



SPEC MANUAL

B.U.R., MODIFIED & SHINGLE ROOFING SYSTEMS

Chapter 4A

Steep Slope Roofing Installation Instructions

***Instructions are accompanied by detail drawings within the text.
Full-size renditions of the details can be found in the next chapter.**

4A.1 CODE COMPLIANCE FOR BEST INSTALLATION

Malarkey printed instructions should be followed for the best installation. Contact Malarkey Technical Services¹ or check our website at: WWW.MALARKEY-ROOFING.COM for the most current version. They may be superseded, however, wherever applicable building codes, local amendments or industry standards require more stringent application techniques.

To qualify for warranty protection and obtain stated coverage, the instructions on all package wraps must be followed. Malarkey assumes no responsibility for improper application, failure to properly prepare the surface, or provide adequate ventilation according to FHA or HUD minimum property standard requirements and adopted building codes.

Plywood or OSB panels used to create roof decks should be rated for structural use as roof sheathing. Most building codes require labeling assuring the panel complies with industry standards. Contact the APA (the Engineered Wood Association, formally known as the American Plywood Association) for specifics regarding the use of plywood in construction.

4A.2 HANDLING AND STORAGE REQUIREMENTS

Unload, handle and store all roofing products and construction materials with care.

Check all packaged materials delivered to the work site for damage. If any material is damaged, contact your roofing products distributor to resolve the issue. All damaged materials must be removed and replaced (this does not include damaged *packaging* with undamaged shingles and/or ridge products). Malarkey assumes no liability for damaged material once it has been released from Malarkey's manufacturing warehouse facilities.

Protect roofing materials from potential damage due to weather prior to and during installation.

Do not double-stack pallets of laminate shingles.

Protect any roll goods, adhesives, and coatings from freezing.

When rooftop loading shingle materials, make sure the staging area is structurally sound, able to safely store the materials, and presents no danger to the occupants or structure.

Windsor® Designer Shingles: Use blocking to prevent sliding of bundles; do not use spikes or nails to keep in place. Windsor® shingles are 6" (152 mm) wider than conventional 3-tab and laminate shingles so ensure the conveyor transporting Windsor® shingles to the roof is able to safely accommodate this difference in width.

Materials stored on the roof surface shall be dispersed to avoid concentrated loading. Larger concentrations should be set over major structural members.

4A.3 SAFETY

Malarkey recommends all applicable safety standards and good roofing practices be followed.

Roofing personnel must be properly trained to operate and install roofing systems safely and effectively. They are responsible for their own safety on the work site, as well as those around them.

Installers should always wear and maintain their Personal Protective Equipment (PPE) when handling or installing components of a roofing system.

Refer to OSHA guidelines for Fall Protection.

Regularly maintain and service all ladders and roofing equipment.

Always keep first aid kits, emergency telephone numbers, escape routes, and area maps to emergency facilities in a place readily accessible to all personnel.

Thoroughly train all personnel in first aid procedures.

All roofing and construction materials should be stored and protected in a manner that does not endanger any workers, personal property, occupants and contents of the building being roofed. Keep the roofing and staging areas clean.

Properly store and handle flammable materials.

Only use flammable materials in safe, well-ventilated areas.

4A.4 GENERAL REQUIREMENTS

Asphalt shingles are an acceptable roof covering for *steep slope* roof decks. Shingles are to be used only in areas approved by state and local building codes.

Steep slope roof decks are decks that have a slope at least 2" (51 mm) of *rise* per 12" (305 mm) *run* of roof span. Shingles should not be installed on roof decks with slopes lower than this.

The type of shingle(s) and type and amount of underlayment(s) used and their installation guidelines will vary depending on degree of roof slope, geographic location, time of year of the installation, shingle product, and customer preference.

Contractors installing Malarkey shingles should use good judgment when installing in extreme cold or hot periods of the year.

Cold temperatures can cause asphalt shingles to freeze together in the bundles, making them difficult to handle and install. Ensure shingles are as flat as possible, sufficiently warm and flexible before application.

Malarkey assumes no responsibility for color variations. The color granules embedded in the shingle are subject to variations of light absorption and reflection of light

¹ Malarkey's Technical Services Department can be reached weekdays at (800) 545-1191 or (503) 283-1191, 7:00 am to 5:00 pm Pacific Time or emailed at malarkey.technicalinquiries@holcim.com.

that may cause apparent variation in color shade, but in no way affects the durability of the shingle.

Note: The film strip (or strips) on each shingle is to prevent shingles from sticking together while in the bundle and is not designed to be removed.

Malarkey shingles are manufactured with strips of a factory-applied, thermal sealant that is activated by the heat of the sun after the shingle is on the roof. Exposure to the sun's heat bonds each shingle to the one below for wind resistance.

A variety of conditions like cold weather, high winds or blowing dust, however, can affect the ability of the sealant strips to activate and prevent shingles from self-sealing during, or shortly after, installation.

If shingles have not sealed after a reasonable time period, *hand-sealing* (also called hand-tabbing) them underneath with quarter-size dabs of asphalt roof cement conforming to ASTM D4586 is strongly recommended.

Excessive use of the roof cement may cause blistering; correct amounts should not bleed out from under the shingle.

Note: Malarkey's wind warranties apply only when shingles are sealed, whether by hand-sealing or activation of the self-sealing strips. Failure to seal under adverse circumstances like those described above is not a manufacturing defect.

Normal rooftop traffic during the installation of shingles can result in footprints, drag marks, and scarring. Malarkey products are hardy and durable, but the manner in which they are installed may affect their appearance if done improperly. Malarkey is not responsible for objectionable appearance should this occur.

Always choose a reputable, bonded and insured contractor for installation of Malarkey roofing products.

4A.5 WARRANTIES

Malarkey shingles and accessories carry *Limited Lifetime* warranties and most offer *Enhanced Wind* and *Algae Resistance* warranties.

Malarkey recommends the owner retain a copy of the product warranty and proof of purchase. A copy of the proof of purchase will be required when filing claims.

Refer to Malarkey sample warranties in the *Warranties, Forms and Applications* chapter of this manual for warranty terms and conditions, or visit WWW.MALARKEYROOFING.COM/warranties.

4A.6 ROOF DECK REQUIREMENTS

The condition of the roof deck is critical to the installation of roofing materials and their appearance afterward. Take time to ensure the deck is sound, smooth

(free of protrusions), and meets adopted building code requirements. Sweep it clean of dirt and debris.

The surface to receive the new roofing should be in good shape and solidly sheathed, constructed of a minimum $\frac{3}{8}$ " (10 mm) thick, exterior-grade plywood, $\frac{7}{16}$ " (11 mm) thick oriented strand board (OSB), or seasoned lumber, 1" (25 mm) thick by 6" (152 mm) wide.

Malarkey strongly recommends installing sheathing when wood board decking is the existing substrate. Problems with the performance of your roofing system, such as leaks and buckling, increase if installed directly over wood board decks. Failure to use properly conditioned deck materials can result in deck movement which can damage the roof covering and may void your warranty.

Malarkey roofing products should only be installed over decks that can sufficiently support the weight of the roofing system and transient load during application of the roofing system.

Malarkey recommends removing the existing roof covering for best performance and appearance. When re-covering an existing shingle roof, evaluation of the existing weight and addition of the new Malarkey roof system must be considered relative to the load limitation of the roof deck and local code requirements.

4A.6.1 PLYWOOD/ORIENTED STRAND BOARD (OSB)

Designers and contractors should research and specify the correct thickness of the plywood or OSB deck based on the amount of roof load (weight of roofing materials and desired performance, etc.) and local building codes to ensure structural compliance and integrity.

Each panel of sheathing should be supported, gapped and securely nailed to all framing members per APA recommendations.

Plywood and OSB decking should be protected to prevent the accumulation of moisture on its surface prior to installation of the roofing assembly. This is shown to be effective in reducing delamination and dimensional stability issues attributed to plywood and OSB panels.

When plywood or OSB is installed over steel panels to provide a substrate to attach shingles, increase the thickness of the plywood/OSB or install furring strips between the steel deck and plywood/OSB to allow shingle fasteners either $\frac{3}{4}$ " (19 mm) penetration into the wood or penetration completely through the wood yet not come in contact with the steel deck. Shearing of the fasteners that hold the plywood in place can occur when the shingle fasteners "punch" the top flutes of the steel decking. Shingle fasteners may fail to fully seat or be underdriven should this occur.

4A.6.2 WOOD BOARD DECKS

As previously mentioned, Malarkey strongly recommends installing sheathing when wood board decking is the existing substrate due to problematic irregularities in their condition (gaps ¼" [6 mm] and greater, splits, cracks, deteriorated or rotted boards, etc.).

Wood board decks should be composed of solid-sawn dimensional lumber, seasoned, kiln dried or water-base-treated, and 1" (25 mm) thick by 6" (152 mm) wide.

Boards should be positioned tight to each other, properly supported, and securely nailed to framing members. Deteriorated or rotted boards should be replaced. For excessively resinous areas and loose knots, cover with sheet metal patches.

Wood board decking should be protected to prevent the accumulation of moisture on its surface prior to the installation of the roofing assembly.

Malarkey does not accept *skip sheathing* as an acceptable substrate to install Malarkey roofing systems unless overlaid with plywood or OSB and secured as outlined in *Plywood/Oriented Strand Board* section above.

Alternative decks: Contact Malarkey's Technical Services Department.

4A.7 SLOPE REQUIREMENTS

Roof decks to be shingled must have a minimum roof slope of 2" (51 mm) of *rise* per 12" (305 mm) of *run*.

Do not apply shingles on roofs having a slope less than 2" (51 mm) of *rise* per 12" (305 mm) of *run*.

4A.8 VENTILATION

Inadequate ventilation of attic areas can cause a buildup of moisture and heat. These conditions can cause:

- Picture framing of the decking (the visible outline of deck panels caused by irregularities in thickness)
- Accelerated roof weathering
- Deck rot and attic fungus
- Shingle distortion due to deck movement
- Blisters

Ventilation provisions must meet or exceed current FHA or HUD requirements.

FHA property standards require one square foot of free ventilation to each 150 ft² (1 m²/ 150 m²) of attic area or one square foot/300 ft² (1 m²/ 300 m²) if 50% is provided near the ridge.

All roof structures must be provided with thorough ventilation to prevent entrapment of moisture-laden air behind roof sheathing.

The following is a list of Malarkey's requirements regarding ventilation:

- Provide free airflow between the eaves and roof/ridge vents.
- Eaves and soffit vents should not be blocked by insulation.
- Vent openings should not be covered during the winter.
- Vent air from kitchens and bathrooms to the outdoors or install attic roof ventilators.
- Balance ventilation so Net Free Area intake equals Net Free Area exhaust. If soffit and roof/ridge vents in use, close off gable vents.

Vaulted or cathedral roofs can present ventilation problems due to their design. Malarkey recommends a means be found to provide ventilation from eave to ridge above the roof deck. This may include the installation of furring strips directly to the roof deck with additional plywood or OSB panels attached to the furring strips.

Please see the *Rigid Insulation and Venting* section below for further details or contact Malarkey Technical Services for more information.

4A.9 RIGID INSULATION AND VENTING

Rigid, above-roof-deck insulation can be used under Malarkey shingles, provided the nailable substrate above the roof insulation can be properly vented. A minimum airspace of 1" (25 mm) between the top of the insulation and the roof sheathing (or as required by your state or local building official), structurally supported by furring strips and installed to allow free air travel from the eave and/or soffit intake to the ridge vents, is one such method.

Malarkey recommends a thermal barrier (a low permeance underlayment or a gypsum roof utility board) be installed directly to the roof deck, staggered, and secured, before the installation of rigid roof insulation. This has been shown effective in reducing thermal transfer between the joints or gaps in the decking that cause picture framing of the nailable substrate on the furring strips.

Contact Malarkey Technical Services if you have questions regarding above-roof-deck rigid insulation.

4A.10 RADIANT BARRIERS

There are many kinds of radiant barriers. Those applied atop the roof deck may cause the shingles installed next to be damaged when nailing them because the radiant barrier creates a less rigid surface.

Due to the prevention of heat dissipation beneath the shingles by a radiant barrier, it may accelerate the aging of the shingles and reduce the life of the roof.

4A.11 SPRAY FOAM AND SIPS PANELS

The installation of spray foam directly to the underside of a roof deck or the use of SIPs panels will not allow proper ventilation and may result in condensation, picture framing, or premature deterioration of the shingles.

4A.12 EAVE AND RAKE DRIP EDGE FLASHING

In accordance with 2018 International Building Code, Section 1507.2.8.3, and 2018 International Residential (Building) Code, Section R905.2.8.5, *drip edge flashing* (drip edge, eave or rake metal, etc.) is required along the eave and rake edges of shingle roofs.

Install drip edge first along the eaves, and later on the rakes once the field underlayment has been applied.

4A.13 UNDERLAYMENTS

Underlayments are rolled membranes applied to the roof deck before finish roofing application and required prior to installation of Malarkey shingles.

Roof decks should be smooth, free of loose nails or other protrusions, and swept clean prior to installation. Always lay underlayment courses parallel to the eaves.

Your geographical location, weather, degree of roof slope, and type of roof covering will help determine which Malarkey underlayment is right for your situation. Consult local building code for additional guidance.

Note: Malarkey installation instructions include applications in regions regularly experiencing *ice dams* and those without.

MALARKEY SELF-ADHERING UNDERLAYMENTS FOR ICE AND WATER PROTECTION

In geographical regions regularly experiencing adverse weather (wind-driven rain, frigid temperatures, possibility of ice dams, etc.), a layer of a *self-adhering underlayment*, Malarkey's Arctic Seal® or Secure Start® HT² products (or equivalent underlayment conforming to ASTM D1970), is recommended. Their use may even be required for ice and water protection if local building code specifies.

Self-adhering underlayment (eave flashing) is installed directly to the roof deck, begins at the eaves and extends up the roof a minimum of 24" (610 mm)³

2 For ice and water protection under *metal* roofing, use Secure Start HT® rather than Arctic Seal®. It is high-temp tolerant and made for those conditions. Secure Start HT® is also intended for complete deck coverage under metal.

3 The 24-inch (610 mm) dimension is a requirement of both International Building Code and International Residential (Building) Code for ice barriers in geographic areas where there has been a history of ice forming along the eaves, causing a backup of water.

beyond the inside, warm interior wall of the house or above the expected level of ice dams or according to building code requirements.

Self-adhering underlayment can also be installed as a flashing membrane in areas susceptible to leaks such as roof valleys, roof deck-to-vertical transitions, and around vents, curbs, skylights and other roof penetrations.

For superior protection in coastal regions, other areas of wind-driven rain, double-slope construction, and mountain regions where ice damming can occur over the entire surface, Malarkey recommends installing a double layer of Arctic Seal® over the entire roof deck.

With a moisture vapor permeance of ≤ 0.1 U.S. perms, Arctic Seal® and Secure Start® HT products are water-proof, Class I impermeable vapor retarders. When using for full deck protection, make sure proper ventilation and moisture control issues are addressed to avoid water vapor condensation beneath the roof deck.

MALARKEY MECHANICALLY-ATTACHED, FIELD UNDERLAYMENTS

Malarkey's Right Start® UDL or our Secure Start® line of *field* underlayments are suitable for use as water-resistant underlayments or dry-in sheets in steep slope roofing applications with asphalt shingles, clay and concrete tile, specialty tiles, and wood shakes and shingles.

Right Start® is an SBS polymer modified, fiberglass underlayment while the Secure Start® line are synthetic. Secure Start® SG features smooth surfaces, top and bottom, which can help speed installation by lessening shingle drag. Secure Start® underlayments are also ideal under metal roofing and preferred for installation over vented nail base.

Malarkey field underlayments may be used over various combustible and non-combustible decks as the initial ply or multiple plies for a specified roof underlayment system.

Underlayment must be installed completely flat with no wrinkles or buckles. Right Start® should be allowed to relax before application to help prevent these conditions.

Fasten Right Start® sufficiently to hold in place and work safely until shingles are applied or according to adopted building code.

Fasten Secure Start® underlayments with plastic cap fasteners that have a nominal cap diameter of 1" (25 mm). Bullseye imprints on the material will guide fastening. Do not use staples without caps.

The number of fasteners and their spacing will depend on the climate region, degree of roof slope, how long the underlayment will be exposed, building code requirements, and safety.

Malarkey field underlayments are not intended as permanently-exposed roofing surfaces but can be left

uncovered for up to 90 days for Right Start® and 180 days for Secure Start® underlayments. However, good roofing practice dictates the finished roofing material be installed over underlayment as soon as possible to minimize the chance of damage, blow-off or leaks.

Other Instructions Common to the Installations that Follow:

- End laps in the same course should be 6" (152 mm), and staggered 6' (1.8 m) apart in subsequent courses.
- Extend field underlayments 6" (152 mm) over hips, ridges and valleys. Where the roof intersects a vertical surface, lap the underlayment a minimum of 3" (76 mm) up the wall and secure.
- Once an expanse of roof is covered by underlayment up to the ridge, apply drip edge flashing to the rakes, over the ends of underlayment.

4A.13.1 INSTALLATION IN NON-ICE DAM REGIONS

Roof Slopes 4:12 and Greater

Roof slopes 4:12 (4" [102 mm] per 12" [305 mm]) and greater require the installation of a single (1) layer of Malarkey's field underlayment or code-compliant equivalent over the entire roof deck.

Install the initial course flush to the eave and trim at the rake.

Continue working up the roof, subsequent courses overlapping the preceding by 2"-4" (51-102 mm), depending on the type of Malarkey underlayment being applied. (See Figure 1)

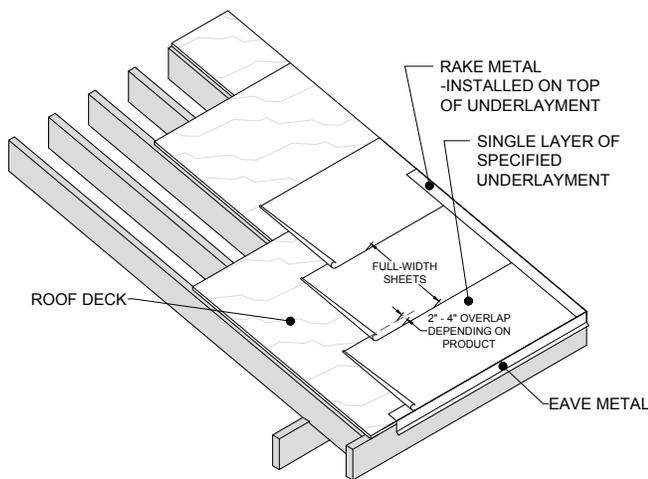


Figure 1 - Application of Field Underlayment on Roof Slopes 4:12 and Greater (Non-Ice Dam Regions)

Roof Slopes 2:12 up to 4:12

A *double layer* of Malarkey field underlayment (or other, code-complying underlayment) is required for slopes 2:12 (2" [51 mm] per 12" [305 mm]) up to 4:12 (4" [102 mm] per 12" [305 mm]).

If local building code has adopted 2015 or later IBC or IRC, a *single layer* of ASTM D1970 underlayment (Arctic Seal®, Secure Start® HT) is acceptable as an exception per the I-Codes.

For a double layer, start at a lower corner of roof and begin by applying a half-width *starter strip* of field underlayment along the eaves.

Follow by applying a full-width sheet on top, completely overlapping the starter course. Courses to follow are each half-lapped over preceding courses, on up the roof. (See Figure 2)

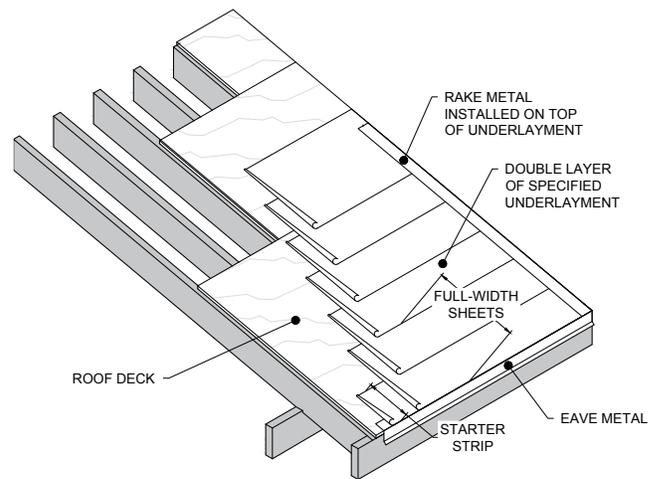


Figure 2 - Application of Field Underlayment on Roof Slopes 2:12 Up to 4:12 (Non-Ice Dam Regions)

4A.13.2 INSTALLATION IN ICE DAM REGIONS

Roof Slopes 4:12 and Greater

Roof slopes 4:12 (4" [102 mm] per 12" [305 mm]) and greater begin with a full-width course of Malarkey *self-adhering* underlayment (or equivalent compliant with ASTM D1970) along the eaves.

Extend courses up and out onto the roof a minimum of 24" (610 mm) beyond the inside, warm interior wall of the house or above the expected level of ice dams or according to building code requirements.

If additional courses of self-adhering underlayment are necessary to reach that point, *course lap guide lines* (lay lines) on the sheets show how far to lap the material. Firmly hand-roll these overlaps to ensure a complete, watertight bond.

Once past 24" (610 mm), follow with full-width sheets of your specified *field* underlayment, the first course lapped 6" (152 mm) over the termination of self-adhering underlayment, and the rest with 2"-4" (51-102 mm) side laps, on up the roof.

For extra protection at the eaves, install a minimum 6"-wide (152 mm) stripping ply of Arctic Seal® prior to installation of the drip edge and ensure it covers the junction of roof and fascia. (See Figure 3)

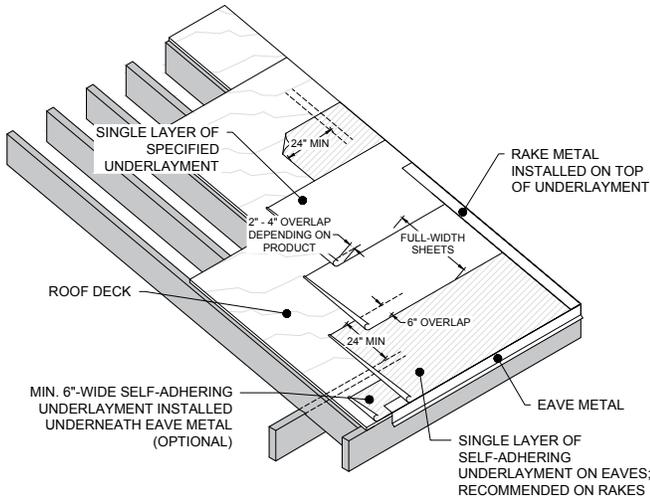


Figure 3 - Application of Self-Adhering and Field Underlayments on Roof Slopes 4:12 and Greater (Ice Dam Regions)

Roof Slopes 2:12 up to 4:12

Begin with a full-width sheet of self-adhering underlayment along the eaves. Continue installation up and out onto the roof as necessary to a point not less than 24" (610 mm) past the interior warm inside wall of the house or above the expected level of ice dams or according to building code requirements.

Once that point is reached, switch to *double layers* of your specified field underlayment, the first course a half-width *starter strip* lapped 6" (152 mm) over the termination of self-adhering underlayment.

Succeeding courses are full-width, the first course completely overlapping the starter, and followed by courses half-lapped over preceding courses, on up the roof.

(See Figure 4)

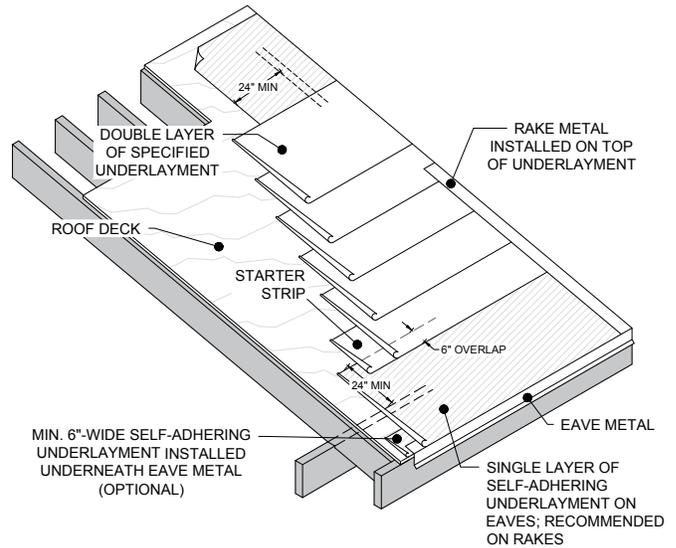


Figure 4 - Application of Self-Adhering and Field Underlayments on Roof Slopes 2:12 Up to 4:12 (Ice Dam Regions)

4A.14 SHINGLE FASTENING

Type of Fasteners: Fasteners must be minimum 12-gauge (0.105 inch [3 mm]) shank, galvanized steel, stainless steel, aluminum or copper roofing nails, with a 3/8" (10 mm) head, compliant with ASTM F1667, and of a length to penetrate through the roofing materials and at least 3/4" (19 mm) into the roof sheathing. Where the roof sheathing is less than 3/4" (19 mm) thick, the fasteners shall penetrate through the sheathing.

Malarkey approves the use of hand-nailing or pneumatic nailers, but nails must be driven flush to the shingle surface and not overdriven, underdriven or driven at an angle, especially on low slope installations where water runs off less freely and leaks could result. When fastening adjacent shingles, butt them loosely together to prevent buckling.

The use of staples is not an approved fastening method. (See Figure 5)

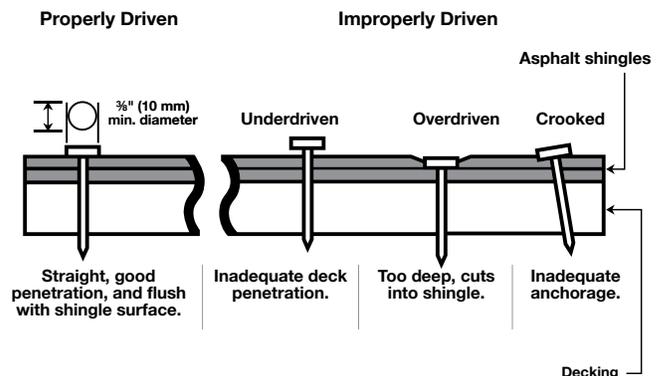


Figure 5 - Nailing Instructions

4A.14.1 ATTACHMENT OF TRADITIONAL 3-TAB SHINGLES

Under normal conditions, use four (4) fasteners for each full shingle.

Place fasteners above the cutouts and below the seal-down strip. Position the outside fasteners approximately 1" (25 mm) in from each end of the shingle and the two remaining nails above the cutouts and below the sealant. (See Figure 6)

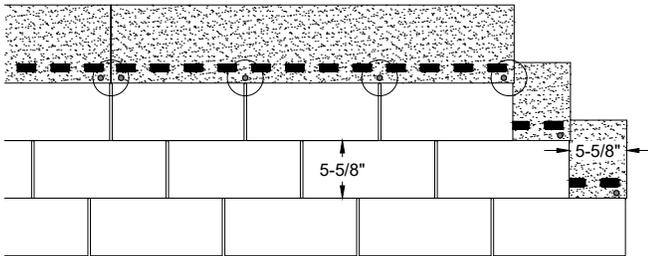


Figure 6 - 3-Tab, 4-Nail Fastening Pattern

Steep Slope Fastening of 3-Tab Shingles: Roof decks with slopes greater than 21" (533 mm) per 12" (305 mm) require installation with six (6) fasteners per shingle and *hand-sealing* of tabs.

Place fasteners above the cutouts and below the sealant strip, the outside fasteners approximately 1" (25 mm) in from each end of the shingle. Place the remaining four fasteners above the cutouts and below the sealant approximately 1" (25 mm) on each side of the cutouts. (See Figure 7)

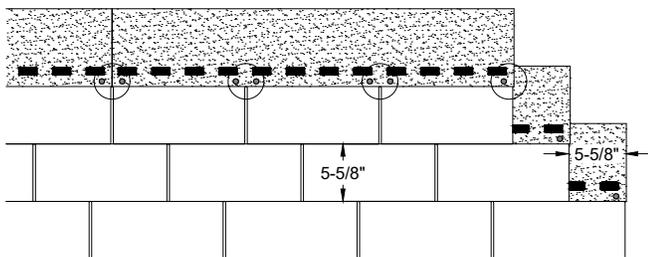


Figure 7 - 3-Tab, 6-Nail Fastening Pattern

To hand-seal a 3-tab shingle, apply a quarter-size dab of asphalt roof cement conforming to ASTM D4586 under each tab corner, and press shingles firmly into the cement. Excessive use may cause blistering; correct amounts should not bleed out from under the shingle. (See Figure 8)

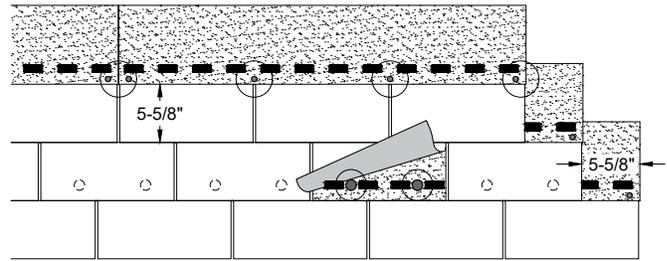


Figure 8 - Hand-Sealing 3-Tab Shingles

4A.14.2 ATTACHMENT OF LAMINATE SHINGLES

Use four (4) fasteners for each full shingle.

Malarkey laminate shingles feature The Zone[®], an enlarged, 1⁵/₁₆" (33 mm) wide *nailling area* that helps ensure correct fastener placement. Place fasteners in this nailing area approximately 1" (25 mm) in from each edge and the remaining fasteners evenly spaced between. (See Figure 9)

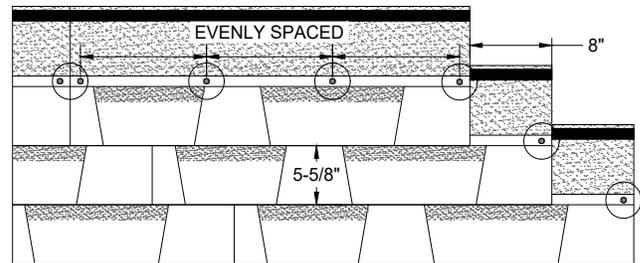


Figure 9 - Laminate, 4-Nail Fastening Pattern

Steep Slope Fastening of Laminate Shingles: Roof slopes greater than 21" (533 mm) per 12" (305 mm) require installation with six (6) fasteners per shingle and *hand-sealing*.

Two methods for fastening can be used, but for each, the outer fasteners must be placed in the nailing area approximately 1" (25 mm) in from each edge. The first method has the remaining four (4) fasteners also placed in the nailing area and evenly spaced between. (See Figure 10)

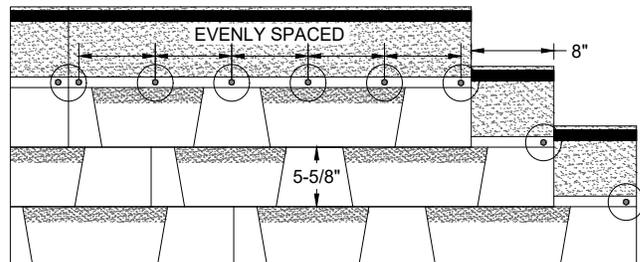


Figure 10 - Laminate, 6-Nail Fastening Pattern

The second, alternate way has the interior fasteners as indicated to accommodate shingle offsets and ensure no nail is less than 4" (102 mm) from the joint of the underlying shingles. (See Figure 11)

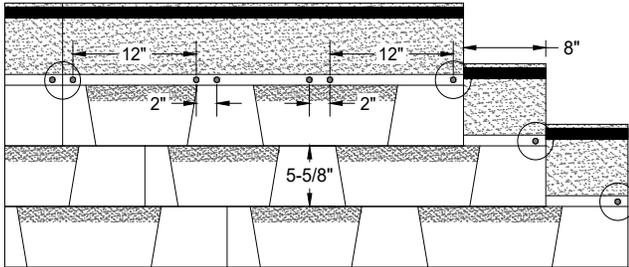


Figure 11 - Laminated, 6-Nail Alternate Fastening Pattern

To hand-seal a laminate shingle, apply four (4) quarter-size dabs of asphalt roof cement conforming to ASTM D4586 evenly spaced under each shingle. Press shingles firmly into the cement. (See Figure 12)

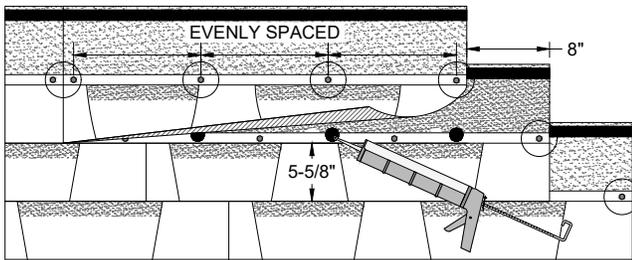


Figure 12 - Hand-Sealing Laminated Shingles

4A.14.3 ATTACHMENT OF WINDSOR® DESIGNER, OPEN TAB LAMINATE SHINGLES

Use five (5) fasteners for each full shingle, equally spaced across the shingle, and within the *high nailing area* designated by the parallel *nailing lines* (also called *paint lines*). Ensure the outer fasteners are placed 1" (25 mm) in from each edge. (See Figure 13)

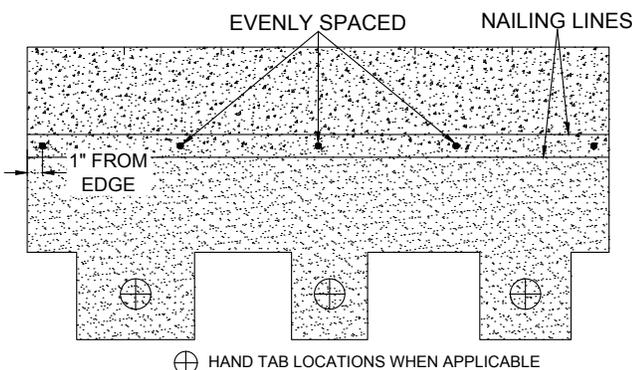


Figure 13 - Windsor®, 5-Nail Fastening Pattern and Hand-Tab Locations

In regions requiring six (6) nails per shingle, two methods can be used:

Method 1:

- Place four (4) fasteners in the high nailing area, equally spaced across the shingle, with the outer fasteners 1" (25 mm) in from each edge.
- Place two (2) fasteners in the *low nailing area*, no more than 1" (25 mm) from each edge, and approximately 3/4" (19 mm) above the tabs, making sure the fasteners will be covered by shingle tabs in the course above them. (See Figure 14)

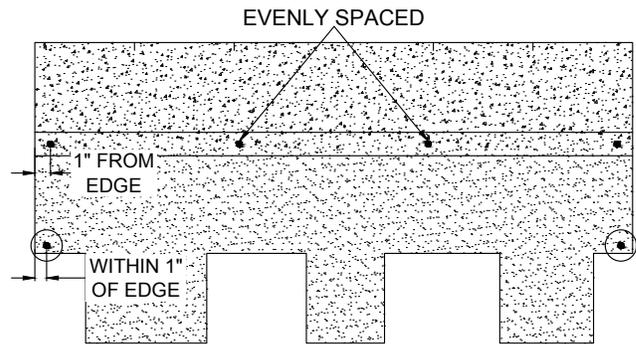


Figure 14 - Windsor®, 6-Nail Fastening Pattern

Method 2:

- Place two (2) fasteners in the high nailing area, each 1" (25 mm) in from the outside edge.
- Place four (4) fasteners in the low nailing area, approximately 3/4" (19 mm) above the tabs, making sure the fasteners will be covered by shingle tabs in the course above them.
- The two inner notches, or slits*, at the top of the shingle will aid in the alignment of the two middle fasteners while the two outer fasteners are placed 1" (25 mm) in from each edge. (See Figure 15)

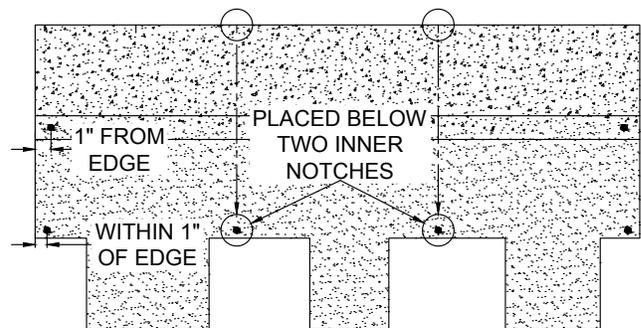


Figure 15 - Windsor®, 6-Nail Alternate Fastening Pattern

Steep Slope Fastening of Designer Shingles: Roof decks with slopes greater than 21" (533 mm) per 12" (305 mm) require installation with nine (9) fasteners per

shingle and *hand-sealing* of tabs (see Figure 12 for tab locations).

- Place five (5) fasteners in the high nailing area, equally spaced across the shingle, with the outer fasteners 1" (25 mm) in from each edge.
- Place four (4) fasteners in the low nailing area, approximately ¾" (19 mm) above the tabs, making sure the fasteners will be covered by shingle tabs in the course above them.
- The two inner notches at the top of the shingle will aid in the alignment of the two inner low nailing area fasteners while the two outer fasteners are placed 1" (25 mm) in from each edge. (See Figure 16)

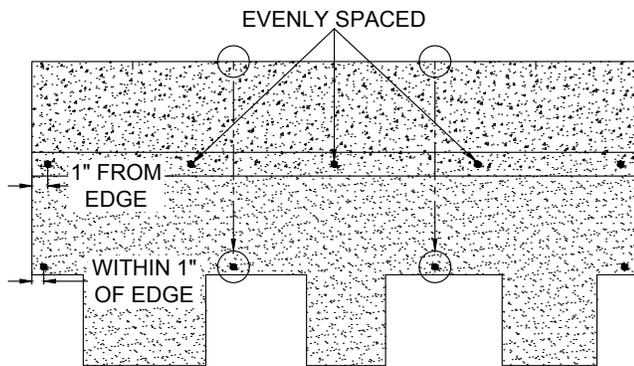


Figure 16 - Windsor®, 9-Nail Fastening Pattern

* Windsor® shingles have five (5) notches on the top of each shingle. The two outer notches are 6⅞" (162 mm) from each edge, two inner notches are each 12¾" (324 mm) from the edge, with the center notch at the center point, 19⅞" (486 mm) from the edges.

When it comes to applying Windsor® shingles (see the *Shingle Pattern Layouts* section below), the outer notches will play an important role for determining offsets and establishing a consistent diagonal pattern of shingles against the rake.

4A.14.4 WIND RESISTANCE AND HAND-SEALING

Malarkey shingles are manufactured with strips of a factory-applied, thermal sealant that is activated by the heat of the sun after the shingle is on the roof. Exposure to the sun's heat bonds each shingle to the one below for *wind resistance*.

A variety of conditions like cold weather, high winds or blowing dust, however, can affect the ability of the sealant strip to activate and prevent shingles from self-sealing during, or shortly after, installation. If shingles have not sealed after a reasonable time period, *hand-sealing* with dabs of asphalt roof cement conforming to ASTM D4586 is highly recommended.

Note: Malarkey's wind warranties apply only when shingles are sealed, whether by hand-sealing or

activation of the self-sealing strips. Failure to seal under adverse circumstances like those described above is not a manufacturing defect.

To ensure immediate adhesion or on roof decks with slopes greater than 21" (533 mm) per 12" (305 mm), hand-seal Malarkey 3-tab and laminate shingles as previously described.

Windsor® shingles require a single, quarter-size dab centered under each shingle tab (see Figure 12).

Press each shingle firmly into the cement. Correct amounts should not bleed out from under the shingle, and excessive use may cause blistering.

In some circumstances, a high solids sealant may be used. Consult Malarkey Technical Services when adverse conditions exist.

Increased Shingle Fastening: As mentioned previously, roof decks with slopes greater than 21" (533 mm) per 12" (305 mm) require shingles have an increased number of fasteners. See Malarkey's *Shingle and Accessory Warranty* online for any additional requirements related to specific coverages.

4A.15 SHINGLE PATTERN LAYOUTS AND APPLICATION

Important: The *diagonal* application procedures described below are necessary to prevent objectionable patterning. Malarkey is not responsible for such patterning on roofs where this diagonal application is not used. Exposures should be even along the courses as well, or an objectionable appearance may occur.

Malarkey Smart Start® Starter Shingles: Smart Start® starter shingles are designed to be separated lengthwise at a perforation so you get two, full-size starter shingles in one. The perforation is in the middle of the shingle, 8⅞" (208 mm) from each edge, and both pieces have seal-down strips. Besides eaves, it is recommended Smart Start® starter shingles be installed on the rake edges of roof to provide a clean edge and increase wind resistance.

The *Starter Course* instructions that follow are repeated in each of our shingle installations.

Starter Course: Install Malarkey Smart Start® starter shingles or equivalent conforming to ASTM D3462:

- Cut 6" (152 mm) off one end of the first starter shingle, and lay it on a lower corner of the roof, overhanging the rake and eave edges by ¼"- ¾" (6-19 mm).
- Ensure it is positioned with the factory-applied seal-down strip face up and the strip adjacent to the eave edge of roof.
- Fasten with 4 nails, 1½"- 3" (38-76 mm) up from the eave, with one fastener 1" (25 mm) from each side of the starter and the remaining two evenly

spaced on the same line as the end fasteners. Do not place fasteners in the seal-down strip.

- d. Continue across the eave with full-length starter shingles, butting them loosely together to prevent buckling.

4A.15.1 TRADITIONAL 3-TAB SHINGLE PATTERN LAYOUT (5⁵/₈" [143 MM] OFFSET, SEVEN COURSE DIAGONAL METHOD)

Install a *Starter Course* of shingles.

First Course of Shingles:

- a. Start the first course with a full-length shingle laid directly over the starter course.
- b. Begin at the same lower corner of roof and apply flush with the edges of the starter course on both eave and rake sides (maintaining the 1/4" - 3/4" [6-19 mm] roof overhang).
- c. Fasten as described in the *Shingle Fastening* section above.

Second through Succeeding Courses:

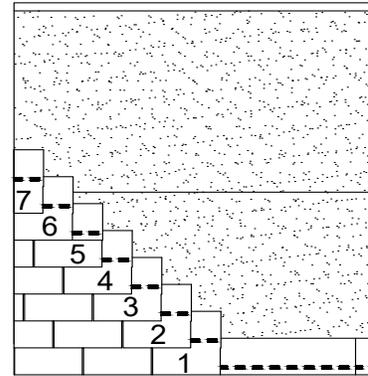
- a. Start the second course with a shingle from which 5⁵/₈" (143 mm) has been cut from one end.
- b. Position the remaining 33³/₄" (857 mm) piece over the underlying shingle, and align the bottom "butt" edge along a line level with the top of the cutouts in the preceding course, leaving an exposure of 5⁵/₈" (143 mm).
- c. Secure with fasteners.
- d. Start the third course with a shingle from which 11¹/₄" (286 mm) has been cut from one end; the fourth course with 16⁷/₈" (429 mm) cut off; the fifth course with 22¹/₂" (572 mm) cut off; the sixth course with 28¹/₈" (714 mm) cut off; and the seventh course with 33³/₄" (857 mm) cut off.

Pieces cut from shingles along the left rake can be used either to continue the diagonal installation pattern or finish off courses at the right rake.

- e. Apply a full-length shingle adjacent to each of the first seven courses to extend the pattern. Join the shingles loosely together to prevent buckling. Butt factory edge to factory edge when installing the stairstep method. This helps maintain a straight layout of the remaining shingles.
- f. The eighth course begins again with a full length shingle, so repeat the 1-to-7 course cycle on up the roof.
- g. Vertical chalk lines every 4 to 5 shingle lengths are recommended for alignment of cutouts.

Shingles may be laid from either lower corner of roof; follow layout and cutting instructions as required for proper application.

Note: Installation of shingles with a 4" (102 mm) offset (or "book") is also acceptable. Offsets must be no less than 4" (102 mm). (See **Figure 17**)



COURSES 1-7

- 1: 39-3/8" LONG
- 2: 33-3/4" LONG
- 3: 28-1/8" LONG
- 4: 22-1/2" LONG
- 5: 16-7/8" LONG
- 6: 11-1/4" LONG
- 7: 5-5/8" LONG

Figure 17 - 3-Tab Shingle Layout Pattern

4A.15.2 LAMINATE SHINGLE PATTERN LAYOUT (8" [203 MM] OFFSET, FIVE COURSE DIAGONAL METHOD)

Install a *Starter Course* of shingles.

First Course of Shingles:

- a. Start the first course with a full-length shingle laid directly over the starter course.
- b. Begin at the same lower corner of roof and apply flush with the edges of the starter course on both eave and rake sides (maintaining the 1/4" - 3/4" [6-19 mm] roof overhang).
- c. Fasten as described in the *Shingle Fastening* section above.

Second through Succeeding Courses:

- a. Start the second course with a shingle from which 8" (203 mm) has been cut from one end.
- b. Position the remaining piece over the underlying, first course shingle, and align the bottom edge along a line level with the "sawtooth" overlay, leaving an exposure of 5⁵/₈" (143 mm).
- c. Secure with fasteners.
- d. Courses three through five are begun with partial shingles, each progressively 8" (203 mm) shorter, establishing the overall diagonal pattern.

Pieces cut from shingles along the left rake can be used either to continue the diagonal installation pattern or finish off courses at the right rake.

- e. Apply a full-length shingle adjacent to each of the first five courses to extend the pattern. Join the shingles loosely together to prevent buckling.

Always butt factory edge to factory edge when installing the stairstep method. This helps maintain a straight layout of the remaining shingles.

- f. The sixth course begins again with a full length shingle, so repeat the 1-to-5 course cycle on up the roof.
- g. Horizontal chalk lines every 5 to 6 courses are recommended to ensure straight courses.

Shingles may be laid from either lower corner of roof; follow layout and cutting instructions as required for proper application.

Note: Other shingle offsets are acceptable but no less than 4" (102 mm). **(See Figure 18)**

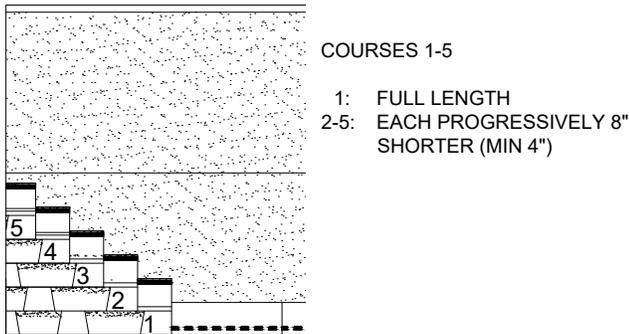


Figure 18 - Laminated Shingle Layout Pattern

4A.15.3 WINDSOR® DESIGNER SHINGLE PATTERN LAYOUT (6³/₈" [162 MM] OFFSET, FOUR COURSE DIAGONAL METHOD)

Install a *Starter Course* of shingles.

Windsor® Starter Course:

- a. Cut 6³/₈" (162 mm) off one end of the first Windsor® Starter shingle, and lay it over the Smart Start™ starter, positioning the Windsor® so the full color blend overhangs the Smart Start™ starter by approximately 1¹/₈" (3 mm).
- b. Install with four (4) fasteners in-between the paint lines, approximately 1" (25 mm) from each side of the starter and the remaining two evenly spaced.
- c. Continue across the eave with full-length Windsor® Starter shingles, butting them loosely together to prevent buckling.

First Course of Shingles:

- a. Start the first course with a full-length shingle laid directly over the starter course.
- b. Begin at the same lower corner of roof and apply flush with the edges of the Windsor® Starter course on both eave and rake sides (maintaining the 1¹/₈" [3 mm] overhang of the Smart Start® starter).
- c. Fasten as described in the *Shingle Fastening* section above.

Second Course:

- a. Start the second course with a shingle from which 6³/₈" (162 mm) has been cut from one end.
- b. Position the remaining 31⁷/₈" (810 mm) piece over the underlying, first course shingle, and align flush with the rake edge. Another way to position it is to align the right side with the right outside notch in the underlying first course shingle.
- c. Position the bottom edge of the shingle tabs along a line level with the top edge of the cutouts in the preceding course, leaving an exposure of 5³/₄" (146 mm).
- d. Secure with fasteners.

Third Course:

- a. Start the third course with a shingle from which 12³/₄" (324 mm) has been cut from one end.
- b. Position the remaining 25¹/₂" (648 mm) piece over the underlying, second course shingle, and align flush with the rake edge. Another way to position it is to align the right side with the right outside notch in the underlying second course shingle.
- c. Position the bottom edge of the shingle tabs along a line level with the top edge of the cutouts in the preceding course, leaving an exposure of 5³/₄" (146 mm).
- d. Secure with fasteners.

Fourth Course:

- a. Start the fourth course with a shingle from which 19¹/₈" (486 mm) has been cut from one end (i.e., cut the shingle in half).
- b. Position the remaining 19¹/₈" (486 mm) piece over the underlying, third course shingle, and align flush with the rake edge. Another way to position it is to align the right side with the right outside notch in the underlying third course shingle.
- c. Position the bottom edge of the shingle tabs along a line level with the top edge of the cutouts in the preceding course, leaving an exposure of 5³/₄" (146 mm).
- d. Secure with fasteners. **(See Figure 19)**

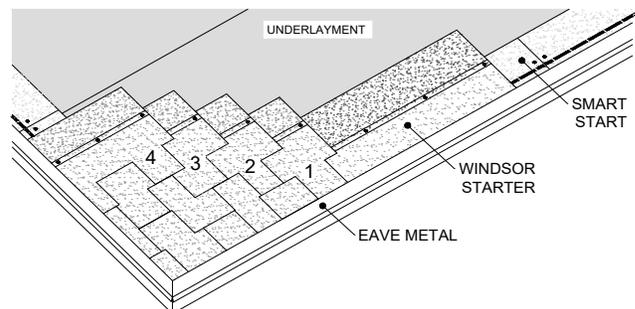


Figure 19 - Windsor® Shingle Layout Pattern with Smart Start® and Windsor® Starter Shingles

Prior to proceeding with the fifth course, fill in the preceding courses with full length shingles adjacent to the first pieces. Secure with fasteners. When positioning and fastening adjacent shingles, butt them loosely together to prevent buckling.

Courses Five and Above: To continue the installation on up the roof, repeat the diagonal pattern established in courses 1-4. Snap a horizontal chalk line every six courses or so to maintain satisfactory horizontal alignment.

Shingles may be laid from either lower corner of roof; follow layout and cutting instructions as required for proper application. If starting from the right rake, position the left side of cut shingles with the left outside notch in shingles of underlying courses.

Unlike 3-tab and laminate installations, pieces cut from Windsor® shingles along the left rake *can only be used* to finish off courses at the right rake. Due to Windsor®'s unique tab patterning, they cannot be used to continue the diagonal installation pattern up the left rake.

Note: Straight up application of shingles, or *racking*, is not recommended.

4A.16 VALLEYS

4A.16.1 VALLEY UNDERLAYMENT

Similar to a roof deck being prepared for shingles by first applying an underlayment, roof valleys must be likewise prepared before they can be “constructed” with shingles.

Center a full-width strip of self-adhering underlayment (or equivalent conforming to ASTM D1970) in the valley, and apply it directly to the roof deck. Ensure this *valley liner* is tight to the deck without bridging in the center of the valley.

Field underlayment can be woven across the valley liner and up the opposite side at least 12" (305 mm) or lapped over each side a minimum of 6" (152 mm). When fastening, be aware no fasteners are allowed within 6" (152 mm) of the valley centerline.

Four (4) types of valley construction are recommended by Malarkey Roofing Products®:

- Woven: 3-tab shingles only
- Closed-Cut: 3-tab, laminates, and Windsor® shingles (contact Malarkey Technical Services for help with Windsor®)
- Open Metal (3-tab, laminates, and Windsor®)
- Open Membrane (3-tab and laminates)

Valley underlayment must be in place for each method described below.

4A.16.2 WOVEN VALLEY (3-TAB ONLY)

Lay a first course of shingles along the eave on one side of the roof, and continue it across the valley and onto the adjoining roof at least 12" (305 mm). Do not make a joint in the valley. Should a shingle fall short, add-in one or two tab sections so the joint falls outside the line of the valley.

Press the shingles well into the break of the valley, and nail using normal fastening methods, remembering no fasteners are allowed closer than 6" (152 mm) to the valley centerline. Besides the nails used to secure the shingle, add another in the upper corner at the end of each shingle crossing the valley.

Repeat these procedures with the first course of shingles on the *intersecting* roof, extending it across the valley, over the top of the shingles laid before, and at least 12" (305 mm) onto the other roof surface. Press into the valley, and fasten as before.

Continue with successive courses, alternating from one adjoining roof surface to the other, weaving valley shingles over each other until the top of the valley is reached. (See Figure 20)

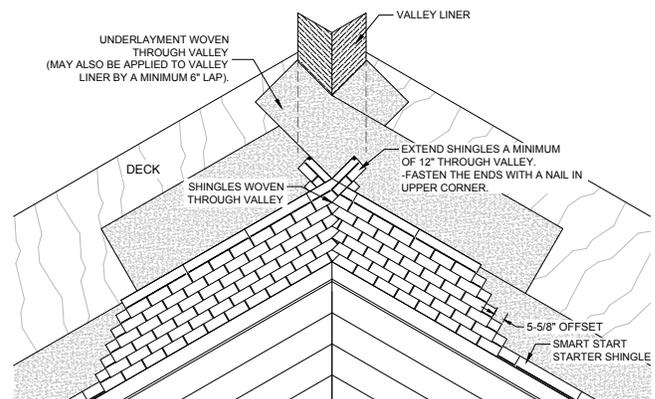


Figure 20 - 3-Tab Woven Valley Application

4A.16.3 CLOSED-CUT VALLEY (3-TAB, LAMINATES, AND WINDSOR® SHINGLES)

Lay a first course of shingles along the eave on one side of the roof, and continue it across the valley and onto the adjoining roof at least 12" (305 mm). Do not make a joint in the valley.

Should a shingle fall short, add-in one or two tab sections so the joint falls outside the line of the valley.

Press the shingles well into the break of the valley, and nail using normal fastening methods, remembering no fasteners are allowed closer than 6" (152 mm) to the valley centerline.

Besides the nails used to secure the shingle, add another in the upper corner at the end of each shingle crossing the valley.

Repeat these procedures with the first course of shingles on the *intersecting* roof, extending it across the valley, over the top of the shingles laid before, and at least 12" (305 mm) onto the other roof surface. Press into the valley, and fasten as before.

Note: The first course of shingles are the only ones woven in this fashion.

Return to the side of the roof you began with, and resume laying shingle courses across the valley and onto the adjoining roof at least 12" (305 mm).

Complete the installation of shingles on that roof section.

Snap a chalk line 2" (51 mm) from the centerline of the valley on the unshingled side.

Begin applying shingle courses on the unshingled side, trimming them diagonally to match the centerline angle, and cropping the upper corner of the last shingle at a 1" (25 mm), 45 degree cut. Doing this will direct water into the valley.

Embed the ends of the cut valley shingles in a continuous, 3" (76 mm) wide bead of asphalt roof cement conforming to ASTM D4586, and press them into the adhesive.

Complete the installation of shingles on that roof section. (See Figure 21)

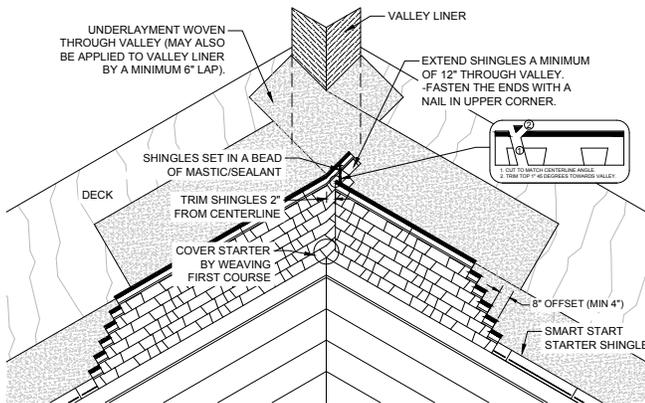


Figure 21 - Laminate Closed-Cut Valley Application

4A.16.4 OPEN METAL VALLEY (3-TAB, LAMINATES, AND WINDSOR® SHINGLES)

Metal valley flashing ("valley metal") used with Malarkey shingles must be minimum 24" (610 mm) wide and 26 gauge. Preformed "W"-shaped flashing is recommended.

Install valley metal over the valley liner, and secure with fasteners no more than 1" (25 mm) from the outside edges at a spacing of 10" (254 mm) to 12" (305 mm) O.C.

Overlaps in the metal should be a minimum of 4" (102 mm) and embedded in a continuous bead of sealant. **DO NOT FASTEN THE METAL LAP.**

For additional sealing, a 6"-wide (152 mm) strip of self-adhering Arctic Seal® may be applied to each side of the valley metal, covering the fasteners.

Never use a shingle trimmed to less than 12" (305 mm) in length to finish a course running into a valley. If necessary, trim a tab off the adjacent shingle in the course to allow a longer portion to be used. Make sure each shingle extends far enough into the valley so in a future step, a shingle's full width (or height) will be trimmed back.

Nail no closer than 6" (152 mm) to the valley centerline.

Now, trim shingles a minimum of 2" (51 mm) back from the centerline, cut the ends diagonally to match the centerline angle, and crop the top of each shingle at a 1" (25 mm), 45 degree cut.

Embed the ends of the cut valley shingles in a continuous 3" (76 mm) wide bead of asphalt roof cement conforming to ASTM D4586, and press them into the adhesive. (See Figure 22)

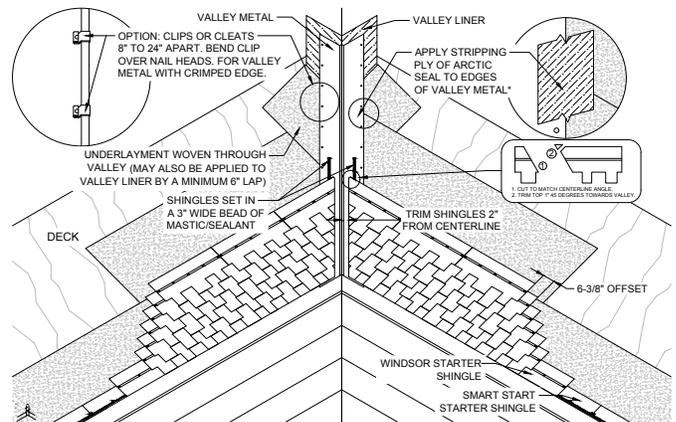


Figure 22 - Windsor® Open Metal Valley Application

4A.16.5 OPEN MEMBRANE VALLEY (3-TAB AND LAMINATES)

Install two (2) layers of 350 Paragon® CHROMA Cap fiberglass roll roofing membrane, centered in the valley, and secure with 1" (25 mm) metal cap fasteners, 1" (25 mm) from each side of the membrane. First layer must be a minimum of 18" (457 mm) wide.

Nail no closer than 6" (152 mm) to the centerline.

If possible, install the membrane in the valley in a single piece to eliminate overlaps. If they cannot be avoided, overlaps should be 6" (152 mm) and embedded in a continuous bead of sealant. **DO NOT FASTEN THE MEMBRANE LAP.**

Remaining procedures are the same as for open metal valleys above.

4A.17 FLASHINGS

4A.17.1 INTERSECTIONS OF ROOF AND VERTICAL SIDEWALL

Minimum 26-gauge, metal step flashing is used in the junction between a sloping roof and intersecting sidewall (on a dormer, for example) to protect this vulnerable area from moisture intrusion.

Step flashing can be square or rectangular, but 8-inch by 8-inch (203 mm x 203 mm) dimensions are common and satisfactory for our purposes. Being 8" wide allows the flashing to be bent 90° and pushed against the transition of roof to wall, the horizontal flange extending 4" (102 mm) out onto the roof deck and the vertical flange, 4" (102 mm) up the wall assembly. Being 8" long allows individual step flashing pieces to overlap each other in water-shedding fashion as they are installed.

One piece of step flashing is integrated with each course of shingles as they are applied to intersect the sidewall. A 1/4" - 3/4" (6 - 19 mm) gap between the shingles and vertical bend of the flashing is recommended.

To allow for possible differential movement, *fasten each piece of step flashing to the roof deck* and not the sidewall.

Installation is as follows:

- Atop the starter course at the eave, place the first piece of step flashing*. The horizontal flange should be flush with the eave edge of the starter and the vertical flange against the sidewall, counter-flashed by the wall cladding.
- Fasten the horizontal flange of the step flashing to the roof deck with two nails placed 1" (25 mm) from the upper edge.
- Lay a first course shingle down on the roof, positioning it close to the sidewall but leaving a 1/4" - 3/4" (6-19 mm) gap between the end of the shingle and vertical bend in the step flashing. Fasten in place. The horizontal flange of the flashing will no longer be visible, but you can still see the vertical flange along the sidewall.
- Place the second step flashing atop the first course shingle and position it up from the eave edge of the shingle, matching the shingle exposure, and fasten as before.
- Lay a second course shingle on the roof, position leaving a gap, and fasten.
- Place the third step flashing atop that, overlapping the end of the previous step flashing at the point of shingle exposure (overlap is typically 2" [51 mm]).

- Continue like this on up to the top of the wall intersection, alternating between the placement of step flashing and shingles.

Note: Because a Windsor roof has two starter courses (Smart Start® and Windsor® Starter), the second step flashing would be placed atop the Windsor Starter®, the third atop the first course shingle, and so on.

The final step for 3-tab roofs is to carefully lift the lower corner of every shingle closest to the sidewall, and hand-seal them to the flashing below.

Note: Any time the flanges of flashing cover the seal-down strips of shingles on a 3-tab roof, the course of shingles above needs to be hand-sealed to the flashing below. Doing so protects the shingles from blow-off in high winds.

* The "first piece of flashing" in this instance might well be "kickout" flashing, a piece of flashing cut and angled to direct water out and away from the side of a structure.

To accommodate the angled part, yet still serve as the initial piece of step flashing, the kickout will likely have a greater length than a regular piece of step flashing. (See **Figure 23**)

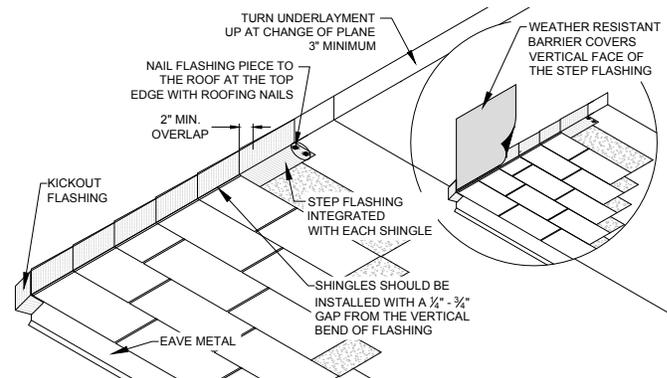


Figure 23 - Step Flashing Application at Roof-to-Sidewall Transitions

4A.17.2 VENT PIPE (AND OTHER FLANGED PENETRATION) FLASHING

Install shingle courses up to the vent pipe, and cut a hole in the shingle to be positioned over the pipe. Install the pipe jack or boot (top and side flanges may be set in sealant).

Additional, *optional* weatherproofing: Unexposed pipe jack flanges (top and both sides) may be stripped-off with minimum 6" (152 mm) wide Arctic Seal®, covering all fasteners used to secure the flanges, and tying onto the field underlayment a minimum of 3" (76 mm).

Continue roofing around the pipe, cutting shingles to fit on the sides and top of the pipe jack flanges. Ensure shingles extend beyond the downslope side of the pipe itself.

Shingles that overlap any part of the flanges should be sealed to the flange with asphalt roof cement conforming to ASTM D4586. Correct amounts should not bleed out from under the shingles; excessive use may cause blistering. Apply pressure to seal.

(See Figure 24)

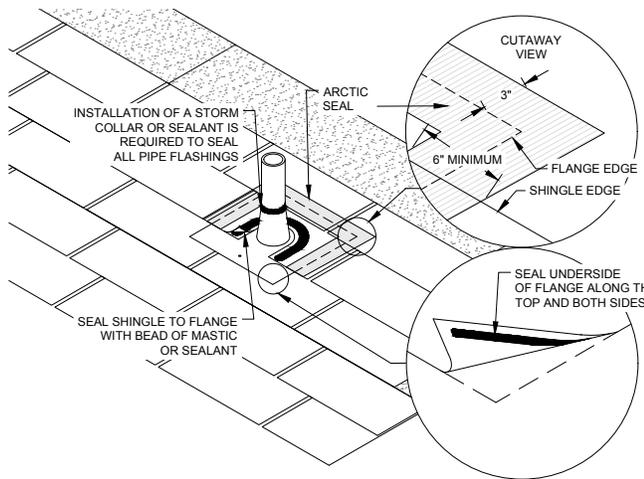


Figure 24 - Vent Pipe Flashing Application

4A.17.3 CAP (COUNTER) AND CHIMNEY FLASHINGS

The metal flashing *apron* for the front of the chimney shall be installed over the last course of shingles below the chimney and its vertical flange extending up the face of the chimney.

The metal flashings of chimneys, skylights, vents, and adjoining walls must be counter-flashed with sheet metal *cap flashing*.

Cap flashing (also called *counter flashing*) should originate in the masonry mortar joints of the chimney and be mortared-in or caulked with urethane sealant to ensure a watertight connection.

Cap flashing should then turn down the chimney and extend a minimum of 2" (51 mm) over the step flashings at all roof-to-sidewall intersections.

(See Figure 25)

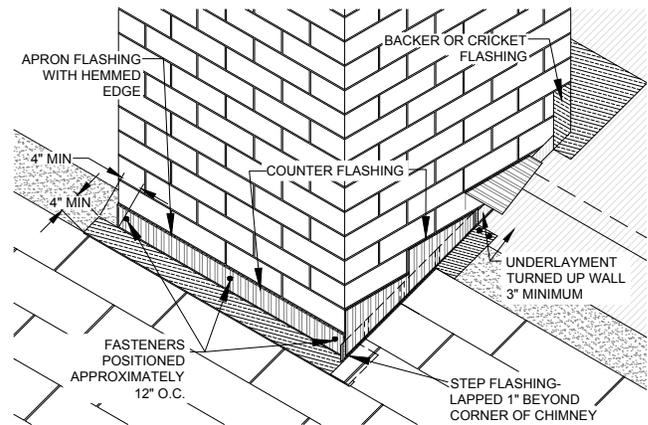


Figure 25 - Chimney Apron and Cap Flashing Applications

4A.17.4 CHIMNEY SADDLES AND CRICKETS

Apply Arctic Seal® self-adhering underlayment (or equivalent conforming to ASTM D1970) atop chimney saddles prior to the installation of flashing assemblies.

Flashing for chimney saddles and crickets shall be minimum 26-gauge galvanized or stainless steel, designed to cover the entire surface, and extend vertically 4" (102 mm) up the chimney.

Install a bead of mastic on the edges of chimney saddles and crickets. Press overlapping shingle courses into the mastic to seal. Seal all relief cuts and corners. (See Figure 26)

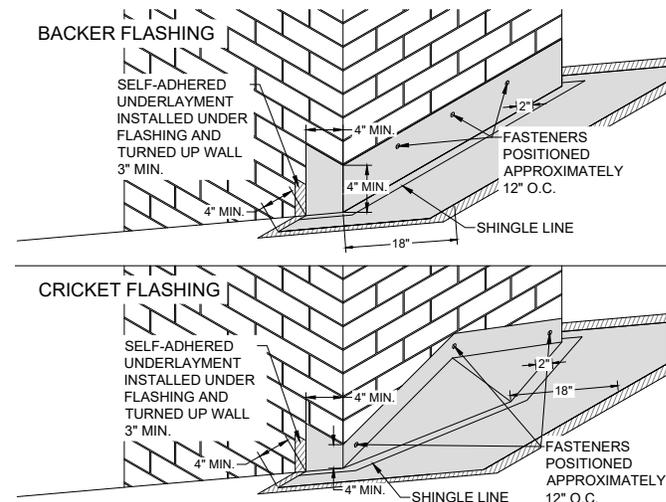


Figure 26 - Chimney Saddle and Cricket Flashing Applications

4A.18 HIP AND RIDGE SHINGLES

Factory-produced, Malarkey hip and ridge shingles are recommended for all Malarkey shingle roofs. When bundled with other Malarkey products to form a complete roofing system, enhanced warranties are available.

Shingles with Scotchgard™ Protector from 3M require hip and ridge shingles with Scotchgard™ Protector be installed with them to receive Malarkey's 20-year Scotchgard™ Protector Warranty. All four of Malarkey's hip and ridge shingle types feature this protection.

Malarkey hip and ridge shingles also include a factory-applied, thermally activated seal-down adhesive that provides additional protection against blow-off. When applied in cold weather or a windy location, however, it is recommended each ridge shingle be hand-sealed under each lower corner with a quarter-size spot of asphalt roof cement conforming to ASTM D4586.

To avoid damage to hip and ridge shingles in cold weather, Malarkey recommends warming them sufficiently to prevent damage during installation.

4A.18.1 LOW-PROFILE INSTALLATION (10" AND 12" RIDGEFLEX® HIP AND RIDGE SHINGLES)

Prepare for application by separating each hip and ridge shingle at the perforations: The 10" RidgeFlex® shingle produces four (4) individual hip and ridge strips (see Figure 27), and the 12" RidgeFlex® shingle produces three (3) (see Figure 28). Note the presence of their seal-down strips.

Each scored strip is 13¼" (337 mm) tall and has an exposure of 5⅝" (143 mm). You will be installing these individual pieces, and all are installed sealant side up.

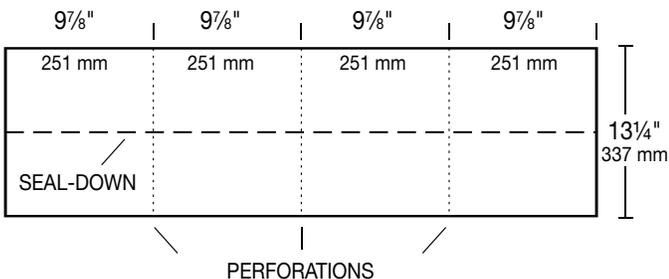


Figure 27 - 10" RidgeFlex® Hip and Ridge Shingle

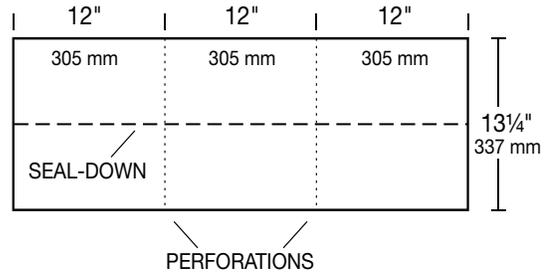


Figure 28 - 12" RidgeFlex® Hip and Ridge Shingle

Detail drawings to follow in this section show the installation of hip and ridge shingles along a roof ridge, but hips are essentially the same.

Application begins at the bottom of the hip or from the end of the ridge opposite the direction of prevailing winds with a hip and ridge starter shingle.

RidgeFlex® Starter Shingle: Create a starter shingle by cutting off the 5⅝" (143 mm) exposed portion of a RidgeFlex® shingle strip, and using the 7⅝" (194 mm) remainder as a starter. (See Figure 29)

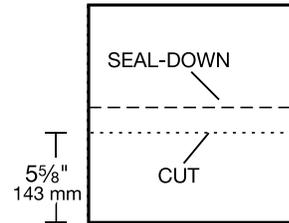


Figure 29 - RidgeFlex® Shingle Strip for Use as a Hip and Ridge Starter Shingle

Apply the starter shingle (with sealant adjacent the roof edge) over the bottom corner of the hip or on either end of the ridge, overhanging the corner or end by ¼"-¾" (6-19 mm), and bending the starter shingle along its centerline to form into place (ensure shingles are sufficiently warm to avoid cracking).

Fasten with two nails, approximately 3" (76 mm) back from the leading edge and 1" (25 mm) up from each side. (See Figure 30)

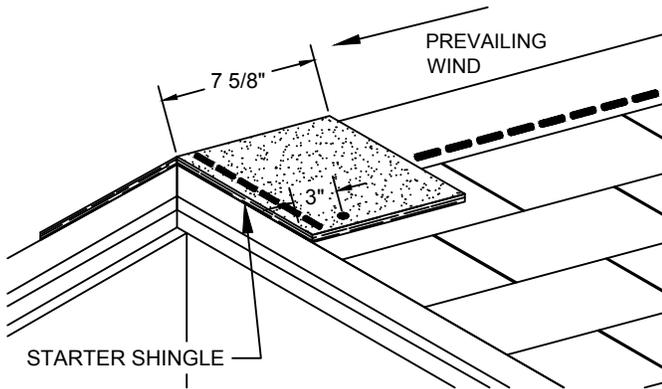


Figure 30 - Placement and Fastening of the RidgeFlex® Starter Shingle

RidgeFlex® Hip and Ridge Shingles: Lay the first full-size shingle on top of the starter shingle (maintaining the overhang). Fasten with two nails, 1" (25 mm) more than the designed exposure and 1" (25 mm) up from each side so succeeding hip and ridge shingles conceal nailheads.

To aid installers for determining the *exposed* portion of a RidgeFlex® shingle, it's manufactured with a paint line in the headlap area, *opposite* the exposed portion. (See Figure 31)

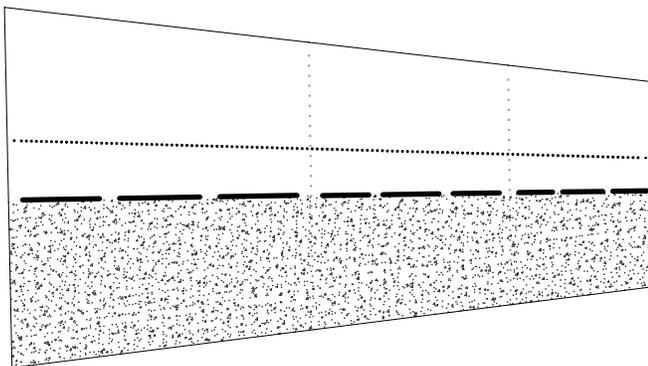


Figure 31 - Paint Line in Headlap Area of Shingle Is Opposite the Exposed Portion

Continue installing shingles across the ridge, maintaining the exposure of 5 5/8" (143 mm) and fastening with one nail to a side. (See Figure 32)

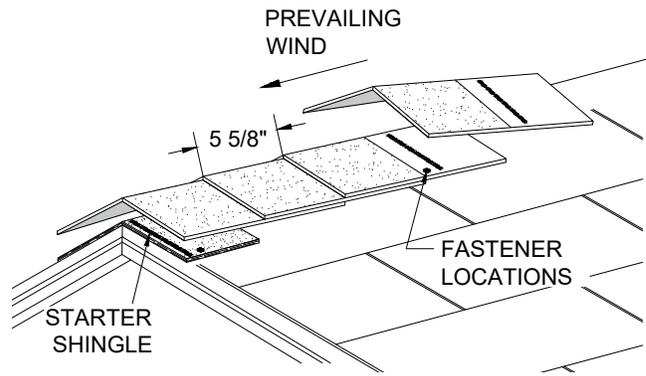


Figure 32 - Placement and Fastening of RidgeFlex® Shingles, Maintaining the 5 5/8" Exposure

At the end of the ridge, cut a shingle strip, and use the 5 5/8" (143 mm) exposed portion of a RidgeFlex® shingle to create an *end cap*, maintaining the exposure of 5 5/8" (143 mm). Trim to fit and set the end cap in asphalt roof cement conforming to ASTM D4586, and press down firmly to seal. (See Figure 33)

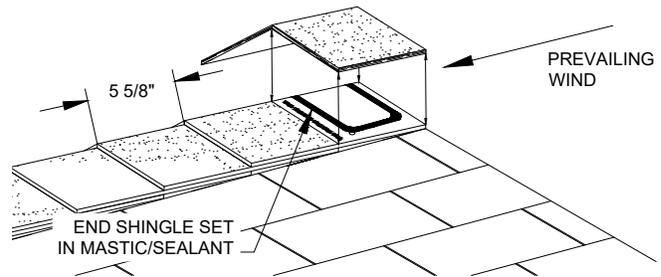


Figure 33 - Installation of RidgeFlex® Shingles; End Cap Set in Mastic

Should adverse conditions exist (like high winds), the end cap can also be face-nailed. Place two (2) nails on each side, 1" (25 mm) back from each end, and 1" (25 mm) up from the sides. Cover the nailheads with a dab of sealant.

4A.18.2 HIGH-PROFILE INSTALLATION (EZ-RIDGE® AND EZ-RIDGE® XT HIP AND RIDGE SHINGLES)

High-profile ridge shingles are recommended to accompany laminates and Windsor® shingle applications, but Malarkey RidgeFlex® shingles may also be used.

Given the added thickness of EZ-Ridge® shingles, ensure your fasteners are long enough to penetrate all layers and at least 3/4" (19 mm) into the roof sheathing. Where the roof sheathing is less than 3/4" (19 mm) thick, the fasteners shall penetrate through the sheathing.

Detail drawings to follow in this section show the installation of shingles on a roof ridge, but hips are essentially the same. Instructions for application along rake edges are at the end of the section.

Application begins at the bottom of the hip or from the end of the ridge opposite the direction of prevailing winds with a *starter shingle*.

EZ-Ridge® Starter Shingle: To create an EZ-Ridge® starter shingle, cut off the 8¼" (210 mm) *exposure* portion of the shingle, and use the remaining 3¼" (83 mm) *cutout* portion (with sealant strip) as the starter. (See Figure 34)

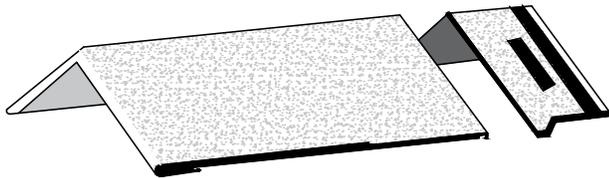


Figure 34 - Cutting an EZ-Ridge® Shingle to Make a Hip and Ridge Starter Shingle

Save the exposure portion because it can be used as the *end cap* on the opposite end of the ridge.

Note: The longer strip on the end of EZ-Ridge® shingles is a film strip that prevents the shingles from sticking together while in the box they're packaged in. It is not designed to be removed.

Place the EZ-Ridge® starter shingle flush to the rake at the peak, and position it so the seal-down strip is nearest the roof edge. Push down on the center of the shingle and adjust to fit the pitch of the roof.

Fasten with two (2) nails, one (1) on each side, ¾" (19 mm) behind the cutout and ½" (13 mm) up from the side. If installed correctly, the fasteners should be covered by the overlaying EZ-Ridge® shingles to come, leaving none exposed.

EZ-Ridge® Hip and Ridge Shingles: Apply a full-size shingle over the starter, and overhang the end of the ridge by ¼" - ¾" (6-19 mm). Push down on the center of the shingle and adjust to fit the pitch of the roof.

Fasten this shingle and those to follow with two (2) nails, one (1) on each side, ¾" (19 mm) behind the cutout (i.e., not on the exposed part of the shingle) and ½" (13 mm) up from the side.

Continue installing EZ-Ridge® shingles across the ridge, overlapping each with the side cutouts of the underlying shingle, and producing a consistent exposure of 8¼" (210 mm). Fasten in the same manner as the first. (See Figure 35)

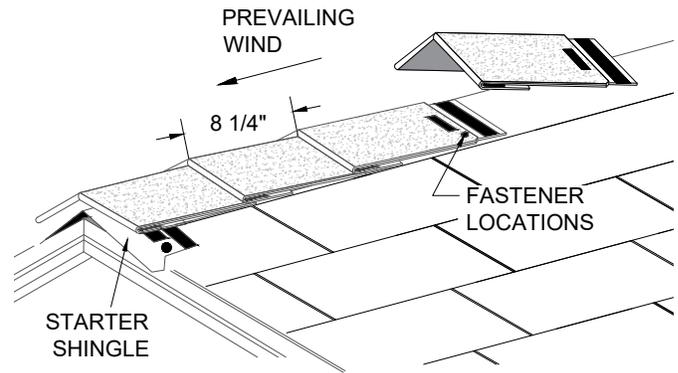


Figure 35 - Placement and Fastening of EZ-Ridge® Shingles, Maintaining the 8¼" Exposure

For the last hip and ridge shingle in the run, remove the cutout portion of an EZ-Ridge® shingle and trim the exposure portion to fit or use the exposure portion of the shingle you cut earlier when creating the starter.

Set this *end cap* in asphalt roof cement, maintaining the 8¼" (210 mm) exposure. (See Figure 36)

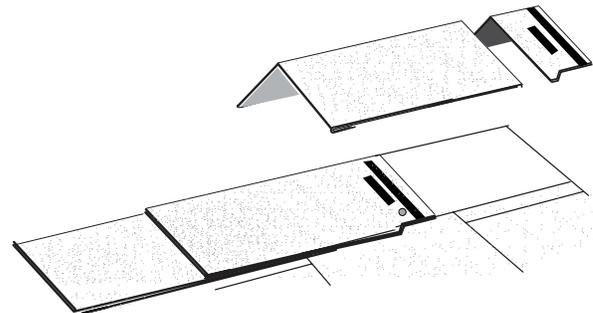


Figure 36 - End Cap Cut to Fit and Set in Mastic

Should adverse conditions exist (like high winds), the end cap can also be face-nailed. Place two (2) nails on each side, 1" (25 mm) back from each end, and 1" (25 mm) up from the sides. Cover the nailheads with a dab of sealant.

Note: The end cap can also be flipped around to preserve the high-profile appearance at the rake edge of the roof. Position it to overhang the end of the ridge by ¼" - ¾" (6-19 mm). (See Figure 37)

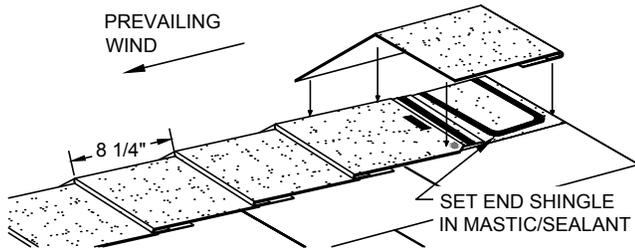


Figure 37 - Optional Positioning and Fastening of EZ-Ridge® End Cap

EZ-RIDGE® RAKE EDGE INSTALLATION

Instructions are the same as those above with these exceptions:

1. Always start at the low end of the roof.
2. Have the high-profile, finished end of EZ-Ridge® shingles in the lowest position.
3. Note: Installation with exposed nails may affect the aesthetic appeal of EZ-Ridge® shingles.

(See Figure 38)

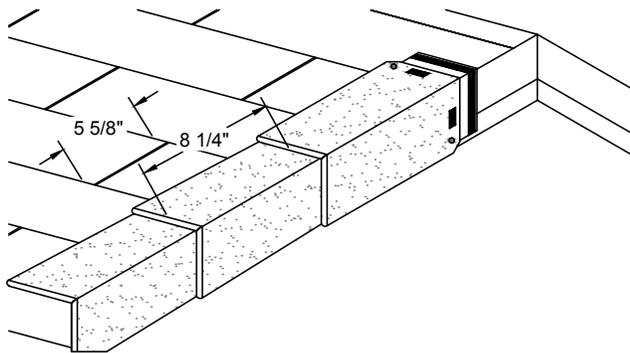


Figure 38 - Installation of EZ-Ridge® Shingles on Rake Edges of the Roof

4A.19 RE-ROOFING OVER EXISTING ASPHALT SHINGLES

For best performance and appearance, Malarkey recommends old roofing be completely removed from the deck.

When roofing over existing asphalt shingles, *it is recommended only 3-tab shingles be overlaid.*

Roofing over laminates and heavyweights creates an irregular surface across each course that may prevent the newly installed shingles from sealing down properly, leaving them more susceptible to wind damage.

Malarkey is not responsible for objectionable appearance of the new surface from any irregularity in the substrate caused by remaining roofing.

In some areas, building codes do not require removal of old roofing if:

1. The existing shingles and framing will support the workers installing the roofing, the new roof itself, and required dead loads; and
2. The old wood deck is sound and capable of providing good anchorage for nails.

Make the surface as smooth as possible by replacing missing shingles and securely nailing all buckles, raised tabs or curled shingles.

Remove hip and ridge shingles.

Remove loose or protruding nails, and sweep the surface clean of loose debris.

Additional ventilation should be provided, and longer nails will likely be necessary to penetrate a minimum of 3/4" (19 mm) into the roof deck or completely through plywood or OSB sheathing.

Installing UL 2218 Class 3 or Class 4 impact-resistant shingles over existing roofs will negate their impact resistance and make them ineligible for insurance discounts.

Flashings: Only existing metal with an expected remaining service life equal to the expected service life of the new shingles should be re-used. It is strongly recommend to replace all roof jacks.

Perimeter metal drip edges: If installing new perimeter drip edge flashing, cut shingles back from the eaves and rakes enough to allow proper installation. If not installing new perimeter metal, it is not typically necessary to trim the shingles back.

If installing an underlayment over the existing shingles, new perimeter metal will need to be installed.

Step flashings along roof to wall and alongside curbs or skylights: At these locations, it is recommended to install new step flashings when installing the shingles.

Underlayment: It is not necessary to install a new underlayment over existing shingles. It may provide a smoother appearance of the new installation, but it can present issues during the install.

The underlayment can bridge gaps, creating voids. When installing new shingles, it increases the chance of over-driven nails or nails blowing through the shingle when hitting these voids.

4A.20 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL APPROVED APPLICATORS RELATIVE TO STEEP SLOPE NDL SHINGLE-WARRANTIED PROJECTS

4A20.1 GENERAL INSTRUCTIONS

Malarkey installation instructions and shingle installation details must be followed or have written approval from the Technical Services Department.

Malarkey Steep Slope NDL Warranties are available in 5, 10, 15, and 20-year terms (Vista®, Vista® AR, and Ecoasis® in 5, 10, and 15-year terms) and require *all* Malarkey products where applicable. See the following list:

Laminates

- Vista®
- Vista® AR
- Ecoasis®
- Legacy®
- Legacy® Scotchgard™

Designer Heavyweights

- Windsor® Scotchgard™

Accessory Products

- Smart Start® Starter Shingles
- Windsor® Starter Shingles
- EZ-Ridge® Hip & Ridge Shingles
- EZ-Ridge® XT Hip & Ridge Shingles
- 10" RidgeFlex® Hip & Ridge Strips
- 12" RidgeFlex® Hip & Ridge Strips
- Right Start® UDL Underlayment
- Secure Start® Synthetic Field Underlayments: Secure Start® SG, Secure Start® Plus, and Secure Start® Permeable
- Arctic Seal® Self-Adhering Underlayment
- Secure Start® HT Self-Adhering, High Temp Underlayment

4A20.2 PRELIMINARY REQUIREMENTS

All work must be completed by a Malarkey-certified *Commercial Approved Applicator* and installed according to Malarkey's latest published installation instructions and adopted building code.

The building structure and roof deck must be sound, comply with all local codes and ordinances, and sufficient to support the weight of the roofing system and transient load during application.

The roof deck must be an acceptable substrate:

- Install solid sheathing (4x8) when wood board decking is the existing substrate.
- Sheathing panels shall meet adopted building code requirements and be at least 3/8" (10 mm) thick, exterior-grade plywood or 7/16" (11 mm) oriented strand board (OSB).
- Likewise, sheathing panels should be supported, gapped and securely nailed to all framing members per APA recommendations.
- **Installing over existing roofing materials (i.e., re-covering) or deteriorated wood products is not acceptable. A complete tear-off is required.**
- Direct-to-deck, ASTM D1970 self-adhering underlayments can remain in place; ensure the surface of the

roof deck is sound, smooth, and free of debris and protrusions.

Besides replacement of warped or rotted decking, repairs are required at other areas of roof that could lead to leaks unrelated to proper installation of the Malarkey roofing system such as deteriorated chimney mortar joints, etc.

Ventilation must comply with FHA Minimum Property Standards.

Use only manufactured Malarkey products for starter and hip & ridge shingles (see list above).

4A20.3 DRIP EDGE FLASHING, UNDERLAYMENT, AND STRIPPING PLIES

Install *drip edge flashing* (drip edge, eave metal, rake metal, etc.) along the eave edges or roof.

Apply 6"-wide (152 mm) membrane of *self-adhering Arctic Seal®* around roof penetrations, and at all roof deck-to-vertical transitions (sidewalls, dormers, chimneys, curbs, skylights, etc.) - 3" (76 mm) up the wall and 3" (76 mm) onto the field.

*See the ROOF VALLEYS section for additional applications of Arctic Seal prior to installation of the field underlayment.

Apply *field* underlayment; installation begins at the eave edge:

- If field underlayment is *mechanically-fastened* Right Start UDL or Secure Start SG, Plus or Permeable, strip-off the eave metal with min. 6"-wide (152 mm) Arctic Seal *prior* to installation of field underlayment.
- If *self-adhering* (SA) Arctic Seal or Secure Start HT is used as field underlayment or applied over the eave metal for ice and water protection, it is not necessary to strip-off the eave metal.

Once an expanse of roof is covered by underlayment up to the ridge, install rake metal over the ends of the underlayment at the *rakes*, and strip-off with 6"-wide (152 mm) Arctic Seal.

4A20.4 UNDERLAYMENTS CONT'D.

All buckles and wrinkles must be corrected prior to installation of shingles. Cut and install, in water-shedding fashion, membrane patches according to the number of plies affected.

Plastic cap or metal cap fasteners are required when mechanically fastening *any* underlayment. No staples without plastic caps.

Where required by building code or in climates with a history of ice damming, install self-adhering Arctic Seal or Secure Start HT underlayments up and out onto the roof as necessary to a point not less than 24" (610 mm) past the interior warm inside wall of the house or above the expected level of ice dams. (**See Figure 39**)

ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL APPROVED APPLICATORS RELATIVE TO STEEP SLOPE NDL SHINGLE-WARRANTED PROJECTS

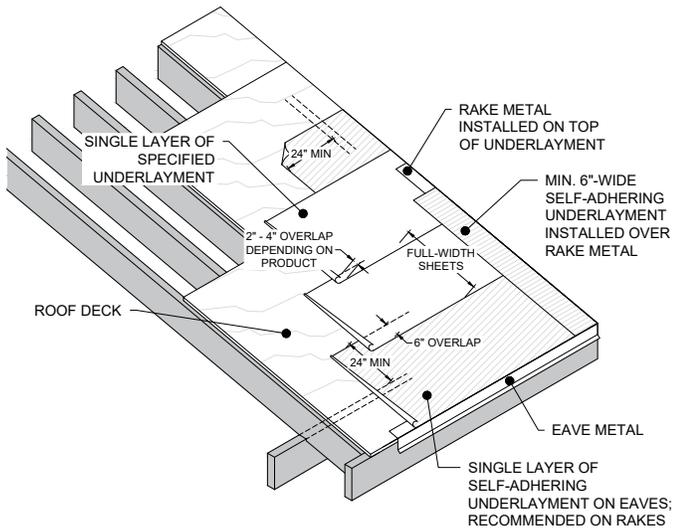


Figure 39 - Application of Self-Adhering and Field Underlayments on 5+ Roof Slopes in Ice Dam Regions

Factory-assembled *vented nail base* requires synthetic underlayment (see below for *Requirements over Vented Nail Base*).

4A20.5 UNDERLAYMENT CONFIGURATIONS

Slopes 5:12 and Above, One (1) layer of the following:

- Right Start UDL
- Secure Start SG, Plus, or Permeable
- Arctic Seal
- Secure Start HT

Slopes 3:12 up to 5:12, A *double* layer of the following (See **Figure 40**):

- Right Start UDL
- Secure Start SG, Plus, or Permeable
- Arctic Seal
- Initial layer of Secure Start HT and one additional layer of mechanically-attached underlayment (Right Start UDL or Secure Start SG/Plus/Permeable) (See **Figure 41**)

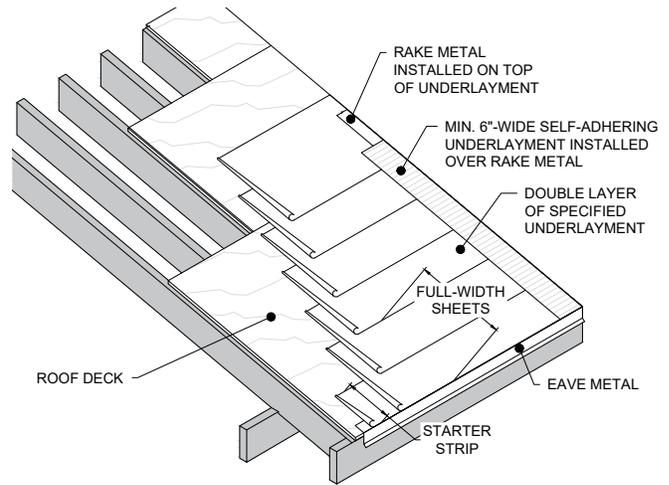


Figure 40 - Application of Field Underlayments on Roof Slopes 3:12 Up to 5:12; Starter Strip Must Be SA

Slopes 2:12 up to 3:12:

- Install an initial layer of Arctic Seal or Secure Start HT and one additional layer of mechanically-attached underlayment (Right Start UDL or Secure Start SG/Plus/Permeable). Two (2) layers of Arctic Seal are also acceptable. (See **Figure 41**)

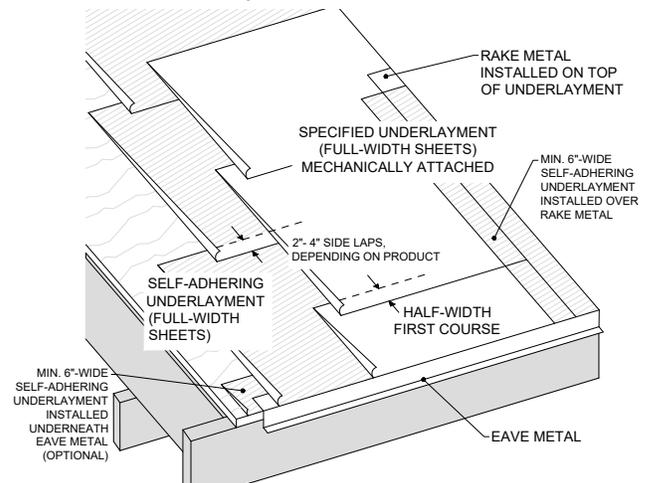


Figure 41 - Initial Layer of Self-Adhering Underlayment Followed by Mechanically-Attached Underlayment

4A20.6 FLASHING

Sheet metal flashing and accessories must be new and installed at roof intersections, wherever there is a

change in roof slope or direction, and around roof openings; step flashing required at all roof-to-vertical transitions; and counter flashing should extend past and cover the top edge of flashing metal a minimum of 2" (51 mm). (See Figure 42)

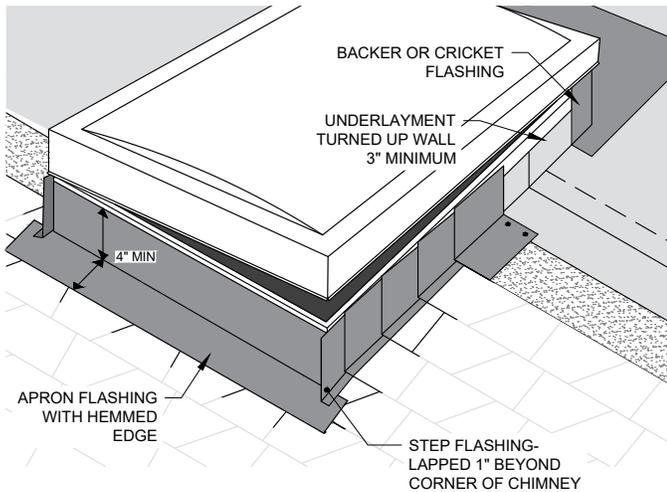


Figure 42 - Installation of Self-Adhering Underlayment and Metal Flashings at Roof Openings

Flanged penetration flashing (vent pipe collars, pipe jacks, etc.) must be sealed underneath along the top and both sides with asphalt roof cement conforming to ASTM D4586 (or other Malarkey-approved sealant).

Strip-off the unexposed flanges of penetration flashing with min. 6"-wide (152 mm) Arctic Seal, covering all fasteners used to secure the flashings. (See Figure 43)

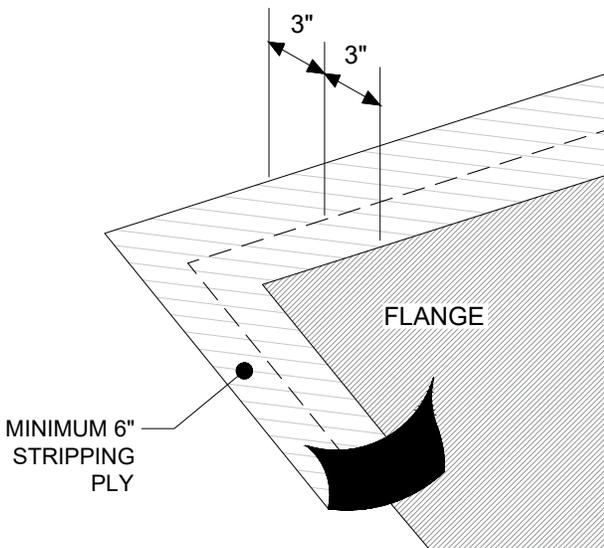


Figure 43 - Stripping-off Flanges of Penetration Flashing

Shingles installed on top of flanged penetration flashing should be sealed down with a bead of asphalt roof cement conforming to ASTM D4586 (or other Malarkey-approved sealant).

Any obstructions greater than 30" (762 mm) in width will need to have a cricket installed on the upslope side of the curb.

4A20.7 SMART START® STARTER SHINGLES

Apply to both eave and rake edges of roof; overhang the drip edge flashing, 1/4" - 3/4" (6 - 19 mm).

Fasten with four (4) nails placed 1 1/2" - 3" (38-76 mm) back from the roof edge: one (1) nail 1" (25 mm) from each end and the other two (2) evenly spaced on the same line as the end fasteners. Do not place fasteners in the seal-down strip. No staples. (See Figure 44)

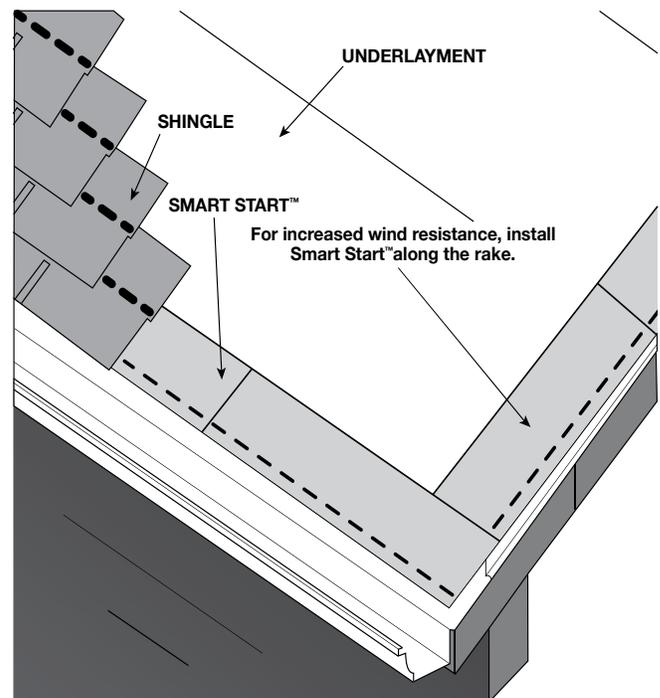


Figure 44 - Application of Smart Start® along the Eave and Rake Edges of Roof

4A20.8 WINDSOR® STARTER SHINGLES

Installation of Windsor Starter shingles *must be preceded* by a starter course of Smart Start (see fastening instructions above).

Windsor Starter should completely overlap the starter course and overhang it by 1/8" (3 mm).

Fasten with four (4) nails placed in-between the nailing lines: one (1) nail 1" (25 mm) from each end and the other two (2) evenly spaced on the same line as the end fasteners. (See Figure 45)

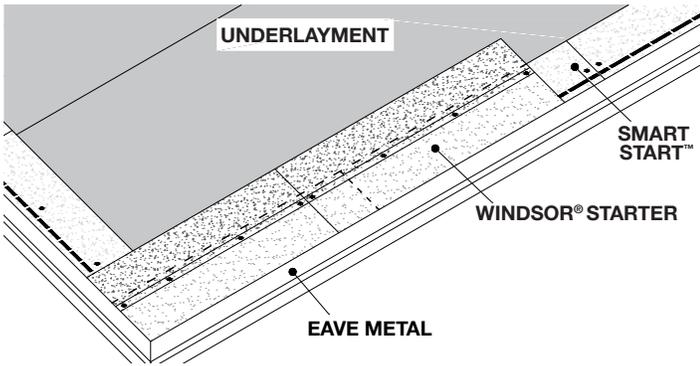


Figure 45 - Application of Windsor® Starter Shingles over Smart Start® at the Eave Edge of Roof

4A20.9 SHINGLE FASTENING

For roof slopes >21:12, shingles, including starter shingles, must be 6-nailed; 9-nails for Windsor shingles, and hand-sealed with asphalt roof cement conforming to ASTM D4586 (or other Malarkey-approved sealant).

4A20.10 ROOF VALLEYS

Open metal valley and closed-cut valley details are approved. *Each begins with the installation of a valley liner (see step-by-step directions next and Figure 46).*

Constructing the Valley Liner

1. Center an initial, full-width membrane of Arctic Seal underlayment in the valley; ensure it is tight to the deck without bridging in the break of the valley.
2. Extend the width of the valley liner by applying a half-width strip of Arctic Seal to each side of the center piece, overlapping the edges 2" (51 mm).

Open Metal Valleys

3. Install minimum 24"-wide (610 mm), metal *W-Valley Flashing* in the center of the valley and secure with fasteners no more than 1" (25 mm) from the outside edges at a spacing of 10" (254 mm) to 12" (305 mm) on center.
4. Apply field underlayment over the valley liner and terminate it approximately 4" (102 mm) from the valley metal (16" [406 mm] from valley centerline).
5. Install a 12"-wide (305 mm) stripping ply of Arctic Seal: 4" (102 mm) over the edge of valley metal (covering fasteners used to secure the metal), 4" (102 mm) over the exposed valley liner, and 4" (102 mm) onto the field underlayment.

Proceed with shingle installation.

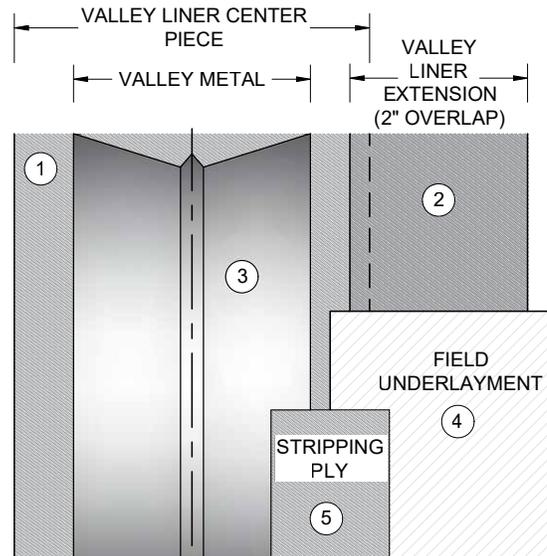


Figure 46 - Construction of an Open Metal Valley

Closed-Cut Valleys

Weave field underlayment across the valley liner and up the opposite side a minimum of 12" (305 mm).

Proceed with shingle installation.

4A20.11 MISCELLANEOUS REQUIREMENTS

The use of a *bleeder run* up valleys is not approved, and pointed valleys are not allowed either (aka a *California* valley or no-cut valley).

Algae-resistant *field* shingles must also have algae resistant *hip and ridge* shingles.

When runoff from an upper roof drains onto a lower, it is recommended downspouts have an extension (or *trough* underneath) and channel water directly to a gutter. Doing so will protect shingles from damage and avoid unsightly streaking. (See Figure 47)

ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL APPROVED APPLICATORS RELATIVE TO STEEP SLOPE NDL SHINGLE-WARRANTIED PROJECTS

4A.20

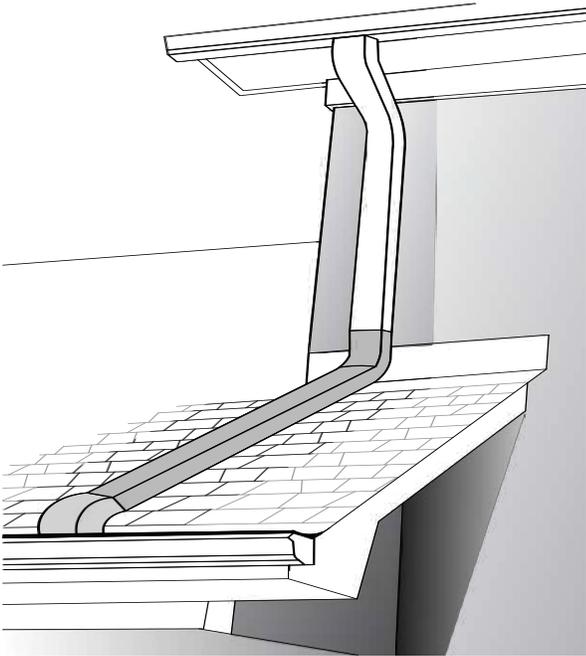


Figure 47 - Channeling Runoff to a Gutter With a Downspout Extension

4A20.12 REQUIREMENTS OVER VENTED NAIL BASE (ABOVE THE DECK INSULATION WITH A VENTING CAVITY)

Vented Nail Base Assemblies: Please contact Malarkey's Technical Services Department on any projects with a vented nail base product.

A vapor retarder may be required under the insulation. The incorporation of a vapor barrier or retarder within the roofing assembly is highly recommended when the project is located in Zones 4 - 8 as determined by the International Code Council Dept. of Energy NW National Lab of the United States (map located at www.polyiso.org).

Consult a licensed design professional, architect, or engineer to establish whether a vapor barrier is necessary and specify its type and location within the system. This is especially important during the construction phase when excessive moisture drive is present.

It is recommended a dew point calculation be performed prior to the installation of any product. This calculation is based on the building's interior relative humidity, interior temperature conditions, and outside temperature. Excessive moisture migration and temperature fluctuations during construction will potentially damage the system and cause unwanted condensation and aesthetic anomalies.

Slopes 3:12 up to 4:12, Field Fabrication

A vented nail base assembly *must be* field-fabricated (building the venting cavity on site with polyiso, 2x4's and

sheathing) using either Hunter Panels or Rmax flat stock polyiso purchased through Malarkey.

A minimum of two (2) layers of insulation is required. The initial layer(s) would be flat stock and the top layer, vented nail base with all joints offset.

Note: Vented nail base assemblies below 3:12 are not eligible for NDL warranties.

Slopes 4:12 and Above

Venting cavity may be field-fabricated or installed using:

- Hunter Panels Cool-Vent panels purchased through Malarkey
- Rmax Multi-Vent Nailable Base-3 panels purchased through Malarkey

When installing factory-fabricated vented nail base, a minimum of two (2) layers of insulation is required. The initial layer(s) would be flat stock and the top layer, vented nail base with all joints offset.

Only Malarkey Secure Start SG, Plus, or Permeable are acceptable over factory-fabricated vented nail base*.

* Factory vented nail base has been known to cause mole runs, a lifting of the underlayment at the joints of the sheathing. This is why synthetic underlayments are strongly recommended along with a double layer of polyiso and a vapor barrier. These mole runs may settle down after a period of time.

See WWW.MALARKEYROOFING.COM for related resources:

- Malarkey Steep Slope Sample NDL Warranty for specific terms and conditions
- Malarkey Shingle & Accessory Warranty
- 3-tab Shingle Installation Instructions
- Laminate Shingle Installation Instructions
- Windsor® Designer Shingle Installation Instructions
- Starter Shingles Installation Instructions
- Hip & Ridge Shingles Installation Instructions
- Right Start® UDL Installation Instructions
- Secure Start® Field Underlayments Installation Instructions
- Arctic Seal® Installation Instructions
- Secure Start® HT Installation Instructions

Contact Malarkey Technical Services with questions at (800) 545-1191 or (503) 283-1191, 7:00 am to 5:00 pm Pacific Time, or email us at:

malarkey.technicalinquiries@holcim.com.