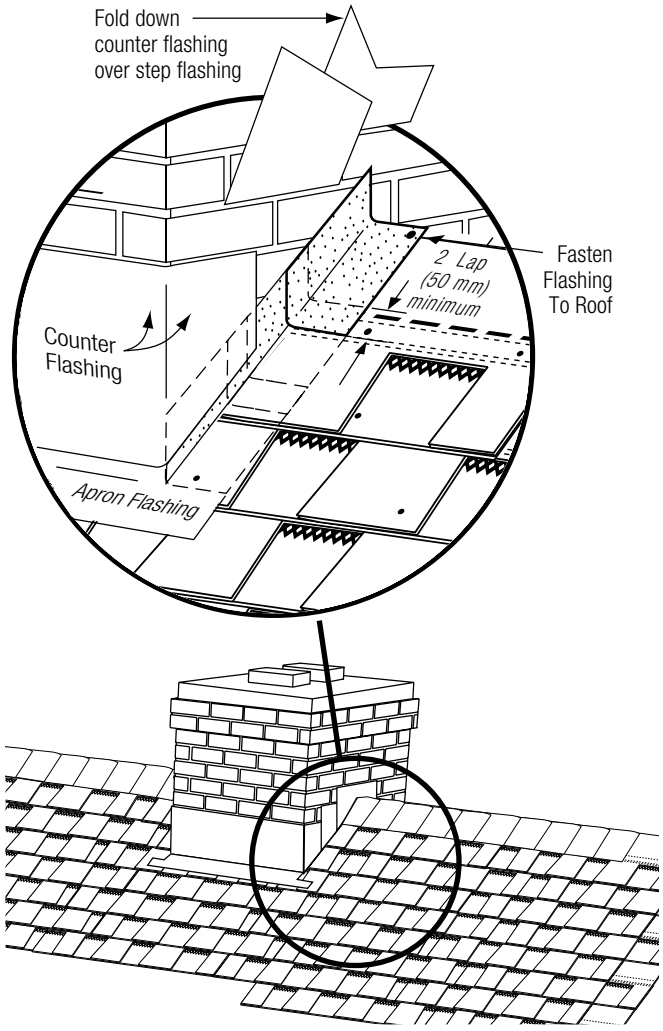


Figure 12-11: Flashing around a chimney.

TWO ROOF-OVER METHODS

The same methods used for clean-deck application of these shingles are used for roof-overs. Application of these shingles over English dimension shingles is not recommended — due to the high cost of workmanship and greater risk of error.

HIPS AND RIDGES

SHADOW RIDGE ACCESSORY SHINGLES

Shadow Ridge shingles have an accented shadow line that is designed to complement these shingles. Simply fold along the pre-cut lines and detach individual cap pieces. Save valuable installation time compared to cutting 3-tab shingles.

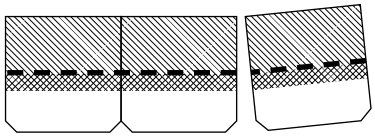


Figure 12-12: Shadow Ridge accessory shingles detach easily from three-piece units to make 72 individual cap pieces.

There are 24 three-piece units in each Shadow Ridge bundle, providing 72 individual caps that will cover 30 linear feet of a hip or ridge. Each English dimension cap piece is 12″ by 12″.

The Metric version detaches into four-piece units to make 96 individual pieces and covers 45 linear feet. Each Metric dimension cap piece is 13-1/4″ by 9-7/8″. Both English and Metric versions feature clipped corners on the bottom edge of the exposed portion.

APPLICATION:

1. Apply shingles up to the hip or ridge on both sides, then trim flush.

NOTE: The last course of shingles should have an exposure of 5″ (5-5/8″ for metric) or less when the shingle cap or ridge vent is fastened in place. Otherwise, a potential water leak could occur at exposed shingle end joints. The figures used in this section illustrate the application of accessory shingles over a ridge vent; application directly to the roof deck is very similar.

IMPORTANT: Use two nails to fasten each shingle. Nails must be minimum 1-3/4″ (45 mm) long.

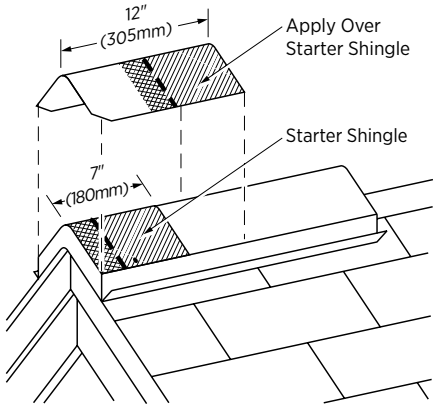


Figure 12-13: Apply a full cap shingle over the starter piece, flush with the bottom and side edges of the starter.

2. Install caps beginning at the bottom of a hip or at either end of a ridge. Apply a starter piece that has the bottom 5″ (5-5/8″ for metric) removed. Fasten the starter with two nails located about 3″ from the rake edge, and 1″ in from each side edge.

Make sure fasteners used to apply caps penetrate at least 3/4″ into or through the decking.

NOTE: To assist in proper alignment when ridge vent is not used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap shingles should be.

3. Apply a full cap shingle over the starter (Figure 12-13), and place fasteners at 5-5/8″ (6-1/4″ for metric) up from the exposed bottom edge and 1″ in from each side. Nails must not be exposed on the finished roof. All nail heads must be driven straight and must not cut into the shingle surface.

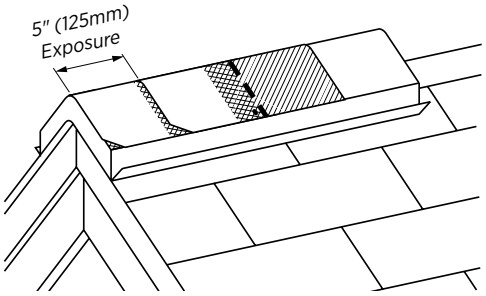


Figure 12-14: Install cap shingles at their correct exposure and cover all fasteners.

NOTE: Each cap has a laying/alignment notch at the top edge to center the piece on the ridge line, and two notches on each side to indicate the correct exposure and shadow-line placement (Figure 12-15). The side notches of the cap being applied should be aligned with the top edge of the previously applied cap.

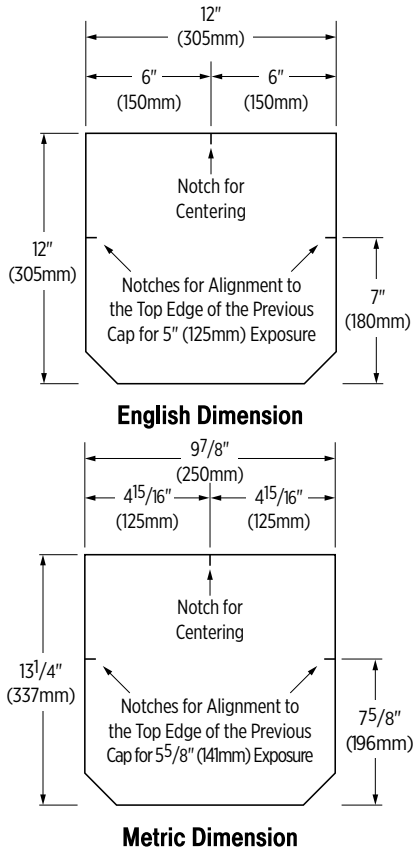


Figure 12-15 : Each Shadow Ridge shingle has a centering notch and two side-alignment notches to help ensure proper placement

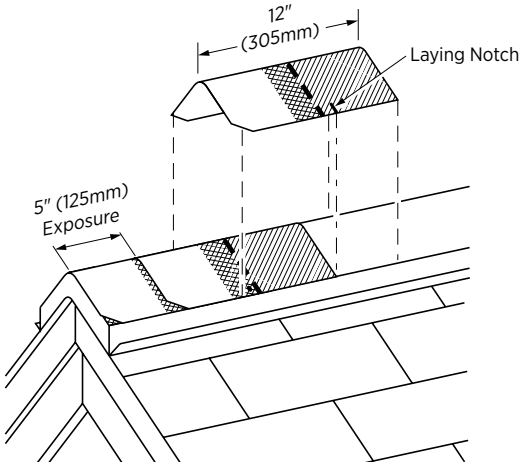


Figure 12-16: Use laying notches to center shingles on hips and ridges, and to locate the correct exposure.

Patriot® Installation Video

SECTION 12 SELF-TEST

12-1. Patriot shingles require 6 nails per shingle in low, standard & steep slope applications.

A. True.

B. False.

12-2. SwiftStart SA is an approved starter for Patriot application.

A. True.

B. False.

12-3. Patriot shingles require what exposure?

A. 4-5/8″

B. 5″

C. 5-5/8″

D. 6″

12-4. A Shadow Ridge bundle provides ___ linear feet of coverage?

A. 30

B. 35

C. 40

D. 50

Test on-line @ www.certainteed.com/samtest

Landmark® Series 13

YOUR OBJECTIVE:
To learn the correct procedure for installing Landmark® shingles.

LANDMARK SERIES

Landmark shingles have the installer-friendly NailTrak® feature, which provides 1-1/2" wide nailing area and specially formulated QuadraBond laminating adhesive (See Figure 13-3).

Landmark ClimateFlex™ is specially manufactured with SBS modified asphalt to meet UL 2218 Class 4 impact resistance rating

Landmark Premium is specially manufactured to meet UL 2218 Class 4 impact resistance rating.

Landmark PRO is specially manufactured to meet UL 2218 Class 3 impact resistance rating.

NOTE: Landmark ClimateFlex and Landmark Premium must be installed over a clean deck (no roofovers) to obtain the UL 2218 Class 4 rating. It is strongly recommended Shadow Ridge ClimateFlex™ or Shadow Ridge ClimateFlex™ 4PC impact resistant cap shingles be installed on all hips and ridges. Some insurance carriers may not consider the roof system as compliant to UL 2218 Class 4 without impact resistant cap shingles.

Landmark Solaris shingles are ENERGY STAR® qualified roof products that meet both solar reflectance and thermal emissivity requirements. Using CertainTeed's advanced roofing granules, Landmark Solaris reflects solar energy and radiates heat far better than traditional roofing shingles — it can reduce the roof's temperature by as much as 20 percent in the summer.

Closed-cut valleys are preferred by CertainTeed when applying any Landmark Series shingles; however, open and woven valleys are also acceptable.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR® include:

1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm) wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner in shingle fashion (half lap) per the low-slope application instructions.

IMPORTANT: Because water drains slowly from these slopes and the Pacific Northwest region is known for its above average annual precipitation, there is a greater chance of water back-up. Therefore, after careful consideration of local weather and the application of Landmark™ Series shingles on a low slope, CertainTeed is requiring a layer of either WinterGuard, VYCOR® Select, VYCOR® Ice and Water Shield®, VYCOR®Ice and Water Shield® HT, or VYCOR® ULTRA™ over the entire roof deck. A double layer of asphalt felt underlayment or synthetic underlayment is not an acceptable alternative when applying these products in the Pacific Northwest region on low slopes. For added protection, CertainTeed recommends doubling the end and side laps.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. (One layer of shingle underlayment meeting ASTM D4869 applied over the required CertainTeed Waterproofing Shingle Underlayment is also recommended.)

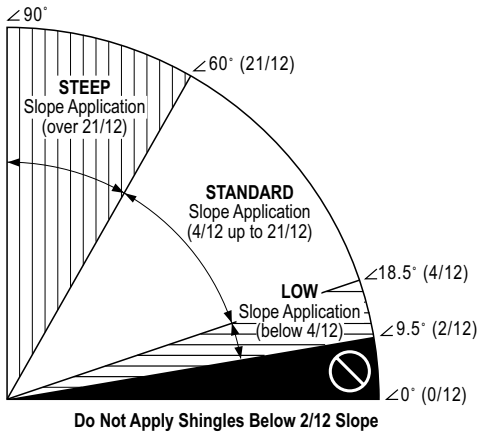


Figure 13-1: Slope definitions.

The roof deck must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative application methods and materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Technical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

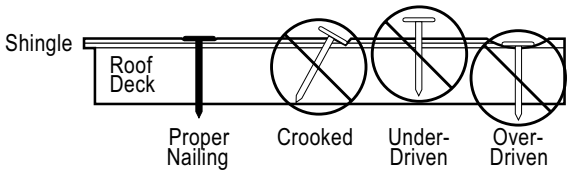


Figure 13-2: Proper and improper nailing.

IMPORTANT: For decks 3/4″ (19 mm) thick or thicker, nails must go at least 3/4″ (19 mm) into the deck. On thinner decks, nails must go at least 1/8″ (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8″ (9.5 mm) heads, and at least 1″ (25 mm) long.

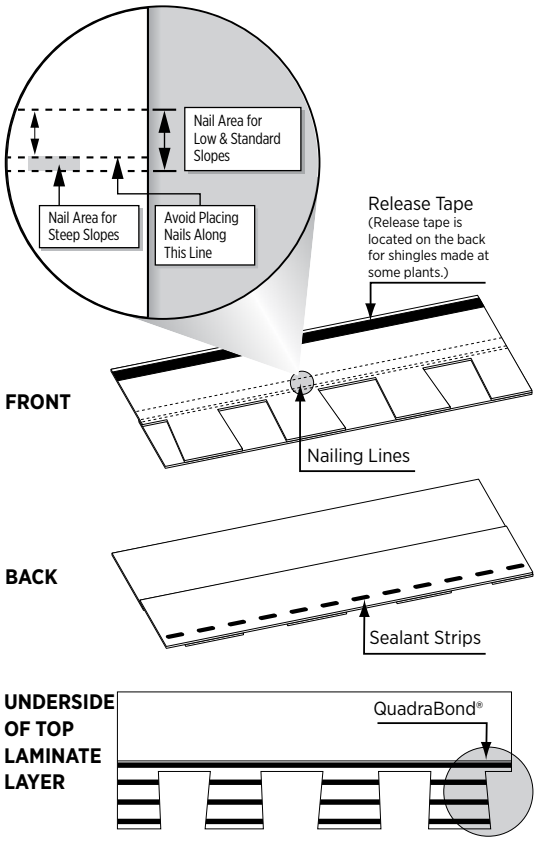


Figure 13-3: NailTrak® features a wider nail area. QuadraBond® technology features a four-layer adhesive system.

LOW AND STANDARD SLOPE

Use four nails for every full shingle as shown below.

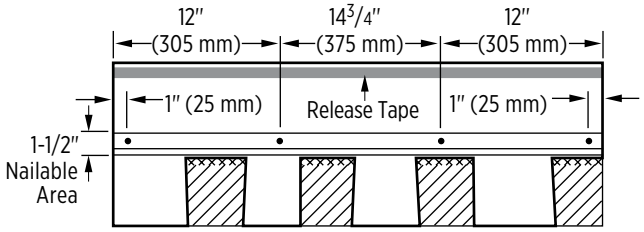


Figure 13-4: Use four nails for every full shingle.

IMPORTANT: When "six nailing" a full shingle, follow the nail pattern shown in figure 11-5, nails are placed in the 1-1/2″ nailable area.

STEEP SLOPE

Use six nails and four spots of asphalt roofing cement for every full shingle as shown below. Asphalt roofing cement should meet ASTM D4586 Type II. Apply 1″ spots of asphalt roofing cement under each corner and at about 12″ to 13″ in from each edge.

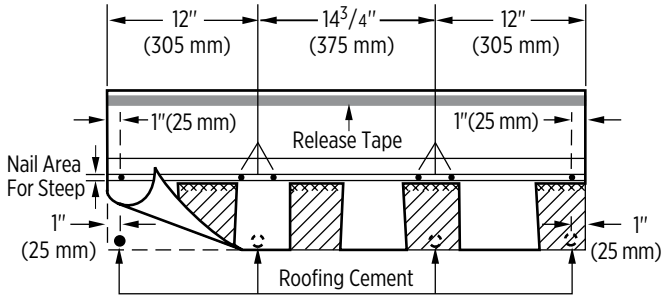


Figure 13-5: Use six nails and four spots of asphalt roofing cement on steep slopes.

IMPORTANT: Failure to follow these steep slope instructions can void the warranty in the event of a shingle delamination.

CAUTION: Excessive use of roofing cement can cause shingles to blister.

TWO CLEAN-DECK APPLICATION METHODS

FIVE-COURSE DIAGONAL METHOD (6″ AND 11″) FIVE-COURSE DIAGONAL METHOD (5 5/8″ AND 11 1/4″)

NOTE: The 6″ and 11″ method is shown below. The 5-5/8″ and 11-1/4″ method follows the same application instructions as the 6″ and 11″ method except the dimensions of the shingle cut-offs in the second and third courses are 5-5/8″ and 11-1/4″ respectively.

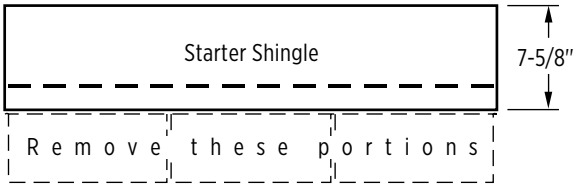
CAUTION: Use of other installation methods may result in an objectionable pattern.

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap chalklines to assure shingles will be correctly aligned.

STARTER COURSE:

1. Use CertainTeed Swiftstart® Starter, or three-tab self-sealing shingles with the lower tab portions removed. Be sure that the starter shingles are a minimum 7-5/8″ in height. (Figure 13-6).



Fastening: Use 4 nails, located as shown below

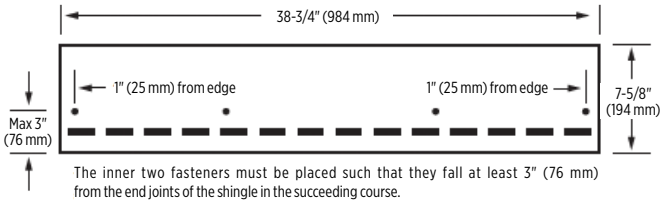


Figure 13-6: Make starter shingles that are a minimum 7-5/8″ in height.

2. For the first starter, cut 6″ from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2″ overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4″. **NOTE:** Overhang should not exceed 1″.
4. Use full length starter shingles for the rest of the course.

★ **Alternatively**,

1. Position SwiftStart SA parallel to the roof edge, granule side up, with the sealing strip closest to the roof edge.
2. Overhang eaves and rakes by 1/4″ to 3/4″ (6 mm to 19 mm). If a drip edge extends beyond the eave/rake edge, install flush to drip edge.
3. Drip edge must be primed with FlintPrime QD or equivalent ASTM D41 asphalt primer and allowed to dry prior to application of SwiftStart SA.
4. Remove release liner and roll into place. Apply uniform pressure with hand or hand roller to ensure SwiftStart SA is applied unwrinkled and is fully adhered.
5. When starting a new roll, overlap by a minimum of 6″ (152 mm).

SwiftStart SA General Notes:

Only install as much SwiftStart SA as will be covered by shingles same day. If applied in temperatures below 40° (4°), spot nailing may be required until adhesion strengthens as temperatures rise. SwiftStart SA butt joints must be offset a minimum of 4″ (101.6 mm) from the butt joints of the first course of shingles.

When installed on rake, position SwiftStart SA to overlap eave starter course a minimum of 3″ (76 mm).

FIRST COURSE: Apply a full shingle at the lower left corner of the roof. Makethe lower edge and left edge lie flush with the edges of the starter course (Figure 13-7).

2ND THROUGH 5TH COURSES:

CAUTION! Failure to follow instruction steps 1-5 below will bring joints too close together and may cause unattractive patterns! Expose all shingles 5-5/8″ (143 mm).

1. Cut 6″ off the left end of the first shingle of the second course and save this piece for later use. Apply the 32-3/4″ long piece over and above the first-course shingle.
2. Cut 11″ off the first shingle of the third course and save this for later. Install the 27-3/4″ long piece over and above the second-course shingle.
3. Apply the previously removed 11″ long piece over and above the third-course shingle.
4. Apply the previously removed 6″ long piece over and above the fourth-course shingle.
5. Install a full shingle against the right edge of each shingle in courses one through five.

CONTINUING UP THE ROOF:

1. Beginning again with a full shingle, repeat the five-course pattern up the left rake. (Figure 13-8, B).
2. Fill-in courses across the roof in a stepped diagonal fashion using full shingles. (Figure 13-8, A). Do not run courses straight across.

IMPORTANT: Do not align joints of Landmark shingles closer than 4″.

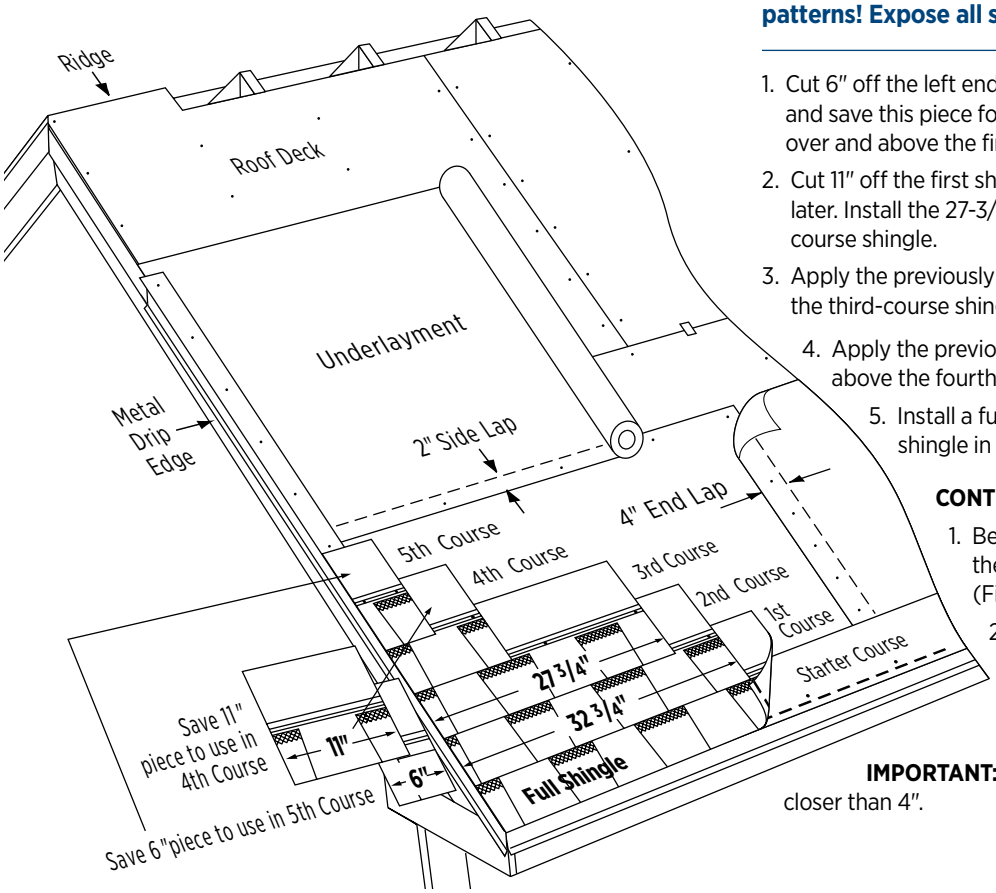
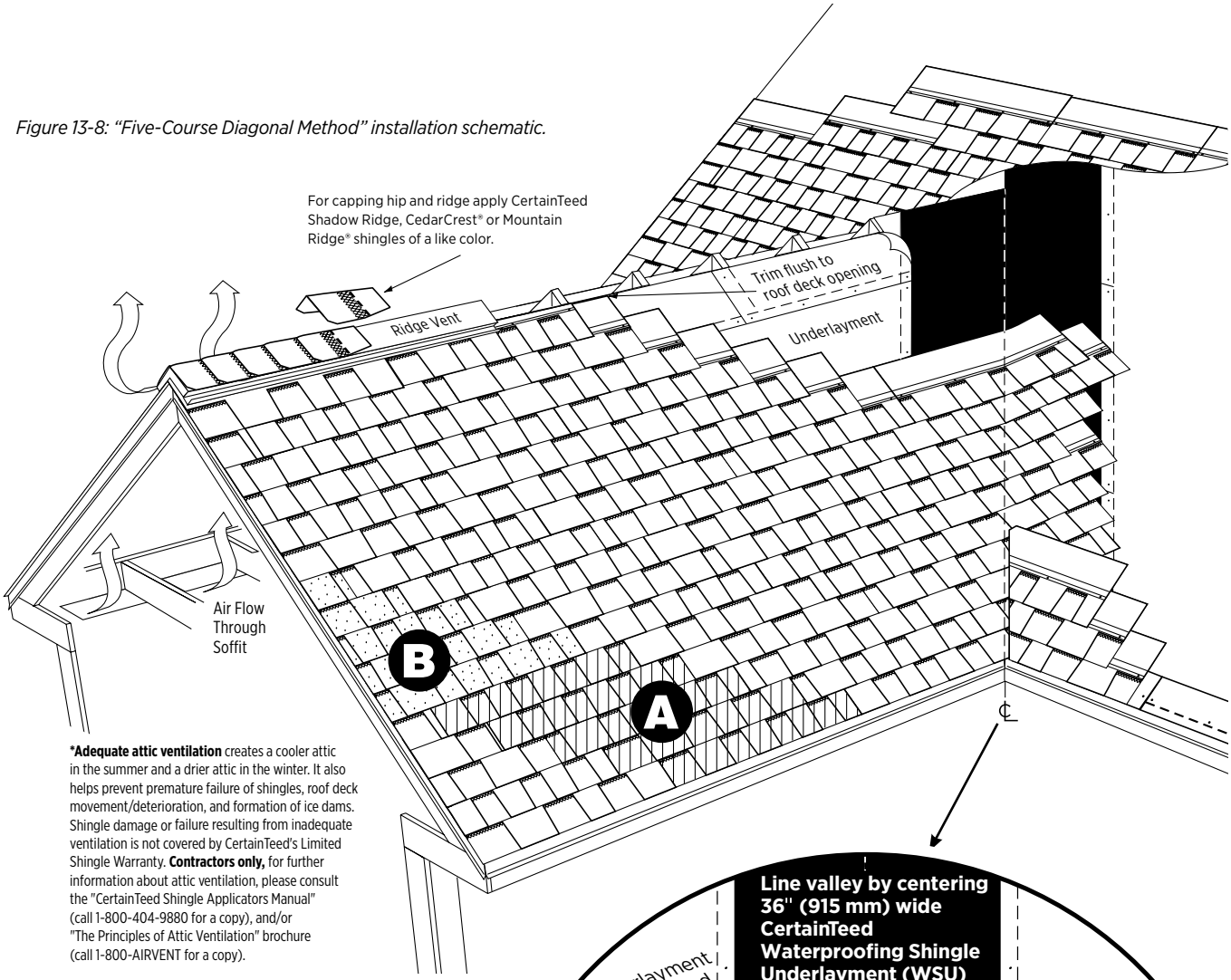


Figure 13-7: Applying the first 5 courses of Landmark.

Figure 13-8: "Five-Course Diagonal Method" installation schematic.



***Adequate attic ventilation** creates a cooler attic in the summer and a drier attic in the winter. It also helps prevent premature failure of shingles, roof deck movement/deterioration, and formation of ice dams. Shingle damage or failure resulting from inadequate ventilation is not covered by CertainTeed's Limited Shingle Warranty. **Contractors only,** for further information about attic ventilation, please consult the "CertainTeed Shingle Applicators Manual" (call 1-800-404-9880 for a copy), and/or "The Principles of Attic Ventilation" brochure (call 1-800-AIRVENT for a copy).

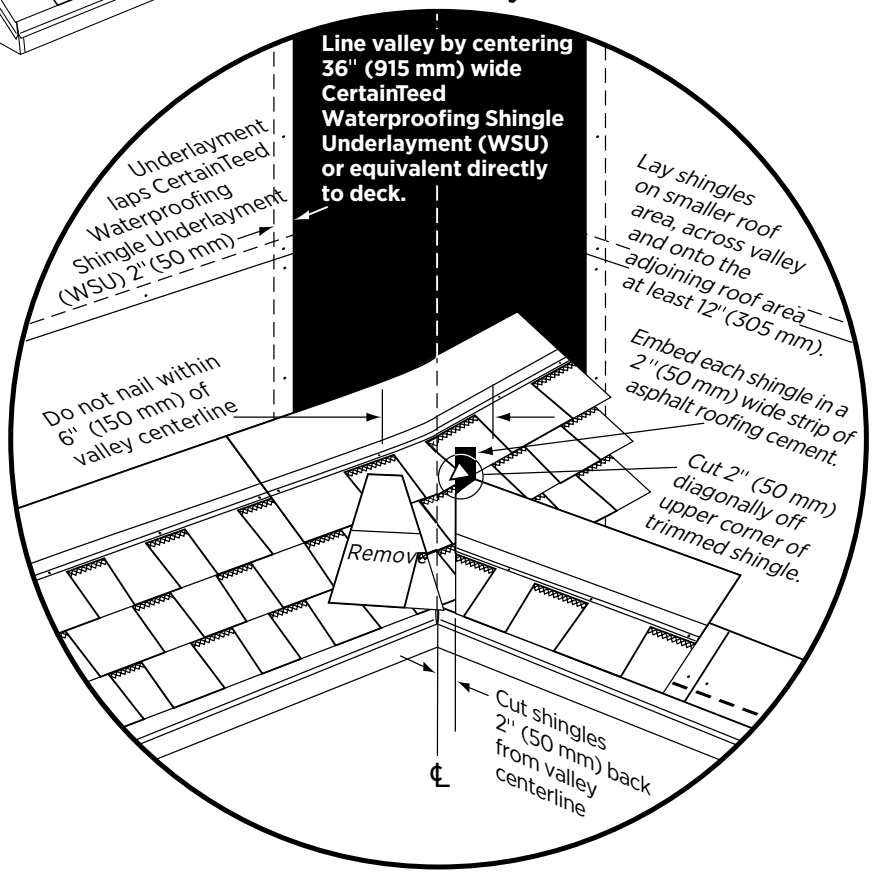


Figure 13-9: Highlight of closed-cut valley details.

CHIMNEY FLASHING

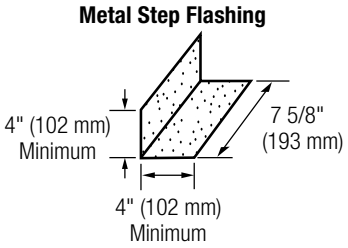


Figure 13-10: Step flashing minimum dimensions.

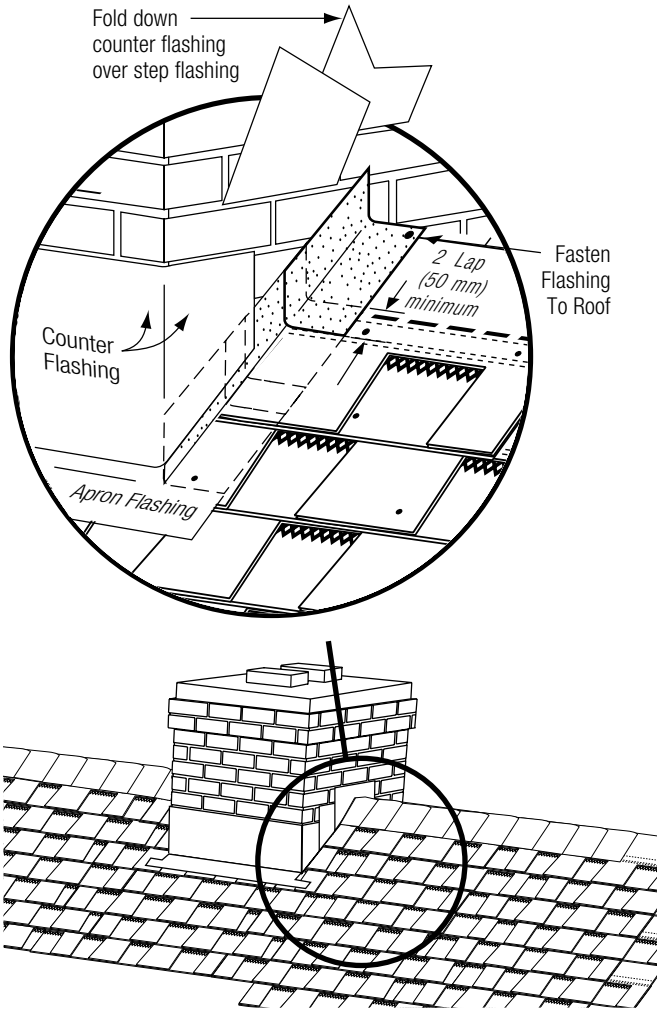


Figure 13-11: Flashing around a chimney.

TWO ROOF-OVER METHODS

The same methods used for clean-deck application of these shingles are used for roof-overs. Application of these shingles over English dimension shingles is not recommended — due to the high cost of workmanship and greater risk of installation error.

HIPS AND RIDGES

SHADOW RIDGE ACCESSORY SHINGLES

Shadow Ridge shingles have an accented shadow line that is designed to complement these shingles. Simply fold along the pre-cut lines and detach individual cap pieces. Save valuable installation time compared to cutting 3-tab shingles.

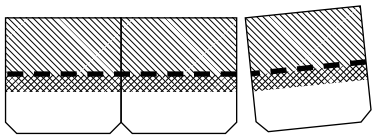


Figure 13-12: Shadow Ridge accessory shingles detach easily from three-piece units to make 72 individual cap pieces.

There are 24 three-piece units in each Shadow Ridge bundle, providing 72 individual caps that will cover 30 linear feet of a hip or ridge. Each English dimension cap piece is 12″ by 12″.

The Metric version detaches into four-piece units to make 96 individual pieces and covers 45 linear feet. Each Metric dimension cap piece is 13-1/4″ by 9-7/8″. Both English and Metric versions feature clipped corners on the bottom edge of the exposed portion.

APPLICATION:

1. Apply shingles up to the hip or ridge on both sides, then trim flush.

NOTE: The last course of shingles should have an exposure of 5″ (5-5/8″ for metric) or less when the shingle cap or ridge vent is fastened in place. Otherwise, a potential water leak could occur at exposed shingle end joints. The figures used in this section illustrate the application of accessory shingles over a ridge vent; application directly to the roof deck is very similar.

IMPORTANT: Use two nails to fasten each shingle. Nails must be minimum 1-3/4″ (45 mm) long.

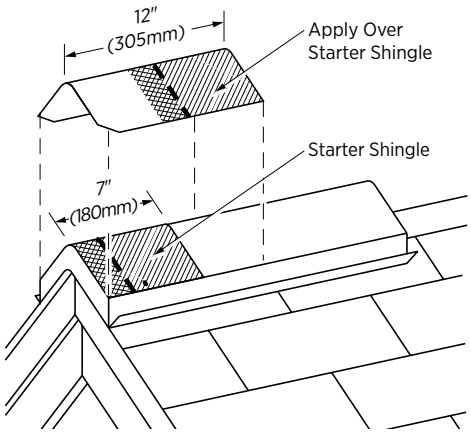


Figure 13-13: Apply a full cap shingle over the starter piece, flush with the bottom and side edges of the starter.

2. Install caps beginning at the bottom of a hip or at either end of a ridge. Apply a starter piece that has the bottom 5″ (5-5/8″ for metric) removed. Fasten the starter with two nails located about 3″ from the rake edge, and 1″ in from each side edge. Make sure fasteners used to apply caps penetrate at least 3/4″ into or through the decking.

NOTE: To assist in proper alignment when ridge vent is not used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap shingles should be.

3. Apply a full cap shingle over the starter (Figure 13-13), and place fasteners at 5-5/8" (6-1/4" for metric) up from the exposed bottom edge and 1" in from each side. Nails must not be exposed on the finished roof. All nail heads must be driven straight and must not cut into the shingle surface.

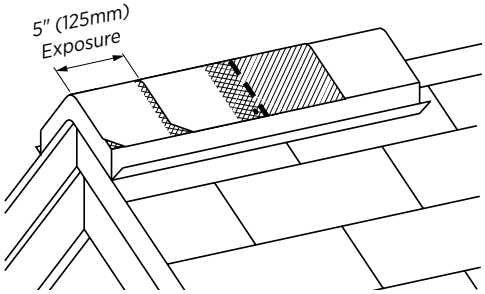


Figure 13-14: Install cap shingles at their correct exposure and cover all fasteners.

NOTE: Each cap has a laying/alignment notch at the top edge to center the piece on the ridge line, and two notches on each side to indicate the correct exposure and shadow-line placement (Figure 13-15). The side notches of the cap being applied should be aligned with the top edge of the previously applied cap.

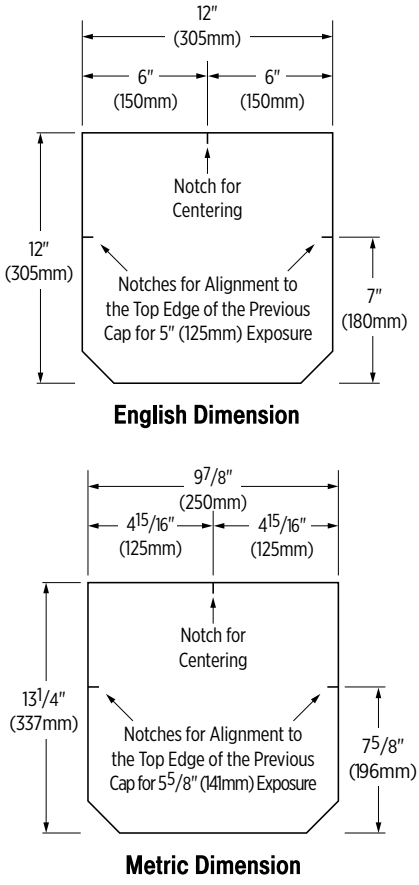


Figure 13-15 : Each Shadow Ridge shingle has a centering notch and two side-alignment notches to help ensure proper placement

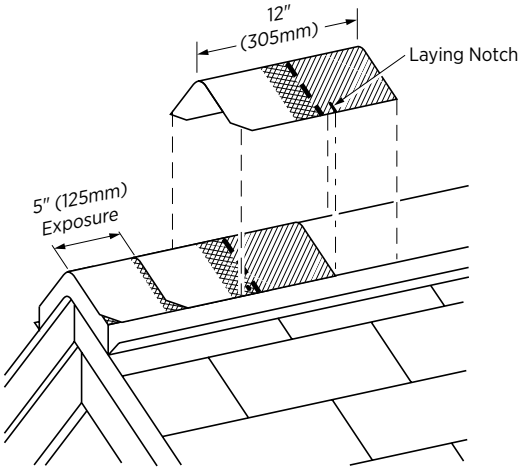


Figure 13-16: Use laying notches to center shingles on hips and ridges, and to locate the correct exposure.

MOUNTAIN RIDGE HIGH-PROFILE HIP AND RIDGE ACCESSORY

Use Mountain Ridge® accessory shingles to cover hips, ridges or rake edges. One box of 10" wide shingles will cover 20 linear feet. To prevent damage to shingles during application, they must be sufficiently warm to allow proper forming.

FASTENING

IMPORTANT: Use two nails to fasten each shingle. Nails must be minimum 1-3/4" (45 mm) long. For the 4" (100 mm) starter shingle, place fastener 1" (25 mm) in from each side edge and about 2" (50 mm) from the rake (or eave) edge, making sure the fastener goes 3/4" into the deck or all the way through. For each full Mountain Ridge shingle, place fasteners 8-5/8" (219 mm) up from its exposed butt edge and 1" (25 mm) in from each side edge.

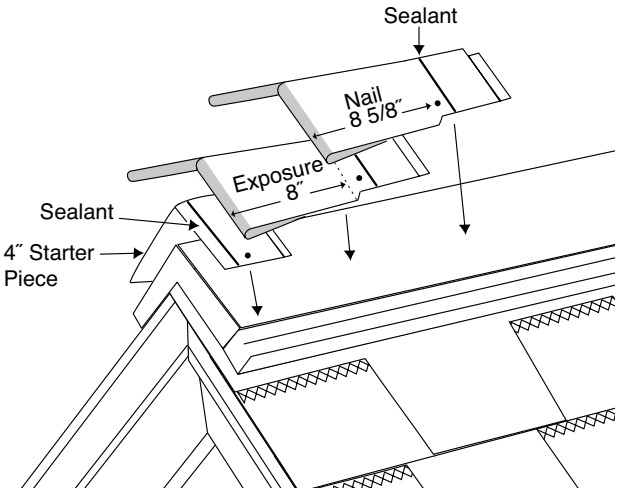


Figure 13-17: Hip and ridge application.

HIP, RIDGE AND RAKE SHINGLE APPLICATION

Apply the primary field roofing up to the hip or ridge from both sides of the roof and trim flush or lap over one side, not more than half the width of a Mountain Ridge® shingle.

Assure that the installed Mountain Ridge shingles properly cover hip and ridge field shingles on both sides and the field shingles applied along rake edges. For a rake edge installation, cut the field shingles flush to the rake edge. Apply Mountain Ridge shingles ensuring they fit securely against the rake board. To assist in proper alignment, snap a chalk line parallel to the hip, ridge or rake along the line where the side edges of the Mountain Ridge shingles should fall.

Prepare a 4″ Starter shingle by cutting off the lower 8″ color granule butt portion of one Mountain Ridge shingle. Apply the 4″ starter piece (with sealant nearest the outer edge) over the bottom corner of the hip or rake, or on either end of the ridge, overhanging the corner or end by approximately 1/2″ and bending the starter shingle along its centerline to form into place (see figures below.) Install a nail on each side about 2″ up from the starter shingle's exposed butt edge and 1″ in from each side edge of the shingle. The 8″ piece that was cut off may be used to finish the opposite end of hip, ridge or rake.

Next, apply a full Mountain Ridge shingle over the installed starter shingle, bending it along its centerline and forming into place over the hip, ridge or rake, flush with the bottom and side edges of the starter shingle. Install a nail on each side of the shingle 8-5/8″ up from the bottom edge and 1″ in from each side edge.

Rake – Ensure field shingles at rake edge are flush with the outer edge of the rake board. Apply Mountain Ridge shingles fitting them snugly against the rake board. Use two color-coordinated aluminum trim or paneling nails, to pin the material to the fascia at 2″ (50 mm) up from bottom edge and 2″ (50 mm) and 3″ (75 mm) in from front edge of shingle. (See Figure 13-18)

Continue application of the Mountain Ridge shingles along the hip, ridge or rake as shown. Expose Mountain Ridge shingles 8″, covering all fasteners.

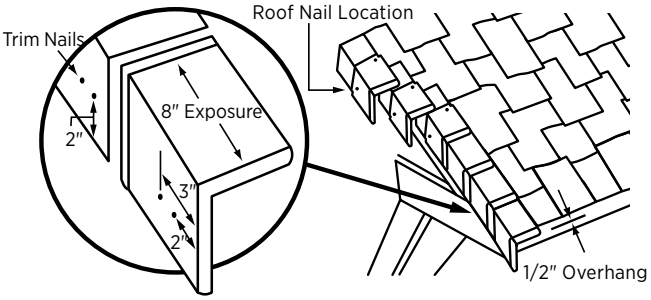


Figure 13-18: Rake edge application

CEDAR CREST MEDIUM-PROFILE HIP AND RIDGE ACCESSORY SHINGLES

Use Cedar Crest® accessory shingles to cover hips and ridges. Carefully separate the three-piece units prior to application, by first folding along the pre-cut lines and then detatching the pieces (see Figure 13-19). No cutting is necessary. There are 30 individual shingles (10 three-piece units) in each bundle. One bundle will cover 20 linear feet. Each 12″ x 12″ (305 mm x 305 mm) shingle has a shadowline that is a design feature which is visible when applied properly. To prevent shingle damage during application, they must be sufficiently warm to allow proper forming.

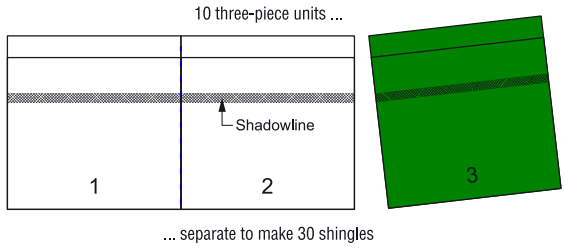


Figure 13-19: Separate to make 3 cap shingles.

FASTENING

IMPORTANT: Use TWO nails for each shingle. Fasteners must be minimum 1-3/4″ (45 mm) long. All nail heads must be driven straight and must not cut into shingle surface. Nails must not be exposed on finished roof.

For the starter shingle, place fastener 1″ in from each side edge and about 2″ up from the starter shingle's exposed butt edge, making sure fastener goes 3/4″ into the deck or all the way through the deck. (see Figure 13-20). For each full Cedar Crest shingle, place fasteners 8-5/8″ up from its exposed butt edge and 1″ in from each side edge (see Figure 13-21).

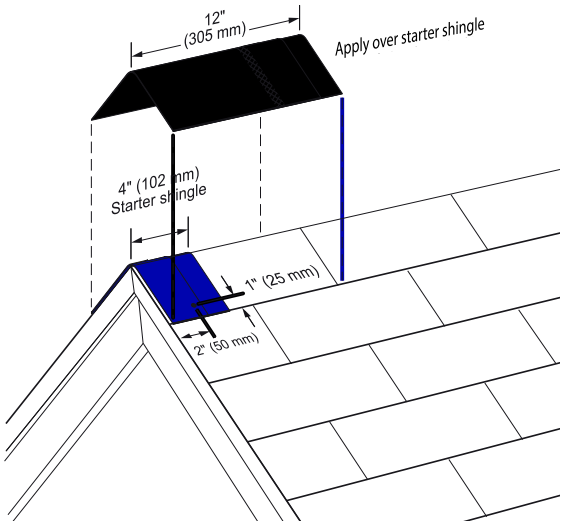


Figure 13-20: Apply a full cap shingle over the starter shingle.

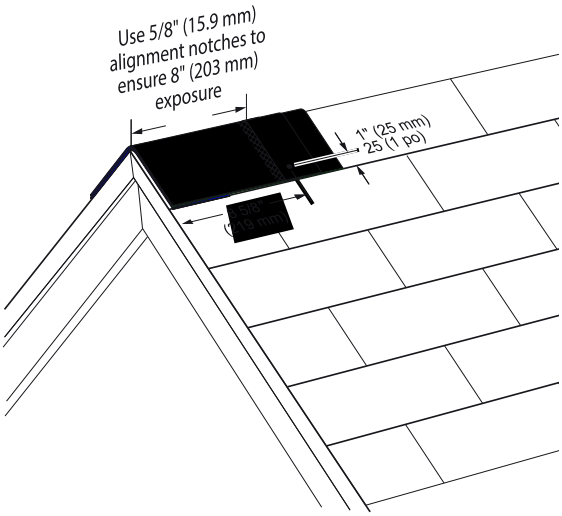
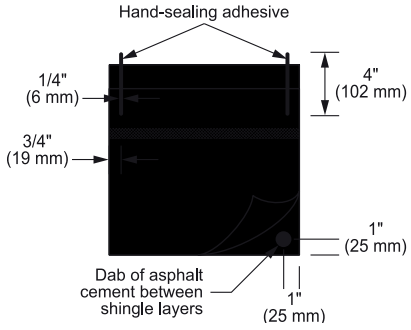


Figure 13-21: Install cap shingles at an 8" exposure and fasten with one nail on each side as shown.

IMPORTANT: High Wind Instructions. In order to achieve the ASTM D3161 Class "F" Wind Resistance Classification each "hip and ridge" shingle must be both 1) fastened with nails as detailed in Cedar Crest Application and 2) hand-sealed with two 1/4" (6 mm) wide beads of either BASF "Sonolastic® NP1™ Adhesive" or Henkel "PL® Polyurethane Roof and Flashing Cement" applied 8 5/8" (219 mm) up from the butt edge, and extending approximately 4" (102 mm) along the sides of the headlap along a line 3/4"-1" (19 mm – 25 mm) in from each side edge of the shingle's headlap as shown. Immediately align and apply the next overlying shingle, gently pressing tab sides into adhesive and ensuring none becomes visible. Only one side of the double thickness tab is laminated together; to secure the other side, after folding the shingle over the ridge and nailing into position, a 1" (25 mm) diameter spot of either NP1 or PL adhesive must be applied between the shingle layers as shown.



Hand seal caps as shown.

CEDAR CREST® APPLICATION

Apply primary roofing up to hip or ridge on both sides of roof and trim flush. Ensure that the Cedar Crest shingles will adequately cover the top course of the shingles on both sides of the hip or ridge. Prepare a 4" (102 mm) "starter" shingle by cutting off the lower 8" (203 mm) color granule portion of one Cedar Crest shingle. Apply the 4" (102 mm) starter piece over the bottom corner of the hip or to either end of the ridge, overhanging the corner or end by approximately 1/2" (13 mm) and bending the starter shingle along its centerline to form into place (see Figure 13-20). Install a nail on each side about 2" (51 mm) up from the starter shingle's exposed butt edge and 1" (25 mm) in from each side edge of the shingle. Then apply a full 12" x 12" (305 mm x 305 mm) piece over the starter, bending the shingle along its centerline and forming it into place over the hip or ridge, flush with the bottom and side edges of the starter shingle. Utilizing the 5/8" (15.9 mm) notches located on either side of the shingle as a guide, position to help ensure the 8" (203 mm) exposure. Fasten with two (2) fasteners minimum 1-3/4" (45 mm) long with one (1) nail on each side of shingle 8-5/8" (219 mm) up from the butt edge and 1" (25 mm) in from each side edge (see Figure 13-21).

Continue application of Cedar Crest shingles up the hip or along the ridge, forming each shingle over the hip or ridge, and fasten as shown in Fastening. Expose Cedar Crest shingles 8", covering all fasteners.

To assist in proper alignment, snap a chalk line parallel to the hip or ridge applying along the line where the side edges of the Cedar Crest shingles should be.

NOTE: When applying Cedar Crest shingles on shingle-over ridge vents, cap shingles may need to be trimmed. Assure proper fit and avoid overhanging vent openings. Contact the ridge vent manufacturer for instructions specific to their product. Be especially careful to use fasteners of sufficient length to penetrate minimum 3/4" (19 mm) into solid decking or through the thickness of the decking, whichever is less. Use approved caulking material to fill gaps between vent and roof surface.

Landmark® Series Installation Video

Here's a Tip...

In the winter put hip and ridge cap shingles in your truck with the heater blasting for 20 minutes so the caps don't crack when formed. (Thanks to Mark Dulz, Richmond, MI.)

SECTION 13 SELF-TEST

13-1. When applying Landmark® shingles on roof slopes greater than 21/12, fasteners must be placed:

A. Anywhere within the 1-1/2″ nailing area.

B. Within the common-bond area.

13-2. When "six-nailing" a full Landmark Shingle, nails must be spaced evenly across the shingle.

A. True.

B. False.

13-3. Failure to follow steep slope fastening instructions can void the warranty in the event of a shingle delamination.

A. True.

B. False.

13-4. Closed valleys are preferred when installing Landmark Shingles.

A. True.

B. False.

13-5. Two layers of felt is not an alternative to WinterGuard or VYCOR® whenever there is a chance of ice buildup in cold weather climates.

A. True.

B. False.

13-6. Putting six nails in the common bond area of a Landmark shingle does not increase the wind warranty from 110 mph to 130 mph.

A. True.

B. False.

13-7. Landmark shingles can be applied using the "6″ and 11″ Method."

A. True.

B. False.

13-8. Failure to follow the five-course application method will bring joints too close together and may cause unattractive patterns.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Landmark® TL

14

YOUR OBJECTIVE:
To learn the correct procedure for installing Landmark® TL shingles.

LANDMARK TL

Landmark TL is unique because its patented Tri-Laminate design combines three layers of material to provide a dramatically thick shingle with a wood shake style.

Open valleys are recommended when applying Landmark TL; however closed-cut valleys are also acceptable. Woven valleys are not recommended for Landmark TL because the tri-laminated shingle can buckle and become damaged when shaped into the valley.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: One layer of WinterGuard® or VYCOR® or equivalent meeting ASTM D1970 must be applied over the entire deck surface. One layer of felt or synthetic underlayment meeting ASTM D226, D4869 or D6757 applied over the REQUIRED WinterGuard or VYCOR® is also recommended. **IMPORTANT:** Applying two layers of felt or synthetic shingle underlayment IS NOT an acceptable alternative to WinterGuard or VYCOR® .

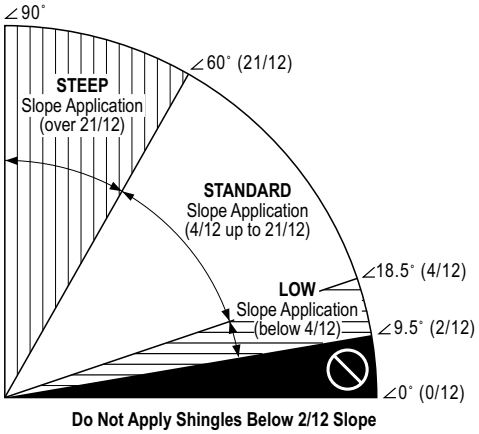


Figure 14-1: Slope definitions.

The roof deck* must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative application methods and materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Technical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

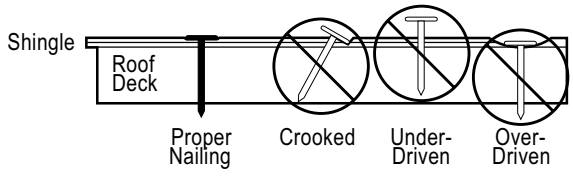


Figure 14-2: Proper and improper nailing.

IMPORTANT: For decks 3/4" (19 mm) thick or thicker, nails must go at least 3/4" (19 mm) into the deck. On thinner decks, nails must go at least 1/8" (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8" (9.5 mm) heads, and at least 1-1/4" (31 mm) long.

LOW AND STANDARD SLOPE

Use four nails for every full shingle as shown below.

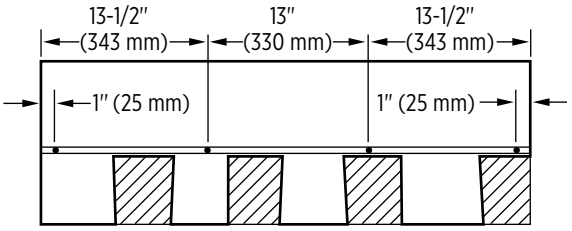


Figure 14-3: Use four nails for every full shingle.

IMPORTANT: When "six nailing" a full shingle, follow the nail placement pattern shown in figure 14-4.

STEEP SLOPE

Use six nails and four spots of asphalt roofing cement for every full shingle as shown below. Asphalt roofing cement should meet ASTM D4586 Type II. Apply 1" spots of asphalt roofing cement under each corner and at about 12" to 13" in from each edge.

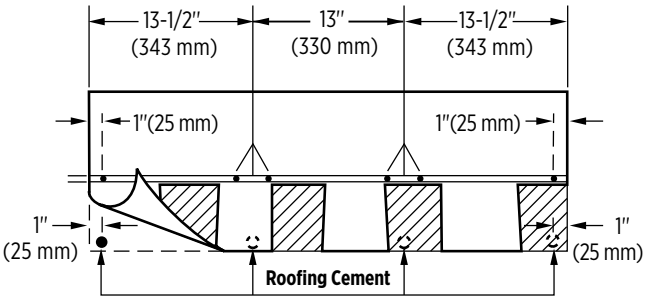


Figure 14-4: Use six nails and four spots of asphalt roofing cement on steep slopes.

CAUTION: Excessive use of roofing cement can cause shingles to blister.

TWO CLEAN-DECK APPLICATION METHODS

FIVE-COURSE DIAGONAL METHOD (6" AND 11")
FIVE-COURSE DIAGONAL METHOD (5-5⁄8" AND 11-1⁄4")

NOTE: The 6" and 11" method is shown below. The 5-5/8" and 11-1/4" method follows the same application instructions as the 6" and 11" method except the dimensions of the shingle cut-offs in the second and third courses are 5-5/8" and 11-1/4" respectively.

CAUTION: Use of other installation methods may result in an objectionable pattern.

Preparing the Deck:

- Apply underlayment as required. CertainTeed recommends that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap chalklines to assure shingles will be correctly aligned.

STARTER COURSE:

1. Use CertainTeed Swiftstart® Starter, or three-tab self-sealing shingles with the lower tab portions removed. Be sure that the starter shingles are a minimum 7-5/8" in height.(Figure 14-5).

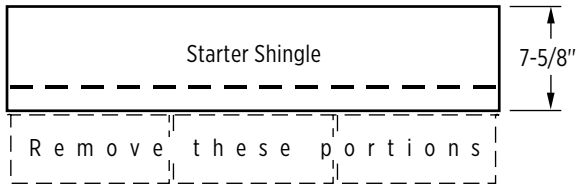
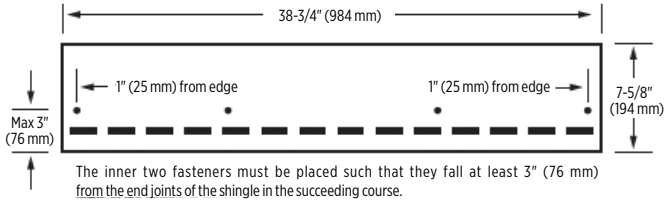


Figure 14-5: Make starter shingles that are a minimum 7-5/8" in height.

Fastening: Use 4 nails, located as shown below



2. For the first starter, cut 6" from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2" overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4". **NOTE:** Overhang should not exceed 1".
4. Use full length starter shingles for the rest of the course

Alternatively,

1. Position SwiftStart SA parallel to the roof edge, granule side up, with the sealing strip closest to the roof edge.
2. Overhang eaves and rakes by 1/4" to 3/4" (6 mm to 19 mm). If a drip edge extends beyond the eave/rake edge, install flush to drip edge.
3. Drip edge must be primed with FlintPrime QD or ASTM D41 asphalt primer and allowed to dry prior to application of SwiftStart SA.
4. Remove release liner and roll into place. Apply uniform pressure with hand or hand roller to ensure SwiftStart SA is applied unwrinkled and is fully adhered.
5. When starting a new roll, overlap by a minimum of 6" (152 mm).

SwiftStart SA General Notes:

Only install as much SwiftStart SA as will be covered by shingles same day. If applied in temperatures below 40° (4°), spot nailing may be required until adhesion strengthens as temperatures rise. SwiftStart SA butt joints must be offset a minimum of 4" (101.6 mm) from the butt joints of the first course of shingles. When installed on rake, position SwiftStart SA to overlap eave starter course a minimum of 3" (76 mm).

1ST COURSE: Apply a full shingle at the lower left corner of the roof. Make the lower edge and left edge lie flush with the edges of the starter course (Figure 14-6).

2ND THROUGH 5TH COURSES:

CAUTION! Failure to follow instruction steps 1-5 below will bring joints too close together and may cause unattractive patterns! Expose all shingles 5-5/8″ (143 mm).

1. Cut 6″ off the left end of the first shingle in the second course and save this piece for later use. Apply the 34″ long piece over and above the first-course shingle.
2. Cut 11″ off the first shingle of the third course and save this for later. Install the 29″ long piece over and above the second-course shingle.

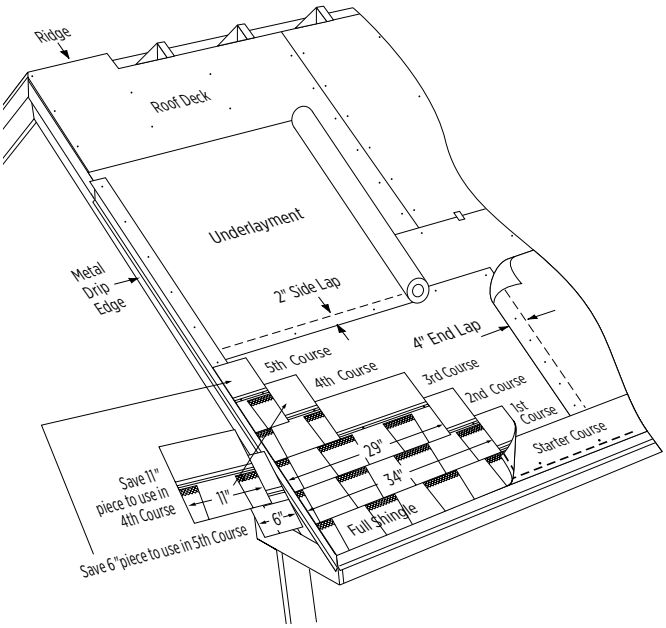


Figure 14-6: Applying the first 5 courses of Landmark TL.

3. Apply the previously removed 11″ long piece over and above the third-course shingle.
4. Apply the previously removed 6″ long piece from the second course over and above the fourth-course shingle.
5. Install a full shingle against the right edge of each shingle in courses one through five.

CONTINUING UP THE ROOF:

1. Beginning again with a full shingle, repeat the five-course pattern up the left rake.(Figure 14-7, B).
2. Fill-in courses across the roof in a stepped diagonal fashion using full shingles. (Figure 14-7, A). Do not run courses straight across.

IMPORTANT: Do not align joints of shingles closer than 4″ from one another.

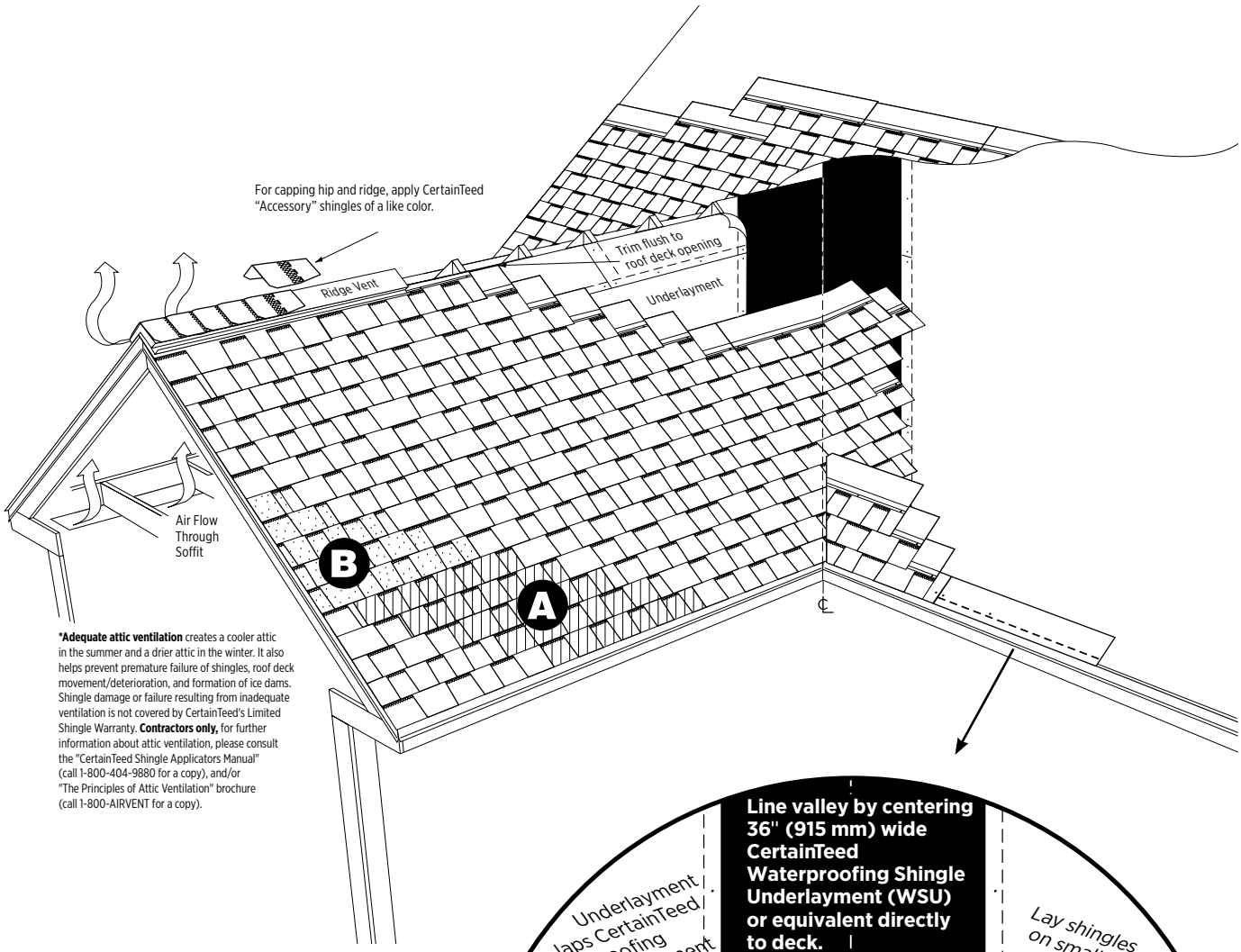


Figure 14-7: "Five-Course Diagonal Method" installation schematic.

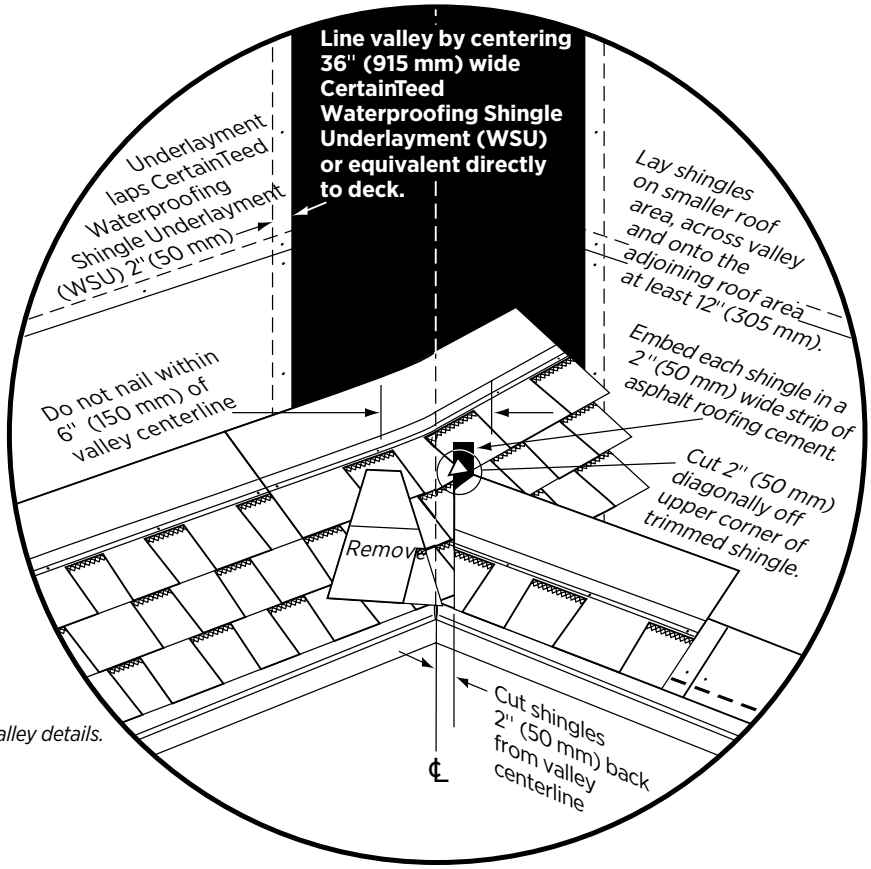


Figure 14-8: Highlight of closed-cut valley details.

CHIMNEY FLASHING

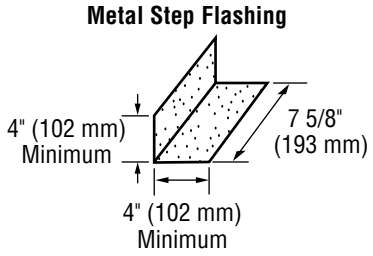


Figure 14-9: Step flashing minimum dimensions.

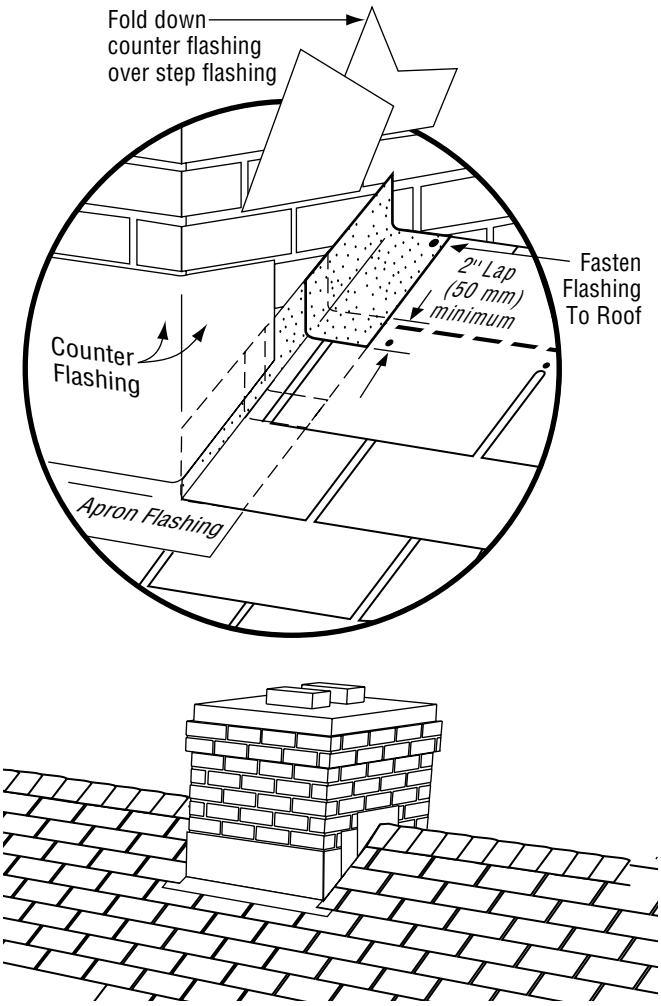


Figure 14-10: Flashing around a chimney.

TWO ROOF-OVER METHODS

The same methods used for clean-deck application of these shingles are used for roof-overs. Application of these shingles over English dimension shingles is not recommended — due to the high cost of workmanship and greater risk of error.

HIPS AND RIDGES

SHADOW RIDGE ACCESSORY SHINGLES

Shadow Ridge shingles have an accented shadow line that is designed to complement these shingles. Simply fold along the pre-cut lines and detach individual cap pieces. Save valuable installation time compared to cutting 3-tab shingles.

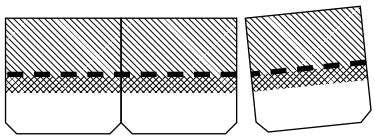


Figure 14-11: Shadow Ridge shingles detach easily from three-piece units to make 72 individual cap pieces.

There are 24 three-piece units in each Shadow Ridge bundle, providing 72 individual caps that will cover 30 linear feet of a hip or ridge. Each English dimension cap piece is 12″ by 12″.

The Metric version detaches into four-piece units to make 96 individual pieces and covers 45 linear feet. Each Metric dimension cap piece is 13-1/4″ by 9-7/8″. Both English and Metric versions feature clipped corners on the bottom edge of the exposed portion.

Application is as follows:

1. Apply shingles up to the hip or ridge on both sides, then trim flush.

NOTE: The last course of shingles should have an exposure of 5″ (5-5/8″ for metric) or less when the shingle cap or ridge vent is fastened in place. Otherwise, a potential water leak could occur at exposed shingle end joints. The figures used in this section illustrate the application of accessory shingles over a ridge vent; application directly to the roof deck is very similar.

IMPORTANT: Use two nails to fasten each shingle. Nails must be minimum 1-3/4″ (45 mm) long. Expose all Shadow Ridge shingles 5″ (125 mm).

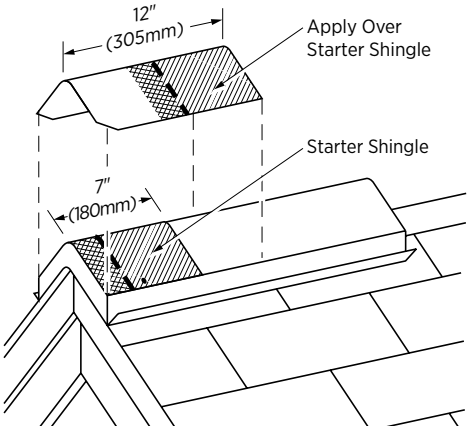


Figure 14-12: Apply a full cap shingle over the starter piece, flush with the bottom and side edges of the starter.

2. Install caps beginning at the bottom of a hip or at either end of a ridge. Apply a starter piece that has the bottom 5" (5-5/8" for metric) removed. Fasten the starter with two nails located about 3" from the rake edge, and 1" in from each side edge. Make sure fasteners used to apply caps penetrate at least 3/4" into or through the decking.

NOTE: To assist in proper alignment when ridge vent is not used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap shingles should be.

3. Apply a full cap shingle over the starter (Figure 14-13), and place fasteners at 5-5/8" (6-1/4" for metric) up from the exposed bottom edge and 1" in from each side. Nails must not be exposed on the finished roof. All nail heads must be driven straight and must not cut into the shingle surface.

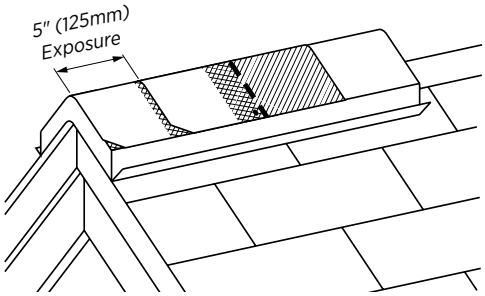


Figure 14-13: Install cap shingles at their correct exposure and cover all fasteners.

NOTE: Each cap has a laying/alignment notch at the top edge to center the piece on the ridge line, and two notches on each side to indicate the correct exposure and shadow-line placement (Figure 14-14). The side notches of the cap being applied should be aligned with the top edge of the previously applied cap.

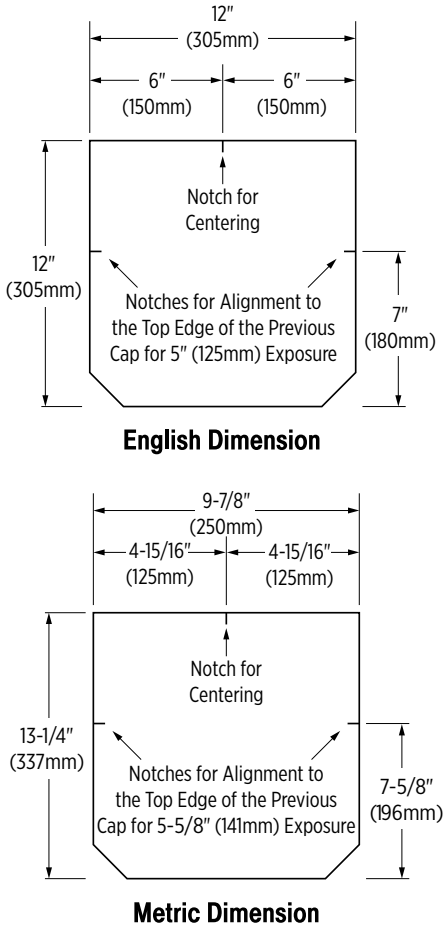


Figure 14-14 : Each Shadow Ridge® shingle has a centering notch and two side-alignment notches to help ensure proper placement

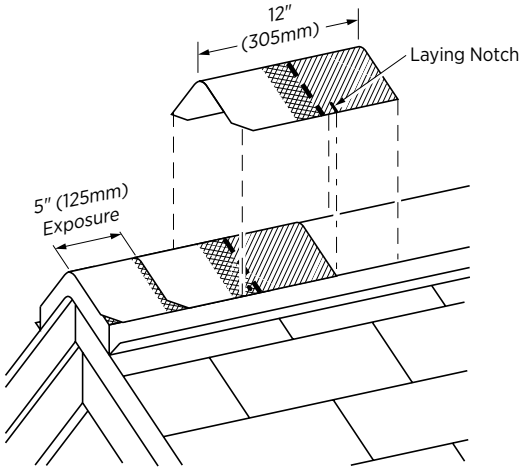


Figure 14-15: Use laying notches to center shingles on hips and ridges, and to locate the correct exposure.

MOUNTAIN RIDGE HIGH-PROFILE HIP AND RIDGE ACCESSORY

Use Mountain Ridge® accessory shingles to cover hips, ridges or rake edges. One box of 10″ wide shingles will cover 20 linear feet. To prevent damage to shingles during application, they must be sufficiently warm to allow proper forming.

FASTENING

IMPORTANT: Use two nails to fasten each shingle. Nails must be minimum 1-3/4″ (45 mm) long. For the 4″ (100 mm) starter shingle, place fastener 1″ (25 mm) in from each side edge and about 2″ (50 mm) from the rake (or eave) edge, making sure the fastener goes 3/4″ into the deck or all the way through. For each full Mountain Ridge shingle, place fasteners 8-5/8″ (219 mm) up from its exposed butt edge and 1″ (25 mm) in from each side edge.

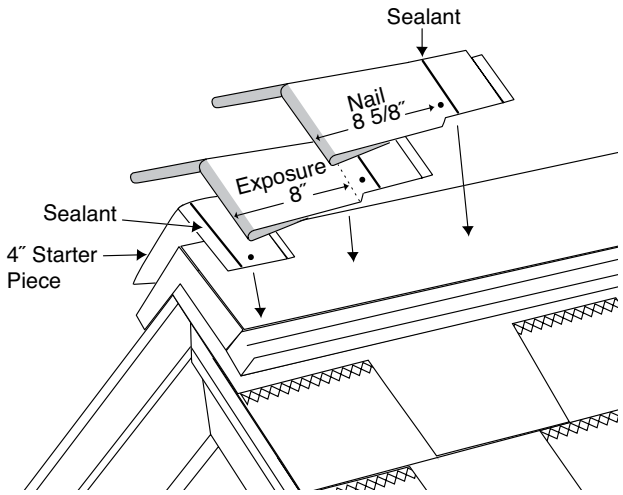


Figure 14-16: Hip and ridge application.

HIP, RIDGE AND RAKE SHINGLE APPLICATION

Apply the primary field roofing up to the hip or ridge from both sides of the roof and trim flush or lap over one side, not more than half the width of a Mountain Ridge® shingle.

Ensure that the installed Mountain Ridge shingles properly cover hip and ridge field shingles on both sides and the field shingles applied along rake edges. For a rake edge installation, cut the field shingles flush to the rake edge. Apply Mountain Ridge shingles ensuring they fit securely against the rake board. To assist in proper alignment, snap a chalk line parallel to the hip, ridge or rake along the line where the side edges of the Mountain Ridge shingles should fall. Expose Mountain Ridge shingles 8″, covering all fasteners

Prepare a 4″ Starter shingle by cutting off the lower 8″ color granule butt portion of one Mountain Ridge shingle. Apply the 4″ starter piece (with sealant nearest the outer edge) over the bottom corner of the hip or rake, or on either end of the ridge, overhanging the corner or end by approximately 1/2″ and bending the starter shingle along its centerline to form into place. Install a nail on each side about 2″ up from the starter shingle's exposed butt edge and 1″ in from each side edge of the shingle. The 8″ piece that was cut off may be used to finish the opposite end of hip, ridge or rake.

Next, apply a full Mountain Ridge shingle over the installed starter shingle, bending it along its centerline and forming into place over the hip, ridge or rake, flush with the bottom and side edges of the starter shingle. Install a nail on each side of the shingle 8-5⁄8″ up from the bottom edge and 1″ in from each side edge.

Rake – Ensure field shingles at rake edge are flush with the outer edge of the rake board. Apply Mountain Ridge shingles fitting them snugly against the rake board. Use two color-coordinated aluminum trim or paneling nails, to pin the material to the fascia at 2″ (50 mm) up from bottom edge and 2″(50 mm) and 3″ (75 mm) in from front edge of shingle. (See Figure 14-17)

Continue application of the Mountain Ridge shingles along the hip, ridge or rake as shown.

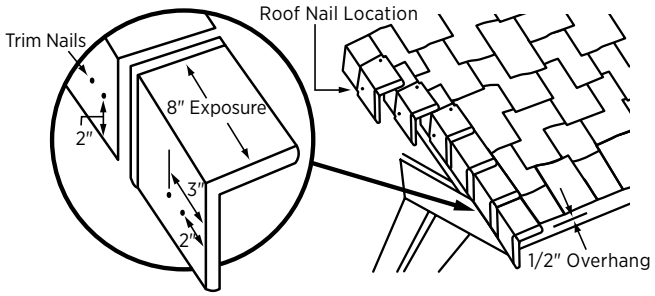


Figure 14-17: Rake edge application

Landmark® TL Installation Video

SECTION 14 SELF-TEST

14-1. Open valleys must be used when installing Landmark TL®.

A. True.

B. False.

14-2. Two layers of felt is not an alternative to WinterGuard® or VYCOR® Ice & Water Shield® when installing Landmark TL on a low slope.

A. True.

B. False.

14-3. Landmark TL shingles can be applied using the "6" and 11" Method."

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

NorthGate® ClimateFlex® 15

YOUR OBJECTIVE:
To learn the correct procedure for installing NorthGate ClimateFlex shingles.

NORTHGATE CLIMATEFLEX

NorthGate ClimateFlex shingles have the installer-friendly NailTrak® feature, which provides 1-1/2" wide nailing area and specially formulated QuadraBond laminating adhesive (See Figure 15-3).

NorthGate ClimateFlex is impact resistant and is specially manufactured with SBS modified asphalt to meet UL 2218 Class 4 impact resistance rating.

NOTE: NorthGate ClimateFlex must be installed over a clean deck (no roof-overs) to obtain the UL 2218 Class 4 rating. It is strongly recommended Shadow Ridge ClimateFlex impact resistant cap shingles be installed on all hips and ridges. Some insurance carriers may not consider the roof system as compliant to UL 2218 Class 4 without impact resistant cap shingles.

Closed-cut valleys are preferred by CertainTeed when applying these shingles; however, open and woven valleys are also acceptable.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR®include:
1) waterproofing shingle underlayments meeting ASTM D1970;
2)in areas not prone to snow or ice, two layers of 36"(915 mm) wide felt shingle underlayment lapped 19"(485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner in shingle fashion (half lap) per the low-slope application instructions.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

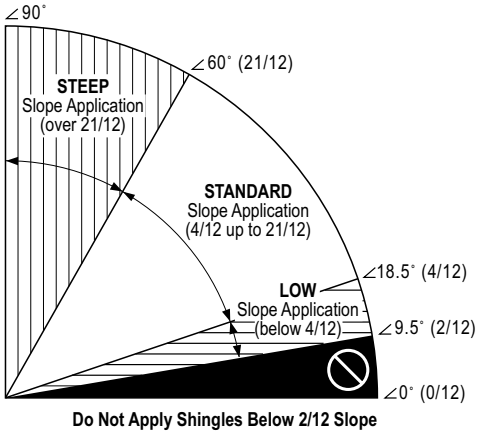


Figure 15-1: Slope definitions.

The roof deck must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative application methods and materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Techinical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

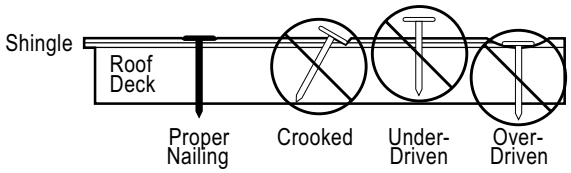


Figure 15-2: Proper and improper nailing.

IMPORTANT: For decks 3/4" (19 mm) thick or thicker, nails must go at least 3/4" (19 mm) into the deck. On thinner decks, nails must go at least 1/8" (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8" (9.5 mm) heads, and at least 1" (25 mm) long.

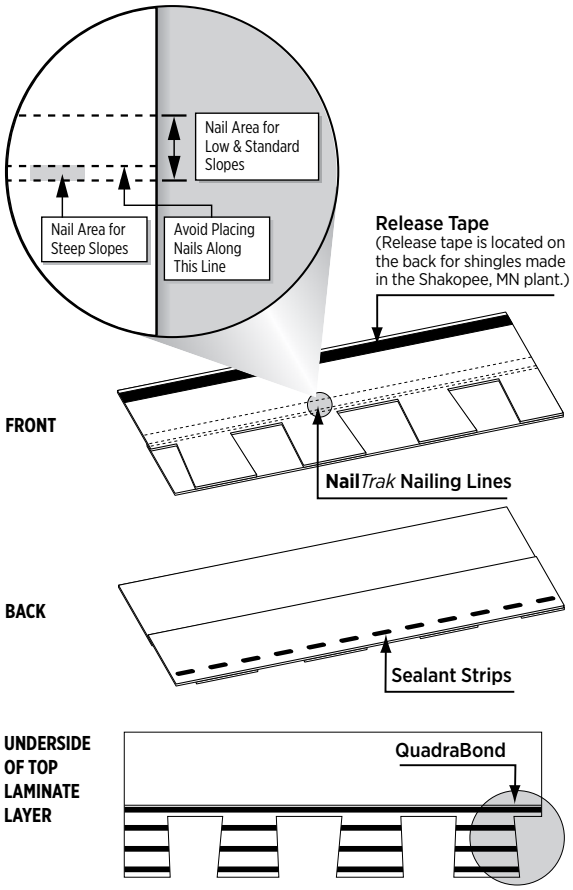


Figure 15-3: NailTrak® features a wider nail area and extra-strong QuadraBond construction .

LOW AND STANDARD SLOPE

Use four nails for every full NorthGate ClimateFlex shingle as shown below.

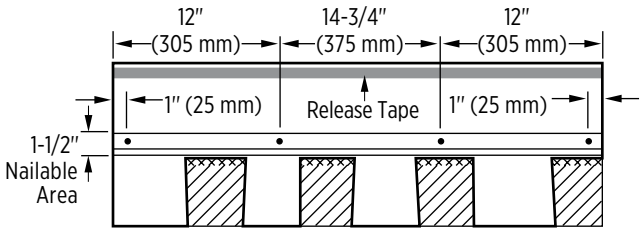


Figure 15-4: Use four nails for every full shingle.

IMPORTANT: When "six nailing" a full shingle, follow the nail pattern shown in Figure 15-5, nails can be placed in the 1-1/2" nailable area.

STEEP SLOPE

Use six nails and four spots of asphalt roofing cement for every full NorthGate ClimateFlex shingle as shown below. Asphalt roofing cement should meet ASTM D4586 Type II. Apply 1" spots of asphalt roofing cement under each corner and at about 12" to 13" in from each edge.

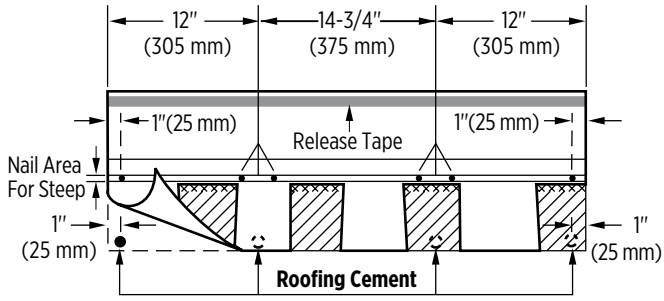


Figure 15-5: Use six nails and four spots of asphalt roofing cement on steep slopes.

IMPORTANT: Failure to follow these steep slope instructions can void the warranty in the event of a shingle delamination.

CAUTION: Excessive use of roofing cement can cause shingles to blister.

TWO CLEAN-DECK APPLICATION METHODS

FIVE-COURSE DIAGONAL METHOD (6" AND 11")
FIVE-COURSE DIAGONAL METHOD (5-5/8" AND 11-1/4")

NOTE: The 6" and 11" method is shown below. The 5-5/8" and 11-1/4" method follows the same application instructions as the 6" and 11" method except the dimensions of the shingle cut-offs in the second and third courses are 5-5/8" and 11-1/4" respectively.

CAUTION: Use of other installation methods may result in an objectionable pattern.

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap chalklines to assure shingles will be correctly aligned.

STARTER COURSE:

1. Use CertainTeed Swiftstart® Starter, or three-tab self-sealing shingles with the lower tab portions removed. Be sure that the starter shingles are a minimum 7-5/8" in height.(Figure 15-6).

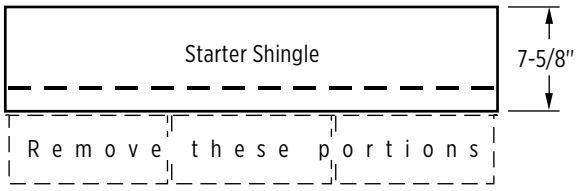
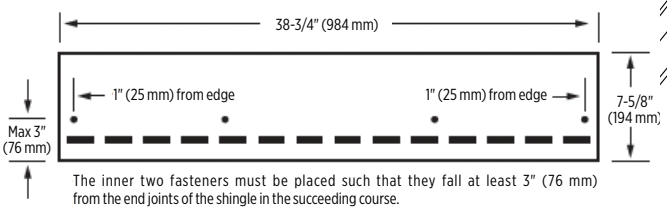


Figure 15-6: Make starter shingles that are a minimum 7-5/8" in height.

Fastening: Use 4 nails, located as shown below



2. For the first starter, cut 6" from one side of the starter shingle.
3. Apply the remaining piece to the lower left corner of the roof. Make sure there is 1/2" overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4". **NOTE:** Overhang should not exceed 1".
4. Use full length starter shingles for the rest of the course

★ **Alternatively,**

1. Position SwiftStart SA parallel to the roof edge, granule side up, with the sealing strip closest to the roof edge.
2. Overhang eaves and rakes by 1/4" to 3/4" (6 mm to 19 mm). If a drip edge extends beyond the eave/rake edge, install flush to drip edge.
3. Drip edge must be primed with FlintPrime QD or equivalent ASTM D41 asphalt primer and allowed to dry prior to application of SwiftStart SA.
4. Remove release liner and roll into place. Apply uniform pressure with hand or hand roller to ensure SwiftStart SA is applied unwrinkled and is fully adhered.
5. When starting a new roll, overlap by a minimum of 6" (152 mm).

SwiftStart SA General Notes:

Only install as much SwiftStart SA as will be covered by shingles same day. If applied in temperatures below 40° (4°), spot nailing may be required until adhesion strengthens as temperatures rise. SwiftStart SA butt joints must be offset a minimum of 4" (101.6 mm) from the butt joints of the first course of shingles. When installed on rake, position SwiftStart SA to overlap eave starter course a minimum of 3" (76 mm).

1ST COURSE: Apply a full shingle at the lower left corner of the roof. Make the lower edge and left edge lie flush with the edges of the starter course (Figure 15-7).

2ND THROUGH 5TH COURSES:

CAUTION! Failure to follow instruction steps 1-5 below will bring joints too close together and may cause unattractive patterns! Expose all shingles 5-5/8" (143 mm).

1. Cut 6" off the left end of the first shingle and save this piece for later use. Apply the 32-3/4" long piece over and above the first-course shingle.
2. Cut 11" off the first shingle of the third course and save this for later. Install the 27-3/4" long piece over and above the second-course shingle.

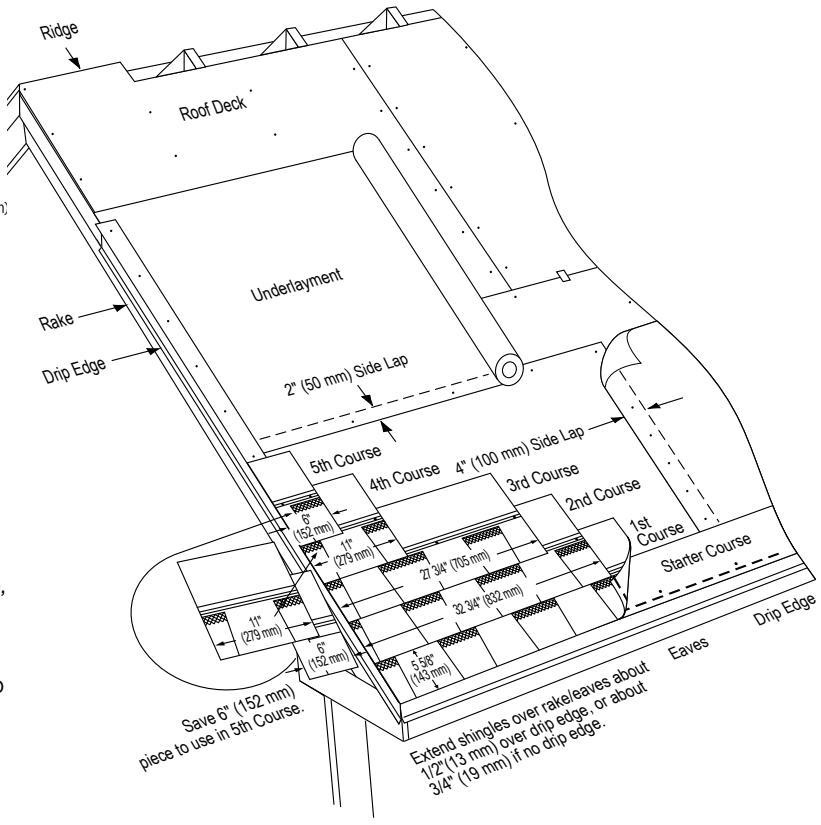


Figure 15-7: Applying the first 5 courses of NorthGate ClimateFlex.

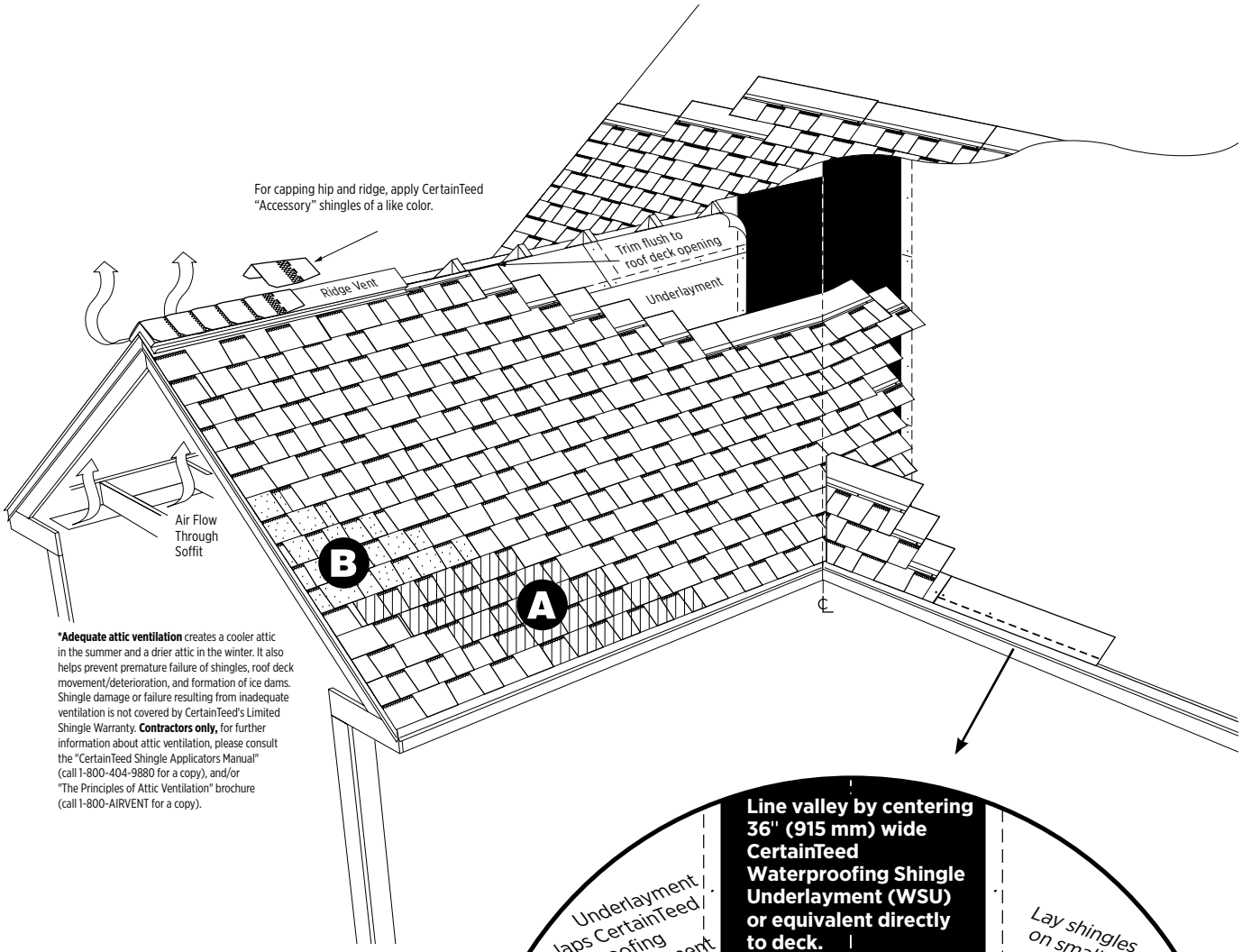


Figure 15-8 "Five-Course Diagonal Method" installation schematic.

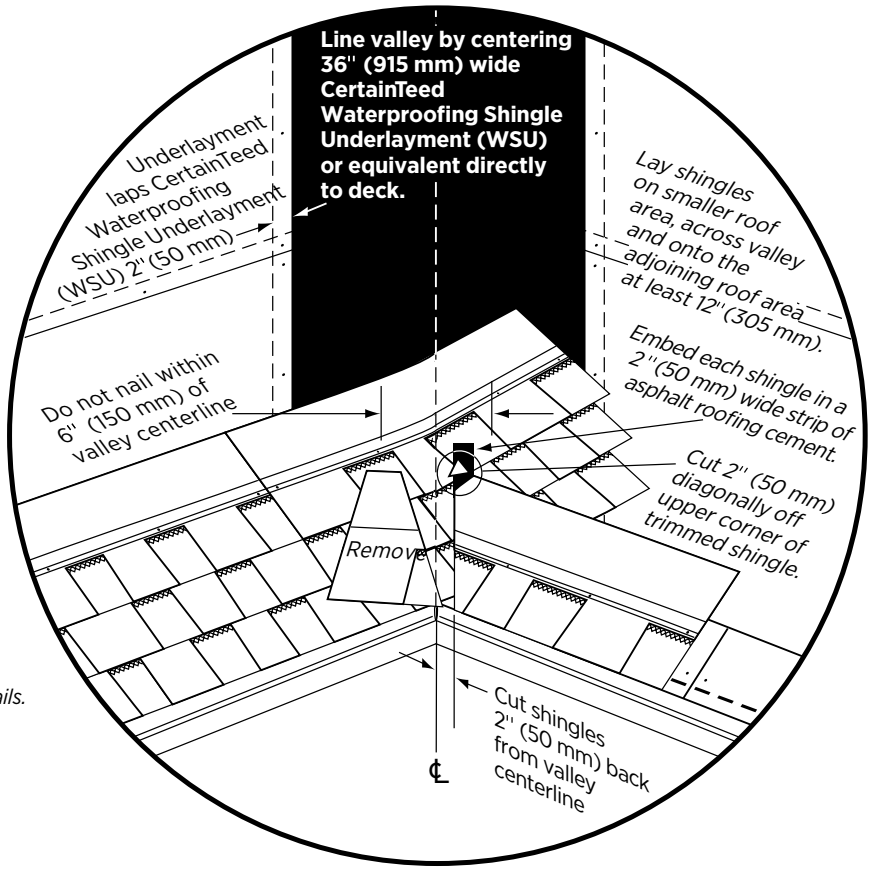


Figure 15-9 Highlight of closed-cut valley details.

3. Apply the previously removed 11" long piece over and above the third-course shingle.
4. Apply the previously removed 6" long piece from the second course over and above the fourth-course shingle.
5. Install a full shingle against the right edge of each shingle in courses one through five.

Continuing up the Roof:

1. Beginning again with a full shingle, repeat the five-course pattern up the left rake.(Figure 15-8, B).
2. Fill-in courses across the roof in a stepped diagonal fashion using full shingles. (Figure 15-8, A). Do not run courses straight across.

IMPORTANT: Do not align joints of shingles closer than 4" from one another.

CHIMNEY FLASHING

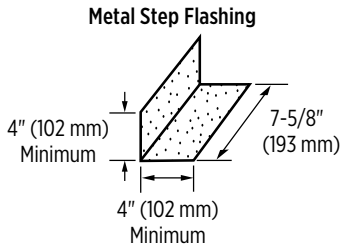


Figure 15-10: Step flashing minimum dimensions.

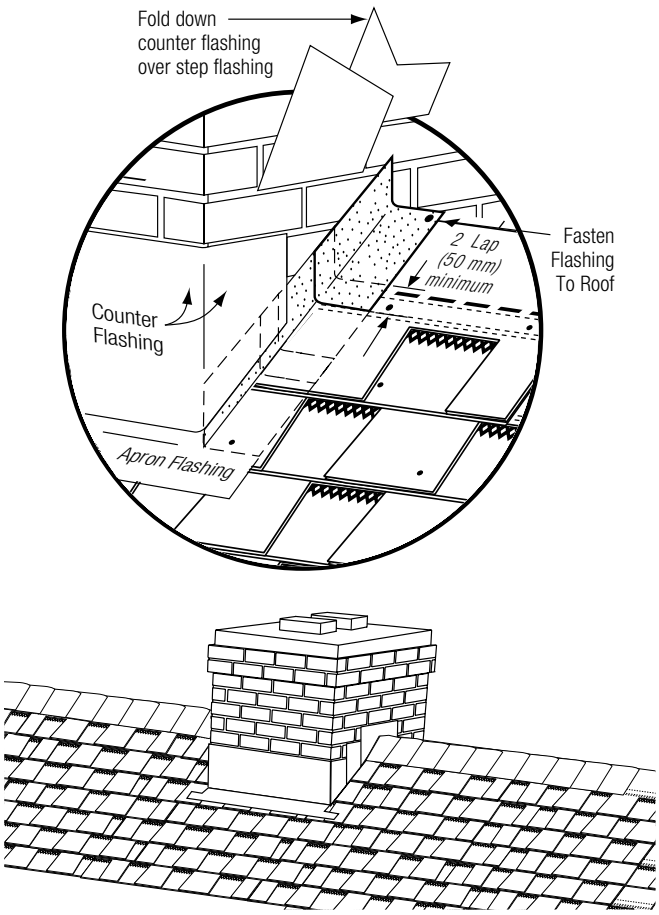


Figure 15-11: Flashing around a chimney.

ROOF-OVER METHODS

Cut old shingles back flush to rakes and eaves. Apply drip edge along rakes and eaves, if desired. The "5-Course Diagonal Nesting" method of application described below is suggested for roofing over square-tab asphalt roofing shingles of 5-5/8" +/- 1/8" (143 mm +/- 3.2 mm) exposure.

NOTE: The UL 2218 rating cannot be achieved with a roof-over.

Starter Course: The starter course consists of 5-5/8" x 38-3/4" (143 mm x 984 mm) strips formed by cutting off the top 2" (50 mm) of CertainTeed's Swiftstart® shingles. Cut 6" (152 mm) off the left end of the first starter shingle only. Apply the remaining 32-3/4" (832 mm) piece to the lower left corner of the roof, overhanging the rakes and the eaves 1/2" (13 mm) if drip edge is used, or 3/4" (19 mm) if no drip edge is used. Continue with full lengths along eaves.

IMPORTANT: When the first course shingles are applied, ensure that the end joints of the starter shingles and the first course shingles are NEVER LESS THAN 4" (102 mm) apart. Either plan the starter shingles' application to avoid end joints getting closer than 4" (102 mm) or cut back the affected first course shingle to ensure the minimum 4" (102 mm) end joint spacing.

1st Course: Cut 2" (50 mm) off the bottom of the full NorthGate ClimateFlex shingle and apply remaining 11-1/4" x 38-3/4" (286 mm x 984 mm) pieces. For all courses, align top edge of shingle to be applied with bottom edge of old shingle in next course.

2nd Course: Cut 6" (152 mm) off the left end of a full shingle and apply remaining 32-3/4" (832 mm) piece. Exposure of 1st course only is reduced to 3-5/8" (92 mm).

3rd, 4th, 5th and Succeeding Courses: Apply as described above in "5-Course Diagonal Application Method" section.

HIPS AND RIDGES

These shingles have an accented shadow line that is designed to complement field shingles. Simply fold along the pre-cut lines and detach individual cap pieces. Save valuable installation time compared to cutting 3-tab shingles.

SHADOW RIDGE CLIMATEFLEX SHINGLES

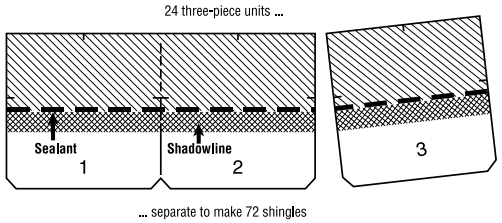


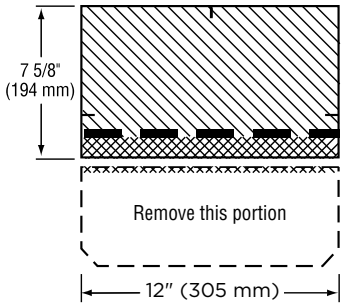
Figure 15-12: Shadow Ridge ClimateFlex shingles detach easily from three-piece units to make 72 individual cap pieces.

There are 24 three-piece units in each bundle, providing 72 individual caps that will cover 30 linear feet of a hip or ridge. Each cap piece is 12″ by 12″ and features clipped corners on the bottom edge of the exposed portion.

Application is as follows:

Apply primary roofing up to hip or ridge on both sides of roof and trim flush. Ensure that the Shadow Ridge ClimateFlex shingles will adequately cover the top course of the shingles on both sides of the hip and ridge. Use only CertainTeed Shadow Ridge ClimateFlex shingles of a like color for capping hips and ridges.

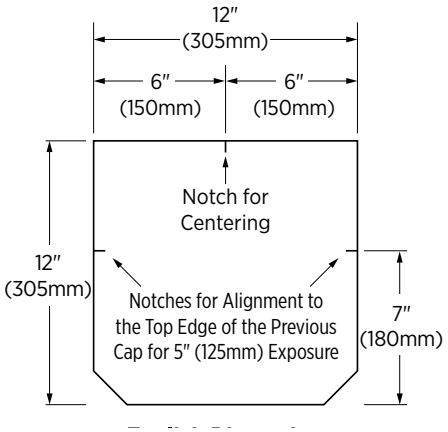
Start by cutting off the bottom 5-5/8″ (143 mm) of one Shadow Ridge ClimateFlex shingle and applying the 7-5/8″ x 12″ piece over hip or ridge by bending this starter shingle along its centerline and forming into place, see A. Align butt edge to the bottom of the hip or to either end of ridge, flush with the edges of the in-place primary shingles. Fasten with two (2) fasteners – minimum 1-3/4″ (45 mm) long, see A.



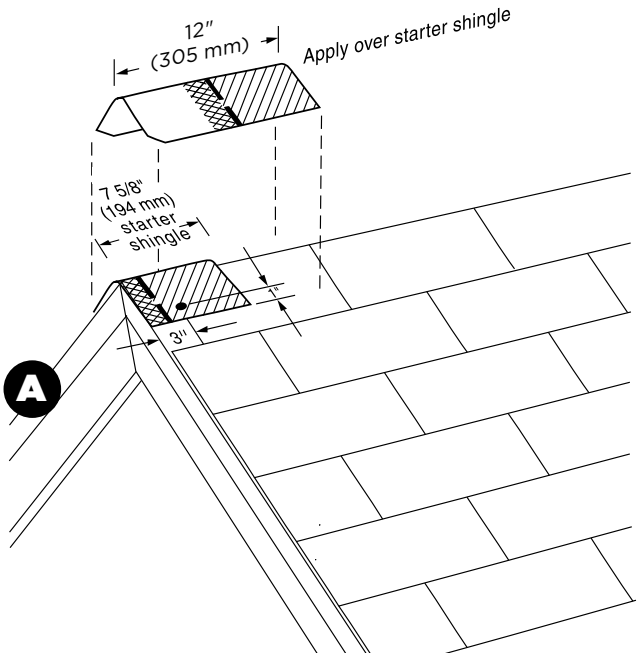
Then apply a full 12″ x 12″ piece over starter, bending the shingle along its centerline and forming into place over the hip or ridge, flush with the bottom and sides of the starter shingle. Fasten with two (2) fasteners – minimum 1-3/4″ (45 mm) long, see B.

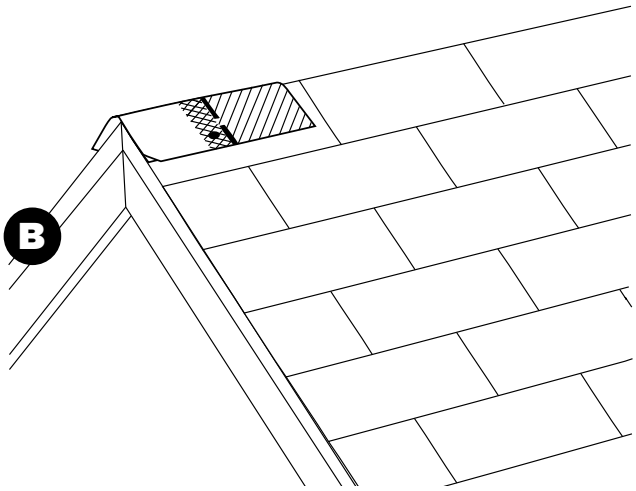
Continue application of Shadow Ridge ClimateFlex shingles up the ridge or along the ridge, forming each shingle over the hip or ridge, and fasten as shown in Fastening. Expose Shadow Ridge ClimateFlex shingles 5″ (125 mm) covering all fasteners, see C.

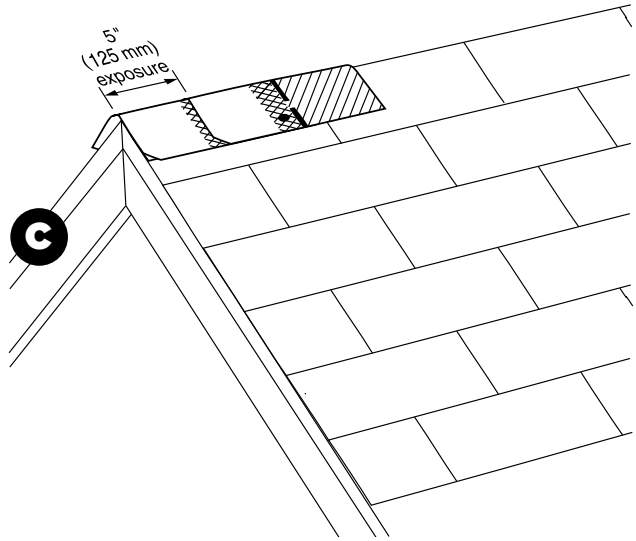
The notches on each shingle may be used to help center the shingle on the ridge and to ensure the 5″ (125 mm) exposure.



To assist in proper alignment, snap a chalk line parallel to the hip or ridge applying along the line where the side edges of the Shadow Ridge ClimateFlex shingles should be.







SHADOW RIDGE CLIMATEFLEX 4PC SHINGLES

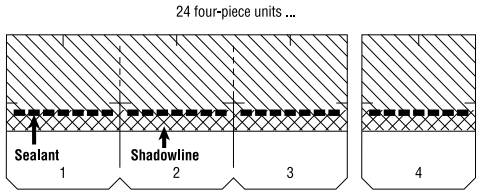
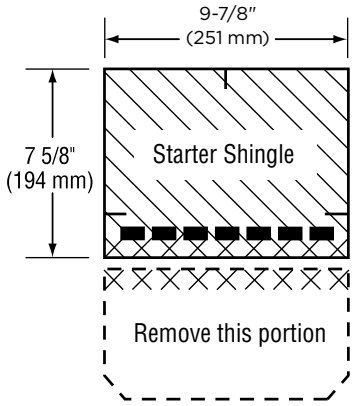


Figure 15-13: Shadow Ridge ClimateFlex 4PC Shingles detach easily from four-piece units to make 96 individual cap pieces.

There are 24 four-piece units in each bundle to make 96 individual caps that will cover 45 linear feet. Each cap piece is 13-1/4″ by 9-7/8″ and features clipped corners on the bottom edge of the exposed portion.

APPLICATION

Apply primary roofing up to hip or ridge on both sides of roof and trim flush. Ensure that the Shadow Ridge ClimateFlex 4PC shingles will adequately cover the top course of the shingles on both sides of the hip and ridge. Use only CertainTeed Shadow Ridge ClimateFlex 4PC shingles of a like color for caping hips and ridges, in order to assure a color match.

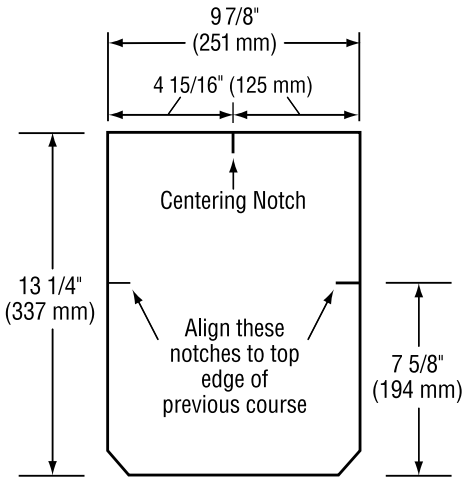


Start by cutting off the bottom 5-5/8″ (143 mm) of one Shadow Ridge ClimateFlex 4PC shingle and applying the 7-5/8″ x 9-7/8 (194 mm x 251 mm) piece over hip or ridge by bending this starter shingle along its centerline and forming into place, see D. Align butt edge to the bottom of the hip or to either end of ridge, flush with the edges of the in-place primary shingles. Fasten with two (2) fasteners – minimum 1-3/4″ (45 mm) long, see E.

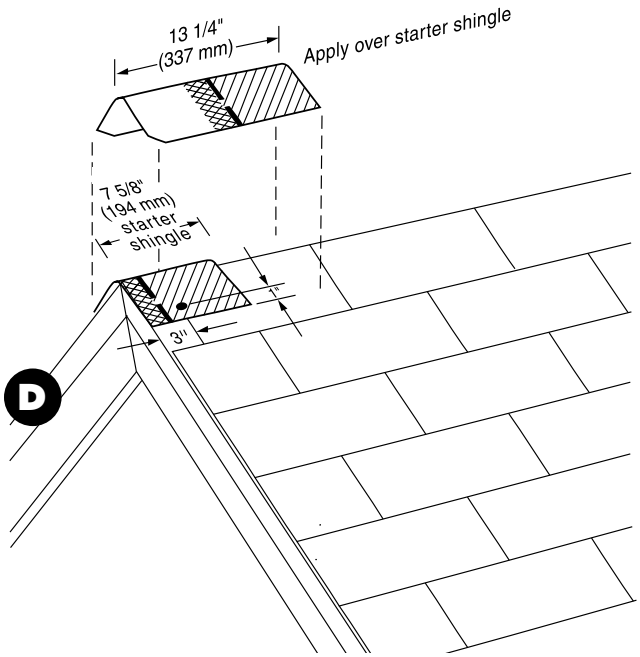
Then apply a full 13-1/4 x 9-7/8″ piece over starter, bending the shingle along its centerline and forming into place over the hip or ridge, flush with the bottom and sides of the starter shingle. Fasten with two (2) fasteners – minimum 1-3/4″ (45 mm) long.

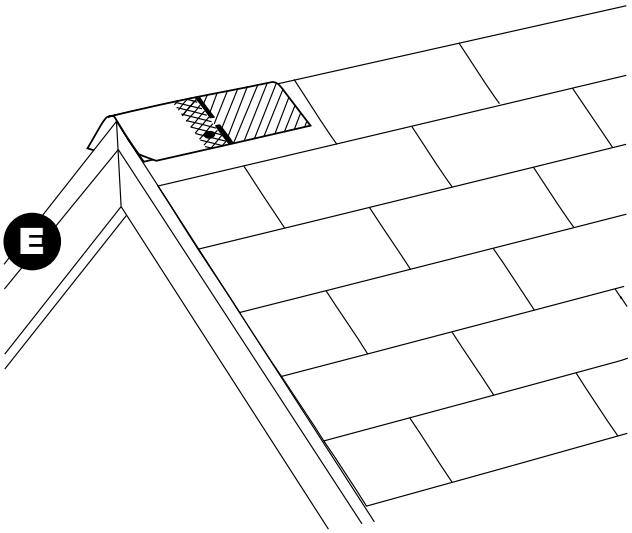
Continue application of Shadow Ridge ClimateFlex 4PC shingles up the ridge or along the ridge, forming each shingle over the hip or ridge, and fasten as shown in Fastening. Expose Shadow Ridge ClimateFlex 4PC shingles 5-5/8″ (143 mm) covering all fasteners, see F.

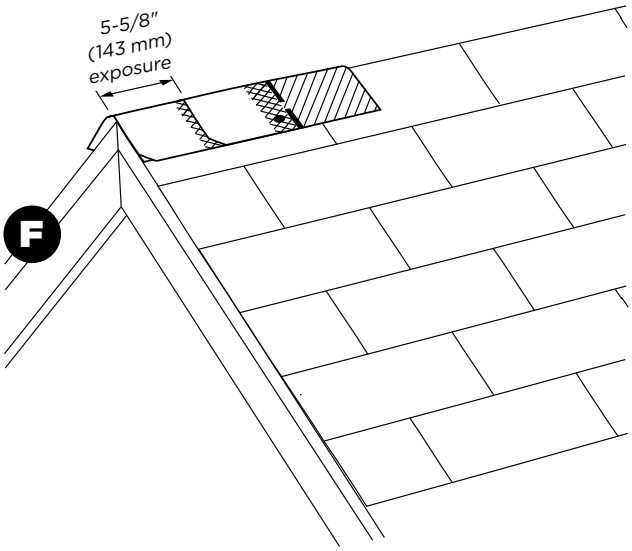
The notches on each shingle may be used to help center the shingle on the ridge and to ensure the 5-5/8" (143 mm) exposure.



To assist in proper alignment, snap a chalk line parallel to the hip or ridge applying along the line where the side edges of the Shadow Ridge ClimateFlex 4pc shingles should be.







**NorthGate® ClimateFlex®
Installation Video**

SECTION 15 SELF-TEST

15-1. NorthGate® ClimateFlex® meets UL 2218 Class 4 impact resistance ratings because it is SBS modified.

A. True.

B. False.

15-2. When applying NorthGate ClimateFlex shingles on roof slopes up to 21/12, fasteners should be placed in the 1-1⁄2" nailing area.

A. True.

B. False.

15-3. When "six-nailing" a full NorthGate ClimateFlex Shingle, nails must be spaced evenly across the shingle.

A. True.

B. False.

15-4. Failure to follow steep slope fastening instructions can void the warranty in the event of a shingle delamination.

A. True.

B. False.

15-5. NorthGate ClimateFlex shingles can only be applied using the "6" and 11" Method."

A. True.

B. False.

15-6. Using Shadow Ridge ClimateFlex cap shingles is strongly recommended.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Presidential® Shake® and Presidential® Shake® TL 16

YOUR OBJECTIVE:
To learn the correct procedures for installing Presidential Shake and Presidential Shake® TL shingles

PRESIDENTIAL SHAKE AND PRESIDENTIAL SHAKE TL SHINGLES

Presidential Shake and Presidential Shake TL shingles are a premium oversized (14-1/4" x 40") roofing product.

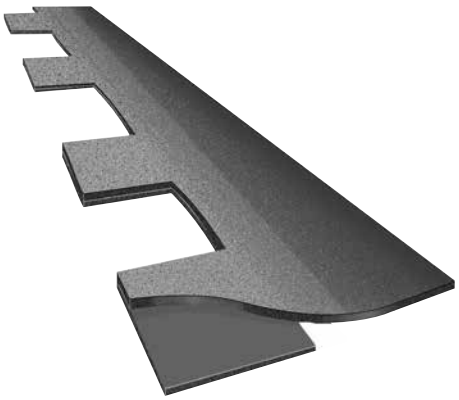


Figure 16-1: Presidential Shake Shingle.

Presidential has the depth and dimension of hand-split cedar shakes. The incomparable Presidential TL is a super-heavyweight shingle constructed using Tri-Laminate Technology — two base layers and a top layer of premium materials. To add a custom design aesthetic, utilize our *Special Effects* color combinations where two different colored shingles can be combined to create a one of a kind look.

Use matching Mountain Ridge Solaris hip and ridge shingles which are also solar reflective.

Presidential Shake IR and Presidential Shake TL meet UL 2218 Class 4 impact resistance rating.

NOTE: This product must be installed over a clean deck (no roof-overs) and Presidential impact resistant starter shingles as well as hip and ridge cap accessories must be used to obtain the UL 2218 Class 4 rating.

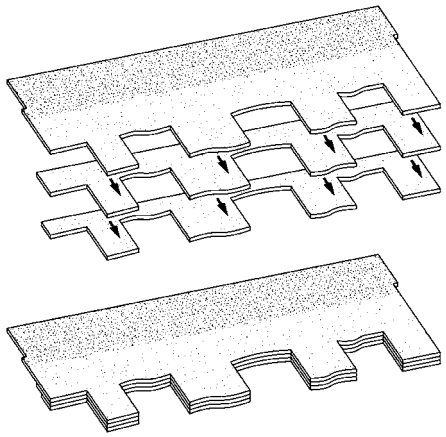


Figure 16-2: Presidential TL Tri-Laminate Construction.

Fastening, low slope underlayment and flashing requirements, are special because of the thickness, design and weight of these shingles. Open valleys are recommended; however, closed-cut valleys are also acceptable. Woven valleys are not recommended when applying Presidential and Presidential TL because the laminated shingle can buckle and become damaged when shaped into the valley.

On lower-sloped roofs where water drains slowly and due to the Presidential TL tri-laminate design, step flashing details are important to ensure a water-tight roof. Extra precautions such as putting a slater's-edge on step flashings under the shingle or applying two beads of asphalt cement lengthwise along the top of the step shingle (perpendicular to the shingle) should be considered when there are multiple roof penetrations or vertical obstructions in close proximity to each other (ex. several skylights on the same roof plane or a skylight close to a vertical wall).

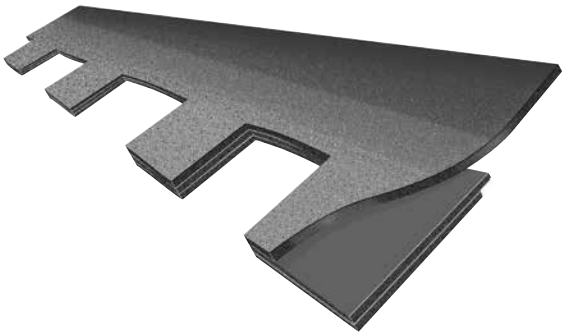


Figure 16-3: Layers of a Presidential TL.

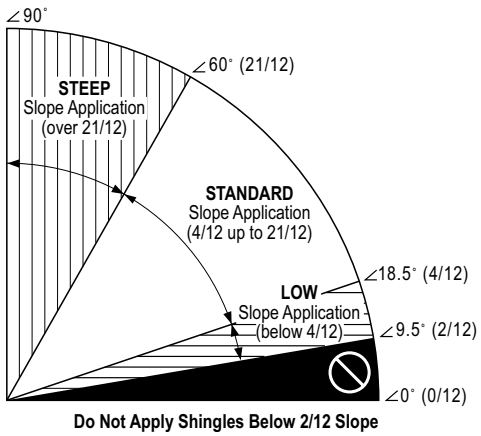


Figure 16-4: Slope definitions

The roof deck* must be at least: 3/8″ (9.5 mm) thick plywood, or 7/16″ (11 mm) thick non-veneer, or nominal 1″ (25 mm) thick wood deck.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Always ensure sufficient deck ventilation, and take particular care when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2″ to below 4″ per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent, * applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

* For Presidential Shake applied to low slopes, underlayment equivalents to WinterGuard or VYCOR® include:
  1) waterproofing shingle underlayments meeting ASTM D1970;
  2) in areas not prone to snow or ice, two layers of 36″ (915 mm) wide felt shingle undelayment lapped 19″ (485 mm).
  3) in areas not prone to snow or ice, two layers CertainTeed's DiamondDeck or RoofRunner in shingle fashion (half lap) per the low-slope application instructions

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type 1 or ASTM D226 Type 1. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. (One layer of shingle underlayment meeting ASTM D4869 applied over the required WinterGuard or VYCOR® is also recommended.

IMPORTANT: Presidential Shake TL, applied to low slopes requires the use of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970. Two layers of felt or synthetic underlayment IS NOT an acceptable alternative to WinterGuard or VYCOR®.

Cold Weather Climates (All Slopes): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

SEALING: Shingle sealing may be slowed if the shingles are applied in cool weather and may be further delayed by airborne dust accumulation. We recommend hand-sealing when weather conditions are likely to prevent the factory-applied sealant from activating.

CAUTION: To prevent cracking, shingles must be warm enough to allow proper forming for hips, ridges and valleys.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

NOTE: To be eligible for the Wind Warranty upgrade, the starter shingle at the rake(s) is required to be SwiftStart. For complete Wind Warranty upgrade requirements, please see the Wind Warranty section of Chapter 2 of this manual and CertainTeed's Asphalt Shingle Residential Products Limited Warranty.

For technical questions, information on acceptable alternative materials, or a copy of the product warranty, contact the sources listed below:		**Warranty**	**Technical Questions**
Your supplier or roofing applicator		✔	
CertainTeed Customer Experience	**800-233-8990**	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔

FASTENING

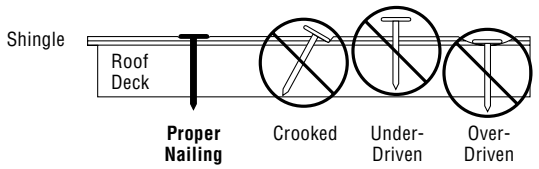


Figure 16-5: Proper and improper nailing.

IMPORTANT: For decks 3/4″ (19 mm) thick or thicker, nails must go at least 3/4″ (19 mm) into the deck. On thinner decks, nails must go at least 1/8″ (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8″ (9.5 mm) heads, and at least 1-1/4″ (31 mm) long.

LOW AND STANDARD SLOPE:

For low and standard slopes, use five nails for each full Presidential shingle as shown below.

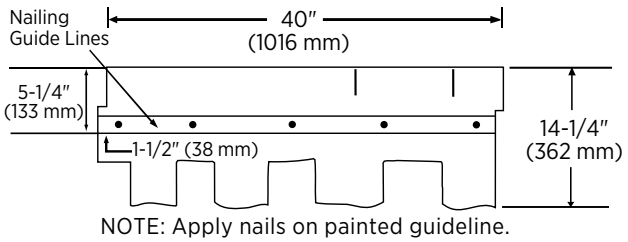


Figure 16-6: Fastening Presidential and Presidential TL shingles on low and standard slopes.

STEEP SLOPE:

For steep slopes, use nine nails for each full Presidential shingle and apply 1" diameter spots of asphalt roofing cement under each shingle tab.

After applying 5 nails in between the nailing guide lines, apply 4 nails 1" above tab cutouts making certain tabs of overlying shingle cover nails.

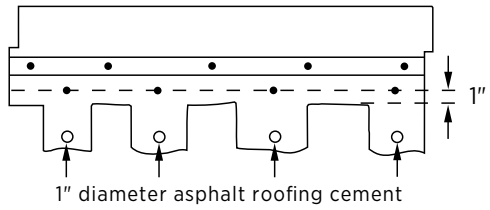


Figure 16-7: Fastening Presidential and Presidential TL shingles on steep slopes.

CAUTION: Too much roofing cement can cause shingles to blister.

ALIGNMENT AND SHIPLAP NOTCHES

To maintain the correct 5" and 15" diagonal offset pattern, use the Alignment Notches at 5-1/2" and 15-1/2" from the right edge of the shingle. These notches are pre-cut into the top of each shingle and serve as a shingle placement guide for the shingles being installed in the course above them.

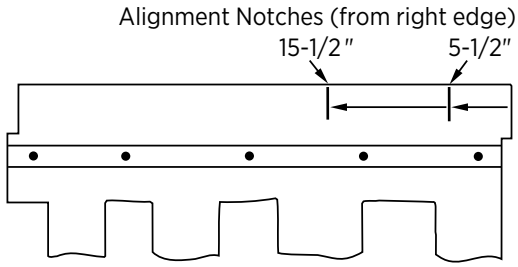


Figure 16-8: Use the alignment notches to ensure shingles are applied at a 5" and 15" diagonal offset.

Shiplap Notches on the left and right side of each shingle are used to ensure the proper 4" exposure is continued across shingle courses by lining up the shiplap notches of adjacent shingles.

ONE CLEAN DECK APPLICATION METHOD

NOTE: Shingle applications are on 5" and 15" offsets with a 4" exposure. Apply shingles up the left side of the roof to establish the pattern and fill in to the right. When cutting shingles, always apply the right hand portion (cut-off the left side.) Use the pieces cut off the left rake, hip, or valley to complete courses at the right rake.

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.
- Snap horizontal and vertical chalklines to assure shingles will be correctly aligned.

PRESIDENTIAL STARTER:

IMPORTANT!

Use TWO (2) OVERLAPPING LAYERS of CertainTeed's "Presidential Starter" shingles, applied in the following fashion, starting at left rake/eaves corner. Starting at the right rake/eaves corner is not permitted. The staggered top edge of the starter pieces will allow a smooth and uniform transition for applied shingles.

1. **BOTTOM STARTER COURSE LAYER:** Cut 20" off the first bottom piece. Apply remaining 13-1/4" x 20" piece, followed by full 13-1/4" x 40" pieces along the eave. DO NOT REMOVE THE PERFORATED TOP SECTION. Extend the shingles over the rake and eaves about 1/2" (13 mm) if drip edge is used, or about 3/4" (19 mm) if no drip edge is used.

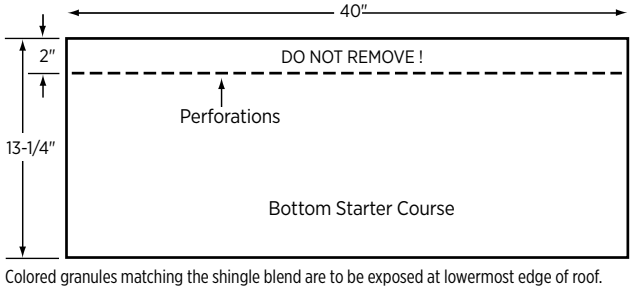


Figure 16-9: Presidential Starter (bottom starter course.)

2. **TOP STARTER COURSE LAYER:** Remove the 2" perforated top section. Cut 2" off the left side of the first top piece only. Install the 11-1/4" x 38" piece over and flush to the bottom starter course. Continue with 11-1/4" x 40" top course pieces over the rest of the bottom starter course.

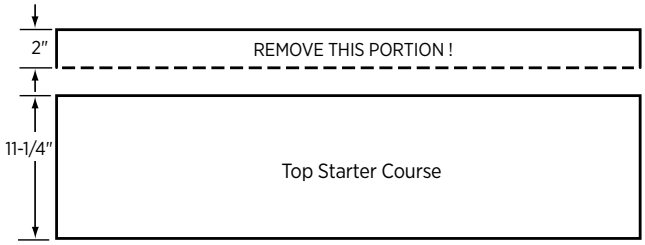


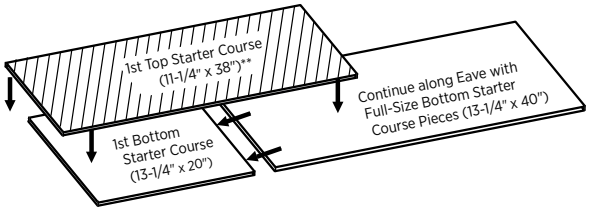
Figure 16-10: Presidential Starter (top starter course.)

Here's a Tip...

When establishing the 4-course shingle pattern, use the proper alignment notches to determine where to cut the shingles on the left hand side. For example, install the first course full shingle, then place a full shingle above it by lining up the right side edge with the 5-1/2" alignment notch in the 1st course shingle below, then fasten and trim the 2nd course shingle along the rake edge. Likewise, use the 15-1/2" alignment notch at the top of the 2nd course shingle to place the right side edge of the 3rd course shingle.Finally, use the 5-1/2" alignment notch at the top of the 3rd course shingle to place the 4th course shingle

NOTE: The exposed colored granules on the "top" starter shingles must match the Presidential/Presidential TL shingle colors.

Fasteners should be placed about 1" and 13" in from both ends of a full length starter shingle. Fasteners for less than full 40" starter shingles should be placed about 1" in from each end and evenly spaced no more than 13" apart (2, 3 or 4 fasteners may be used on shorter starter shingles depending on the length.)



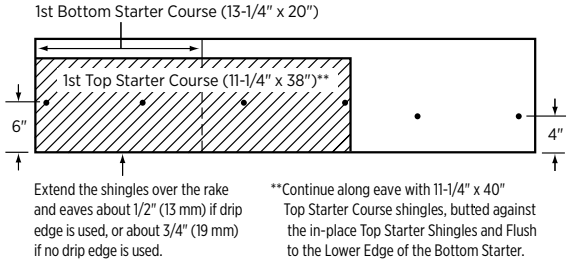


Figure 16-11: Use two (2) overlapping layers of CertainTeed's "Presidential Starter."

5" AND 15" OFFSET, FOUR-COURSE DIAGONAL METHOD. EXPOSE ALL SHINGLES 4" (102 MM).

1ST COURSE: Start at left rake, hip or valley and apply a full shingle.

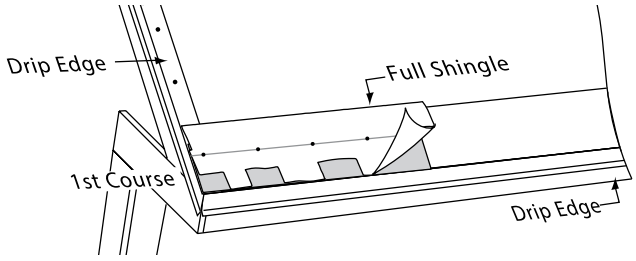


Figure 16-12: First Course.

2ND COURSE: Cut 5" from the left edge of the first shingle. Install the remaining 35" piece by lining up the right lower edge with the 5-1/2" alignment notch in the top of the First Course shingle.

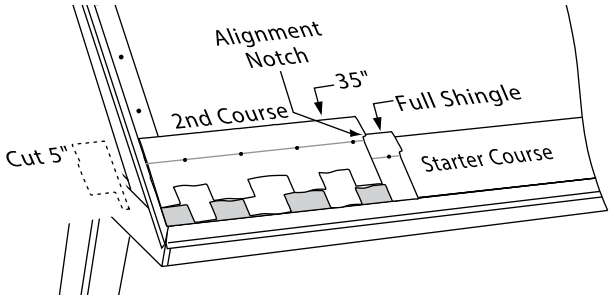


Figure 16-13: Second Course.

3RD COURSE: Cut 20" from the left edge of the first shingle. Install the remaining 20" piece by lining up the right lower edge of the shingle with the 15-1/2" alignment notch in the top of the Second Course shingle.

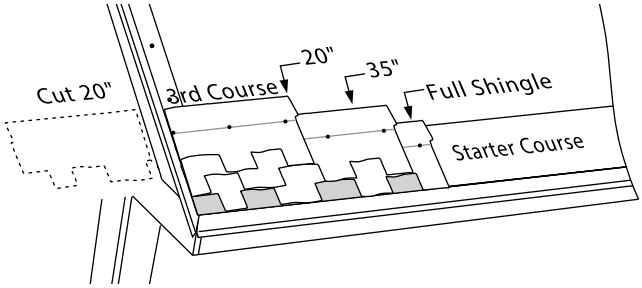


Figure 16-14: Third Course.

4TH COURSE: Cut 25" from the left edge of the first shingle. Install the remaining 15" piece by lining up the right lower edge of the shingle with the 5-1/2" alignment notch in the top of the Third Course shingle.

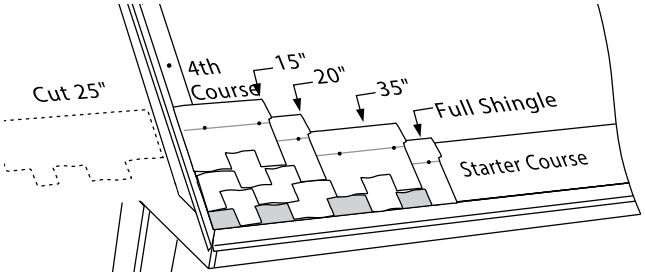


Figure 16-15: Fourth Course.

Here's a Tip...

After establishing the 4 course shingle pattern, extend the 1st course by installing additional full shingles along the eave. Using the proper alignment notch in the shingle course below to maintain the 5" and 15" offset, build the courses up the roof by working "back and forth" across the roof deck. (Be careful to maintain the correct offsets!)

Figure 16-16: Highlight of step flashing details.

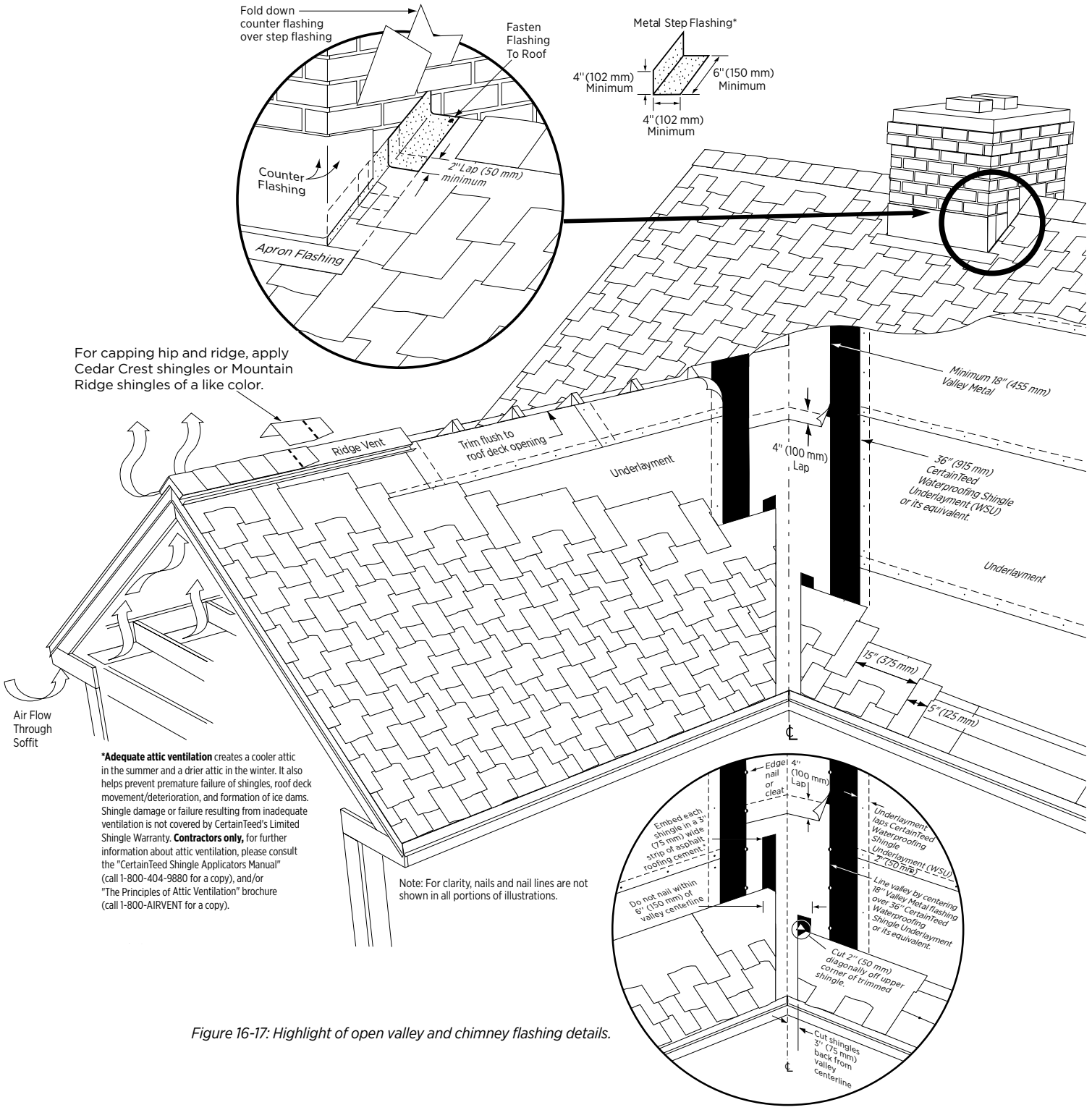


Figure 16-17: Highlight of open valley and chimney flashing details.

SUCCEEDING COURSES: Start the Fifth Course by installing a full shingle and repeat the four-course pattern. Continue applying shingles filling into the right of the first four courses.

Another Way to View it:

The 5″ and 15″ offset pattern is established over the 4 courses as follows:
1st course shingle = 40″ L (full shingle)
2nd course shingle = 35″ L (1st course – 5″)
3rd course shingle = 20″ L (2nd course – 15″)
4th course shingle = 15″ L (3rd course – 5″)

An alternative to starting on the left:

Follow the same application instructions specified in the 5″ and 15″ Offset Method above except instead of starting at the left rake, strike a chalkline perpendicular to the eave, at least 10′ from the rake's edge. Install the First Course full shingle by aligning its left edge with the perpendicular chalk-line. Follow the 5″ and 15″ Offset Method instructions for the remaining courses.

IMPORTANT: The designed appearance and service of Presidential Shake Shingles requires strict adherence to the application instructions.

"SPECIAL EFFECTS" PRESIDENTIAL SHAKE SHINGLES

DUAL COLOR APPLICATION METHODS USING THE 5″ AND 15″ OFFSET

METHOD # 1 – ALTERNATING COLORS – SINGLE COURSES

1. Select color combinations of Presidential® Shake shingles for use in dual color application, e.g. Slate Gray and Weathered Wood. Color designations "A" and "B" for two different shingle colors will be used in the following shingle application instructions.
2. **STARTER COURSE:** Apply color "A" Starter Strip shingles as starter course and follow instructions for Starter Course application.
3. **1ST COURSE:** Apply color "B" Presidential Shake shingles to the first course. Follow instructions for First Course application. All shingles applied to the first course and all successive odd numbers will be the same color i.e., color "B".
4. **2ND COURSE:** Apply color "A" shingles to second course. Follow instructions for Second Course application. All shingles applied to the second course and all successive even numbers will be the same color i.e., color "A".
5. Every other course of shingles will alternate between colors "A" and "B". Complete shingle application to each course across the roof deck with the same color of shingles. To avoid confusion, completely fill in each course of shingles across the deck at the same time. Follow the appropriate installation instructions for Presidential Shake shingles.
6. **HIP & RIDGE:** Apply hip & ridge cap shingles that are the opposite color as that of the last course of Presidential Shake Shingle. For example, if the last (top) course of Presidential Shake Shingle is color "A", then hip and ridge cap shingles should be color "B".

METHOD #2 – ALTERNATING COLORS – DOUBLE COURSES

1. Select color combinations of Presidential Shake Shingles for use in dual color application, e.g. Slate Gray and Weathered Wood. Color designations "A" and "B" for two different shingle colors will be used in the following shingle application instructions.
2. **STARTER COURSE:** Apply color "A" Starter Strip Shingles as starter course and follow instructions for Starter Course application.
3. **1ST COURSE:** Apply color "A" Presidential Shake Shingles, same color as starter shingles, to the first course. Follow instructions for First Course application.
4. **2ND AND 3RD COURSE:** Apply color "B" shingles to the second and third courses. Follow instructions for Second Course and Third Course applications.
5. **4TH AND 5TH COURSES:** Apply color "A" shingles to the fourth and fifth courses. Follow instructions for Fourth Course and Fifth Course applications.
6. All succeeding courses continue with two courses of shingles of one color followed by two courses of shingles of the other color. To avoid confusion completely apply the two courses of same colored shingles at the same time. Follow the appropriate installation instructions for Presidential Shake shingles.
7. **HIP & RIDGE:** The hip & ridge shingle color to be used will depend upon the color of the last two courses of Presidential shingles. If the last two courses contain shingles of the same color, then the hip & ridge color will be the opposite color. For example, if the last two courses are color "A", then the color "B" hip & ridge shingles are used. If the last two courses of shingles are different in color, then the color of hip & ridge shingles will be the same as the last course of Presidential Shake shingle. For example, if the next to last course is color "A" and the last (top) course is color "B", then the Hip & Ridge color used is "B".

Here's a Tip...

To provide a level surface for hip and ridge caps applied over Presidential TL, a "nailer" made from 1-by boards can be installed or a piece of metal can be formed to support the caps. Also ridge vents made from sturdy material can serve as a base to provide an even uniform appearance.

CAPPING THE HIP AND RIDGE

Cedar Crest® or Mountain Ridge® accessory shingles can be used for covering hips and ridges. Apply shingles up to the ridge. Fasten each accessory with two fasteners. The fasteners must be 1-3/4″ long or longer, so they penetrate either 3/4″ into the deck or completely through the deck.

MOUNTAIN RIDGE HIGH-PROFILE HIP AND RIDGE ACCESSORY SHINGLES

Use Mountain Ridge accessory shingles to cover hips, ridges or rake edges. One box will cover 20 linear feet. To prevent damage to shingles during application, they must be sufficiently warm to allow proper forming.

FASTENING

IMPORTANT: Use two nails to fasten each shingle. Nails must be minimum 1-3/4″ (45 mm) long. For the 4″ (102 mm) starter shingle, place fastener 1″ (25 mm) in from each side edge and about 2″ (50 mm) from the rake (or eave) edge, making sure the fastener goes 3/4″ into the deck or all the way through. For each full accessory shingle, place fasteners 8-5/8″ (219 mm) up from its exposed butt edge and 1″ (25 mm) in from each side edge.

HIP, RIDGE AND RAKE SHINGLE APPLICATION

Apply the primary field roofing up to the hip or ridge from both sides of the roof and trim flush or lap over one side, not more than half the width of an accessory shingle. Expose Mountain Ridge shingles 8″, covering all fasteners.

Assure that the installed accessory shingles properly cover field shingles on both sides and along rake edges. For a rake edge installation, cut the field shingles flush to the rake edge. Apply accessory shingles ensuring they fit securely against the rake board. To assist in proper alignment, snap a chalk line parallel to the hip, ridge or rake along the line where the side edges of the accessory shingles should fall.

Prepare a 4″ Starter shingle by cutting off the lower 8″ color granule butt portion of one accessory shingle. Apply the 4″ starter piece (with sealant nearest the outer edge) over the bottom corner of the hip or rake, or on either end of the ridge, overhanging the corner or end by approximately 1/2″ and bending the starter shingle along its centerline to form into place (see figures below.) Install a nail on each side about 2″ up from the starter shingle's exposed butt edge and 1″ in from each side edge of the shingle. The 8″ piece that was cut off may be used to finish the opposite end of hip, ridge or rake.

Next, apply a full Mountain Ridge® shingle over the installed starter shingle, bending it along its centerline and forming into place over the hip, ridge or rake, flush with the bottom and side edges of the starter shingle. Install a nail on each side of the shingle 8-5/8″ up from the bottom edge and 1″ in from each side edge.

Rake – Ensure field shingles at rake edge are flush with the outer edge of the rake board. Apply Mountain Ridge shingles fitting them snugly against the rake board. Use two color-coordinated aluminum trim or paneling nails, to pin the material to the fascia at 2″ (50 mm) up from bottom edge and 2″ (50 mm) and 3″ (75 mm) in from front edge of shingle. (See Figure 16-18).

Continue application of the Mountain Ridge shingles along the hip, ridge or rake as shown.

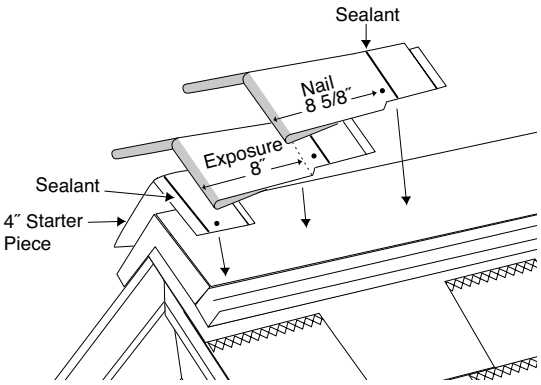
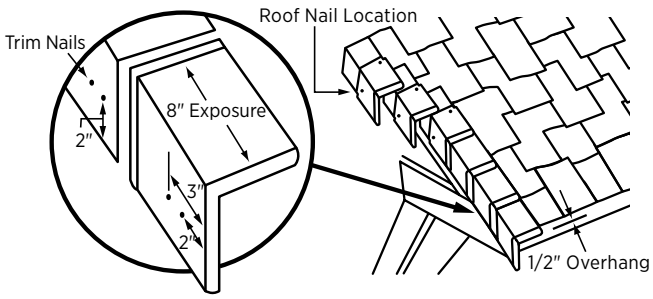


Figure 16-18: Mountain Ridge Rake edge application.



CEDAR CREST MEDIUM-PROFILE HIP AND RIDGE ACCESSORY SHINGLES

Use Cedar Crest® accessory shingles to cover hips and ridges. Carefully separate the three-piece units prior to application, by first folding along the pre-cut lines and then detatching the pieces (see Figure 16-19). No cutting is necessary. There are 30 individual shingles (10 three-piece units) in each bundle. One bundle will cover 20 linear feet. Each 12″ x 12″ (305 mm x 305 mm) shingle has a shadowline that is a design feature which is visible when applied properly. To prevent shingle damage during application, they must be sufficiently warm to allow proper forming.

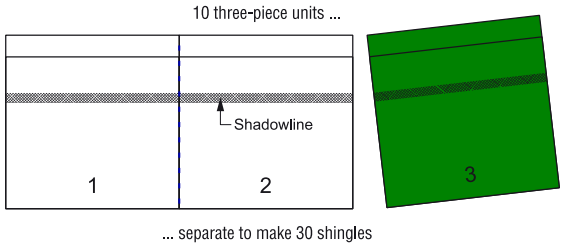


Figure 16-19: Separate to make 3 cap shingles.

FASTENING

IMPORTANT: Use TWO nails for each shingle. Fasteners must be minimum 1-3/4″ (45 mm) long. All nail heads must be driven straight and must not cut into shingle surface. Nails must not be exposed on finished roof.

For the starter shingle, place fastener 1″ in from each side edge and about 2″ up from the starter shingle's exposed butt edge, making sure fastener goes 3/4″ into the deck or all the way through the deck. (see Figure 16-20). For each full Cedar Crest shingle, place fasteners 8-5/8″ up from its exposed butt edge and 1″ in from each side edge (see Figure 16-21).

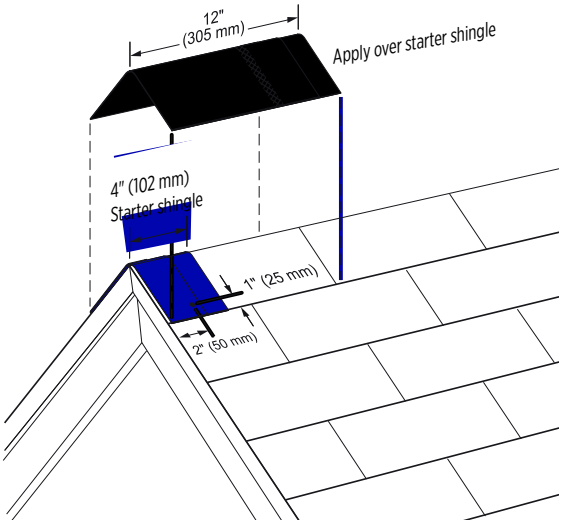


Figure 16-20: Apply a full cap shingle over the starter shingle.

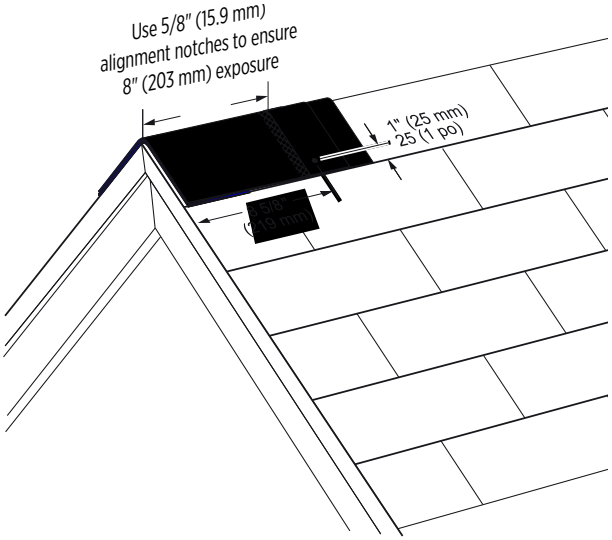


Figure 16-21: Install cap shingles at an 8″ exposure and fasten with one nail on each side as shown.

IMPORTANT: High Wind Instructions. In order to achieve the ASTM D3161 Class "F" Wind Resistance Classification each "hip and ridge" shingle must be both 1) fastened with nails as detailed in Cedar Crest Application and 2) hand-sealed with two 1/4″ (6 mm) wide beads of either BASF "Sonolastic® NP1™ Adhesive" or Henkel "PL® Polyurethane Roof and Flashing Cement" applied 8 5/8″ (219 mm) up from the butt edge, and extending approximately 4″ (102 mm) along the sides of the headlap along a line 3/4″-1″ (19 mm – 25 mm) in from each side edge of the shingle's headlap as shown. Immediately align and apply the next overlying shingle, gently pressing tab sides into adhesive and ensuring none becomes visible. Only one side of the double thickness tab is laminated together; to secure the other side, after folding the shingle over the ridge and nailing into position, a 1″ (25 mm) diameter spot of either NP1 or PL adhesive must be applied between the shingle layers as shown.

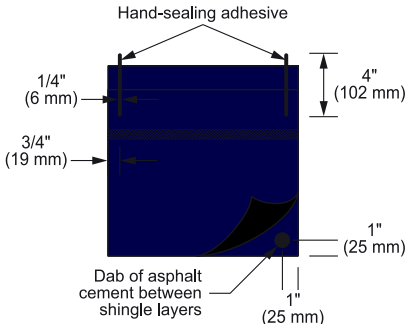


Figure 16-22: Hand seal caps as shown.

CEDAR CREST® APPLICATION

Apply primary roofing up to hip or ridge on both sides of roof and trim flush. Ensure that the Cedar Crest shingles will adequately cover the top course of the shingles on both sides of the hip or ridge. Prepare a 4″ (102 mm) "starter" shingle by cutting off the lower 8″ (203 mm) color granule portion of one Cedar Crest shingle. Apply the 4″ (102 mm) starter piece over the bottom corner of the hip or to either end of the ridge, overhanging the corner or end by approximately 1/2″ (13 mm) and bending the starter shingle along its centerline to form into place (see Figure 16-20). Install a nail on each side about 2″ (51 mm) up from the starter shingle's exposed butt edge and 1″ (25 mm) in from each side edge of the shingle. Then apply a full 12″ x 12″ (305 mm x 305 mm) piece over the starter, bending the shingle along its centerline and forming it into place over the hip or ridge, flush with the bottom and side edges of the starter shingle. Utilizing the 5/8″ (15.9 mm) notches located on either side of the shingle as a guide, position to help ensure the 8″ (203 mm) exposure. Fasten with two (2) fasteners minimum 1-3/4″ (45 mm) long with one (1) nail on each side of shingle 8 5/8″ (219 mm) up from the butt edge and 1″ (25 mm) in from each side edge (see Figure 16-21).

Continue application of Cedar Crest shingles up the hip or along the ridge, forming each shingle over the hip or ridge, and fasten as shown in Fastening. Expose Cedar Crest shingles 8″, covering all fasteners.

To assist in proper alignment, snap a chalk line parallel to the hip or ridge applying along the line where the side edges of the Cedar Crest shingles should be.

NOTE: When applying Cedar Crest shingles on shingle-over ridge vents, cap shingles may need to be trimmed. Assure proper fit and avoid overhanging vent openings. Contact the ridge vent manufacturer for instructions specific to their product. Be especially careful to use fasteners of sufficient length to penetrate minimum 3/4″ (19 mm) into solid decking or through the thickness of the decking, whichever is less. Use approved caulking material to fill gaps between vent and roof surface.

METAL STEP FLASHING

Metal flashing must consist of a piece extending a minimum 4″ vertically and 4″ into the field with a minimum 6″ length. Figure 16-23.

Place each piece of flashing 2″ up the roof from where the lowermost edge of the next (overlapping) shingle will be applied. Each succeeding course of flashing must “overlap” the flashing course below it a minimum of 2″.

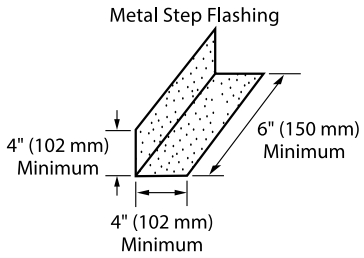


Figure 16-23: Metal step flashing.

REROOFING

“TEAR-OFF”

CertainTeed recommends but does not require old roofing be removed before installation of these products. Inspect the condition of the roof to determine that the load bearing capacity is adequate for the application of the Presidential® shingles. If the old roof consists of two or more layers of shingles, it is required to remove (tear-off) the existing roofing. After tear-off, repair the decking and /or install new decking and apply new underlayment, eaves flashing, and Presidential shingles using the recommended procedure.

“ROOF-OVER”

Over Asphalt Shingles:

IMPORTANT: If Presidential shingles are applied over existing roofing shingles, special “nesting” application methods must be followed. Applied incorrectly, raised shingle edges may result which can give an objectionable appearance and reduce the performance of the roofing.

If Presidential Shake Shingles are installed over existing wood shingles, replace old wood shingles along eave and rake edges with 1″ (25 mm) x 4″ (102 mm) boards. Beveled wood strips 4″ (102 mm) x 5″ (127 mm) wide may be installed below butt of shingles to provide a solid nailing base. Install Presidential Shake shingles using the recommended procedures.

Presidential® Series Installation Video

SECTION 16 SELF-TEST

16-1. Applying two layers of felt shingle underlayment is not an acceptable alternative to WinterGuard® or VYCOR® Ice & Water Shield® when installing Presidential® TL on a low slope.

A. True.

B. False.

16-2. Nails must be used as fasteners to install Presidential TL and Presidential Shake.

A. True.

B. False.

16-3. Both Presidential Shake and Presidential Shake TL shingles must be installed using the "5" and 15" Offset Method."

A. True.

B. False.

16-4. Open valleys are recommended when installing either of these products.

A. True.

B. False.

16-5. Cedar Crest or Mountain Ridge® accessory shingles should be used to cap hips and ridges.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Highland Slate®

17

YOUR OBJECTIVE:
To learn the correct method for installing Highland Slate®.

HIGHLAND SLATE

Highland Slate is an oversized 18" x 36" designer shingle with an 8" exposure that replicates blended slate. Highland Slate shingles are manufactured to meet dimensional tolerances of ± 1/16".

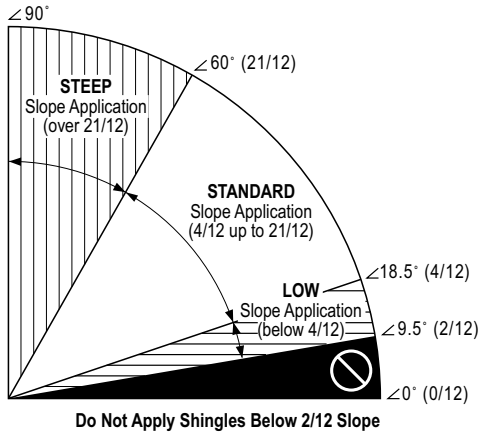


Figure 17-1: Slope definitions.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

*For low slopes, underlayment equivalents to WinterGuard and VYCOR® include:
1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner in shingle fashion (half lap) per the low-slope application instructions.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

The roof deck* must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Technical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

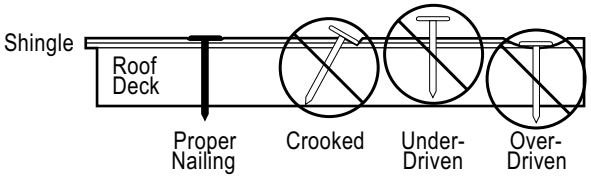


Figure 17-2: Proper and improper nailing.

For decks 3/4″ (19 mm) thick or thicker, nails must go at least 3/4″ (19 mm) into the deck. On thinner decks, nails must go at least 1/8″ (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8″ (9.5 mm) heads, and at least 1-1/4″ (32 mm) long.

LOW AND STANDARD SLOPE:

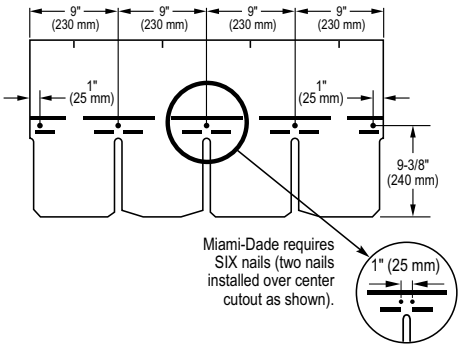


Figure 17-3: Use FIVE nails for every Highland Slate® shingle. For Miami-Dade, SIX nails are required (see inset).

STEEP SLOPE:

Use FIVE nails and EIGHT spots of asphalt roofing cement* for each full Highland Slate shingle. For Miami-Dade, SIX nails are required. Apply 1″ diameter spots of asphalt roofing cement under each tab corner. Asphalt roofing cement should meet ASTM D4586 Type II.

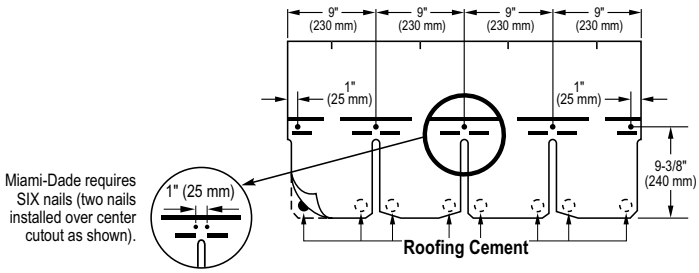


Figure 17-3A: Use FIVE nails and eight spots of asphalt roofing cement under each tab corner.

*__CAUTION:__ Excessive use of roofing cement can cause shingles to blister.

CLEAN DECK APPLICATION METHOD

PREPARING THE DECK:

- Apply underlayment as required. CertainTeed suggests that a layer of shingle underlayment be applied. For UL fire rating, underlayment is generally required. Apply flat and unwrinkled.

INSTALL ON NEW ROOFS AND TEAR-OFFS USING THE FOLLOWING METHOD:

4-1/2″ OFFSET, SINGLE-COLUMN, VERTICAL RACKING METHOD ("RACKING")

Underlayment: Apply as required, following manufacturer's instructions. Figure 17-5 illustrates application of standard felt underlayment, for standard or steep-slopes only. Always ensure sufficient deck ventilation, and take particular care when DiamondDeck®, RoofRunner™ or other synthetic underlayment is installed. Follow manufacturer's application instructions. Alignment: Snap horizontal and vertical chalklines to assure shingles will be correctly aligned. Expose all shingles 8″.

STARTER COURSE: IMPORTANT!

1. Use CertainTeed's High-Performance Starter Shingles or remove the lower 8″ tab portions from Highland Slate shingles. This is a requirement in order to be eligible for the 110 mph wind warranty. Do not rotate or "flip" full shingle. Sealant stripes must be at lower-most edge.
2. Cut 4-1/2″ off the LEFT end of the first starter shingle only.
3. Apply the 31-1/2″ remaining piece to the lower left corner of the roof. Make sure there is 1/2″ overhanging the rakes and eaves if drip edge is being used. If you are not using drip edge, make the overhang 3/4″. Install nails approximately 3″ up from eave, assuring they go into solid wood.
4. Use full 36″ long by 10″ wide starter shingles for the rest of the course.

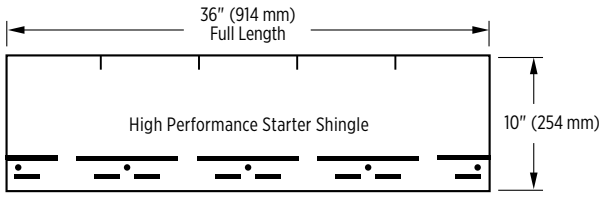


Figure 17-4: High-Performance Starter

1ST COURSE: (Figure 17-5). Apply a full Highland Slate shingle at the lower left corner of the roof, flush with the starter course left corner. Fasten with 5 nails.

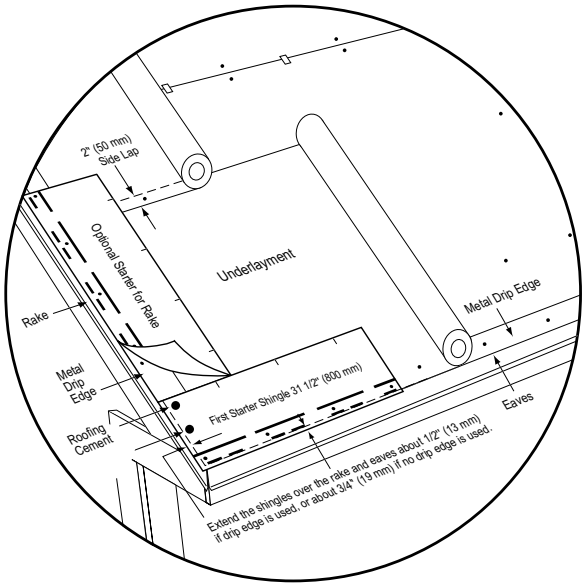


Figure 17-5: Standard slope underlayment and starter drip edge details.

2ND COURSE: (Figure 17-6). Cut 4-1/2" off the left end of a full shingle and apply remaining 31-1/2" piece over left edge of 1st course. Fasten with 5 nails and ensure 8" exposure.

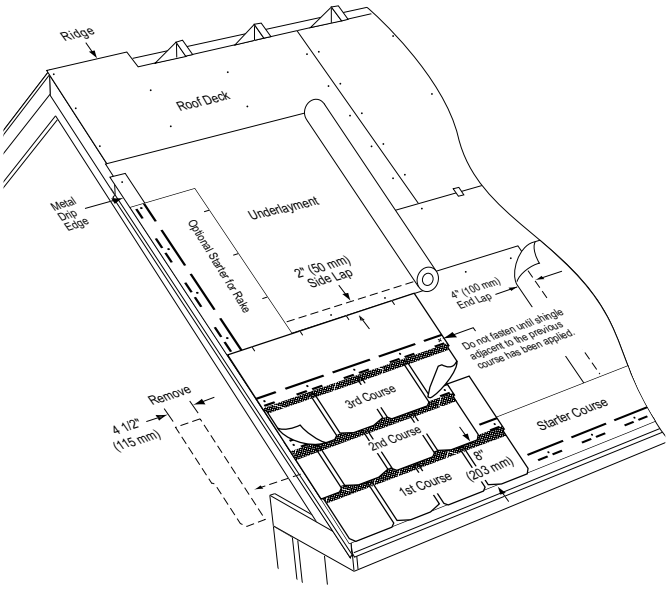


Figure 17-6: Applying the first three courses on a standard slope.

SUCCEEDING COURSES: Begin application of the 3rd course with a full shingle. Fasten with 4 nails, leaving the right end unfastened until later. (Figure 17-6). Begin the 4th course using a shingle with 4-1/2" cut off its left end. Fasten with 5 nails. To begin the application of subsequent courses, alternate full shingles [36"] and cut shingles [31-1/2"] up the rake edge, fastening as described above.

REMAINING COLUMNS AND COURSE COMPLETION: Apply a full shingle against the right edge of each shingle in previous column. When applying a shingle against a covered shingle, carefully lift the right edge of the shingle above and slip the new shingle under it. Fasten as usual with 5 fasteners; then, fasten the loose right edge of the shingle above.

Figure 17-7: Installation schematic.

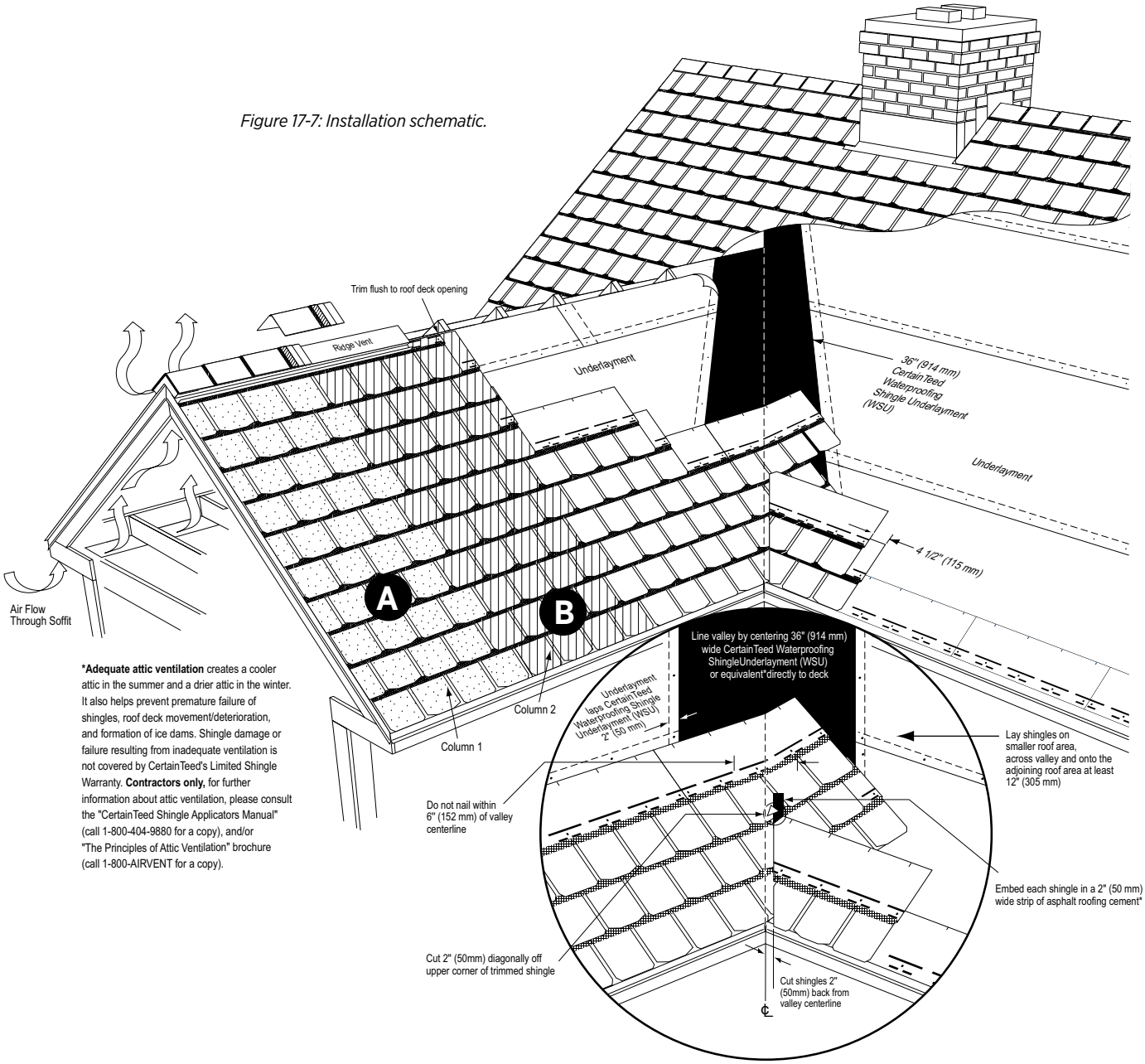


Figure 17-8: Highlight of closed-cut valley detail.

CEDAR CREST MEDIUM-PROFILE HIP AND RIDGE ACCESSORY SHINGLES

Use Cedar Crest® accessory shingles to cover hips and ridges. Carefully separate the three-piece units prior to application, by first folding along the pre-cut lines and then detatching the pieces (see Figure 17-9). No cutting is necessary. There are 30 individual shingles (10 three-piece units) in each bundle. One bundle will cover 20 linear feet. Each 12" x 12" (305 mm x 305 mm) shingle has a shadowline that is a design feature which is visible when applied properly. To prevent shingle damage during application, they must be sufficiently warm to allow proper forming.

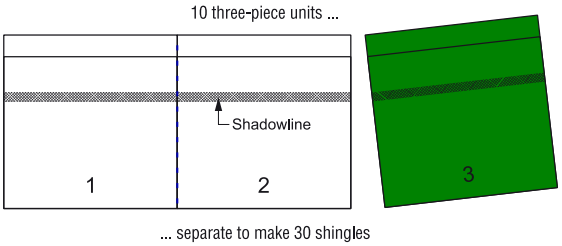


Figure 17-9: Separate to make 3 cap shingles.

FASTENING

IMPORTANT: Use TWO nails for each shingle. Fasteners must be minimum 1-3/4" (45 mm) long. All nail heads must be driven straight and must not cut into shingle surface. Nails must not be exposed on finished roof.

For the starter shingle, place fastener 1" in from each side edge and about 2" up from the starter shingle's exposed butt edge, making sure fastener goes 3/4" into the deck or all the way through the deck. (see Figure 17-10). For each full Cedar Crest shingle, place fasteners 8-5/8" up from its exposed butt edge and 1" in from each side edge (see Figure 17-11).

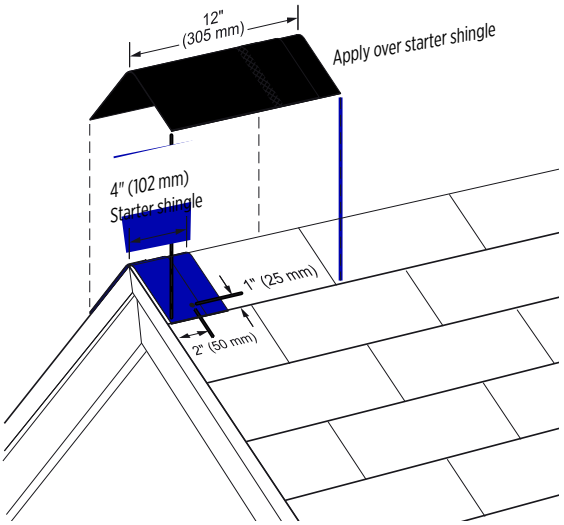


Figure 17-10: Apply a full cap shingle over the starter shingle.

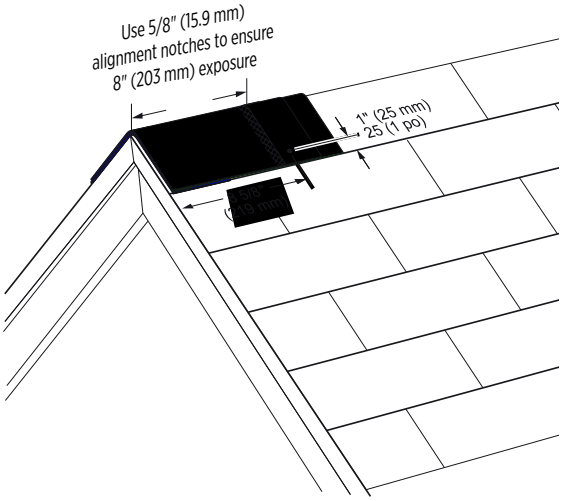


Figure 17-11: Install cap shingles at an 8" exposure and fasten with one nail on each side as shown.

IMPORTANT: High Wind Instructions. In order to achieve the ASTM D3161 Class "F" Wind Resistance Classification each "hip and ridge" shingle must be both 1) fastened with nails as detailed in Cedar Crest Application and 2) hand-sealed with two 1/4" (6 mm) wide beads of either BASF "Sonolastic® NP1™ Adhesive" or Henkel "PL® Polyurethane Roof and Flashing Cement" applied 8 5/8" (219 mm) up from the butt edge, and extending approximately 4" (102 mm) along the sides of the headlap along a line 3/4"-1" (19 mm – 25 mm) in from each side edge of the shingle's headlap as shown. Immediately align and apply the next overlying shingle, gently pressing tab sides into adhesive and ensuring none becomes visible. Only one side of the double thickness tab is laminated together; to secure the other side, after folding the shingle over the ridge and nailing into position, a 1" (25 mm) diameter spot of either NP1 or PL adhesive must be applied between the shingle layers as shown.

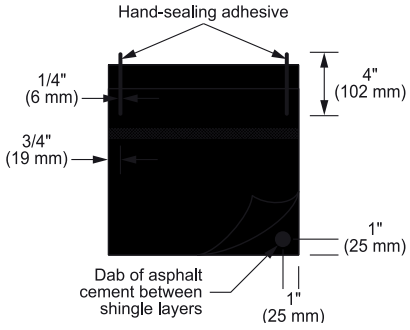


Figure 17-12: Hand seal caps as shown.

CEDAR CREST® APPLICATION

Apply primary roofing up to hip or ridge on both sides of roof and trim flush. Ensure that the Cedar Crest shingles will adequately cover the top course of the shingles on both sides of the hip or ridge. Prepare a 4" (102 mm) "starter" shingle by cutting off the lower 8" (203 mm) color granule portion of one Cedar Crest shingle. Apply the 4" (102 mm) starter piece over the bottom corner of the hip or to either end of the ridge, overhanging the corner or end by approximately 1/2" (13 mm) and bending the starter shingle along its centerline to form into place (see Figure 17-10). Install a nail on each side about 2" (51 mm) up from the starter shingle's exposed butt edge and 1" (25 mm) in from each side edge of the shingle. Then apply a full 12" x 12" (305 mm x 305 mm) piece over the starter, bending the shingle along its centerline and forming it into place over the hip or ridge, flush with the bottom and side edges of the starter shingle. Utilizing the 5/8" (15.9 mm) notches located on either side of the shingle as a guide, position to help ensure the 8" (203 mm) exposure. Fasten with two (2) fasteners minimum 1-3/4" (45 mm) long with one (1) nail on each side of shingle 8 5/8" (219 mm) up from the butt edge and 1" (25 mm) in from each side edge (see Figure 17-11).

Continue application of Cedar Crest shingles up the hip or along the ridge, forming each shingle over the hip or ridge, and fasten as shown in Fastening. Expose Cedar Crest shingles 8", covering all fasteners.

To assist in proper alignment, snap a chalk line parallel to the hip or ridge applying along the line where the side edges of the Cedar Crest shingles should be.

NOTE: When applying Cedar Crest shingles on shingle-over ridge vents, cap shingles may need to be trimmed. Assure proper fit and avoid overhanging vent openings. Contact the ridge vent manufacturer for instructions specific to their product. Be especially careful to use fasteners of sufficient length to penetrate minimum 3/4" (19 mm) into solid decking or through the thickness of the decking, whichever is less. Use approved caulking material to fill gaps between vent and roof surface.

SHANGLE RIDGE APPLICATION

Apply Shangle Ridge® shingles to hips and ridges.

1. Each shingle is a 12" by 18", color-coordinated, pre-assembled, double-layered product. Exposure is 8".
2. Apply Highland Slate up to the hip or ridge from both sides and trim flush. Allow for adequate coverage by making sure the last course of shingles will not be exposed more than 8" when the cap shingles are applied.
3. To assist with proper alignment when ridge vents aren't used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap should be.
4. If possible, try to start at the end of the ridge opposite to where the prevailing wind strikes the house. This will give the wind and rain less of a chance of getting underneath the cap. As for the hip, begin by installing the cap at the bottom and work your way up.

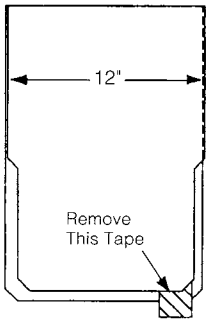


Figure 17-13: Shangle Ridge®.

5. Start with one Shangle Ridge "starter shingle" with its lower 8" (203 mm) cut off, remove the protective tape (see Figure 17-14) from the sealant between the two layers and bend the shingle along the centerline of its longer dimension to form into place over the hip or ridge, beginning at the bottom of the hip or at either end of the ridge.
6. Fasten with 2 fasteners minimum 1-3/4" (44 mm) long.
7. Next install one full Shangle Ridge shingle over top of the "starter shingle", aligning its sides and lower edge to it. Remove the protective tape from the sealant between the two layers and bend the shingle along the centerline of its longer dimension to form into place over the hip or ridge. Fasten each shingle with 2 fasteners minimum 1-3/4" (44 mm) long located as shown in Figure 17-14. Expose each Shangle Ridge 8" and cover all fasteners.

IMPORTANT: In order for the shingle to bend smoothly over the hip or ridge, the "left" side (without the protective tape) must be fastened first. Then, remove the protective tape, bend the cap to form into place and fasten the "right" side.

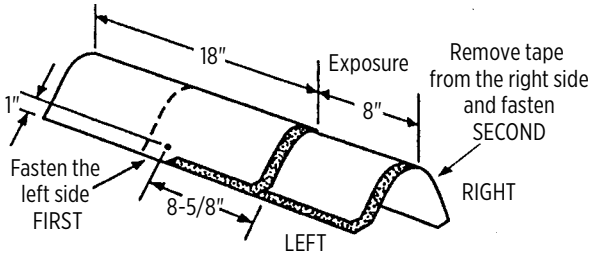


Figure 17-14: Installation of Shangle Ridge shingles on hips and ridges.

8. If shingle-over ridge vents are being installed (Figure 17-15), they must match the 12″ width dimensions of the hip and ridge caps. Be sure to follow the ridge vent manufacturer's instructions. To attach the cap shingles to the shingle-over ridge vent, use hot-dipped galvanized nails of sufficient length to penetrate 3/4″ into, or through, the deck.

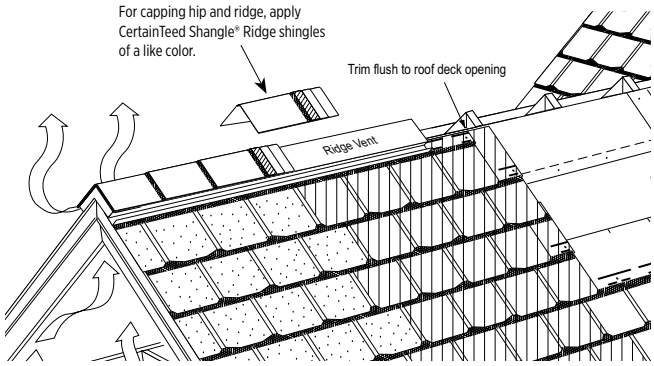


Figure 17-15: Installation of Shangle Ridge shingles on ridge vent.

REROOFING

"TEAR OFF"

It is important to determine that the roof deck is in satisfactory condition and the load-bearing capacity is adequate for application of these shingles. If the old roof consists of two or more layers of shingles, or if the roof consists of wood shingles (other than sawn square butt style), it is required to tear off (remove) existing roofing. If the old shingles have exposure lengths other than 8″ (203 mm), it is strongly recommended to tear off existing roofing, since roofing over these shingles can lead to periodic patterns which may have an objectionable appearance. After tear-off, repair decking and/or install new decking, and apply underlayment, eaves flashing and shingles according to procedure in "4-1/2″ Single Column Vertical Racking Method" section.

"ROOF-OVER":

IMPORTANT: If Highland Slate® shingles are applied over existing asphalt roofing shingles having exposure lengths other than 8″ (203 mm) CertainTeed requires using the nesting method described below. Never apply Highland Slate shingles over laminates or lock-type shingles. Failure to follow these directions will cause shingle "bridging" that can give an objectionable appearance and reduce the performance of the roofing.

CUTBACK/NESTING METHOD

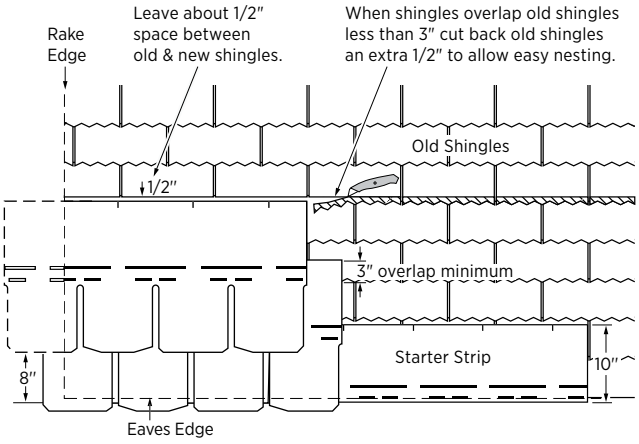


Figure 17-16: "Cutback/Nesting Method"

1) Make the surface of the old roof as smooth as possible by replacing missing shingles. Split and nail flat all buckled, raised or curled shingle tabs.
2) Cut old shingles back flush to the rakes and eaves.
3) Apply corrosion-resistant drip edge along the rakes and eaves, covering the edges of the old shingles.
4) **STARTER COURSE:** If applying over old 5″ exposure shingles, prepare starter strip according to Highland Slate application instructions. Apply starter strip with sealant near bottom edge so that the top edge of the starter strip will nest below the lower edge of the third course of old shingles. Starter shingle should overhang eaves and rake edges about 1/2″. If applying over shingles of other than 5″ exposure, apply CertainTeed High-Performance™ 10″ starter in a similar fashion, with the sealant near the eaves. Follow the cutback/nesting method described below if the top edge of the starter shingle overlaps the old shingles less than 3″.
5) **REMAINDER OF ROOF:** Apply Highland Slate shingles using the 4-1/2″ single column vertical racking method. When Highland Slate shingles overlap the old shingles less than 3″, cut back old shingles to the overlap dimension plus about 1/2″, to allow easy nesting. This "Cutback/Nesting Method" permits the upper part of the Highland Slate shingle to lay smoothly against the old shingles, resulting in a roof that will perform better and have a more even appearance.

OVER SQUARE-BUTT WOOD SHINGLES:

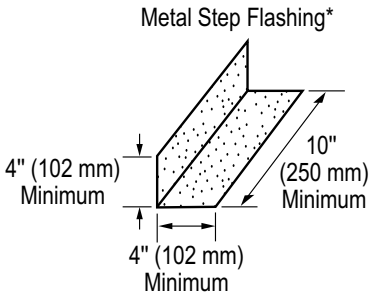
If the roof consists of square-butt sawn wood shingles, apply beveled wood strips to obtain an even base and apply underlayment, eaves flashing and shingles according to procedure in "4-1/2″ Single Column Vertical Racking Method" section.

Highland Slate® Installation Video

METAL STEP FLASHING

The first course of metal flashing must be a minimum of 8″ x 12″ (203.2 mm x 305 mm), bent as shown in Figure 17-17, applied flush with the lowermost edge of the first shingle.

Succeeding courses of flashing must consist of pieces that are a minimum 8″ x 10″ (203.2 mm x 250 mm), bent as shown in Figure 15-17. Place each piece of flashing 2″ (50 mm) up the roof from where the lowermost edge of the next (overlapping) shingle will be applied. Each succeeding course of flashing must "overlap" the flashing course below it a minimum of 2″ (50 mm).



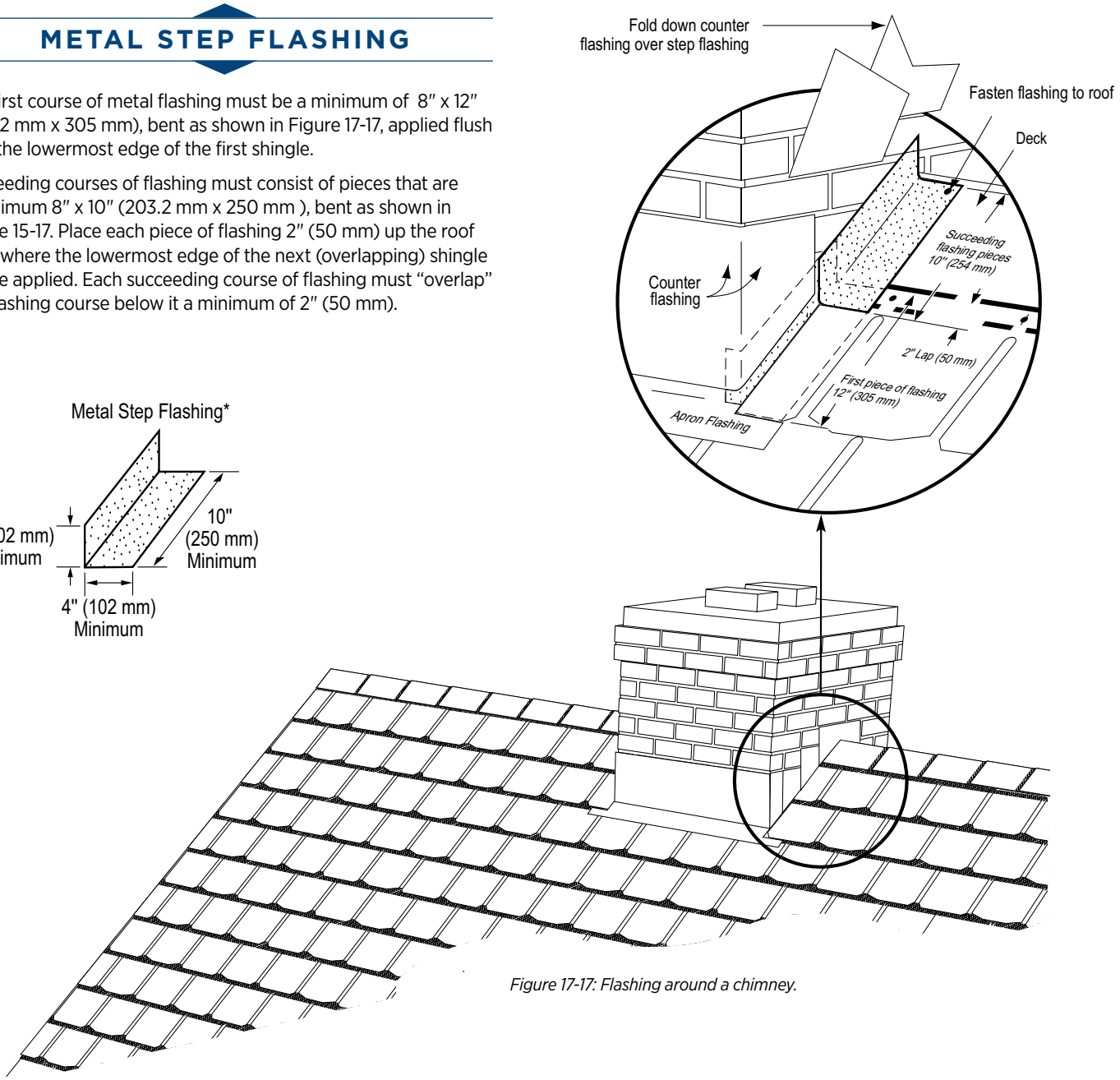


Figure 17-17: Flashing around a chimney.

SECTION 17 SELF-TEST

17-1. Highland Slate® shingles are built to meet dimensional tolerances of ± 1/16".

A. True.

B. False.

17-2. On standard slopes, use 5 nails to fasten each full Highland Slate shingle.

A. True.

B. False.

17-3. CertainTeed High-Performance Starter Shingles can be used when installing Highland Slate.

A. True.

B. False.

17-4. The approved application method for clean-decks is the 4-1/2" Single Column Vertical Racking Method.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Belmont®

18

YOUR OBJECTIVE:
To learn the correct method for installing Belmont™.

BELMONT

Belmont is an oversized 18" x 36" designer shingle with an 8" exposure.

Fastening, steep slopes, and flashing requirements are special because of the thickness, design, and weight of this product.

For UL fire rating, underlayment may be required.
Apply flat and unwrinkled.

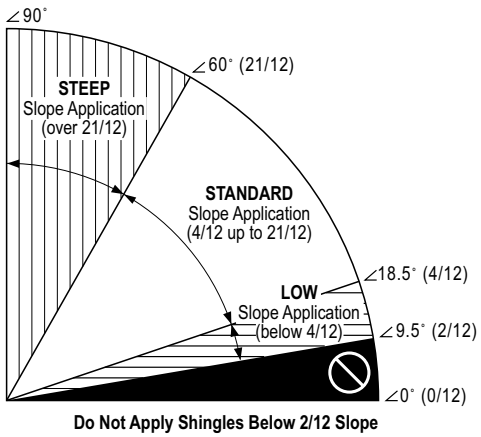


Figure 18-1: Slope definitions.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Take care to ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR® include:
1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm) wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner™ in shingle fashion (half lap) per the low-slope application instructions.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

The roof deck must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or 1" (25 mm) thick nominal wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips, ridges and valleys.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Technical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

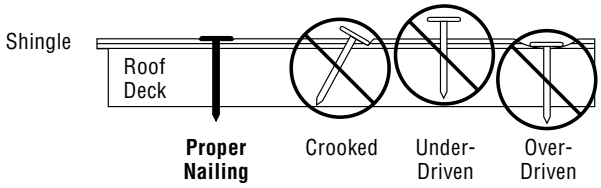


Figure 18-2: Proper and improper nailing.

IMPORTANT: For decks 3⁄4″ (19 mm) thick or thicker, nails must go at least 3/4″ (19 mm) into the deck. On thinner decks, nails must go at least 1/8″ (3.2 mm) through the deck.

Nails must be 11 or 12 gauge roofing nails, corrosion-resistant, with at least 3/8″ (9.5 mm) heads, and at least 1-1/4″ (32 mm) long.

LOW AND STANDARD SLOPE

Use FIVE nails for every full shingle located as shown below.

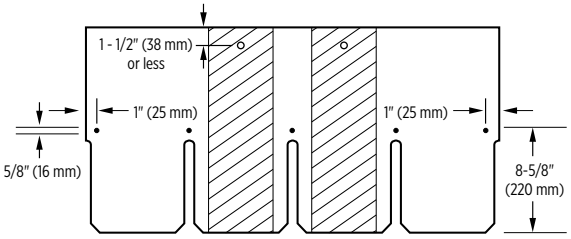


Figure 18-3: Use five nails for every full shingle.

STEEP SLOPE

Use SEVEN nails and EIGHT spots of asphalt roofing cement for every full shingle as shown below. Apply asphalt roofing cement 1″ (25 mm) from edge of shingle. Asphalt roofing cement meeting ASTM D4586 Type II is suggested.

CAUTION: Excessive use of roofing cement can cause shingles to blister.

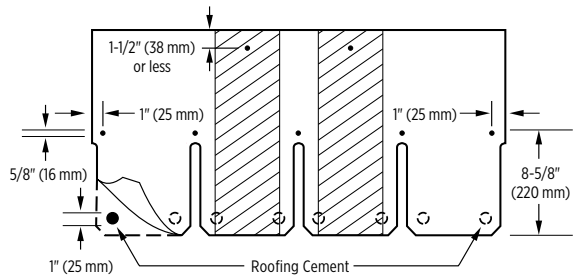


Figure 18-4: Use seven nails and eight spots of asphalt roofing cement on steep slopes.

IMPORTANT: To prevent slippage of the laminated tabs (shown cross-hatched above) when individual shingles meet a wall, ridge, and on steep slopes (greater than 21″ per foot), each laminated tab at the junction must be fastened individually with an additional fastener as shown. Fasteners applied to the tabs in this manner are to be horizontally centered on the laminated tab and placed within 1-1/2″ (38 mm) of the upper edge of the shingle. To protect against slippage of the laminated tabs during application of these shingles in hot weather, it might become necessary to fasten all the tabs individually as described above.

SINGLE-COLUMN VERTICAL RACKING METHOD

4-1/2″ OFFSET, SINGLE-COLUMN, VERTICAL RACKING METHOD ("RACKING")

Underlayment: Apply as required, following manufacturer's instructions. Figure 18-5 illustrates application of standard felt underlayment, for standard or steep-slopes only. Always ensure sufficient deck ventilation, and take particular care when DiamondDeck®, RoofRunner™ or other synthetic underlayment is installed. Follow manufacturer's application instructions.

Alignment: Snap horizontal and vertical chalklines to assure shingles will be correctly aligned. Expose all shingles 8″ (203 mm).

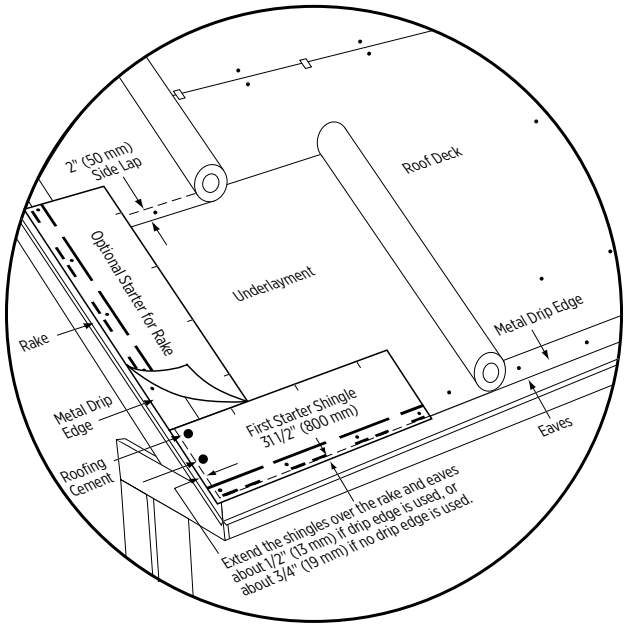


Figure 18-5: Standard slope underlayment and starter drip edge details.

STARTER COURSE (IMPORTANT): Use CertainTeed's High-Performance Starter Shingles or remove the lower 8″ (203 mm) tab portions from Belmont shingles. **DO NOT ROTATE OR "FLIP" FULL SHINGLE. SEALANT STRIPES MUST BE AT LOWER-MOST EDGE.**

Cut 4-1/2″ (115 mm) off the LEFT end of the first starter shingle only. Apply the 31-1/2″ (800 mm) remaining piece to the lower left corner of the roof. Install nails approximately 3″ (76 mm) up from eave, assuring they go into solid wood. Use full length High-Performance Starter or cut Belmont® shingles as a starter for the rest of the course. For added protection, It is suggested, not required, to install Belmont starter shingles or CertainTeed's High-Performance Starter [10″ x 36″ (254 mm x 914 mm)] along the rake edges of the roof and butt shingles (DO NOT OVERLAP).

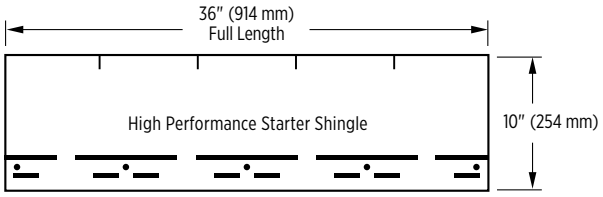


Figure 18-6: High Performance Starter Shingle

1ST COURSE: Apply a full Belmont shingle at the lower left corner of the roof, flush with the starter course left corner. Fasten with 5 nails (See Figure 18-7).

2ND COURSE: Cut 4-1/2" (115 mm) off the left end of a full shingle and apply remaining 31-1/2" (800 mm) piece over left edge of 1st course. Fasten with 5 nails and ensure 8" (203 mm) exposure (See Figure 18-7).

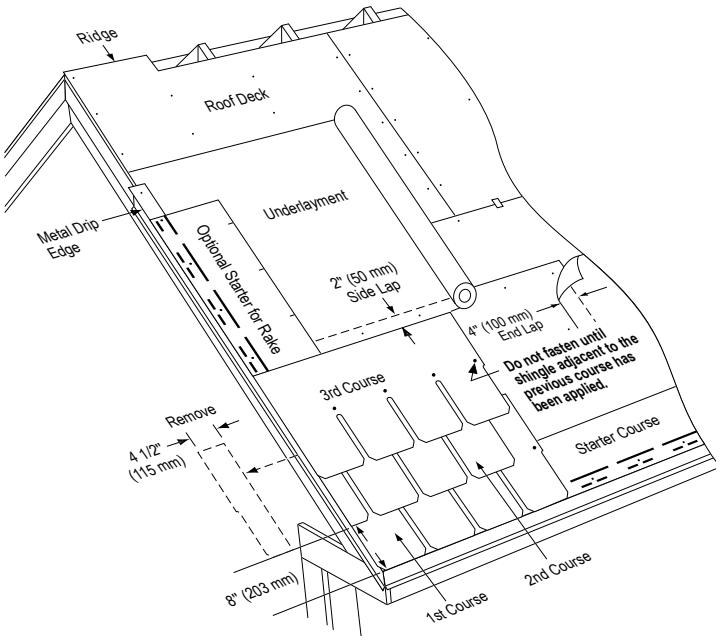


Figure 18-7: Applying the first 3 courses on a standard slope.

SUCCEEDING COURSES: Begin application of the 3rd course with a full shingle. Fasten with 4 nails, leaving the right end unfastened until later (See Figure 18-7).

Begin the 4th course using a shingle with 4-1/2" (115 mm) cut off its left end. Fasten with 5 nails. To begin the application of subsequent courses, alternate full shingles [36" (914 mm)] and cut shingles [31-1/2" (800 mm)] up the rake edge, fastening as described.

REMAINING COLUMNS AND COURSE COMPLETION: Apply a full shingle against the right edge of each shingle in previous column.

When applying a shingle against a covered shingle, carefully lift the right edge of the shingle above and slip the new shingle under it. Fasten as usual with 5 fasteners; then, fasten the loose right edge of the shingle above (See Figure 18-8).

INSTALLING VALLEYS

- Closed-cut and open valleys are recommended.
- When installing an open valley, preformed "W" style valleys are preferred.

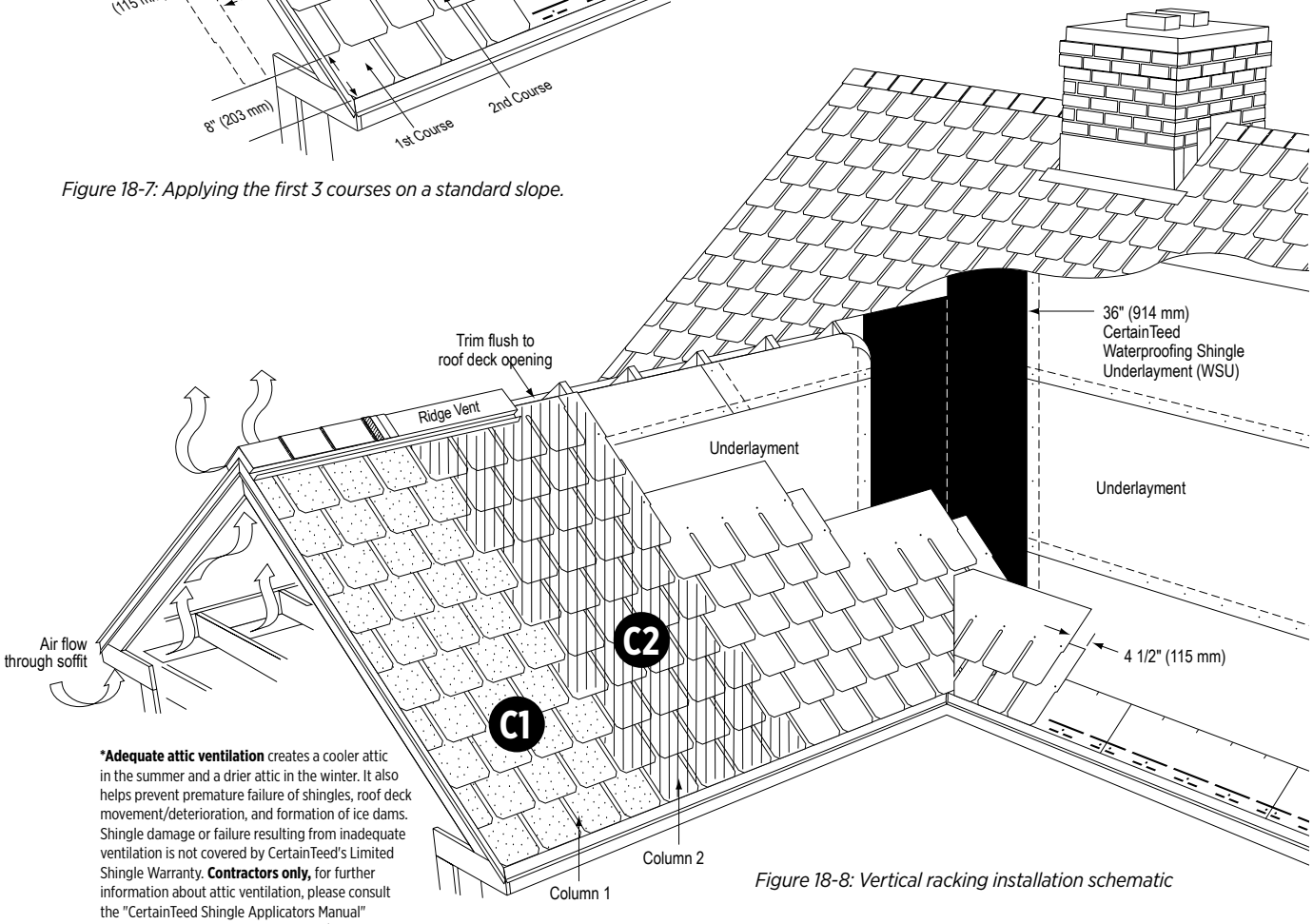


Figure 18-8: Vertical racking installation schematic

***Adequate attic ventilation** creates a cooler attic in the summer and a drier attic in the winter. It also helps prevent premature failure of shingles, roof deck movement/deterioration, and formation of ice dams. Shingle damage or failure resulting from inadequate ventilation is not covered by CertainTeed's Limited Shingle Warranty. **Contractors only,** for further information about attic ventilation, please consult the "CertainTeed Shingle Applicators Manual" (call 1-800-404-9880 for a copy), and/or "The Principles of Attic Ventilation" brochure (call 1-800-AIRVENT for a copy).

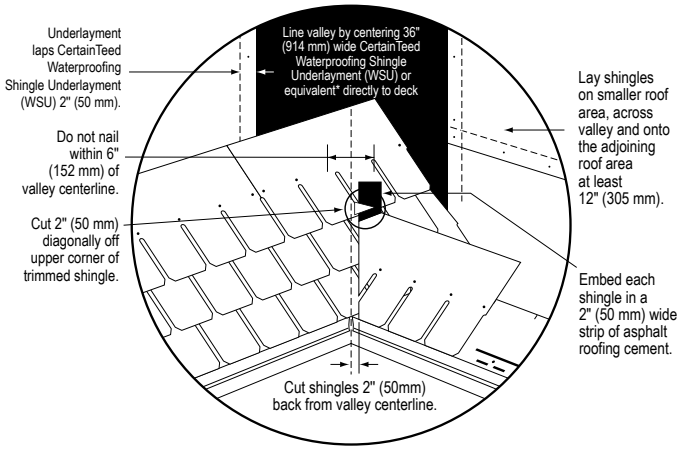


Figure 18-9: Closed-cut valley installation.

CHIMNEY FLASHING

Metal Step Flashing: First course of metal flashing must consist of a minimum 5″ x 12″ (127 mm x 305 mm) piece applied flush with the lowermost edge of the first shingle. Succeeding courses of flashing must consist of pieces that are a minimum 5″ x 10″ (127 mm x 254 mm) in size. Each succeeding course of flashing must "overlap" the flashing course beneath it a minimum of 2″ (50 mm).

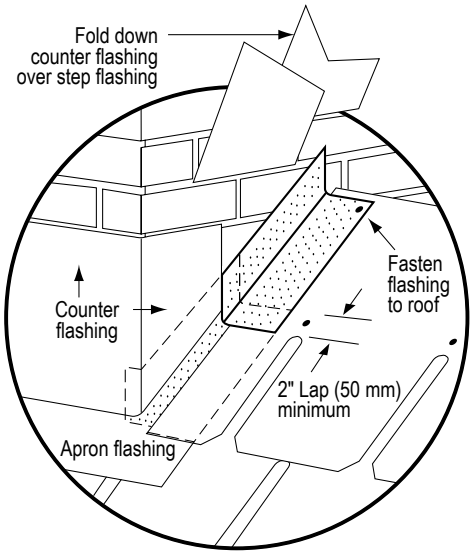


Figure 18-10: Flashing around a chimney.

CEDAR CREST MEDIUM-PROFILE HIP AND RIDGE ACCESSORY SHINGLES

Use Cedar Crest® accessory shingles to cover hips and ridges. Carefully separate the three-piece units prior to application, by first folding along the pre-cut lines and then detatching the pieces (see Figure 18-11). No cutting is necessary. There are 30 individual shingles (10 three-piece units) in each bundle. One bundle will cover 20 linear feet. Each 12″ x 12″ (305 mm x 305 mm) shingle has a shadowline that is a design feature which is visible when applied properly. To prevent shingle damage during application, they must be sufficiently warm to allow proper forming.

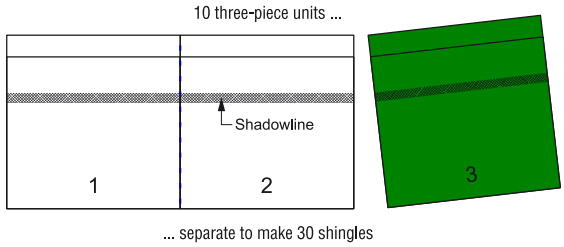


Figure 18-11: Separate to make 3 cap shingles.

FASTENING

IMPORTANT: Use TWO nails for each shingle. Fasteners must be minimum 1-3/4″ (45 mm) long. All nail heads must be driven straight and must not cut into shingle surface. Nails must not be exposed on finished roof.

For the starter shingle, place fastener 1″ in from each side edge and about 2″ up from the starter shingle's exposed butt edge, making sure fastener goes 3/4″ into the deck or all the way through the deck. (see Figure 18-12). For each full Cedar Crest shingle, place fasteners 8-5/8″ up from its exposed butt edge and 1″ in from each side edge (see Figure 18-13).

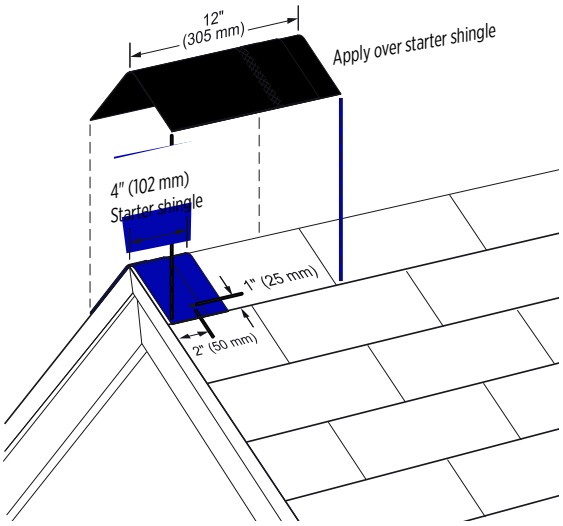


Figure 18-13: Apply a full cap shingle over the starter shingle.

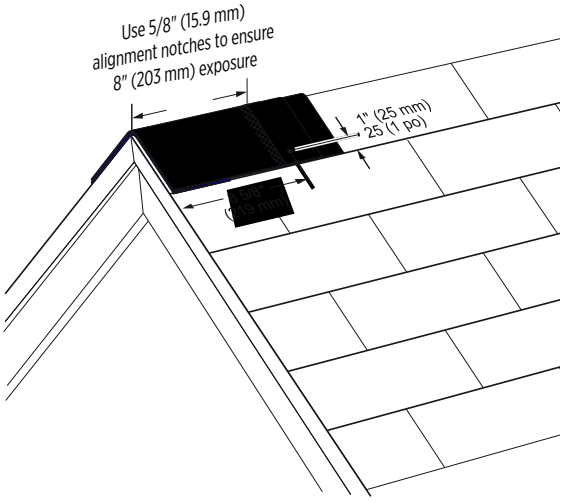


Figure 18-14: Install cap shingles at an 8" exposure and fasten with one nail on each side as shown.

IMPORTANT: High Wind Instructions. In order to achieve the ASTM D3161 Class "F" Wind Resistance Classification each "hip and ridge" shingle must be both 1) fastened with nails as detailed in Cedar Crest Application and 2) hand-sealed with two 1/4" (6 mm) wide beads of either BASF "Sonolastic® NP1™ Adhesive" or Henkel "PL® Polyurethane Roof and Flashing Cement" applied 8 5/8" (219 mm) up from the butt edge, and extending approximately 4" (102 mm) along the sides of the headlap along a line 3/4"-1" (19 mm – 25 mm) in from each side edge of the shingle's headlap as shown. Immediately align and apply the next overlying shingle, gently pressing tab sides into adhesive and ensuring none becomes visible. Only one side of the double thickness tab is laminated together; to secure the other side, after folding the shingle over the ridge and nailing into position, a 1" (25 mm) diameter spot of either NP1 or PL adhesive must be applied between the shingle layers as shown.

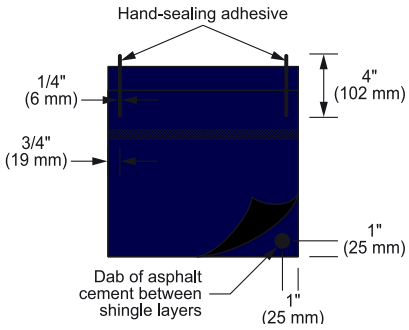


Figure 18-15: Hand seal caps as shown.

CEDAR CREST® APPLICATION

Apply primary roofing up to hip or ridge on both sides of roof and trim flush. Ensure that the Cedar Crest shingles will adequately cover the top course of the shingles on both sides of the hip or ridge. Prepare a 4" (102 mm) "starter" shingle by cutting off the lower 8" (203 mm) color granule portion of one Cedar Crest shingle. Apply the 4" (102 mm) starter piece over the bottom corner of the hip or to either end of the ridge, overhanging the corner or end by approximately 1/2" (13 mm) and bending the starter shingle along its centerline to form into place (see Figure 18-13). Install a nail on each side about 2" (51 mm) up from the starter shingle's exposed butt edge and 1" (25 mm) in from each side edge of the shingle. Then apply a full 12" x 12" (305 mm x 305 mm) piece over the starter, bending the shingle along its centerline and forming it into place over the hip or ridge, flush with the bottom and side edges of the starter shingle. Utilizing the 5/8" (15.9 mm) notches located on either side of the shingle as a guide, position to help ensure the 8" (203 mm) exposure. Fasten with two (2) fasteners minimum 1-3/4" (45 mm) long with one (1) nail on each side of shingle 8 5/8" (219 mm) up from the butt edge and 1" (25 mm) in from each side edge (see Figure 18-14).

Continue application of Cedar Crest shingles up the hip or along the ridge, forming each shingle over the hip or ridge, and fasten as shown in Fastening. Expose Cedar Crest shingles 8", covering all fasteners.

To assist in proper alignment, snap a chalk line parallel to the hip or ridge applying along the line where the side edges of the Cedar Crest shingles should be.

NOTE: When applying Cedar Crest shingles on shingle-over ridge vents, cap shingles may need to be trimmed. Assure proper fit and avoid overhanging vent openings. Contact the ridge vent manufacturer for instructions specific to their product. Be especially careful to use fasteners of sufficient length to penetrate minimum 3/4" (19 mm) into solid decking or through the thickness of the decking, whichever is less. Use approved caulking material to fill gaps between vent and roof surface.

SHANGLE RIDGE® HIP AND RIDGE

Apply Shangle Ridge shingles to hips and ridges.

1. Each shingle is a 12" x 18" (305 mm x 457 mm), color-coordinated, pre-assembled, double-layered product. Exposure is 8" (203 mm).
2. Apply Belmont™ up to the hip or ridge from both sides and trim flush. Allow for adequate coverage by making sure the last course of shingles will not be exposed more than 8" (203 mm) when the cap shingles are applied.
3. To assist with proper alignment when ridge vents aren't used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap should be.
4. If possible, try to start at the end of the ridge opposite to where the prevailing wind strikes the house. This will give the wind and rain less of a chance of getting underneath the cap. As for the hip, begin by installing the cap at the bottom and work your way up.
5. Start with one Shangle Ridge "starter shingle" with its lower 8" (203 mm) cut off, remove the protective tape (see Figure 18-15) from the sealant between the two layers and bend the shingle along the centerline of its longer dimension to form into place over the hip or ridge, beginning at the bottom of the hip or at either end of the ridge.
6. Fasten with 2 fasteners minimum 1-3/4" (44 mm) long.
7. Next install one full Shangle Ridge shingle over top of the "starter shingle", aligning its sides and lower edge to it. Remove the protective tape from the sealant between the two layers and bend the shingle along the centerline of its longer dimension to form into place over the hip or ridge. Fasten each shingle with 2 fasteners minimum 1 3/4" (44 mm) long located as shown in Figure 18-17. Expose each Shangle Ridge 8" and cover all fasteners.

IMPORTANT: In order for the shingle to bend smoothly over the hip or ridge, the "left" side (without the protective tape) must be fastened first. Then, remove the protective tape, bend the cap to form into place and fasten the "right" side.

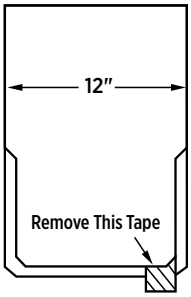


Figure 18-16: Shangle Ridge

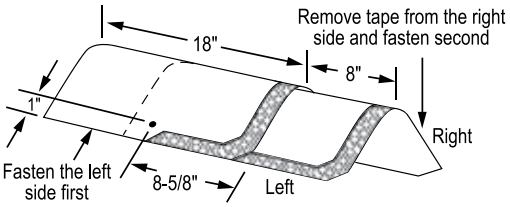


Figure 18-17: Installation of Shangle Ridge shingle on hips and ridges.

8. If shingle-over ridge vents are being installed (see Figure 18-18), they must match the 12" (305 mm) width dimensions of the hip and ridge caps. Be sure to follow the ridge vent manufacturer's instructions. To attach the cap shingles to the shingle-over ridge vent, use hot-dipped galvanized nails of sufficient length to penetrate 3/4" (19 mm) into, or through, the deck.

NOTE: When applying ridge vent over Belmont shingles, minimize the occurrence of voids caused by the shingles' laminated tabs by using approved caulking material to fill any gaps that form between the vent and the roof surface.

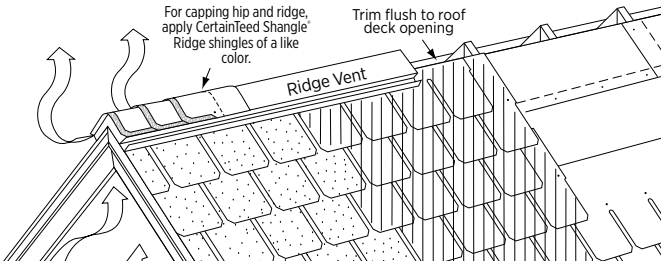


Figure 18-18: Installation of Shangle Ridge shingles on ridge vent.

REROOFING

"TEAR OFF"

It is important to determine that the roof deck is in satisfactory condition and the load-bearing capacity is adequate for application of these shingles. If the old roof consists of two or more layers of shingles, or if the roof consists of wood shingles (other than sawn square butt style), it is required to tear off (remove) existing roofing. If the old shingles have exposure lengths other than 8" (203 mm), it is strongly recommended to tear off existing roofing, since roofing over these shingles can lead to periodic patterns which may have an objectionable appearance. After tear-off, repair decking and/or install new decking, and apply underlayment, eaves flashing and shingles according to procedure in "4-1/2" (115 mm) Single-Column Vertical Racking Method" section.

"ROOF-OVER":

IMPORTANT: If Belmont® shingles are applied over existing asphalt roofing shingles having exposure lengths other than 8" (203 mm) CertainTeed requires using the nesting method described below. Never apply Belmont shingles over laminates or lock-type shingles. Failure to follow these directions will cause shingle "bridging" that can give an objectionable appearance and reduce the performance of the roofing.

CUTBACK/NESTING METHOD

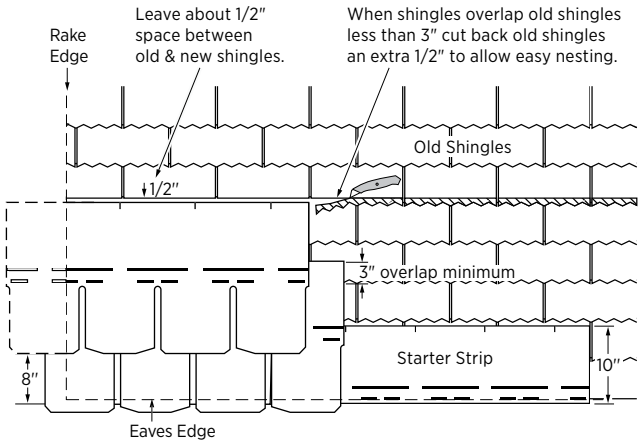


Figure 18-19: "Cutback/Nesting Method"

1) Make the surface of the old roof as smooth as possible by replacing missing shingles. Split and nail flat all buckled, raised or curled shingle tabs.
2) Cut old shingles back flush to the rakes and eaves.
3) Apply corrosion-resistant drip edge along the rakes and eaves, covering the edges of the old shingles.
4) **STARTER COURSE:** If applying over old 5" exposure shingles, prepare starter strip according to Belmont application instructions. Apply starter strip with sealant near bottom edge so that the top edge of the starter strip will nest below the lower edge of the third course of old shingles. Starter shingle should overhang eaves and rake edges about 1/2". If applying over shingles of other than 5" exposure, apply CertainTeed High-Performance™ 10" starter in a similar fashion, with the sealant near the eaves. Follow the cutback/nesting method described below if the top edge of the starter shingle overlaps the old shingles less than 3".
5) **REMAINDER OF ROOF:** Apply Belmont shingles using the 4-1/2" single column vertical racking method. When Belmont shingles overlap the old shingles less than 3", cut back old shingles to the overlap dimension plus about 1/2", to allow easy nesting. This "Cutback/Nesting Method" permits the upper part of the Belmont shingle to lay smoothly against the old shingles, resulting in a roof that will perform better and have a more even appearance.

OVER SQUARE-BUTT WOOD SHINGLES

If the roof consists of square-butt sawn wood shingles, apply beveled wood strips to obtain an even base and apply underlayment, eaves flashing and shingles according to procedure in "4-1/2" (115 mm) Single Column Vertical Racking Method" section.

Belmont® Installation Video

SECTION 18 SELF-TEST

18-1. 4 nails are required for fastening each full shingle.

A. True.

B. False.

18-2. High-Performance starter shingles can be used with Belmont®.

A. True.

B. False.

18-3. The 4-1/2" Vertical Racking Method is the only approved method for Belmont.

A. True.

B. False.

18-4. Either Cedar Crest® or Shangle Ridge® cap shingles can be used with Belmont.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Grand Manor® and Carriage House®

19

YOUR OBJECTIVE:
To learn the correct method of installing each of these roofing products.

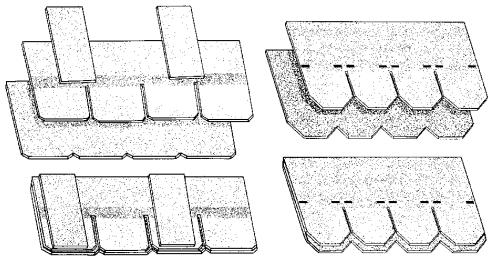


Figure 19-1: Super Heavy-Weight Construction.

These types of super heavy-weight shingles were invented by CertainTeed, and are made of two full laminated shingles. The bottom laminate is a full-size shingle without slots or cutouts. The top laminate shingle incorporates color, shape and design options. Grand Manor® also has one or more smaller tabs attached to the top full shingle to enhance its dimensionality (Figure 19-1).

These shingles feature the benefit of multiple-layer water protection. This means that, when installed, four full shingles are layered over the entire roof. This is quadruple coverage!

Other features of these shingles include:

- Extra large 18" x 36" shingles installed at an 8" exposure.
- Fastening, steep slopes, and flashing requirements are special because of the thickness, design, and weight of the products.

For UL Fire Rating, underlayment may be required. Apply flat and unwrinkled.

STANDARD OR STEEP SLOPES: CertainTeed recommends DiamondDeck® or RoofRunner™ Synthetic Underlayment or shingle underlayment meeting ASTM D226, D4869 or D6757. Always ensure sufficient deck ventilation, and take particular care when DiamondDeck, RoofRunner or other synthetic underlayment is installed. Follow manufacturer's application instructions.

LOW SLOPES: All roof shingles applied to a low slope deck (2" to below 4" per foot) require the use of CertainTeed WinterGuard® or VYCOR® Waterproofing Shingle Underlayment, or its equivalent,* applied over the entire deck surface. Consult the WinterGuard or VYCOR® and individual shingle application instructions for details.

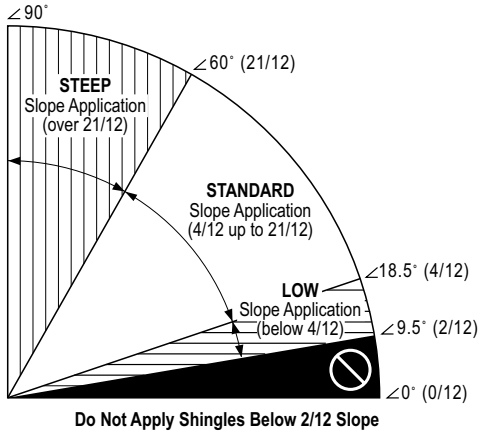


Figure 19-2: Slope definitions.

*For low slopes, underlayment equivalents to WinterGuard or VYCOR include:

1) waterproofing shingle underlayments meeting ASTM D1970;
2) in areas not prone to snow or ice, two layers of 36" (915 mm wide felt shingle underlayment lapped 19" (485 mm).
3) in areas not prone to snow or ice, two layers of CertainTeed's DiamondDeck or RoofRunner™ in shingle fashion (half lap) per the low-slope application instructions.

Shingle underlayment should meet ASTM D6757, ASTM D4869 Type I or ASTM D226 Type I. Ensure sufficient deck ventilation when DiamondDeck, RoofRunner or other synthetic underlayment is installed.

The roof deck* must be at least: 3/8" (9.5 mm) thick plywood, or 7/16" (11 mm) thick non-veneer, or nominal 1" (25 mm) thick wood deck.

COLD WEATHER CLIMATES (ALL SLOPES): Application of WinterGuard or VYCOR® or a waterproofing shingle underlayment meeting ASTM D1970 is strongly recommended whenever there is a possibility of ice build-up. Follow manufacturer's application instructions.

FLASHING: Corrosion-resistant flashing must be used to help prevent leaks where a roof meets a wall, another roof, a chimney or other objects that penetrate a roof.

SEALING: Shingle sealing may be delayed if shingles are applied in cool weather and may be further delayed by airborne dust accumulation. If any shingles have not sealed after a reasonable time period, hand sealing may be necessary.

CAUTION: To prevent cracking, shingles must be sufficiently warm to allow proper forming for hips and ridges.

WARRANTY: These shingles are warranted against manufacturing defects and are covered by SureStart™ protection. See the warranty itself for specific details and limitations.

For technical questions, information on acceptable alternative materials, or a copy of the product warranty, contact the sources listed below:		Warranty	Alternative Instructions	Techinical Questions
Your supplier or roofing applicator		✔		
CertainTeed Customer Experience	**800-233-8990**	✔	✔	
CertainTeed-RPG Technical Services	**800-345-1145**	✔	✔	✔

FASTENING

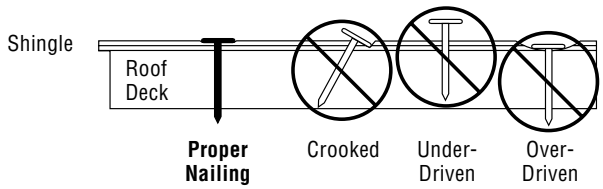


Figure 19-3: Proper and improper nailing.

IMPORTANT: For decks 3/4″ (19 mm) thick or thicker, nails must go at least 3/4″ (19 mm) into the deck. On thinner decks, nails must go at least 1/8″ (3.2 mm) through the deck.

Nails must be 11- or 12-gauge roofing nails, corrosion-resistant, with at least 3/8″ (9.5 mm) heads, and at least 1-1/2″ (38 mm) long for clean-decks and 1-3/4″ (44 mm) long for roof-overs using Grand Manor®; for Carriage House® nails must be 1-1/4″ (31 mm) long for clean-decks and 1-1/2″ (38 mm) long for roof-overs.

LOW AND STANDARD SLOPE

Use five nails for every full shingle.

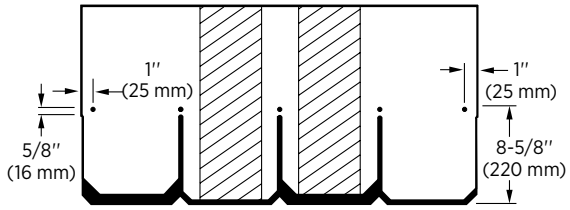


Figure 19-4: Use five nails for every full Grand Manor, or Carriage House.

STEEP SLOPE

Use seven nails and three spots of asphalt roofing cement for every full Grand Manor. Use five nails and three spots of asphalt roofing cement for every full Carriage House. Apply asphalt roofing cement 1″ (25 mm) from edge of shingle (Figure 19-5). Asphalt roofing cement meeting ASTM D4586 Type II is suggested. **CAUTION:** Excessive use of roofing cement can cause shingles to blister.

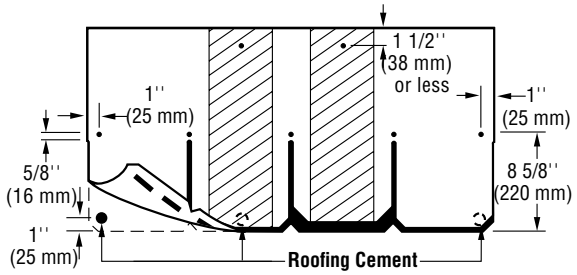


Figure 19-5: When installing Grand Manor on steep slopes, use seven nails and three spots of asphalt roofing cement.

IMPORTANT: To prevent slippage of the laminated tabs (shown cross-hatched above) when individual shingles meet a wall, ridge, and on steep slopes (greater than 21″ per foot), each laminated tab at the junction must be fastened individually with an additional fastener as shown. Fasteners applied to the tabs in this manner are to be horizontally centered on the laminated tab and placed within 1-1/2″ of the upper edge of the shingle. To protect against slippage of the laminated tabs during application of these shingles in hot weather, it might become necessary to fasten all the tabs individually as described above. This would require the use of an additional 100 nails per standard square.

CLEAN-DECK APPLICATION METHOD FOR GRAND MANOR OR CARRIAGE HOUSE

4-1/2″ OFFSET, SINGLE-COLUMN, VERTICAL RACKING METHOD (“RACKING”)

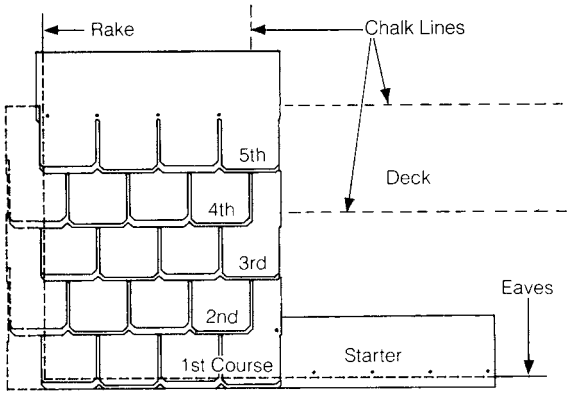


Figure 19-6: Vertical Racking Method.

STARTER COURSE:

- When installing Grand Manor, the starter course is made of the shingle itself, from which the 8″ lower portion has been removed, or of CertainTeed High-Performance Starter (10″).

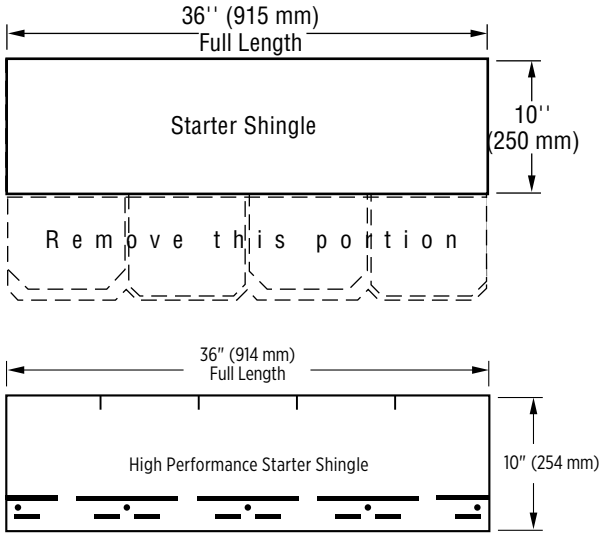


Figure 19-7: Make Starter Shingles by removing the 8” lower portion or use High Performance Starter Shingle (Grand Manor only).

Here's a Tip...

Make sure you have many large new hook blades on hand when installing these products. Cutting the double-thick shingles from the top granule side will quickly dull the blades.

- When installing Carriage House, the starter course will consist of Carriage House shingles from which the 8" lower portion has been removed. The easiest way to do this is by cutting straight across the length of the shingle just above the top of the cutouts (Figure 19-7).
- For both shingle styles, cut 4-1/2" off the length of the left side of the first starter strip and apply at the lower left corner of the roof. This 31-1/2" starter strip should overhang the rakes and eaves 1/2" when drip edge is used or 3/4" when no drip edge is used. Continue with full 36" lengths of starter strips all along the eaves (Figure 19-8).

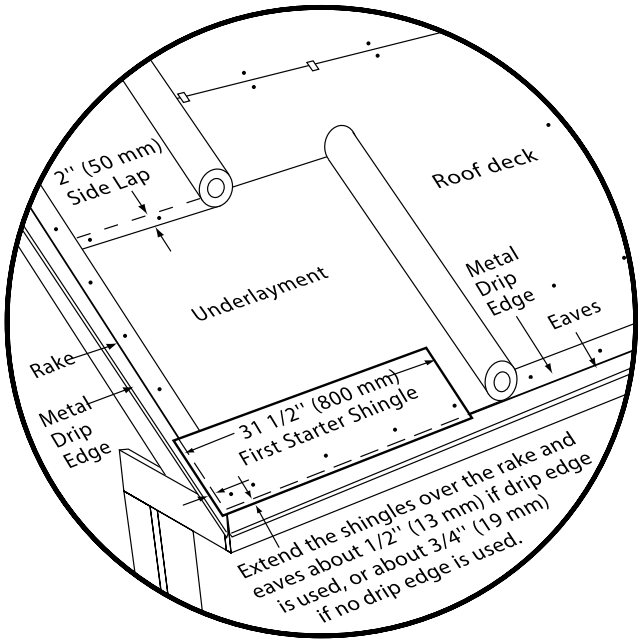


Figure 19-8: Standard slope underlayment and starter drip edge details.

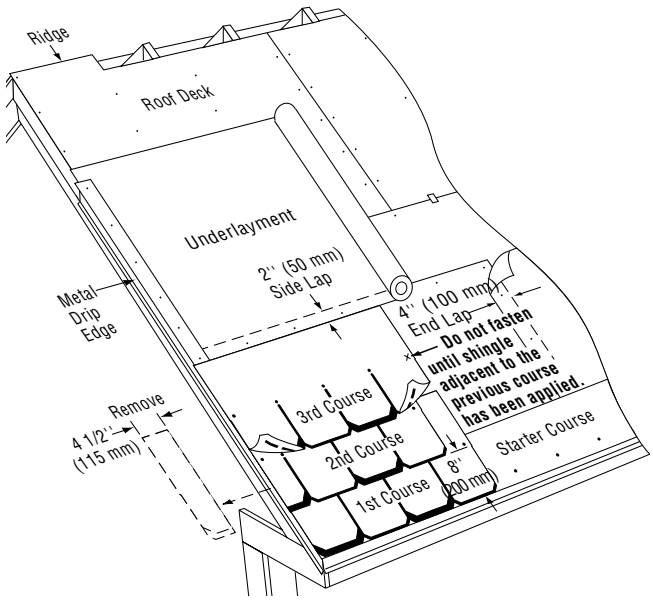


Figure 19-9: Applying the first 3 courses on a standard slope.

1ST COURSE: The first course starts with a full shingle at the lower left corner of the roof. Keep the tabs flush with the left and bottom edges of the starter course (Figure 19-9).

2ND COURSE: Cut 4-1/2" off the left end of a shingle. Apply the remaining larger piece over the first-course shingle, flush with the left edge and leaving 8" of the first course exposed. Snap chalk lines horizontally and vertically, as necessary (Figure 19-9). Be sure to check for proper alignment.

SUCCEEDING COURSES:

- Begin the application of succeeding courses by alternating the placement of full shingles, and shingles with 4-1/2" cut off the left edge, up the rake in a single column.
- Fasten each full shingle with four fasteners, leaving the right tab edge unfastened until later.
- Fasten each trimmed shingle (31-1/2") using five fasteners.

COMPLETING COURSES:

- Across the roof, full shingles are to be butted against the right side of applied shingles in each course (Figure 19-10).
- Work up the roof from the eaves, one vertical column at a time, maintaining the 8" exposure.
- On alternating courses where the right-hand shingle end was purposely left unfastened, carefully lift the loose shingle end, so as not to cause damage by tearing or sharply bending, especially at the top of the cutout tab "keyway," and slip the next shingle underneath to butt the hidden shingle end.
- Apply all five fasteners to the newly placed shingle and one fastener to the free end of the shingle above it.
- On alternating courses where the new shingles butt against the visible shingle ends, initially apply only four fasteners, leaving the right end free.
- Repeat the above procedure one column at a time to complete the courses across the roof.

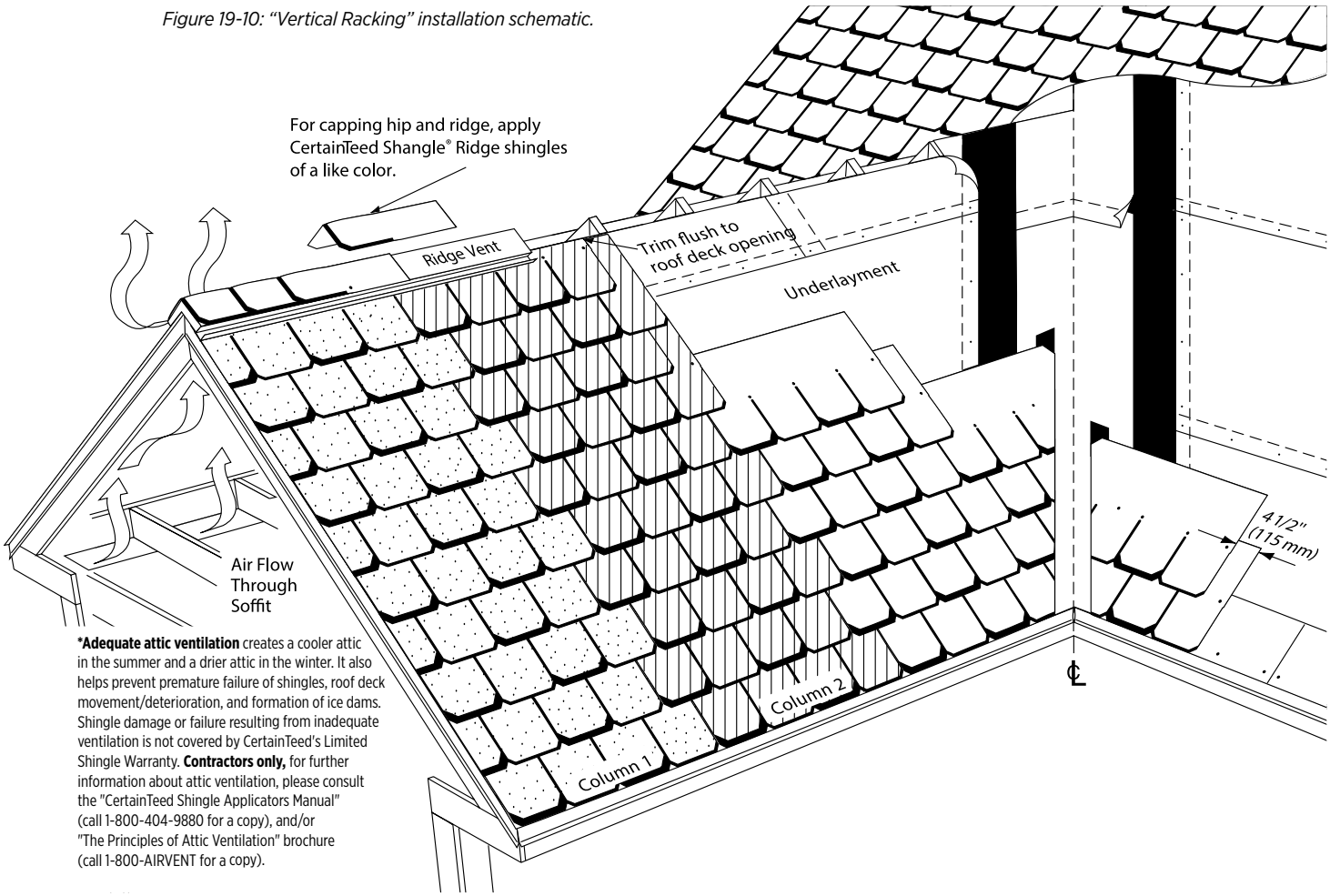
INSTALLING VALLEYS:

- Open valleys are strongly recommended, but not required. Closed-cut and woven valleys while not recommended are acceptable if the shingles are applied without cracking, buckling, or damaging them when shaped into the valley.
- When installing an open valley, use 16 oz. copper flashing at a minimum (or its equivalent) over WinterGuard or VYCOR® Waterproofing Shingle Underlayment (or its equivalent). Preformed "W" style valleys are preferred (Figures 19-11 and 19-12).

Here's a Tip...

Other tools used by contractors to cut these products include the 3-3⁄8" battery-operated power saw offered by several manufacturers with a carbide blade, asbestos shingle cutters, large heavy-duty paper cutters and sheet metal shears with replaceable blades.

Figure 19-10: "Vertical Racking" installation schematic.



***Adequate attic ventilation** creates a cooler attic in the summer and a drier attic in the winter. It also helps prevent premature failure of shingles, roof deck movement/deterioration, and formation of ice dams. Shingle damage or failure resulting from inadequate ventilation is not covered by CertainTeed's Limited Shingle Warranty. **Contractors only,** for further information about attic ventilation, please consult the "CertainTeed Shingle Applicators Manual" (call 1-800-404-9880 for a copy), and/or "The Principles of Attic Ventilation" brochure (call 1-800-AIRVENT for a copy).

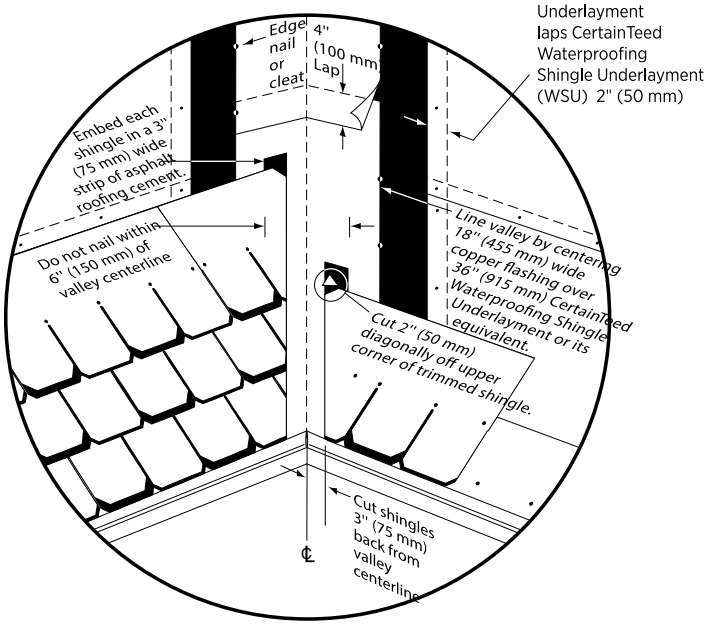


Figure 19-11 Valley installation for Grand Manor®.

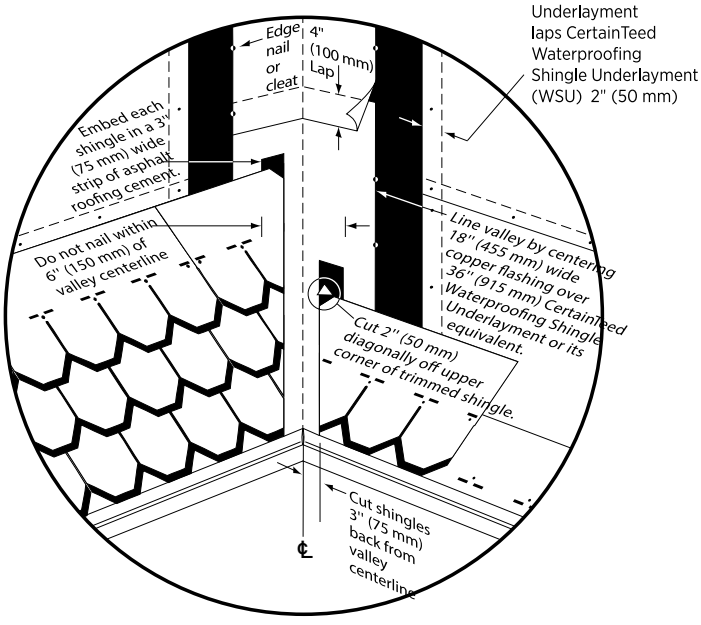


Figure 19-12: Valley installation for Carriage House®.

INSTALLING STEP FLASHING: Use 8″ by 10″ corrosion-resistant metal such as copper. For the first course of Carriage House® only, use a 8″ by 12″ piece of metal flashing (Figure 19-14).

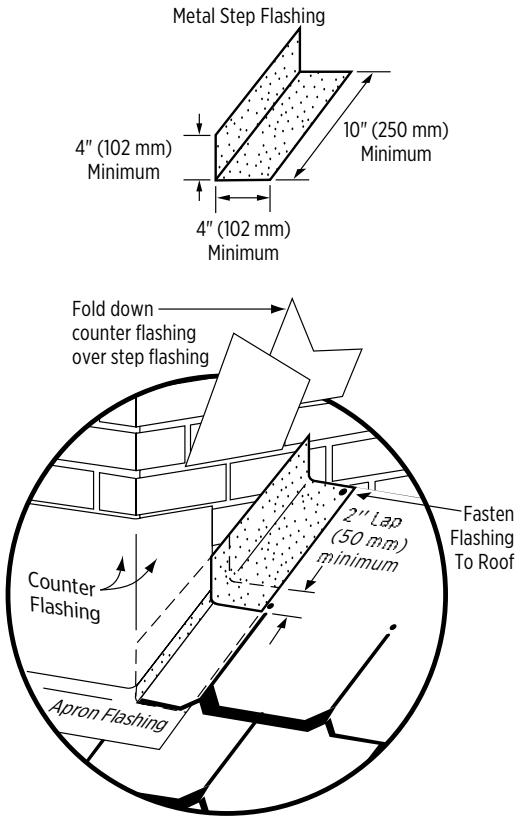


Figure 19-13: Metal step flashing for Grand Manor®.

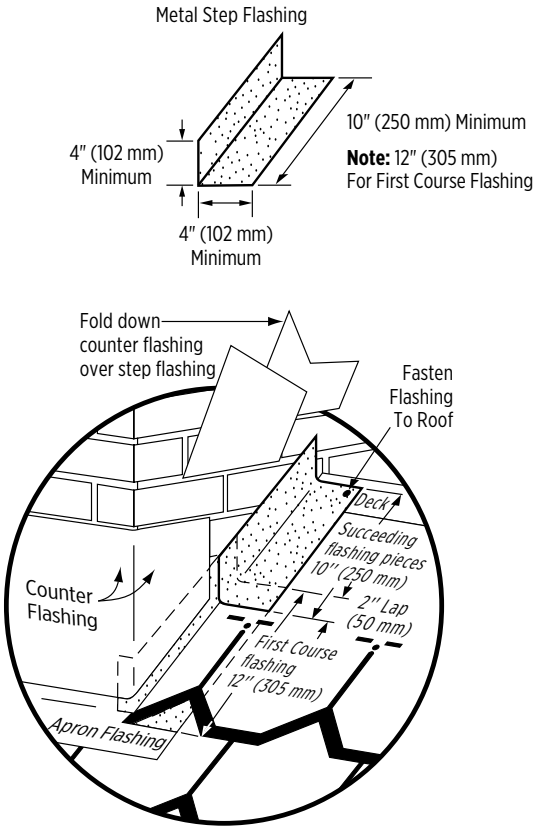


Figure 19-14: Metal step flashing for Carriage House®.

CARRIAGE HOUSE ALTERNATIVE CLEAN-DECK APPLICATION METHOD

SIX-COURSE, 4-1/2″, STEPPED-OFF DIAGONAL METHOD (“4-1/2″ OFF, SIX UP”)

Because of the potential for “patterning” to appear, Grand Manor should not be installed using stepped-off methods. However, Carriage House may be installed using the “Six-Course, 4-1/2″, Stepped-Off Diagonal Method.” This installation calls for the removal of a half tab for each step.

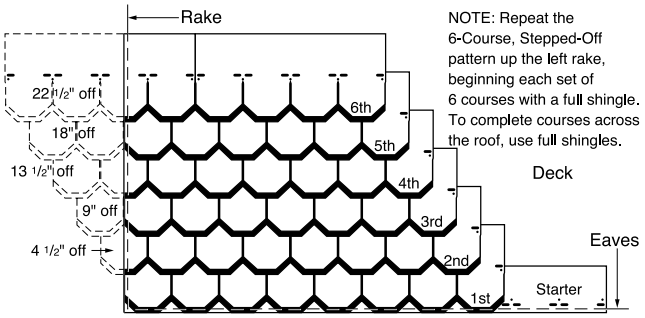


Figure 19-15: Four-and One-Half Off, Six Up (Carriage House).

STARTER COURSE:

1. The starter course will consist of Carriage House shingles from which the 8″ lower portion has been removed. Cut 4-1/2″ off the length of the left side of the first starter strip and apply at lower left corner of the roof. This 31-1/2″ long starter strip should overhang rakes and eaves 1/2″ when drip edge is used, or 3/4″ when no drip edge is used.
2. Locate fasteners in starter strip about 1-1/2″ up from the bottom edge, so they are centered under the first-course tabs. Continue with full 10″ by 36″ lengths along the eaves (Figure 19-15).

1ST COURSE:

Apply a full shingle at the lower left corner of the roof, tabs flush with starter course (Figure 19-15).

2ND THROUGH 6TH COURSES:

1. The second course is begun by cutting 4-1/2″ off the left end of a shingle, and applying this 31-1/2″ piece over the first-course shingle. Expose first course 8″.
2. Each subsequent course, up to and including the sixth course, should consist of a shingle 4-1/2″ shorter than the previous course, ending with a 13-1/2″ piece on the sixth course. Expose each course 8″. This method will establish the 4-1/2″ stepped-off pattern.
3. Install full 18″ by 36″ shingles against these six courses.

SUCCEEDING COURSES:

Repeat the six-course, 4-1/2″ stepped-off pattern up the left rake, beginning each set of six courses with a full shingle. To complete courses across the roof, use full shingles. All shingles on the finished roof must be applied with five fasteners.

Here's a Tip...

Use Grand Manor® as the first course for a Carriage House® roof to achieve a straight edge at the eaves.

TWO ROOF-OVER METHODS

DECK LOADING

The job supervisor should always check local building codes regarding maximum deck loading limits. In particular, someone must determine that the existing roof frame can support workers and the additional weight of a new roof using these super heavyweight shingles over the old shingle roof. Keep in mind that Grand Manor weighs 430 pounds per square and Carriage House weighs 350 pounds per square. In many locations, it's also important to figure in the weight of a snow load. In no case should you put these products over another heavyweight roof, or over a roof that already has two or more layers of shingles. The combined weight of the roofs, more than likely, will be too much weight for most frame buildings.

PREPARING THE ROOF SURFACE FOR REROOFING

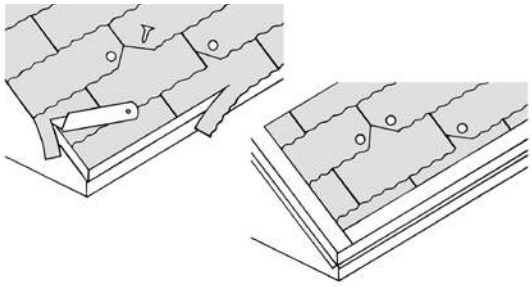


Figure 19-16: Preparing an old roof for reroofing.

- Make the surface of the old roof as smooth as possible by replacing missing shingles. Split and nail flat all buckled, raised tabs and curling shingles. If Carriage House or Grand Manor shingles will be nested into the old shingles, review the Nesting/Cutback Method described later in this chapter.
- It's a good idea to cut old shingles back flush to the rakes and eaves.
- We suggest that you apply corrosion-resistant drip edge along the rakes and eaves, covering the edges of the old shingles. This will provide a uniform straight edge that will help prevent water seepage under the shingle edges.

(1) BRIDGING METHOD

INSTALLATION: The "bridging" method (direct application over the smoothed, old roof surface) is acceptable for Grand Manor only. Essentially, follow the standard application method for Grand Manor, but do not use underlayment. However, the Nesting/Cutback Method is preferred over this method when reroofing because nested shingles shed water best and look better.

When reroofing with the bridging method over existing shingles use the approved application method as described in the Clean-Deck Application Method earlier in this chapter.

(2) NESTING/CUTBACK TECHNIQUE

When reroofing with Carriage House we strongly recommend that this method be used to avoid slumps and raised edges caused by "bridging" shingles. It may also be used when applying Grand Manor.

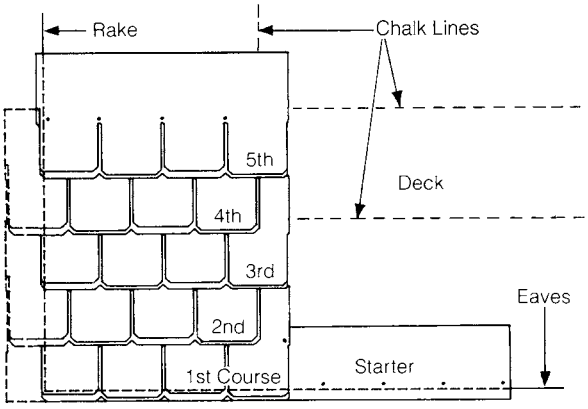


Figure 19-17: The "Nesting/Cutback Method."

To use the Nesting/Cutback Method (Figure 19-17), simply cut 3" off the leading edge of all old shingles when they are lapped less than 2-1/2" by the new shingle. This permits a flat nested application that avoids lifted edges and slumps.

In addition, follow all the standard application and nesting instructions. Do not apply underlayment.

Here's a Tip...

When applying caps, gently form them over the ridge to avoid cracking or granule loss. On very steep ridge lines, applying double caps will reduce the "sharpness" of the angle at the peak.

SHANGLE RIDGE® HIP AND RIDGE

Apply Shangle Ridge shingles to hips and ridges.

1. Each shingle is a 12" by 18", color-coordinated, pre-assembled, double-layered product. Exposure is 8".
2. Apply Grand Manor or Carriage House up to the hip or ridge from both sides and trim flush. Allow for adequate coverage by making sure the last course of shingles will not be exposed more than 8" when the cap shingles are applied.
3. To assist with proper alignment when ridge vents aren't used, snap a chalk line parallel to the hip or ridge along the line where the side edges of the cap should be.
4. If possible, try to start at the end of the ridge opposite to where the prevailing wind strikes the house. This will give the wind and rain less of a chance of getting underneath the cap. As for the hip, begin by installing the cap at the bottom and work your way up.
5. Start with one Shangle Ridge "starter shingle" with its lower 8" (203 mm) cut off, remove the protective tape (see Figure 19-18) from the sealant between the two layers and bend the shingle along the centerline of its longer dimension to form into place over the hip or ridge, beginning at the bottom of the hip or at either end of the ridge. (Figure 19-20).

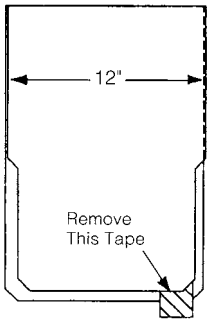


Figure 19-18: Shangle Ridge®.

6. Fasten with 2 fasteners minimum 1-3/4" (44 mm) long.
7. Install one full Shangle Ridge shingle over top of the "starter shingle", aligning its sides and lower edge to it. Remove the protective tape from the sealant between the two layers and bend the shingle along the centerline of its longer dimension to form into place over the hip or ridge. Fasten each shingle with 2 fasteners minimum 1-3/4" (44 mm) long located as shown in Figure 19-19. Expose each Shangle Ridge 8" and cover all fasteners.

IMPORTANT: In order for the shingle to bend smoothly over the hip or ridge, the "left" side (without the protective tape) must be fastened first. Then, remove the protective tape, bend the cap to form into place and fasten the "right" side.

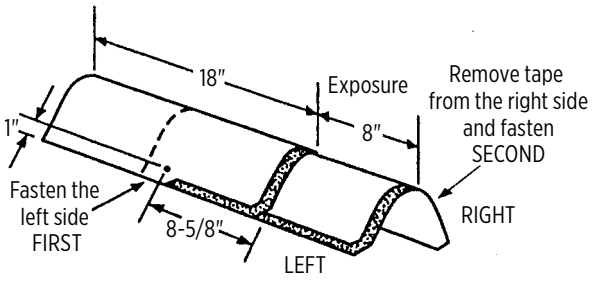


Figure 19-19: Installation of Shangle Ridge shingles on hips and ridges.

8. If shingle-over ridge vents are being installed (Figure 19-20), they must match the 12" width dimensions of the hip and ridge caps. Be sure to follow the ridge vent manufacturer's instructions. To attach the cap shingles to the shingle-over ridge vent, use hot-dipped galvanized nails of sufficient length to penetrate 3/4" into, or through, the deck.

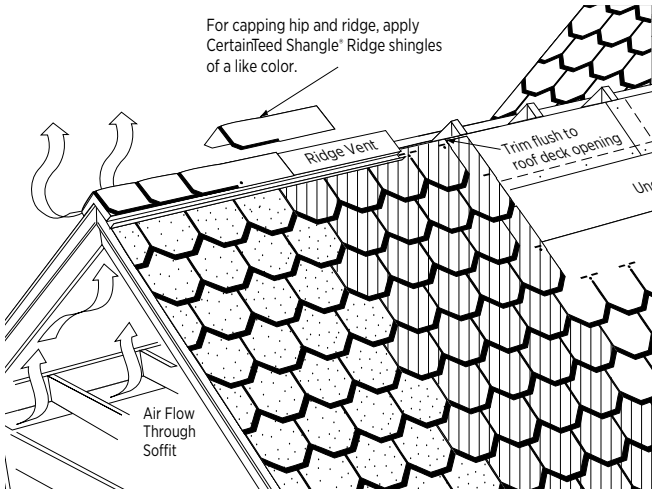
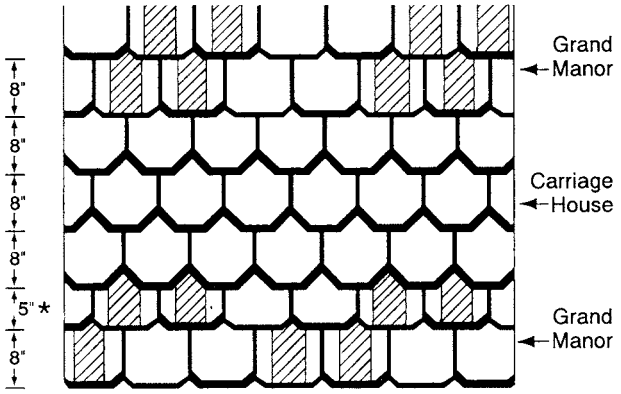


Figure 19-20: Installation of Shangle Ridge shingles on ridge vent.

BLENDED APPLICATIONS

BLENDING CARRIAGE HOUSE AND GRAND MANOR ON THE ROOF



*5" transitional course used only when blending Carriage House over Grand Manor.

Figure 19-21: Blending Carriage House® with Grand Manor®.

IMPORTANT: Carriage House shingles can be blended into a Grand Manor roof to achieve a unique and distinctive appearance, much like the slate artisans did to make homes distinctive. Mixing of products on the roof to create a design is at the owner's discretion and risk, and CertainTeed will not be responsible for the aesthetics of the finished design.

Generally, covering 1/4 to 1/3 of the roof with Carriage House can offer an aesthetically appealing appearance. A common application method uses several courses of Carriage House in the middle of a Grand Manor roof (see Figure 19-21). Each course must consist of only one shingle type.

1. The first course of Carriage House shingles to be applied over Grand Manor must expose the Grand Manor course only 5" to the weather. This will allow the proper color to show through the notched cutouts. Expose subsequent courses of Carriage House 8" to the weather. Hand seal the first course of Carriage House with four quarter-size spots of asphalt plastic cement (ASTM D4586, Type II) under each shingle.
2. Expose the first course of Grand Manor applied over Carriage House (and all subsequent courses of Grand Manor) 8" to the weather except, of course, when another course of Carriage House shingles is begun (see Step 1).
3. Follow all other standard application instructions found on the appropriate packages when applying shingles.

Grand Manor® Installation Video

Carriage House® Installation Video

SECTION 19 SELF-TEST

19-1. A minimum of 5 nails are required for fastening each full shingle.

A. True.

B. False.

19-2. High-Performance Starter is used with both Grand Manor® and Carriage House®.

A. True.

B. False.

19-3. The 4-1⁄2" Vertical Racking Method is approved for Grand Manor® and Carriage House®.

A. True.

B. False.

19-4. Carriage House may be installed using a diagonally stepped-off method but Grand Manor may not.

A. True.

B. False.

19-5. The type of valley recommended by CertainTeed, when installing Grand Manor or Carriage House is an open valley using preformed "W" style flashing material.

A. True.

B. False.

19-6. Shangle Ridge® cap shingles are designed for use with Grand Manor and Carriage House.

A. True.

B. False.

Test on-line @ www.certainteed.com/samtest

Flintlastic® SA

20

YOUR OBJECTIVE:
To learn the correct method of installing Flintlastic SA.

BASE/ANCHOR & INTERPLY SHEETS			
Product	**Use When:**	**Weight/Roll**	**Coverage/Volume**
Flintlastic® SA NailBase	Roof deck is nailable, such as plywood, and best practice is to mechanically attach a base sheet.	82 lbs.	2 squares
Flintlastic SA PlyBase	Base ply will be fully adhered and desired warranty duration is 15-years; may also function as interply in 3-ply systems.	86 lbs.	2 squares
Flintlastic SA MidPly	Base ply will be fully adhered and desired warranty duration is 20-years; may also function as interply in 3-ply systems.	63 lbs.	1 square

CAP SHEETS			
Product	**Use When:**	**Weight/Roll**	**Coverage/Volume**
Flintlastic SA Cap	Color matching shingles is a priority and extreme protection against fire and hail are **not** needed.	95 lbs.	1 square
Flintlastic SA Cap CoolStar®	High solar reflectivity is a priority and extreme protection against fire and hail are **not** needed.	95 lbs.	1 square
Flintlastic SA Cap FR	Extreme protection against fire and hail are desired.	88 lbs.	1 square
Flintlastic SA Cap FR CoolStar	High solar reflectivity and extreme protection against fire and hail are desired.	88.5 lbs.	1 square

PRIMERS & ADHESIVES		
Product	**Use When:**	**Volume/Unit**
FlintPrime QD	Priming the roof deck is required or desired prior to the direct adhesion of Flintlastic SA PlyBase or MidPly.	1G & 5G
FlintPrime Aerosol	Priming small details such as fastener heads or metal detail surfaces.	15 oz.
FlintBond® Caulk or Trowel	Preparing granulated surfaces for self-adhered overlaps (Trowel) and sealing detail edges (Caulk).	Trowel - 3G & 5G Caulk - 10.1 oz
Arctic Edge Cold Lap Tape	Ambient temperatures are between 35°F (1.67C) and 49°F (9°C), see cold weather instructions	4" x 260'

WHERE & WHY

WHERE CAN I USE IT?

The value associated with labor savings and safety can be applied to any roof project. In addition, Flintlastic SA roof systems are ideal when access to the roof is limited, such as high-rise buildings. No asphalt kettle means no odor, which makes SA systems an ideal solution on healthcare, education, hospitality and residences/condos where occupant comfort is tremendously desirable.

WHAT ARE THE ADVANTAGES?

Self-adhered roofing offers the time-tested protection of modified bitumen roof systems for a fraction of the labor with with minimal (if any) occupant disturbance. The application of self-adhered low-slope roof systems is also easier to master than traditional bituminous application methods.

FLINTLASTIC SA SYSTEMS ARE VALUED FOR:

- Superior initial and long-term bonds;
- Excellent applicator handleability in hot or cold temperatures;
- Allowed application temperatures as low as 35°F (cold weather application instructions must be followed when ambient temperatures are between 35°F – 49°F);
- Wide array of cap sheet colors true-blended to complement popular CertainTeed shingles
- National stocking at all CertainTeed facilities with mix-truck allowance (shingles/Flintlastic SA);
- Excellent sales and applicator support.

ENERGY SAVINGS

Flintlastic SA Cap and SA Cap FR are available with CoolStar highly reflective granules. Specific product details can be found on product technical data sheets or by viewing **www.coolroofs.org.**

POPULAR LOW-SLOPE RESIDENTIAL SA SYSTEMS ON WOOD DECKS

Warranty Duration	Base Sheet	Interply	Cap
10[1]	—	—	SA Cap (FR)
12	SA NailBase	—	
15[2]	SA NailBase	SA PlyBase[3]	
20[2]	SA NailBase	SA MidPly[3]	

[1] *SureStart™ Limited Warranty coverage may include a square maximum. See SureStart Warranty Brochure applicable for year of product installation for additional information.*

[2] *SureStart PLUS Coverage may include a square maximum. See SureStart Warranty Brochure applicable for year of product installation for additional information.*

[3] *Direct adhesion to plywood or OSB, without the inclusion of Flintlastic SA NailBase, is permitted (OSB requires priming with FlintPrime QD prior to Flintlastic SA PlyBase or Flintlastic SA MidPly application).*
NOTE: *Direct adhesion to plywood or OSB may not be permitted in certain counties. Check local building code for compliance. At the end of the roofing membrane's life, roofing membranes directly adhered to wood roof decks will require replacement of the deck; self-adhering to wood plank decks constructed of resinous woods, such as pine, is prohibited.*

COLD WEATHER CONSIDERATIONS

ARCTIC EDGE™ COLD LAP TAPE

Flintlastic® SA self-adhered membranes deliver an excellent bond when ambient temperatures are 50°F and rising. Arctic Edge™ is a revolutionary auxiliary tape engineered to significantly boost Flintlastic SA adhesion in temperatures as low as 35°F.

COLD WEATHER APPLICATION FUNDAMENTALS

- Cold weather application instructions shall be followed when ambient temperatures are below 49°F (9°C)
- **NEVER INSTALL COLD ROLLS**
  Store rolls, tape and adhesives in a heated location and draw as needed; if materials have been exposed to cold temperatures, allow to warm to a minimum 50°F (10°C) in a heated environment before use; never use a torch to heat rolls
- Arctic Edge is used with self-adhering membranes; Arctic Edge is not used to install Flintlastic SA NailBase which is mechanically attached
- Arctic Edge is permitted to support adhesion to all approved Flintlastic SA substrates; see Flintlastic SA Low-Slope Substrate Guidelines Technical Bulletin
- Granule overlaps, such as, but not limited to, cap sheet end laps, require the use of a hot air welder and silicone roller; Arctic Edge does not adhere to granules

Base/Interply Side Laps

Base/Interply End Laps

Perimeter/Metal Details

Cap Side Laps

PRE-APPLICATION CONSIDERATIONS

SA-SPECIFIC TOOLS

- A weighted roller for pressing the membrane into place, 2″ to 4″ in diameter (min. 70 lbs.);
- Suitable trowel for applying FlintBond to flashing details;
- Roofer's knife with hooked blade;
- Caulk gun for applying beads of FlintBond;
- Seam probing tool to check for voids;
- Hot Air Welder for cold weather applications or, if preferred, for flashing details year round;
- **AS NEEDED**: Long-handled (standing) roller with 1/8″– 1/4″ nap for applying primer (1/8″ nap for smooth surfaces, 1/4″ nap for more porous surfaces).

STORAGE

- Store Flintlastic SA rolls indoors on upright pallets, protected from the elements. Improperly stored rolls or those that have been warehoused for prolonged periods of time may lose their tack and should not be used.
- In cold weather, rolls MUST be stored indoors, minimum 60°F, or in warming huts prior to application. Allow material to relax a minimum of 15 minutes prior to installation. Avoid allowing rolls to fall below 50°F to avoid material contraction.

GENERAL PRECAUTIONS

- Do not attempt application if ice, snow, moisture, or dew are present.
- When ambient temperatures are between 35°F and 49°F, cold weather application instructions must be followed.

FIELD DETAILS REFERENCE

	2-PLY SYSTEMS		3-PLY SYSTEMS		
	Base	**Cap**	**Base**	**Ply**	**Cap**
Starter row width	19-11/16″ (1/2 roll)	39-3/8″ (full roll)	26-1/4″ (2/3 roll)	19-11/16″ (1/2 roll)	39-3/8″ (full roll)
Side laps	2″	3″	2″	2″	3″
End laps, staggered 36″	4″	6″	4″	4″	6″

NEVER INSTALL COLD ROLLS. If ambient temperatures are below 50°F, ensure rolls are kept in a heated location and draw materials as needed. If exposed to cold temperatures, allow a sufficient time for them to warm to 50°F. Never use a torch to heat rolls. **If the material isn't bonding, STOP the application immediately!**

- Flintlastic SA membranes are designed to be applied together in fully self-adhered roof systems. Flintlastic SA base sheets may also be used in hybrid roof systems with a an APP torch-welded cap. However, Flintlastic SA base sheets cannot be paired with cap sheets applied with hot asphalt or cold adhesive. Flintlastic SA Cap (or SA Cap FR) cannot be applied to any other base sheets other than as described here.
- Cut rolls to manageable lengths and allow to relax, unrolled, at a minimum 50°F ambient temperature, for a minimum of 15 minutes prior to installation.
- All plies of the assembly should be installed in one day. If any base sheet must be exposed for longer periods of time, cover with tarp or suitable alternate protection.
- Substrates must be free of dust, dirt, oil, debris, moisture and other contaminates.
- When applying Flintlastic self-adhered membranes on slopes exceeding 1″ in 12″, membranes shall be back nailed (see Appendix for detail).
- When applied parallel to the slope, Flintlastic self-adhered membranes shall be blind-nailed at end laps 2″ in from top edge, 6″ o.c. through tin discs and to wood nailers. (See General Requirements Section of CertainTeed Commercial Roof Systems Specifications manual for details.)
- Refer to Field Details Reference for width of starting course to ensure sidelaps within the roof system are staggered/offset from each other

PRIMERS & ADHESIVES

- If primer is used, it must be applied at the specified rate and be allowed to cure as specified.
- Only use FlintBond Caulk or Trowel for flashing details and target 1/4″ FlintBond bleed out at endlap areas. Be careful not to roll weighted roller into bleed out.

Do not use cold adhesives, such as FlintBond Brush, with Flintlastic self-adhered membranes.

BASE SHEET – MECHANICALLY ATTACHED

Prior to application of Flintlastic SA NailBase, inspect the roof substrate to make sure it is free of dust, dirt, oil, debris and moisture. **REFER TO FIELD DETAILS REFERENCE** for width of starter course.

Begin at the low point of the roof. Position to allow for a 2″ overhang at perimeter edges. Mechanically fasten Flintlastic SA NailBase to nailable deck using appropriate fasteners **(SEE FASTENERS CHART).**

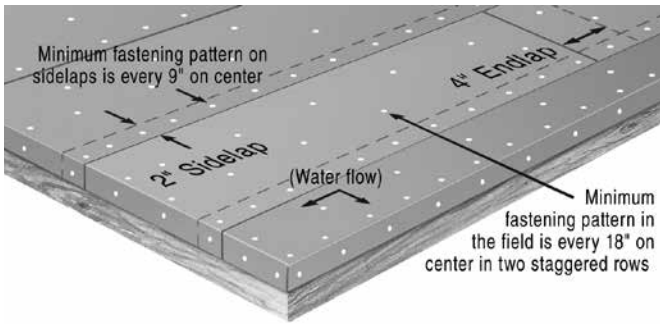
Install so that no sidelaps are against the flow of water. A minimum fastening pattern is every 9″ on center on sidelaps and every 18″ on center in two staggered equally spaced rows in the field of the sheet. Overlap base sheet sidelaps a minimum 2″ and endlaps 4″. Turn base sheet over fascia by 2″ and fasten. Offset endlaps of adjacent courses a minimum of 3′.

DO NOT LEAVE FLINTLASTIC SA NAILBASE EXPOSED TO THE WEATHER. Cover in the same day with optional SA interply and/or SA Cap (FR).

BASE PLY – SELF-ADHERED

SA PlyBase or SA MidPly may be self-adhered to approved substrates.

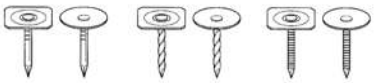
(See Approved Substrates Reference table. In accordance with published exclusions from warranty coverage CertainTeed shall not be held responsible for failure caused by settlement, deflection, movement, moisture content, inadequate attachment, or other deficiencies of the roof deck, preexisting roof system, walls, foundations or any other part of the building structure, insulation or other materials underlying the product.)



FASTENER CHART

Standard (Round Head) Roofing Nails and Cap
(Note: CertainTeed does not permit the use of plastic caps)
For use with Base Sheet, Flash/Termination Bar on Plywood Decks, Non Veneer Decks, Wood Plank Decks

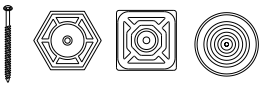
Large Head Roofing Nails
For use with Base Sheet, Flash/Termination Bar on Plywood Decks, Non Veneer Decks, Wood Plank Decks



Base Sheet Fasteners for some Cementitious Roof Decks
For use with Base Sheet on Light Weight Insulation Concrete, Poured Gypsum

Self-Locking Fasteners
For use with Base Sheet on Cement/Wood Fiber

Insulation Fasteners



APPROVED SUBSTRATES FOR DIRECT ADHESION REFERENCE

Base Sheets
• Flintlastic® SA NailBase • Flintlastic SA PlyBase • Flintlastic SA MidPly

Insulation
• FlintBoard® ISO & ISO Cold (polyisocyanurate insulation)

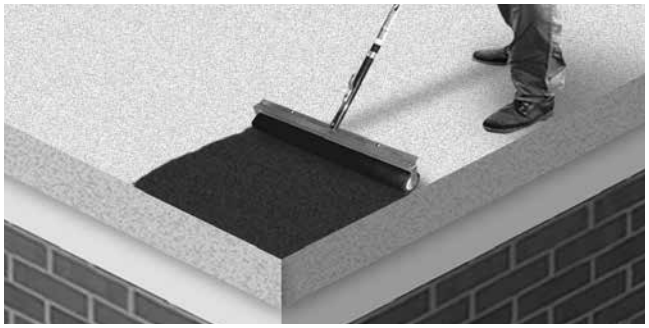
Cover Board
• High density fiberboard (ASTM C208 & 209 – primed boards only)
  – i.e. STRUCTODEK® High Density Fiberboard with Primed Red Coating[2]
• Asphalt coated cover boards
• Gypsum based cover board products (priming may be required):
  – USG Securock® Gypsum-Fiber Roof Board
• Georgia Pacific DensDeck® Roof Boards:
  – DensDeck (priming is required for OSB)
  – DensDeck Prime (priming is not required but will enhance adhesion)
• Zip System® Sheathing[2]
• FlintBoard HD or other High-density polyisocyanurate (ASTM C1278, Type II, Class 4)

Decks
• Structural concrete decks* (priming is required)
  – *Lightweight Structural Concrete is subject to greater moisture content and not acceptable for direct adherence of Flintlastic SA self-adhering products
• Wood[1] (priming is required for OSB)
  – Approved Wood Types:
    • APA Rated Exterior Grade Plywood
    • APA Rated Exterior Grade Oriented Strand Board (OSB)

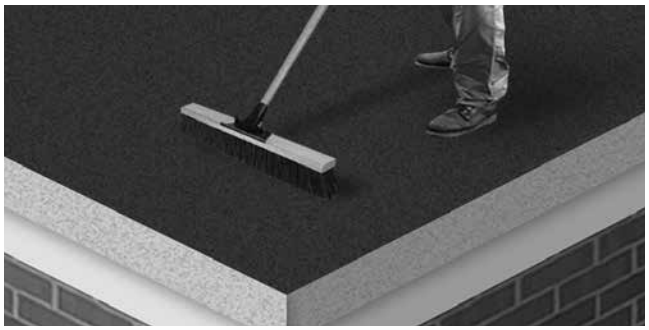
Precautions: Direct adhesion may not be permitted by your local building code; At the end of the roofing membrane's life, roofing membranes directly adhered to wood roof decks may require replacement of the deck. **Self-adhering to wood plank decks constructed of resinous woods, such as pine, is prohibited.**

[2] *When self-adhering direct to these substrates, eligible for CertainTeed Asphaltic Membrane Limited Warranty on Materials only.*

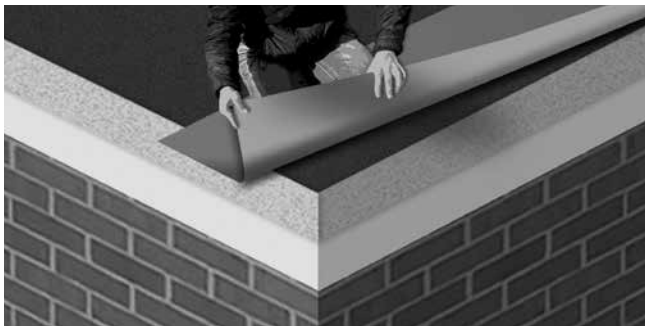
BASE APPLICATION



When self-adhering direct to an OSB deck, FlintPrime QD is required.



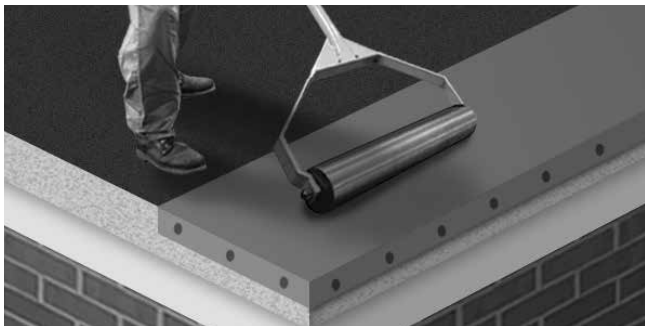
Before adhering a base ply, sweep the surface of the deck or insulation to remove any debris that could interfere with adhesion. Refer to **FIELD DETAILS REFERENCE** for starter course width.



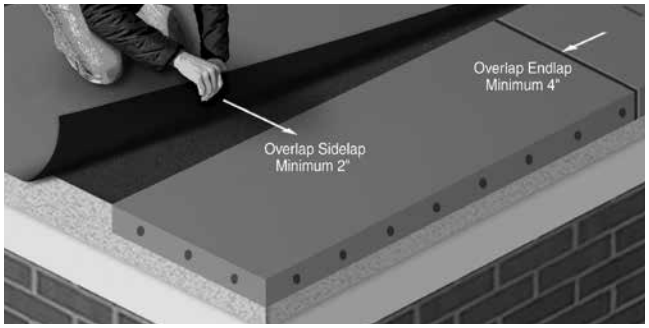
Begin at the low point of the roof. Position base to allow for a 2″ overhang at perimeter edges.

Fold the membrane back halfway lengthwise to remove the split release film.

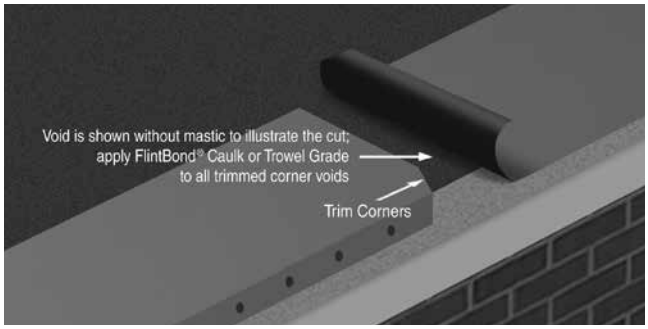
Press membrane securely into place and repeat with the opposite half of the membrane. Turn base ply over fascia by 2″ and fasten.



Use a heavy, weighted roller over the entire surface of the PlyBase or MidPly to secure the membrane. Work from the center of the roll outwards across the width to eliminate air pockets; **DO NOT** roll lengthwise as it can cause the roll to stretch.



Overlap sidelaps of subsequent SA PlyBase or SA MidPly membrane courses a minimum 2" and endlaps 4". Offset endlaps of adjacent courses a minimum 3'.



Cut endlaps at opposing diagonal corners at an angle approximately 5-1/2" long by the over sidelap dimension (2" or 3") to prevent water incursion at T-seams. See Appendix CT-22 ENDLAP DETAIL.

Apply a bead or small trowel dab of FlintBond SBS-Modified Bitumen Adhesive, Caulk or Trowel grade, at the edge of the angled cut. Use of a hand-held hot air gun at the joint area prior to rolling the membrane will maximize adhesion.
It is recommended to apply a bead of Caulk grade at all SA PlyBase or SA MidPly side and endlaps edges to eliminate a capillaries.

DO NOT LEAVE BASE SHEET EXPOSED TO THE WEATHER. Cover in the same day with optional Flintlastic SA interply and or Flintlastic SA Cap/SA Cap FR.

INTERPLY APPLICATION

OPTIONAL, SPECIFICATION AND WARRANTY DURATION DEPENDENT

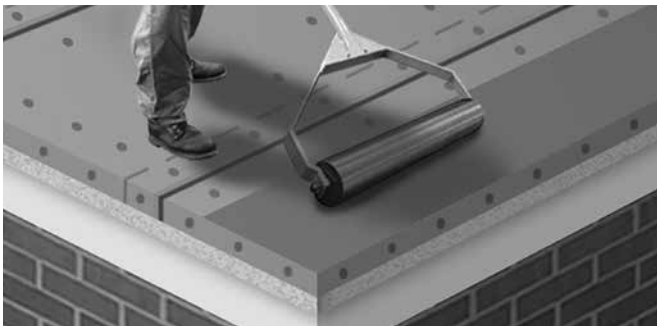
NOTE: Proceed to "Before Installing Flintlastic® SA Cap (or SA Cap FR)" if installing a 2-ply system.

Before installing interply, sweep the underlying base sheet/ply to remove any debris that could interfere with adhesion. Refer to **FIELD DETAILS REFERENCE** for starter course width.

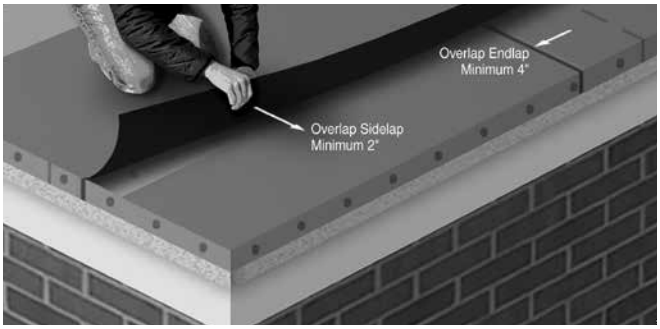
Begin at the low point of the roof. Position interply flush to roof edge. Install so that no sidelaps are against the flow of water.

Fold the membrane back halfway lengthwise to remove the split release film.

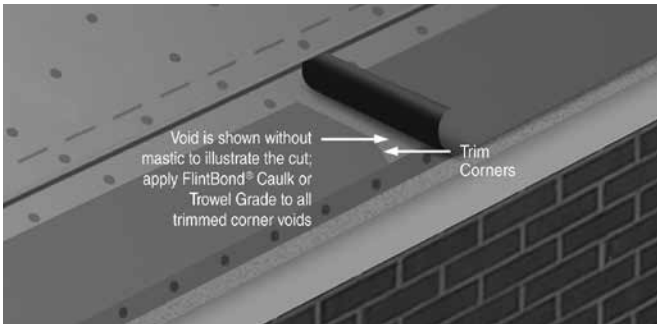
Press membrane securely into place and repeat with the opposite half of the membrane.



Use a heavy, weighted roller over the entire surface to secure the membrane. Work from the center of the roll outwards across the width to eliminate air pockets; **DO NOT** roll lengthwise as it can cause the roll to stretch.



Overlap sidelaps of subsequent SA PlyBase or SA MidPly membrane courses a minimum 2" and endlaps 4". Offset (stagger) endlaps of adjacent courses a minimum 3'.



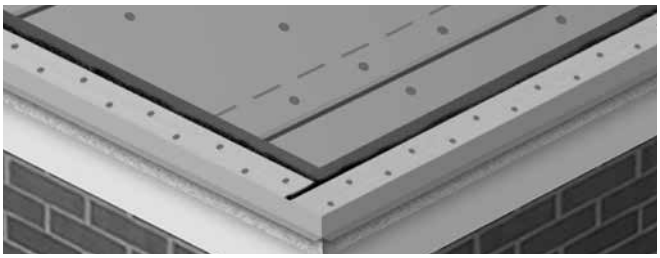
Cut endlaps at opposing diagonal corners at an angle approximately 5-1/2" long by the sidelap dimension (2" or 3") to minimize water incursion at T-seams. See Appendix, CT-22 ENDLAP DETAIL. Apply a bead or small trowel dab of FlintBond® Caulk or Trowel grade, at the edge of the angled cut.

It is recommended to apply a bead of FlintBond® Caulk grade, at all SA PlyBase or SA MidPly side and endlap edges to eliminate a capillary.

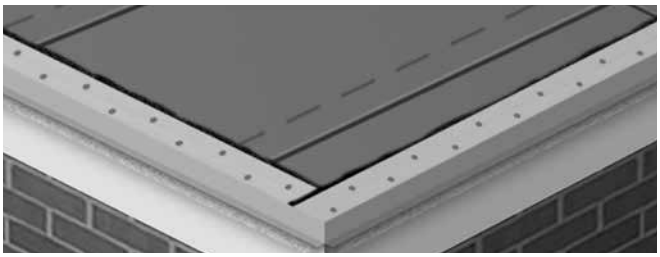
DO NOT LEAVE BASE SHEET EXPOSED TO THE WEATHER. Cover in the same day with Flintlastic SA Cap/SA Cap FR.

If roof edge detail utilizes edge metal, proceed as follows.

EDGE METAL FOR TWO-PLY SYSTEMS (WITH NO INTERPLY)



If an interply is not installed, adhere a 9″ wide flashing strip of SA PlyBase or SA MidPly (material assumed to match base sheet if fully adhered) onto the field of the roof and flush to the roof edge; miter cut at corners to avoid overlap. Install minimum 26 gauge edge metal using appropriate fasteners, set entirely in a uniform 1/8″ - 1/4″ thick troweling of FlintBond. Fasten edge metal into the deck using appropriate fasteners **(SEE FASTENER CHART)**, spaced 4″ on center in two staggered rows. See Appendix CT-01 EDGE FLASHING. Remove any oil from the metal surface using a vinegar and water solution. Prime the horizontal surface of the metal with FlintPrime and allow primer to dry/tackify.



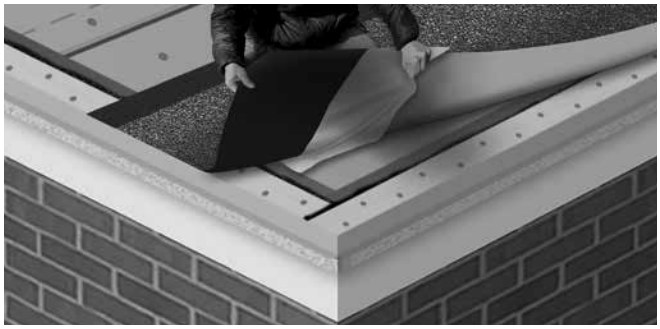
EDGE METAL FOR THREE-PLY SYSTEMS (WITH INTERPLY)

If an interply has been installed, install minimum 26 gauge edge metal using appropriate fasteners and set entirely in a uniform 1/8″ - 1/4″ thick troweling of FlintBond. Fasten edge metal through the metal surface, into the deck using appropriate fasteners **(SEE FASTENER CHART)**, spaced 4″ on center in two staggered rows. Remove any oil from the metal surface using a vinegar and water solution. Prime the horizontal surface of the metal with FlintPrime® Aerosol and allow to dry/tackify.

CAP APPLICATION

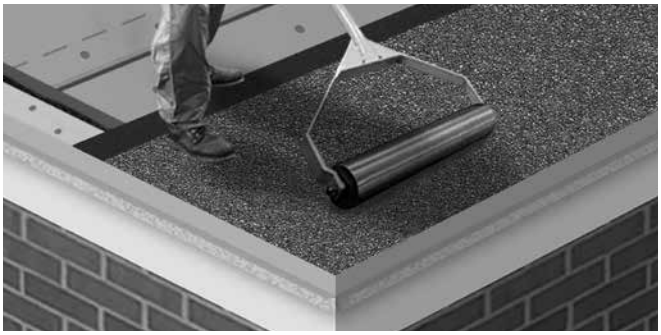
Before installing Flintlastic® SA Cap or SA Cap FR, sweep the underlying sheet to remove any debris that could interfere with adhesion. Refer to **FIELD DETAILS REFERENCE** for starter course width.

Begin at the low point of the roof. Position cap flush to roof edge with selvage at high side of the roof. Install so that no sidelaps are against the flow of water.

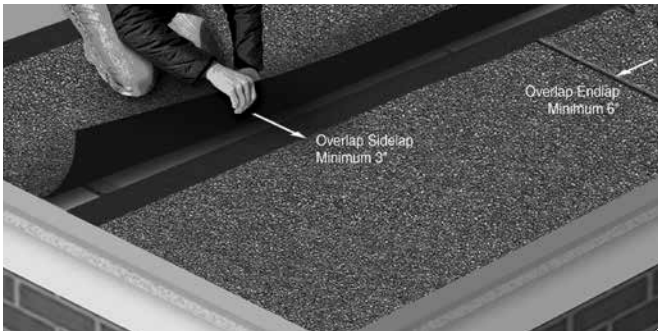


Fold back lower half of the cap to remove the split release film.

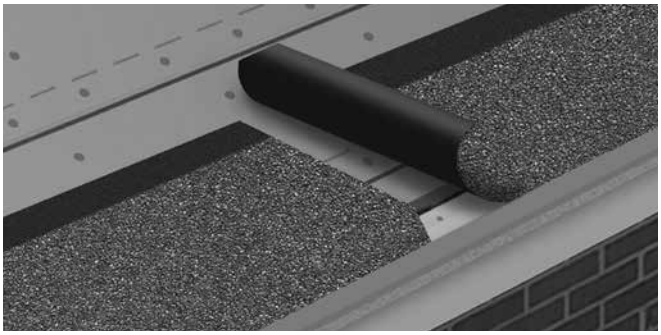
Press cap securely into place and repeat with the opposite half.



Use a heavy, weighted roller over the entire surface to secure the membrane. Work from the center of the roll outwards across the width to eliminate air pockets; **DO NOT** roll lengthwise as it can cause the roll to stretch.



Overlap sidelaps of subsequent courses a minimum 3″ and endlaps 6″. Offset endlaps of adjacent courses a minimum 3′. As subsequent membranes are installed, remove the selvage edge release strip just prior to overlapping to keep the adhesive area protected and clean.



Cut endlaps at opposing diagonal corners at an angle approx. 3″ by 5-1/2″ from the corners to prevent water incursion at T-seams. Treat rake edge application similarly, cutting diagonal corners off Cap selvage above rake metal.

CAP APPLICATION

ONE OF THE FOLLOWING OPTIONS must be followed for any granule over granule overlap, such as an endlap:

1. Apply a uniform 1/8" - 1/4" troweling of FlintBond® adhesive to the entire 6" width of the underlying sheet, extending beyond underlying lap 1/4" or;

2. Apply heat from a hot-air welder with a 2" tip to the overlapped sheet while applying rolling pressure from a silicone roller to the overlapping sheet. With the hot air welder set between 900°F-1,100°F (setting 8-10), apply heat to the overlapped granulated surface while bonding the overlapping cap with rolling pressure. Roll the overlapping SA Cap in place, moving the hot air welder to allow for forward progress. Avoid applying so much heat or moving at a pace that results in smoke. A 6" endlap requires a minimum of three passes. Apply a bead of FlintBond® Caulk along the edge.

WHEN AMBIENT TEMPERATURES ARE BETWEEN 35°F - 49°F THE HOT-AIR WELDER METHOD MUST BE USED. (See Flintlastic SA Cold Weather Applicator Instructions for further details.)

Once the membrane has had a chance to bond, check all laps and joints to ensure full adhesion. If any area of the membrane can be lifted, it is not properly adhered. A seam probing tool can be useful for detecting voids at the laps. If any area is found to not be adhered, use an appropriate hand-held hot-air welding tool and seam roller, or apply FlintBond Caulk or Trowel adhesive, to seal sections as needed.

CONSTRUCTION DETAILS

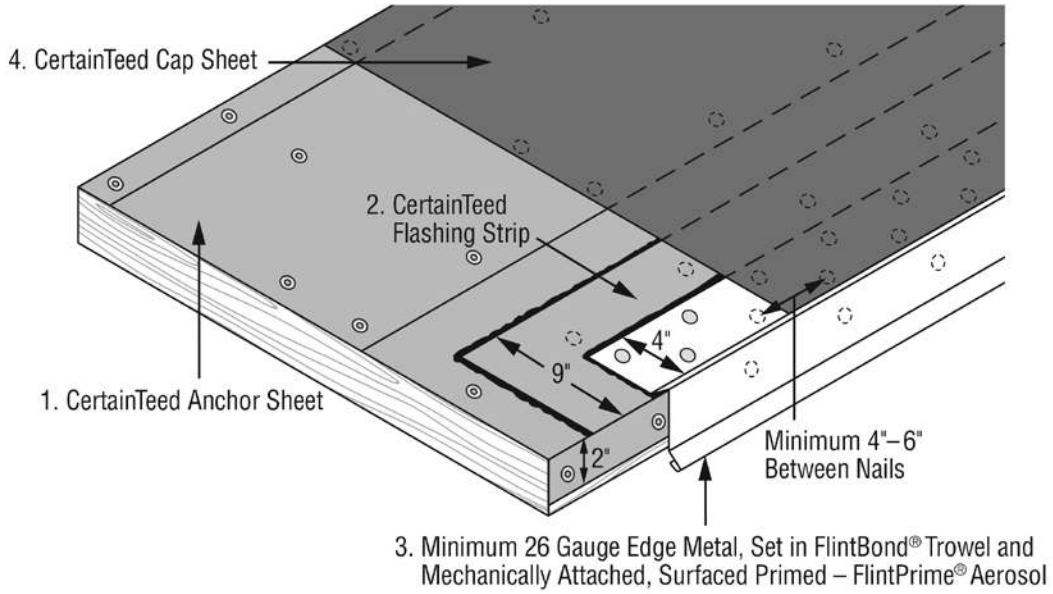
Included in this manual are a few common construction details. Please refer to CertainTeed's Commercial Roof Systems Specification Manual or certainteed.com for complete details. Important to note with all details,

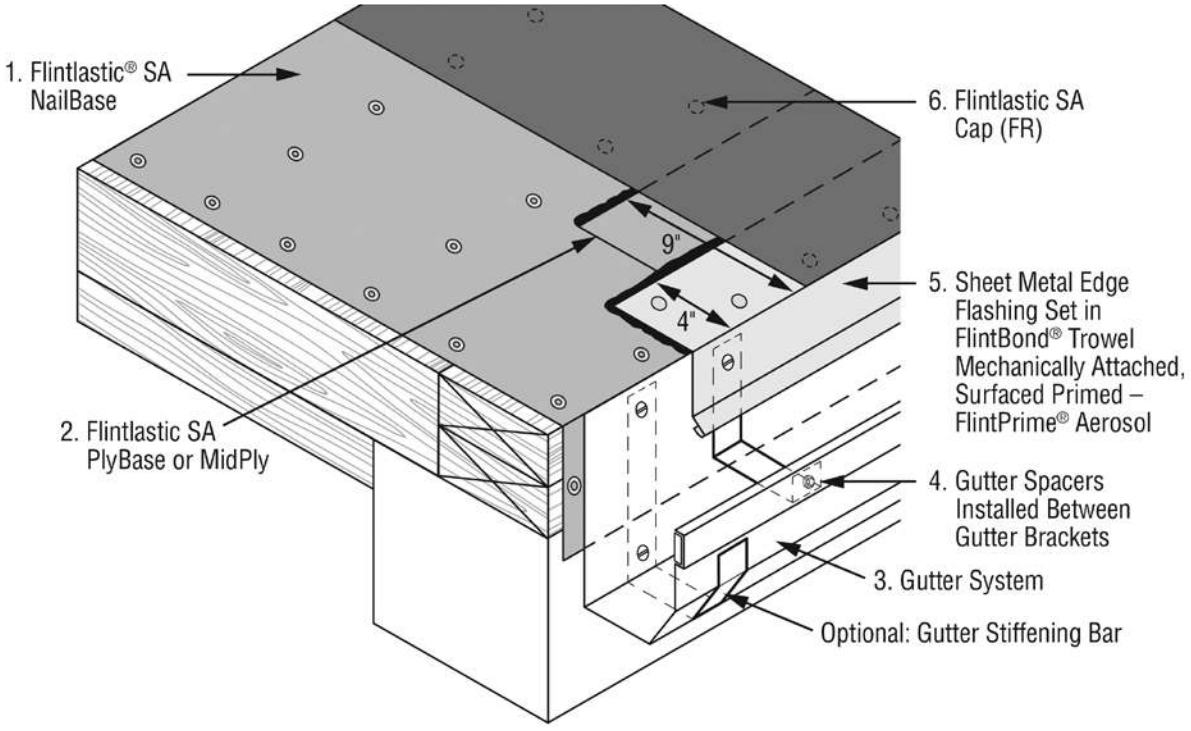
- All metal (with the exception being coping) must be primed and set in FlintBond Caulk or Trowel adhesive
- All overlaps over granule surfacing must utilize either FlintBond Caulk or Trowel or the combination of a hot-air welder and silicone roller (cold weather requirement).

NOTE: All published NRCA Construction Details are acceptable.

TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 2 PLY SYSTEMS

CT-01 Edge Flashing

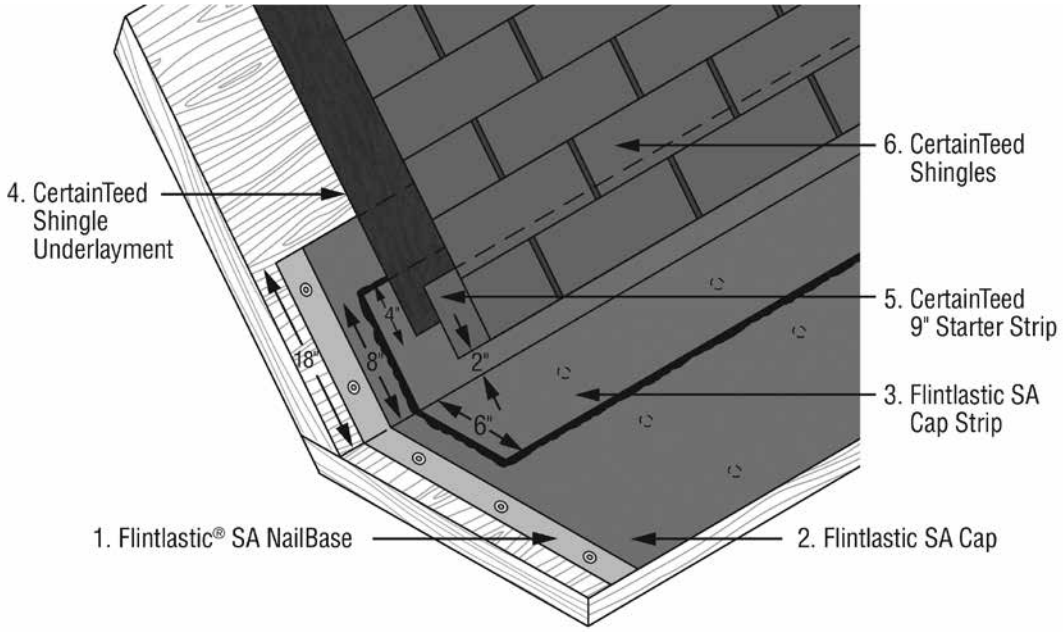


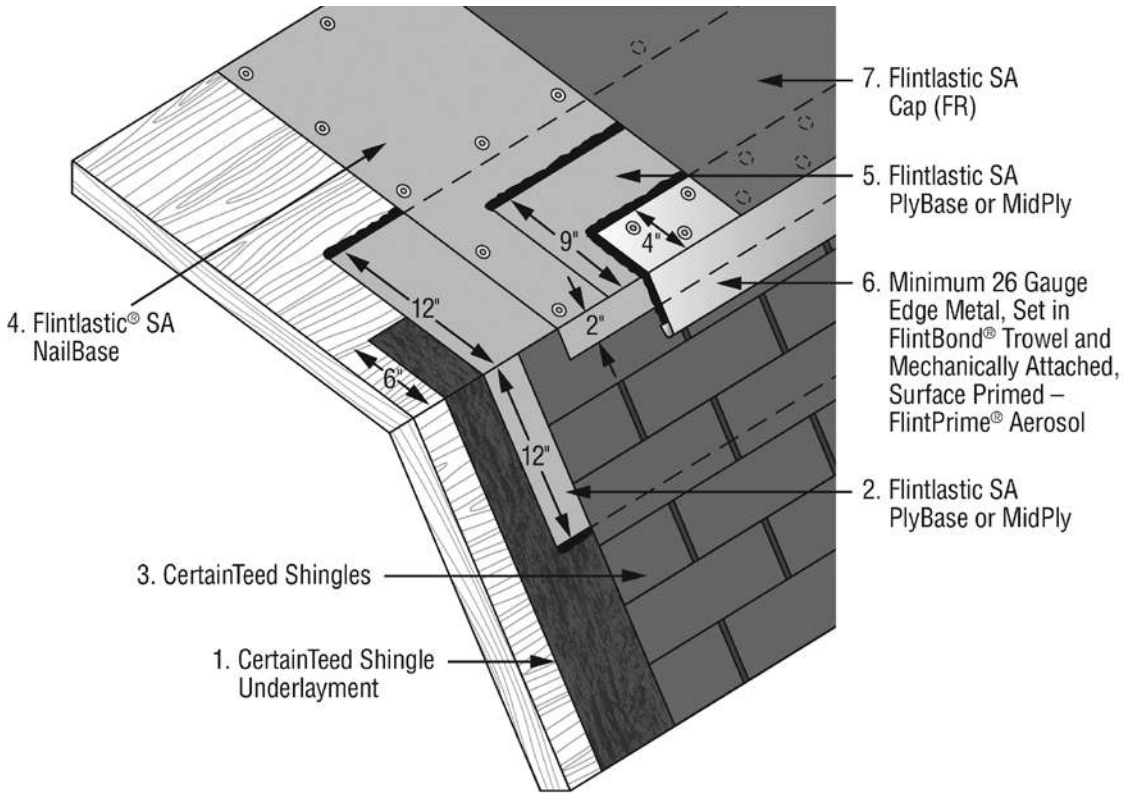


CT-01B Edge Flashing — Gutter

TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 2 PLY SYSTEMS

CT-23 Steep to Low-Slope Roof Transition Flashing

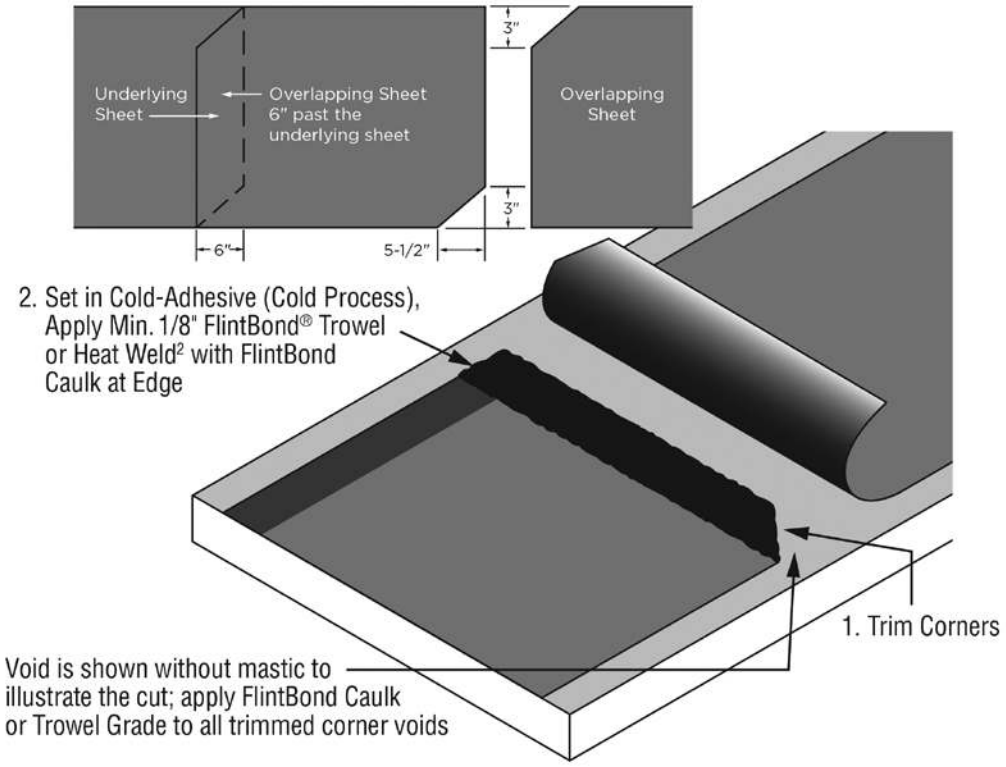




CT-24 Mansard Roof Transition Flashing

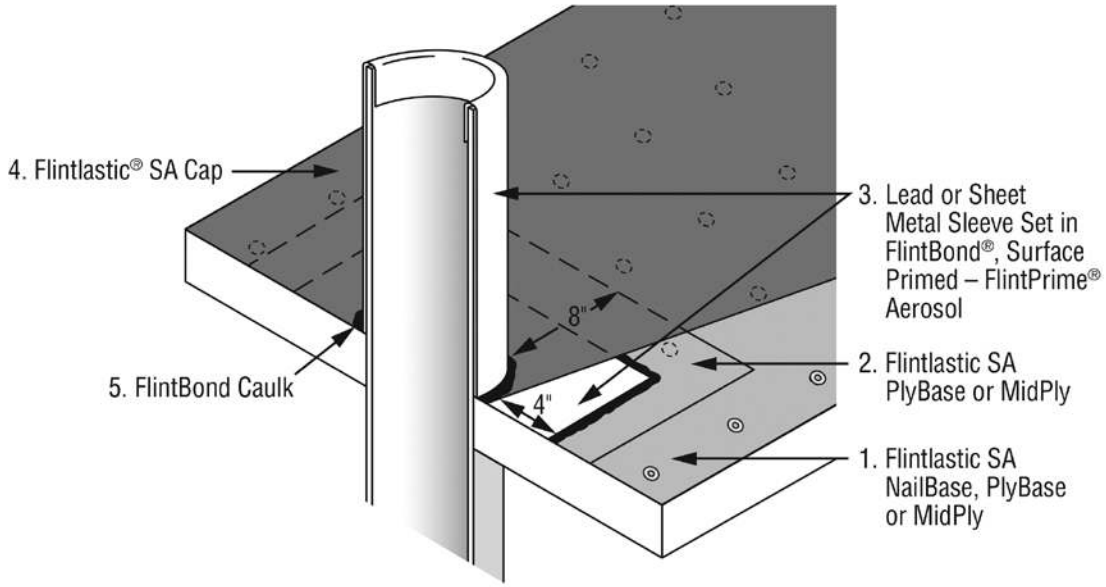
TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 2 PLY SYSTEMS

CT-22 End Lap Detail



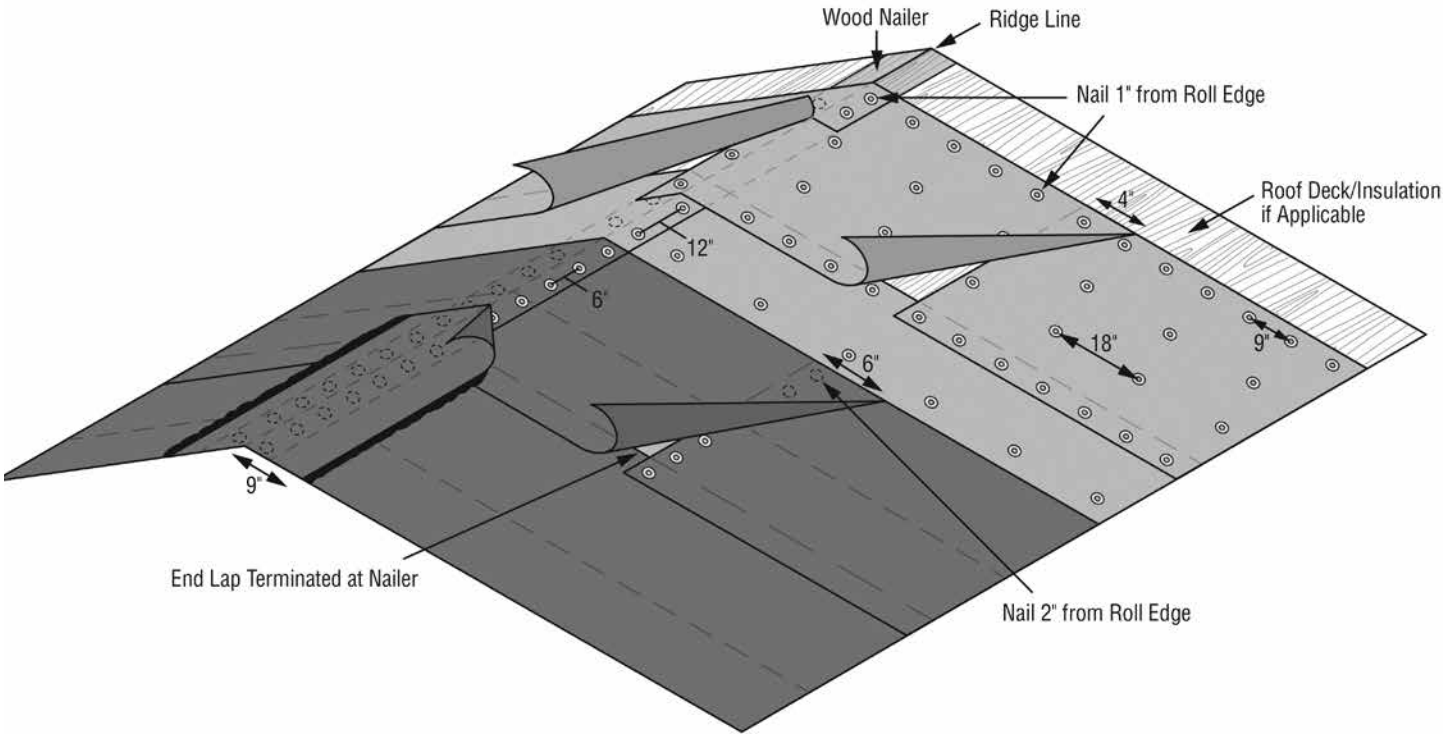
TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 2 PLY SYSTEMS

CT-13 Pipe Flashing — Lead or Sheet Metal



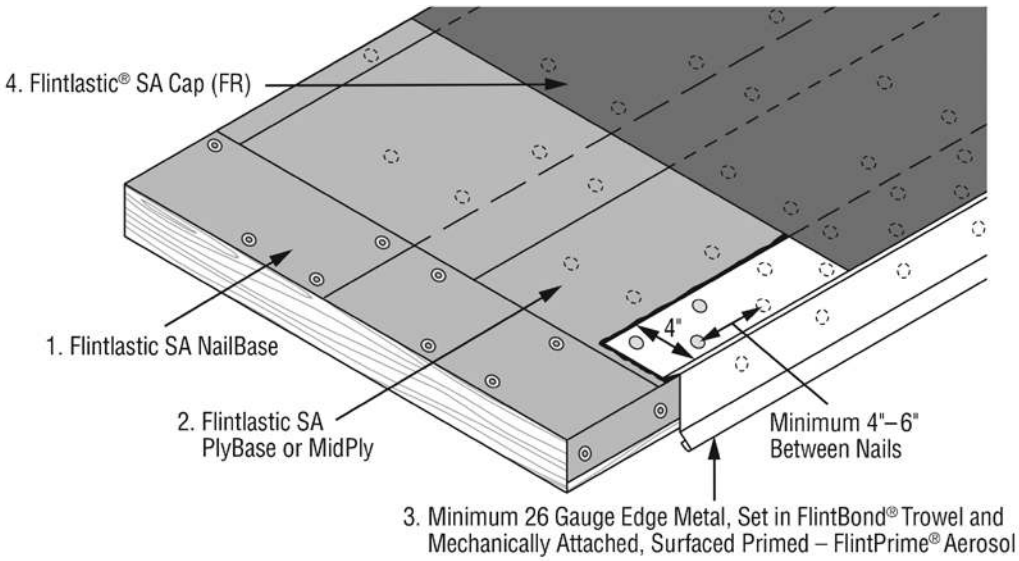
TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 2 PLY SYSTEMS

CT-29A Back Nailing — Nailable Substrates



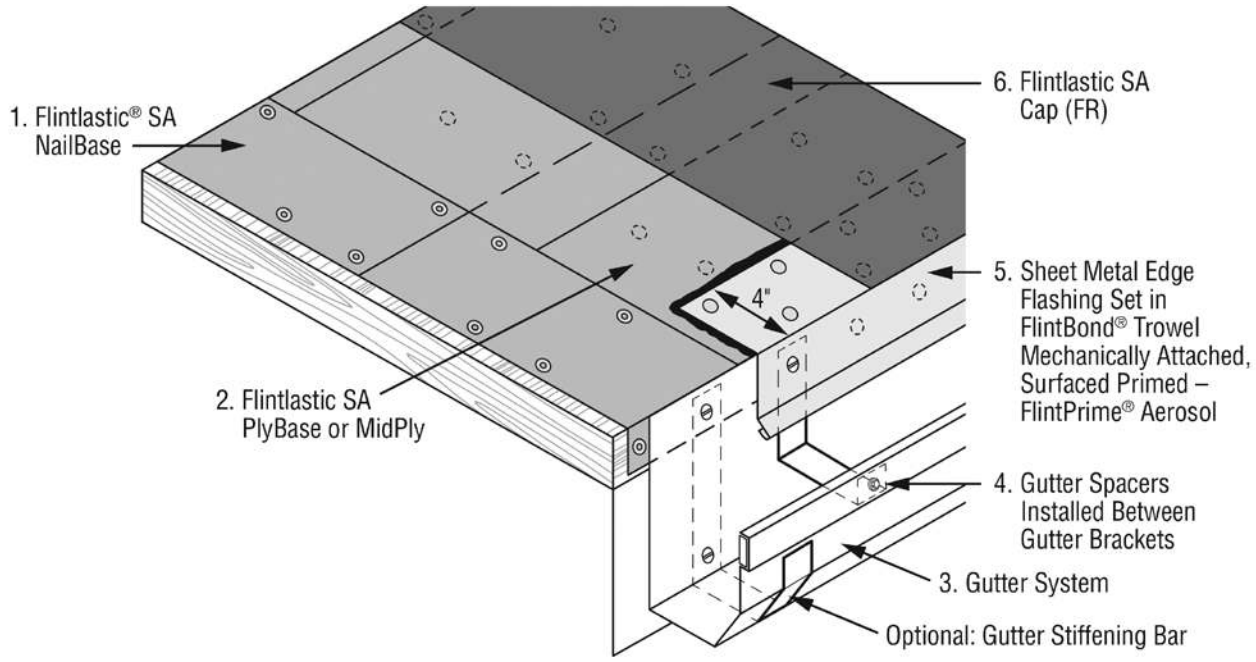
TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 3 PLY SYSTEMS

CT-01 Edge Flashing



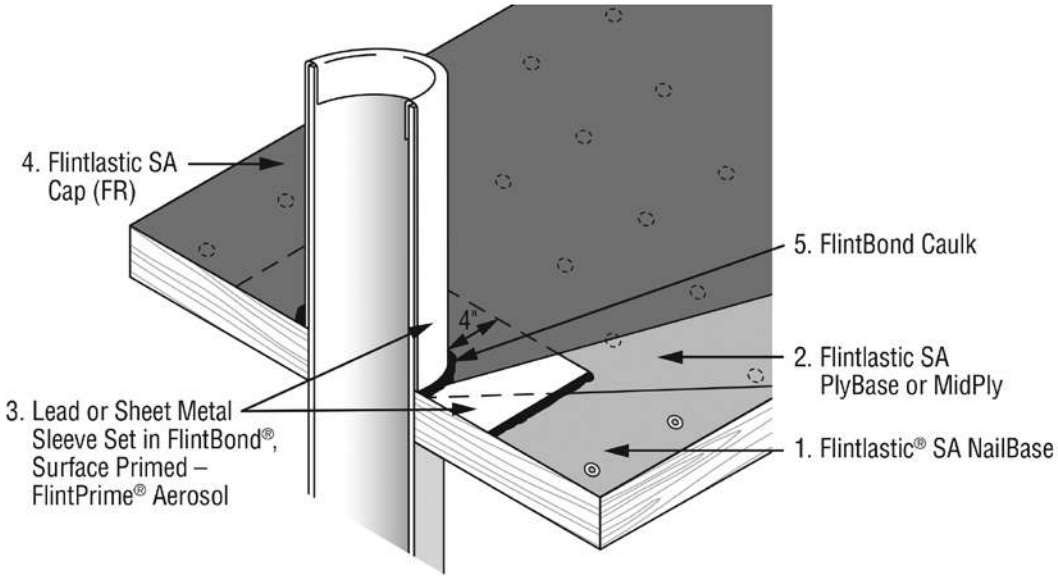
TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 3 PLY SYSTEMS

CT-01B Edge Flashing — Gutter

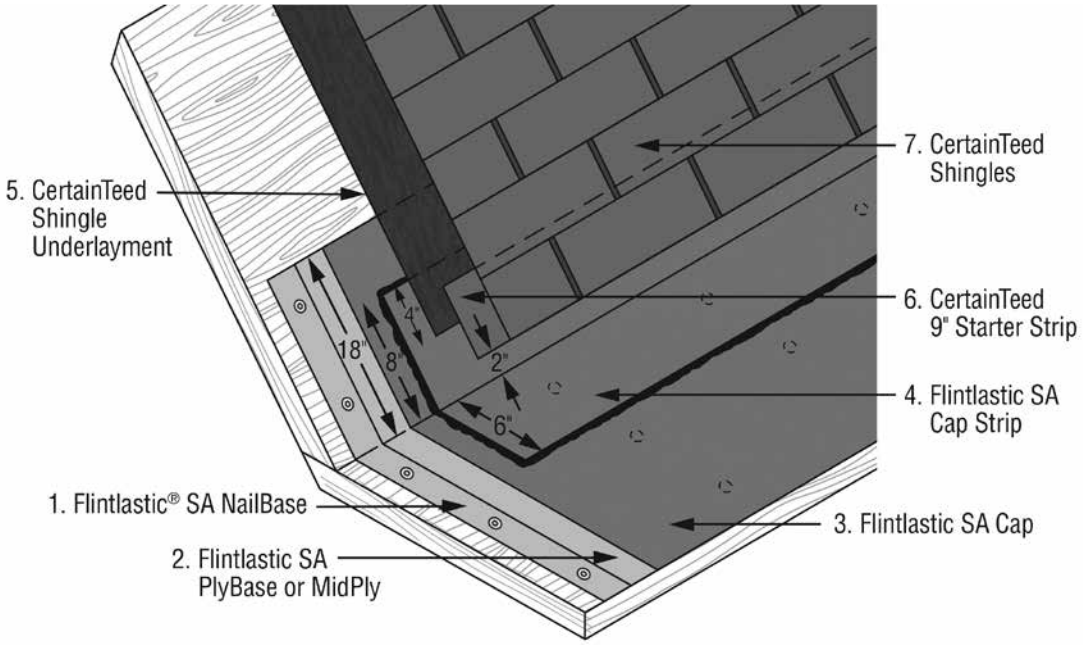


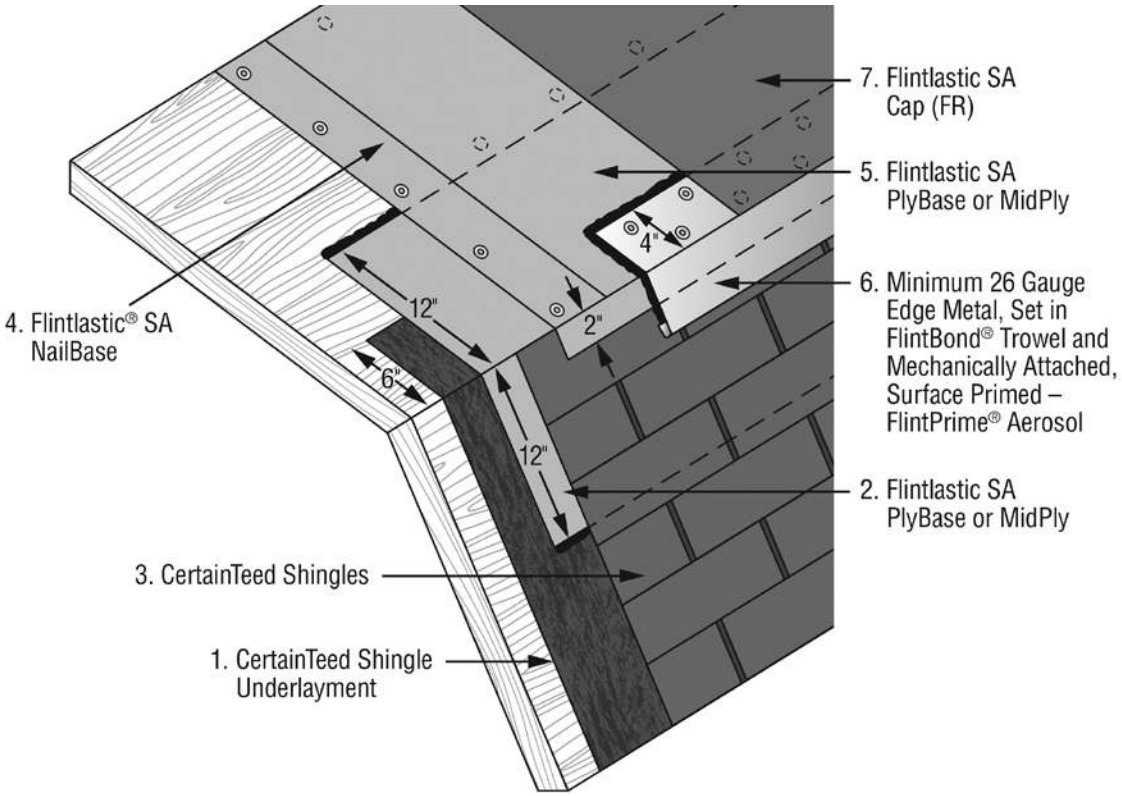
TYPICAL CONSTRUCTION DETAILS – FLINTLASTIC® SA 3 PLY SYSTEMS

CT-13 Pipe Flashing — Lead or Sheet Metal



CT-23 Steep to Low-Slope Roof Transition Flashing





CT-24 Mansard Roof Transition Flashing

Flintlastic® SA Installation Video

SECTION 20 SELF-TEST

20-1. Ambient temperature must be 50°F (10°C) or rising to install Flintlastic® SA roof membrane systems.

A. True.

B. False.

20-2. Roofing nails with plastic caps are acceptable when installing Flintlastic SA NailBase.

A. True.

B. False.

20-3. The starting row of the base sheet should be cut into ___ for a 2-ply SA roof membrane system and ___ for a 3-ply roof membrane system.

A. 1/3 roll, 1/2 roll

B. 1/2 roll, 2/3 roll

20-4. SA Base sheets should have a ___ inch overlap on the sidelaps and ___ inch overlap on the end laps.

A. 4″, 6″

B. 2″, 4″

20-5. SA PlyBase/MidPly, when used as an interply, should have a ___ inch overlap on the sidelaps and ___ inch overlap on the end laps.

A. 3″, 6″

B. 2″, 4″

20-6. SA Cap should be installed with a ___ inch sidelaps and ___ inch end laps.

A. 3″, 6″

B. 4″, 6″

20-7. Flintlastic SA PlyBase and SA MidPly may be adhered directly to:

A. Primed concrete

B. FlintBoard ISO roof insulation

C. Primed Gypsum cover boards

D. All of the above

20-8. FlintBond® Trowel should always be applied in a uniform 1/8″ to 1/4″ troweling on all end lap seams and everywhere there is an overlap of SA Cap onto another granule surfacing.

A. True

B. False

20-9. Proper T-Seam corner cuts should be ___ from the end of the roll with a ___ width into the sidelap.

A. 5-1/2″, 3″

B. 6″, 3″

Test on-line @ www.certainteed.com/samtest

Glossary

The following terms and definitions are excerpted from the Asphalt Roofing Manufacturers Association's Residential Asphalt Roofing Manual. CertainTeed has included additional terms and definitions for your reference.

A

Algae discoloration – A type of roof discoloration caused by algae. Commonly, but inaccurately, called fungus growth. Usually, it is dark brown to black in color.

Algae Resistant Shingles – Shingles which are coated with copper granules on the weather side to prevent the formation of algae and the resultant discoloration.

Algicidal Treatment – A method of cleaning discolored shingles with a bleach mixture to lighten the discoloration caused by algae formation.

APA – The Engineered Wood Association.

ARMA – Asphalt Roofing Manufacturers Association.

Asphalt – A bituminous waterproofing agent applied to roofing materials during manufacture.

Asphalt felt – Fibrous material saturated with asphalt and used as an underlayment or sheathing paper.

Asphalt roofing cement – An asphalt-based cement, containing solvent, used to bond roofing materials. Also known as asphalt plastic cement, flashing cement, muck, bull or mastic.

ASTM – American Society for Testing and Materials. A voluntary organization concerned with development of consensus standards, testing procedures and product specifications.

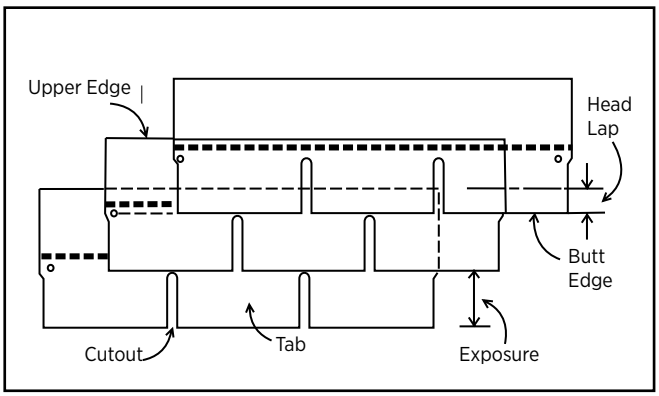


Figure GI-1

B

Back surfacing – Fine mineral matter applied to the back side of shingles, keeping them from sticking together when packaged in the bundles.

Base flashing – The portion of the flashing attached to or resting on the deck to direct the flow of water onto the roof covering. See Step flashing.

Battens – Parallel strips of wood to which roof tiles are fastened.

Blisters – Raised areas or bubbles that may appear on the surface of asphalt roofing after installation.

Blow-off – A condition in which shingles flutter or flap up and down with the wind, tear, and finally blow off the roof entirely.

Buckling – The formation of wrinkles or furrows across a shingle or shingles.

Bundle – A package of shingles. There are typically three, four or five bundles per square.

Butt edge – The lower edge of the shingle tabs (Figure GI-1).

C

Cap flashing – The portion of the flashing attached to a vertical surface to prevent water from migrating behind the base flashing.

Caulk – To fill a joint with mastic or asphalt roofing cement, or the material used to fill the joint.

Certificate of Compliance – A certificate indicating that shingles meet their appropriate standards.

Chalk line – A line made on the roof by snapping a taut string or cord dusted with chalk. Used for alignment purposes.

Class "A" – The highest fire-resistance rating for roofing as per ASTM E 108. Indicates roofing is able to withstand severe exposure to fire originating from sources outside the building.

Class "B" – Fire-resistance rating that indicates roofing materials are able to withstand moderate exposure to fire originating from sources outside the building. (Not currently available for any asphalt shingle.)

Class "C" – Fire-resistance rating that indicates roofing materials are able to withstand light exposure to fire originating from sources outside the building.

Closed-cut valley – A method of valley treatment in which shingles from one side of the valley extend across the valley, while shingles from the other side are trimmed 2" from the valley centerline. The valley flashing is not exposed.

Coating Asphalt – A layer of asphalt applied to the base reinforcement material into which granules or other surfacing is embedded.

Collar – Pre-formed flange placed over a vent pipe to seal the roof around the vent pipe opening. Also called a Vent sleeve.

Color Code Numbers – Number indicating the color are on each bundle of CertainTeed shingles. Color code number must match.

Color variation – Slight differences in shingle appearance which may be due to variations in normal manufacturing color blends or the mixing of color blends during shingle application.

COM-PLY Panels – Composite panels made of wood veneer on the face and back, with an inside core of compressed wood strands.

Condensation – The change of water from vapor to liquid when warm, moisture-laden air comes in contact with a cold surface.

Counter flashing – See Cap flashing.

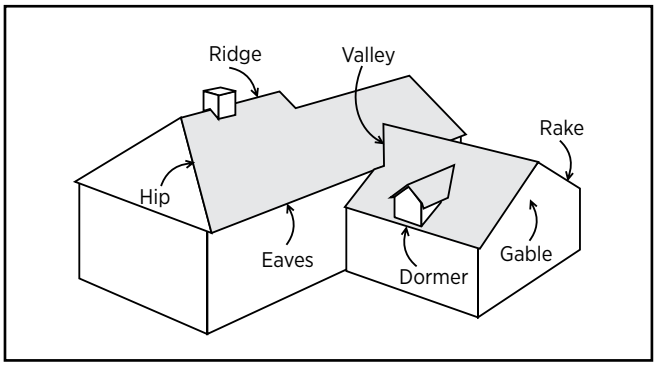


Figure Gl-2

Course – A horizontal row of shingles or roll roofing running the length of the roof.

Cricket – A peaked saddle construction at the back of a chimney to prevent accumulation of snow and ice and to deflect water around the chimney.

Cutout – The open portions of a strip shingle between the tabs (Figure Gl-1).

D

Date Codes – Date of manufacture printed on bundles. CertainTeed has eliminated most date codes because it is able to closely control the color in production runs.

Deck – The surface, installed over the supporting framing members, to which the roofing is applied.

Diagonal method – Roofing application method in which shingles are applied diagonally up the roof.

Dormer – A framed window unit projecting through the sloping plane of a roof (Figure Gl-2).

Double coverage – Application of asphalt roofing such that the lapped portion is at least 2″ wider than the exposed portion, resulting in two layers of roofing material over the deck.

Downspout – A pipe for draining water from roof gutters. Also called a Leader.

Drip edge – A corrosion-resistant, non-staining material used along the eaves and rakes to allow water run-off to drip clear of underlying construction.

E

Eaves – The horizontal, lower edge of a sloped roof (Figure Gl-2).

Eaves flashing – Additional layer of roofing material applied at the eaves to help prevent damage from water back-up.

Exposure – The portion of the roofing exposed to the weather after installation, usually expressed in inches (Figure Gl-1).

Exposure 1 grade plywood – Type of plywood approved by The Engineered Wood Association for exterior use.

F

Feathering strips – Tapered wood filler strips placed along the butts of old wood shingles to create a level surface when reroofing over existing wood shingle roofs. Also called Horsefeathers.

Felt – Organic fiber mat impregnated with asphalt and used as an underlayment. See Underlayment. See Organic felt.

Fiber glass mat – A reinforcing material for asphalt roofing manufactured from glass fibers.

Fiber Glass Shingles – Asphalt shingles made with a fiber glass mat.

Filler – See Mineral stabilizers.

Flashing – Pieces of metal or roll roofing used to prevent seepage of water into a building around any intersection or projection in a roof, such as vent pipes, chimneys, adjoining walls, dormers and valleys.

Flashing cement – See Asphalt roofing cement.

FRT Plywood – Fire Retardant Treated plywood.

Fungus stain – See Algae discoloration.

G

Gable – The upper portion of a sidewall that comes to a triangular point at the ridge of a sloping roof (Figure Gl-2).

Gable roof – A type of roof containing sloping planes of the same pitch on each side of the ridge. Contains a gable at each end (Figure Gl-3).

Gambrel roof – A type of roof containing two sloping planes of different pitch on each side of the ridge. The lower plane has a steeper slope than the upper. Contains a gable at each end (Figure Gl-3).

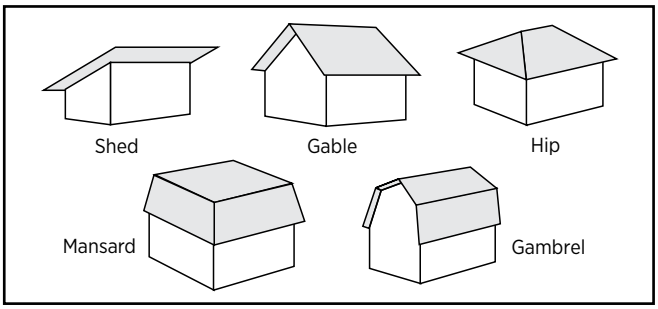


Figure Gl-3

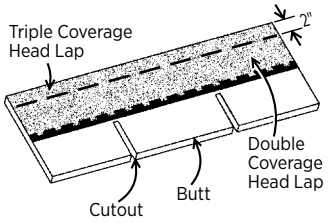
Granules – Ceramic-coated, colored crushed rock that is applied to the exposed surface of asphalt roofing products.

Gutter – The trough that channels water from the eaves to the downspouts.

H

Head lap – According to ASTM it is the shortest distance from the butt edge of an overlapping shingle to the upper edge of the shingle two courses below it. It is the "triple coverage" portion of the strip shingle system (designed to be minimum 2" in length) (Figure GI-1).

Note: In CertainTeed jargon, head lap refers to the entire upper portion of a shingle covered by the succeeding course after installation – about 7" for 12" x 36" strip shingles (Figure GI-4).



Heavyweight Dimensional Shingles – Sometimes called architectural shingles, these shingles combine a rough dimensional look with attractive natural color blends. Typical weight: 265-350 lb./sq.

Hip – The inclined external angle formed by the intersection of two sloping roof planes. Runs from the ridge to the eaves (Figure GI-2).

Hip roof – A type of roof containing sloping planes of the same pitch on each of four sides. Contains no gables (Figure GI-3).

Hip shingles – Shingles used to cover the inclined external angle formed by the intersection of two sloping roof planes. Sometimes called "hip and ridge" shingles.

Homasote® Roofing Decking – High density wood fiber board.

Horsefeathers – See Feathering strips.

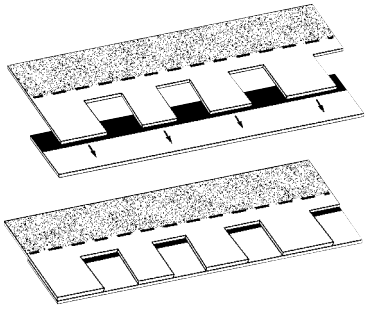
HUD Ventilation Standard – Minimum standard requires one square foot of net free ventilation area for every 150 square feet of attic floor space. However, if half of the open ventilation area is in the upper portion of the roof and half is in the lower area, the standard changes to one square foot of net free ventilation for every 300 square feet of attic floor space.

I

Ice dam – Condition formed by the thawing and refreezing of melted snow, especially at the lower roof edge on the roof overhang and in gutters. Can cause water to pond and flow up and under shingles, causing leaks.

L

Laminated shingles – Strip shingles containing more than one layer of tabs to create extra thickness. Also called three-dimensional shingles or architectural shingles (Figure GI-5).



Lap – To cover the surface of one shingle or roll with another.

Leader – See Downspout.

LOADMASTER® Nailable Double Board Assembly – Trademarked roof decking composed of a double layer of mineral board placed over a rigid insulation board (optional), and fastened to a steel deck.

Low Budget Shingles – A class of shingles that can cause problems. They might have coloring that does not match from bundle to bundle, shingle lengths out of spec, or weak fiber glass mats. Such defects often lead to roofing difficulties.

Low-slope application – Method of installing asphalt shingles on roof slopes between 2" and 4" per foot.

M

Mansard roof – A type of roof containing two sloping planes of different pitch on each of four sides. The lower plane has a much steeper pitch than the upper, often approaching vertical. Contains no gables (Figure GI-3 on previous page).

Mastic – See Asphalt roofing cement.

Mid-Weight Dimensional Shingles – These roofing products are often characterized by the use of shadow lines and color blends which give the shingles a more vibrant appearance than common three-tab shingles. Typical weights can run the range from 205-265 lbs./sq.

Mineral stabilizers – Sometimes called Filler. Finely ground limestone, slate, traprock or other inert materials added to asphalt coatings for durability and increased resistance to fire and weathering.

N

Nesting – A method of reroofing with new asphalt shingles over old shingles in which the top edge of the new shingle is butted against the bottom edge of the existing shingle tab.

No-cutout shingles – Shingles consisting of a single, solid tab with no cutouts.

Non-veneer panel – Any wood-based panel that does not contain veneered layers, such as oriented strand board (OSB) or waferboard.

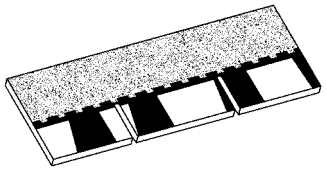
O

Open valley – Method of valley construction in which shingles on both sides of the valley are trimmed along a chalk line snapped on each side of the valley. Shingles do not extend across the valley. Valley flashing is exposed.

OSB – Non-veneer oriented strand board.

Overhang – The portion of the roof structure that extends beyond the exterior walls of a building.

Overlay Shingle – A one-piece base shingle to which overlay pads, consisting of an additional layer of asphalt and granules, are applied in random patterns to simulate two-piece laminated shingles (Figure GI-6).



Oxalic Acid – A diluted water solution of oxalic acid is used to reduce rust stains.

P

Pallets – Wooden platforms used for storing and shipping bundles of shingles.

Patterning – The formation of various geometric designs or patterns on the roof resulting from overlay- or laminated tab-type shingles applied incorrectly or from incorrect color blends.

Plastic cement – See Asphalt roofing cement.

R

Racking – Roofing application method in which shingle courses are applied vertically up the roof.

Rafter – The supporting framing member immediately beneath the deck, sloping from the ridge to the wall plate.

Rake – The inclined edge of a sloped roof over a wall (Figure GI-2).

Release tape – A plastic strip that is applied to the back of self-sealing shingles. This strip prevents the shingles from sticking together in the bundles, and normally should not be removed for application.

Ridge – The uppermost, horizontal external angle formed by the intersection of two sloping roof planes (Figure GI-2).

Ridge shingles – Shingles used to cover the horizontal external angle formed by the intersection of two sloping roof planes. Sometimes called "hip and ridge" shingles.

Ripper – Basic tool for tearing off old shingles. Also called the ripping shovel, it has a long handle connected at a steep angle to a flat blade with a serrated leading edge.

Rise – The vertical distance from the eaves line to the ridge.

Roll roofing – Asphalt roofing products manufactured in roll form.

Run – The horizontal distance from the eaves to a point directly under the ridge. One-half the span.

S

Saturated felt – An asphalt-impregnated felt used as an underlayment between the deck and the roofing material.

Scuffing – Damage to the shingle surface, usually the granules or top coating layer, caused by foot traffic or by placing objects on newly installed shingles.

Sealant Adhesive – Applied to the face or back of shingles to hold them down in severe wind conditions.

Self-sealing shingles – Shingles containing factory-applied strips of self-sealing adhesive.

Self-sealing strip – Factory-applied adhesive that bonds shingle courses together when exposed to the heat of the sun after application.

Shading – Slight differences in shingle color that may occur as a result of normal manufacturing operations. See Color variation. See Patterning.

Sheathing – Exterior grade boards used as a roof deck material.

Shed roof – A roof containing only one sloping plane. Has no hips, ridges, valleys or gables (Figure GI-3).

Shoe-Wraps – Wrappings for workers shoes that prevent scuffing of shingles.

Sight Card – Cardboard geometrical shape used to determine roof slope from the ground.

Single coverage – Asphalt roofing that provides one layer of roofing material over the deck.

Sit-Upons – Carpet or foam rubber pieces that roofers kneel or sit on while working to avoid scuffing shingles in hot weather.

Slope – The degree of roof incline expressed as the ratio of the rise, in inches, to the run, in inches (or feet). Sometimes expressed as "pitch" in degrees of an angle (Figure GI-7).

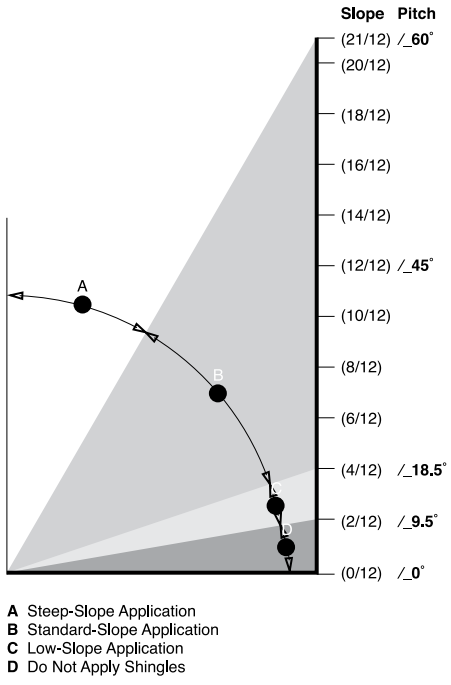


Figure GI-7

NOTE: *Check individual shingle chapters to confirm slope definitions.*

Soffit – The finished underside of eaves.

Soffit Vents – Vents located under the eaves that provide air intake. They should be used together with other higher elevation vents.

Soil stack – A vent pipe that penetrates the roof.

Square – A unit of roof measurement equaling 100 square feet of roof area.

Square tab shingles – Shingles on which tabs are all the same size and exposure.

Stabilized Asphalt Coating – A tough asphalt material used to coat the impregnated felt of the asphalt shingle. Also used as the only waterproofing in a fiberglass shingle. See also: Saturant.

Standard-slope application – Method of installing asphalt shingles on roof slopes between 4″ and 21″ per foot. **NOTE:** Check individual shingle chapters to confirm slope definitions

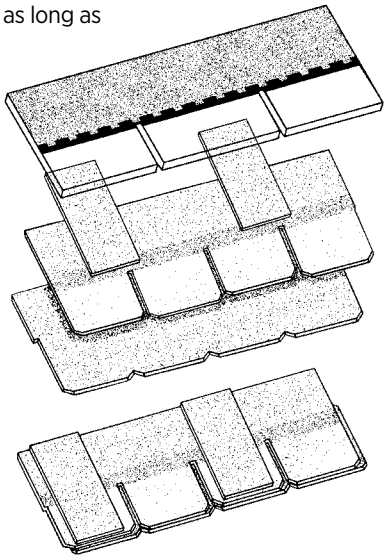
Starter strip – Asphalt roofing applied at the eaves that provides protection by filling in the spaces under the cutouts and joints of the first course of shingles. It also provides for sealing down of tabs of the first course of self-sealing shingles.

Steep-slope application – Method of installing asphalt shingles on roof slopes greater than 21″ per foot. **NOTE:** Check individual shingle chapters to confirm slope definitions.

Step flashing – Base flashing application method used where a vertical surface meets a sloping roof plane. Utilizes multiple pieces of flashing material.

Stickering – The process of inserting spacers between deck panels before installation in order to allow them to reach a more natural moisture content and dimension.

Strip shingles – Asphalt shingles that are approximately three times as long as they are wide (Figure GI-8).



Super Heavy-Weight – A top-of-the-line asphalt roofing shingle product exclusive to CertainTeed which is constructed of two full-size base shingles, and may also have a massive weather tab (Figure GI-9).

T

TL – A unique, top-of-the-line asphalt shingle product which is constructed using a patented Tri-Laminate™ design process (Figure GI-10-11).

Tab – The exposed portion of strip shingles defined by cutouts (Figure GI-1).

Tab cement – An asphalt-based cement used to adhere tabs of strip shingles to the course below. A type of asphalt roofing cement often supplied in tubes.

Tear Resistance – The industry-accepted method for comparing shingle toughness is the ASTM D3462 performance standard for fiber glass shingles. All of CertainTeed's shingles meet the tear resistance requirements of ASTM D3462.

Telegraphing – A shingle distortion that may arise when a new roof is applied over an uneven surface.

U

UL – UL Solutions

UL label – Label displayed on packaging to indicate the level of fire and/or wind resistance of asphalt roofing, and whether shingles meet certain ASTM standards.

Underlayment – Asphalt-impregnated felt used beneath roofing to provide additional protection for the deck.

V

Valley – The internal angle formed by the intersection of two sloping roof planes (Figure GI-2).

Vapor retarder – Any material used to prevent the passage of water vapor.

Vent – 1) Any outlet for air that protrudes through the roof deck, such as a pipe or stack. 2) Any device installed on the roof, gable or soffit for the purpose of ventilating the underside of the roof deck.

Vent sleeve – See Collar.

W

Waterproofing shingle underlayment – A self-adhered waterproofing shingle underlayment designed to protect against water infiltration due to ice dams or wind-driven rain.

WB – Non-veneer wafer board.

Woven valley – Method of valley construction in which shingles from both sides of the valley extend across the valley and are woven together by overlapping alternate courses as they are applied. The valley flashing is not exposed.

Image above is for visual purposes only and does not include imagery for all products within each category.

Integrity Roof System®

PERFORMANCE ENGINEERED FOR COMPLETE PROTECTION, STRONG RESILIENCE AND LASTING BEAUTY

With as much care as you take in selecting the right contractor, choosing the right roof system is equally as important. A CertainTeed Integrity Roof System combines key elements that help ensure you have a well-built roof for long-lasting performance.

1. Waterproofing Underlayment*

The first step in your defense against the elements. Self-adhering underlayment is installed at vulnerable areas of your roof to help prevent leaks from wind-driven rain and ice dams.

2. Water-Resistant Underlayment

Provides a protective layer over the roof deck and acts as a secondary barrier against leaks.

3. Shingle Starter

Designed to work in tandem with the roof shingles above for optimal shingle sealing and performance.

4. Shingles

Choose from a variety of Good-Better-Best styles to complement any roof design and fit your budget.

5. Ventilation

A roof that breathes is shown to perform better and last longer. Ridge Vents, in combination with Intake Vents, allow air to flow on the underside of your roof deck, keeping the attic cooler in the summer and drier in the winter.

6. Hip & Ridge

Available in numerous profiles, these accessories are used on the roof's hip and ridge lines for a distinctive finishing touch to your new roof.

* Waterproofing Underlayment is not typically applied at the eaves in climate areas not prone to snow and ice.

Low-Slope Sections
CertainTeed Flintlastic® and SMARTCOAT™ roofing products are also available for low-slope roof areas.

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