

Preparing Activity: NAVFAC

Superseding
UFGS-07 31 13 (August 2016)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2026

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08/25

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SECTION 07 31 13

ASPHALT SHINGLES
08/25

NOTE: This guide specification covers the requirements for asphalt shingle roofing, surfaced with mineral granules, including ridge vents, underlayments, and flashings.

Adhere to [UFC 1-300-02](#) Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a [Criteria Change Request \(CCR\)](#).

NOTE: Design exterior envelope to meet the requirements of UFC 1-200-02, "High Performance and Sustainable Building Requirements" which invokes the requirements within UFC 3-101-01, "Architecture". UFC 1-200-02 and UFC 3-101-01 make references throughout to various ASHRAE documents governing energy efficiency and requirements for the components of building envelope design including moisture control and thermal performance.

NOTE: For a more detailed description of asphalt shingle roofing and requirements for asphalt shingle reroofing over existing asphalt shingles, wood

shingles, roll roofing, or built-up roofing, see the "Residential Asphalt Roofing Manual," published by Asphalt Roofing Manufacturers Association (ARMA) and "The NRCA Steep Roofing Manual," published by the National Roofing Contractors Association (NRCA). Avoid reroofing with asphalt shingles over more than one layer of existing roofing material.

NOTE: On the drawings, show:

1. Pitch of substrate/shingle roofing
2. Detail of crickets and flashings at chimneys
3. Detail at eave/rake corner of roof including underlayment, drip edge, starter strip, shingle exposure, shingle courses, and fastener placement.

NOTE: Where project involves tear-off of existing asphalt roofing materials and it is desired for the Contractor to salvage roofing materials for milling and recycling, include this requirement in Section 02 41 00 [DEMOLITION][AND][DECONSTRUCTION].

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D41/D41M	(2011; R 2023) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D1970/D1970M	(2021) Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
ASTM D3018/D3018M	(2022) Standard Specification for Class A Asphalt Shingles Surfaced With Mineral Granules
ASTM D3161/D3161M	(2020) Standard Test Method for Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method)
ASTM D3462/D3462M	(2023) Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
ASTM D4586/D4586M	(2025) Standard Specification for Asphalt Roof Cement
ASTM D6380/D6380M	(2003; R 2022) Standard Specification for Asphalt Roll Roofing (Organic Felt)
ASTM D7158/D7158M	(2024a) Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)
ASTM D8257/D8257M	(2022) Standard Specification for Mechanically Attached Polymeric Roof Underlayment Used in Steep Slope Roofing
ASTM E1980	(2024) Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 5005	(2021) The NRCA Roofing Manual: Steep-slope Roof Systems
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UL SOLUTIONS (UL)

UL 790	(2022) UL Standard for Safety Test Methods for Fire Tests of Roof Coverings
UL 2218	(2010; Reprint May 2024) UL Standard for Safety Impact Resistance of Prepared Roof Covering Materials

1.2 DEFINITIONS

1.2.1 Top Lap

That portion of shingle overlapping shingle in course below.

1.2.2 Head Lap

The triple coverage portion of top lap which is the shortest distance from the butt edge of an overlapping shingle to the upper edge of a shingle in the second course below.

1.2.3 Exposure

That portion of a shingle exposed to the weather after installation.

1.3 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy and Air Force projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Sample Warranty Certificate; G, [_____]

SD-03 Product Data

Shingles

[Heat Island Reduction; S

] SD-04 Samples

NOTE: Select color according to local practice, except use light-reflective colors for air conditioned buildings. Where color is specified in paragraph SHINGLES, delete the requirement for submittal of color charts.

Shingles; G, [_____]

[Color Charts; G, [_____]

] SD-07 Certificates

Installer's Qualifications

SD-08 Manufacturer's Instructions

Application

SD-11 Closeout Submittals

Manufacturer's Warranty

Contractor's Warranty

1.4 QUALITY ASSURANCE

1.4.1 Preroofing Conference

After submittals are received and approved but before roofing work, including associated work, is performed, the Contractor must hold a preroofing conference to review the following:

- a. The drawings, specifications, and submittals related to the roof work;
- b. Procedure for on-site inspection and acceptance of the roofing substrate and pertinent details relating to the roofing system;
- c. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing;
- d. Quality control plan for the roof system installation;
- e. Safety requirements

Coordinate and schedule a pre-roofing conference with the Contracting Officer and attended by the Contractor, the Contracting Officer's designated personnel, personnel directly responsible for the installation of roof system, related accessories, [mechanical] and [electrical] work, and other trades interfacing with the roof work. Before beginning roofing work, provide a copy of meeting notes and action items to all attending parties. Note action items requiring resolution prior to start of roof work.

1.4.2 Installer's Qualifications

**NOTE: Specify 3 years as an approved Contractor
unless directed otherwise by the Government.**

The roofing system installer must be approved, authorized, or licensed in writing by the asphalt shingle manufacturer to install the system, and have a minimum of [3][_____] years experience as an approved applicator with that manufacturer, approved at a level capable of providing the specified warranty. The installer must have completed five installations from the manufacturer being submitted of similar size, scope, and the same system as this project within the previous 3 years. Submit the names, locations, and client contact information of five projects of similar size and scope constructed by installer using the manufacturer's roofing products submitted for this project within the previous 3 years.

1.4.3 Single Source

Asphalt shingles, flashing, and other accessories must be standard products of the same manufacturer; must be the latest design by the manufacturer; and must have been designed by the manufacturer to operate as a complete system for the intended use.

1.5 DELIVERY AND STORAGE

Deliver materials in the manufacturer's unopened bundles and containers bearing the manufacturer's brand name. Keep materials dry, completely covered, and protected from the weather. Store according to manufacturer's written instructions. Store roll goods on end in an upright position or in accordance with manufacturer's recommendations.

1.6 WARRANTIES

**NOTE: The warranty clauses in this guide
specification have been approved by the Government.
The paragraphs may be used without any request for
waiver.**

Warranties must begin on the date of Government acceptance of the work. Submit a [sample warranty certificate](#) during the pre-construction phase to prove all warranty requirements will be achieved.

1.6.1 Manufacturer's Warranty

NOTE: Specify 30-year warranty for architectural laminated shingles. Specify the 25-year warranty for three-tab shingles. Require algae-resistance warranty for projects located in climates having high humidity. Humid locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations. Note that requirement for algae resistant shingles may limit the colors available with some manufacturers.

Provide the asphalt shingle manufacturer's [25 year][30 year] extended warranty for the asphalt shingle materials and installation workmanship, including flashing and accessories necessary for a watertight roof system construction.[Provide manufacturer's 10 year algae resistance warranty.] Write warranty directly to the Government, commencing at the time of Government's acceptance of the roof work

1.6.2 Contractor's Warranty

Provide warranty for 5 years that the asphalt shingle roofing system, as installed, is free from defects in workmanship. When repairs due to defective workmanship are required during the Contractor's warranty period, the Contractor must make such repairs within 72 hours of notification. When repairs are not performed within the specified time, emergency repairs performed by others will not void the warranty.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Shingles

NOTE: For structures located adjacent to airfields, do not use high light reflectance colors where resultant glare would be objectionable to pilots.

Edit this paragraph for the correct weight of shingle required for the project. Use heavyweight inorganic mat type shingles for ARHOC 81 Barracks or similar designs for permanent construction which utilize shingles.

Hip and ridge shingles must be manufacturer's pre-manufactured ridge cap shingles; cutting hip and ridge shingles from strip shingles is not allowed. Starter strip shingles must also be manufacturer's accessory products with self-sealing strip and not shingles with tabs removed.

NOTE: For shingle weights, 9.3 kg per square meter 190 pounds per 100 square feet represents a three-tab strip shingle, 10.2 kg per square meter 210 pounds per 100 square feet represents a basic architectural laminated type, 11.5 kg per square

meter 235 pounds per 100 square feet indicates a mid-range architectural laminated shingle, and 14.2 kg per square meter 290 pounds per 100 square feet represents a high-end residential or Specialty shingle (such as those with heavy shading to match slate).

NOTE: When available, polymer modified asphalt shingles offer better weathering properties. Polymer modified shingles resist cracking and shrinkage in hot and cold weather climates and better adhesion to hold surface granules. Performance advantages should be considered along with cost. In some locations polymer modified shingles range from comparable in price to double the price of standard asphalt shingles. When available and cost effective, consider using polymer modified asphalt shingles in Environmental Severity Classifications (ESC) C3 thru C5.

NOTE: Specify algae-resistant shingles for projects located in climates having high humidity. Humid locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations.

NOTE: In geographical areas of the United States prone to severe hail events, specify impact resistant shingles.

NOTE: Address structural aspects of the design in accordance with ASCE 7, Minimum Design Loads for Buildings and Other Structures. In areas where the roof deck design is required to resist wind pressures of 220 kg/m² 45 lbs./ft.² or more as determined by ASCE 7, the manufacturers' high wind design and installation requirements apply. This may include requiring six nails per shingle as determined by applicable building code, wind speed, slope, and building height.

With respect to the wind resistance class options below, the Class F option is for 110 miles per hour resistance. The Class H option is for 150 miles per hour resistance.

NOTE: When a designer desires IgCC compliance with cool roof requirements, include the next to last set

of bracketed sentences for projects in ASHRAE climate zones 0 thru 4; see IgCC Chapter 5 for exceptions when design conditions eliminate these requirements. Retain the last bracketed sentence for projects with sustainable third party certification credit requirement for reduced heat island effect; include required solar reflectance or SRI values if the specific certification system dictates these. Designer to verify adequate local availability of shingles with solar reflectance properties prior to including these requirements.

Mineral granule-surfaced asphalt shingles, self-sealing, square tab, strip[, algae-resistant][impact resistant shingles conforming to [UL 2218](#), Class 4.][[ASTM D3018/D3018M](#), Type I, and [ASTM D3462/D3462M](#)][three-tab, strip-type weighing not less than 9.3 kilograms per square meter 190 pounds per 100 square feet][, architectural shingles weighing not less than 10.2 kilograms per square meter 210 pounds per 100 square feet][11.5 kilograms per square meter 235 pounds per 100 square feet][14.2 kilograms per square meter 290 pounds per 100 square feet]][polymer modified asphalt]. Shingles must meet the fire resistance requirements of [UL 790](#) for Class A[and the wind resistance requirements of [ASTM D3161/D3161M](#), Class F and [ASTM D7158/D7158M](#), Class H]. Color must be [____][as selected from the manufacturer's standard color charts]. Shingle color must be[in accordance with COLOR SCHEDULE] [____]. Provide roof finishes for more than 75 percent of the roof surface having a minimum 3-year aged Solar Reflectance Index of 25 when determined in accordance with the Solar Reflectance Index method in [ASTM E1980](#) using a convection coefficient of 11.9 W per m² 2.1 BTU per ft².][Provide emittance and reflectance percentages, solar reflectance index values,[and] slopes [____], to meet sustainable third party certification requirements for [Heat Island Reduction](#).]

2.1.2 Hip/Ridge and Starter Shingles

Provide hip and ridge shingles from manufacturer's pre-manufactured ridge cap shingles. Starter strip shingles must also be manufacturer's accessory products with self-sealing strip. Cutting hip/ridge or starter shingles from strip shingles is prohibited.

2.1.3 Mineral-Surfaced Asphalt Roll Roofing

[ASTM D6380/D6380M](#).

2.1.4 Smooth-Surfaced Asphalt Roll Roofing

[ASTM D6380/D6380M](#), Type II.

2.1.5 Underlayment

2.1.5.1 Synthetic Underlayment

Synthetic underlayment complying with [ASTM D8257/D8257M](#), without perforations or other material specified by the shingle manufacturer for use as underlayment.

2.1.5.2 Self-Adhering Underlayment

Self-adhering underlayment must comply with **ASTM D1970/D1970M** for sealability around nails.

2.1.5.3 Ice Dam or Leak Barrier Underlayment

Self-adhering leak barrier or ice dam underlayment must comply with **ASTM D1970/D1970M** for use as eave flashing.

2.1.6 Self-Adhering Membrane

Self-adhering rubberized asphaltic membrane, a minimum of **1 mm 40 mils** thick, and recommended by the shingle manufacturer.

2.1.7 Nails for Applying Shingles and Synthetic Underlayment

Aluminum or hot-dipped galvanized steel or equivalent corrosion resistant with sharp points and flat heads **10 to 11 mm 3/8 to 7/16 inch** in diameter. Shank diameter of nails must be a minimum of **2.67 mm 0.105 inch** and a maximum of **3.43 mm 0.135 inch** with garb or otherwise deformed for added pull-out resistance. Nails must be long enough to penetrate completely through or extend a minimum of **20 mm 3/4 inch** into roof deck, whichever is less, when driven through materials to be fastened.

2.1.8 Asphalt Roof Cement

ASTM D4586/D4586M, Type II.

2.1.9 Asphalt Primer

ASTM D41/D41M.

2.1.10 Ventilators

NOTE: Drawings must detail type of ridge vent required. For aluminum ridge vents, see Section 07 60 00 FLASHING AND SHEET METAL.

Incorporate ventilation in the design with a total net free ventilating area of not less than 1 to 150 of the area of the space ventilated. The total area is permitted to be reduced to 1 to 300, provided at least 50 percent and not more than 80 percent of the required ventilating area is provided by ventilators located in the upper portion of the ventilated space at least **914 mm 3 feet** above eave or cornice vents, with the balance of required ventilation provided by eave or cornice vents. As an alternative, the net free cross-ventilation area may be reduced to 1 to 300 when a vapor barrier having a transmission rate not exceeding 1 perm is located on warm side of the attic insulation.

2.1.10.1 Nailable Plastic Shingle Over Type Ridge Vents

Provide ridge vents constructed of UV stabilized nailable rigid

polypropylene material, approximately 0.30 m 1 foot wide and 25 mm 1 inch thick, and must be in 1.2 m 4 foot long interlocking sections with self-aligning ends or corrugated polyethylene rigid roll or rigid strip ridge vent with aluminum wind deflectors on each side. Vents must be designed to prevent infiltration of insects, rain, and snow.

2.1.10.2 Nailable Mesh Shingle Over Type Ridge Vents

Provide ridge vents constructed of UV stabilized nailable polyester mesh material, approximately 0.30 m 1 foot wide. Vents must be designed to prevent infiltration of insects, rain, and snow.

PART 3 EXECUTION

3.1 VERIFICATION OF CONDITIONS

Do not install building construction materials that show visual evidence of biological growth.

Ensure that roof deck is smooth, clean, dry, and without loose knots. Roof surfaces must be firm and free from loose boards, large cracks, and projecting ends that might damage the roofing. Vents and other projections through roofs must be properly flashed and secured in position, and projecting nails must be driven flush with the deck.

3.2 SURFACE PREPARATION

Cover knotholes and cracks with sheet metal nailed securely to sheathing. Flash and secure vents and other roof projections, and drive projecting nails firmly home.

3.3 APPLICATION

Apply roofing materials as specified herein unless specified or recommended otherwise by shingle manufacturer's written instructions[or by NRCA 5005].

3.3.1 Underlayment

NOTE: Select the applicable paragraph(s) from the following.

NOTE: The installation of asphalt strip shingles at maximum exposure is not recommended on roofs having a slope of less than 1:4.

In locations where the January mean temperature is minus 1 degree C 30 degrees F or less, or in high wind areas (wind pressures of 220 kg/m2 45 lbs./ft.2 or more as determined by ASCE 7, select either self-adhering underlayment or two layers of synthetic underlayment. One layer of synthetic underlayment is sufficient in other than cold climate or high wind areas Also, where synthetic underlayment is used in cold areas, additionally include leak barrier (ice dam protection)

underlayment applied along eaves; leak barrier material not needed where self-adhering underlayment is utilized.

In locations where the average daily January temperature is **minus 4 degrees C 25 degrees F** or below, use the second optional paragraph instead of the first optional paragraph.

[Provide for roof slopes **1 in 3 4 inches per foot** and greater. Apply[one layer of self-adhering][one-layer of synthetic][two layers of synthetic] shingle underlayment to roof deck.[Apply one layer of leak barrier material as eave protection extending membrane minimum **600 mm 24 inches** up slope beyond interior face of exterior wall.] Lay underlayment parallel to roof eaves, starting at eaves. Provide minimum **50 mm 2 inch** head laps, **100 mm 4 inch** end laps, and **150 mm 6 inch** laps from both sides over hips and ridges. Cap nail synthetic underlayment as required by IBC for wind resistance and in accordance with the manufacturer's instructions. Turn up vertical surfaces a minimum of **100 mm 4 inches**.

] *****

NOTE: These requirements are intended primarily for roof slopes between **1 in 6 and 1 in 3 2 and 4 inches per foot**. Do not include for roof slopes **1 in 3 4 inches per foot** and greater unless the condition of the note above is met. Select either self-adhering underlayment or two layers of synthetic underlayment. Where synthetic underlayment is used, additionally include leak barrier (ice dam protection) underlayment applied along eaves; leak barrier material not needed where self-adhering underlayment is utilized. Delete bracketed sentence unless eave flashing is required.

[Provide for roof slopes[between **1 in 6 2 inches per foot** and **1 in 3 4 inches per foot**]. Apply[one-layer of self-adhering][two layers of synthetic] underlayment to roof deck. Provide starter sheet width and headlaps as required by the underlayment manufacturer's application instructions for the two layer coverage based on the width of the synthetic underlayment material.[Apply one layer of leak barrier material as eave protection extending membrane minimum **600 mm 24 inches** up slope beyond interior face of exterior wall.] Lay parallel to eaves, starting at eaves. Provide minimum **480 mm 19 inch** head laps, **150 mm 6 inch** laps from both sides over hips and ridges, and **300 mm 12 inch** end laps in the field of the roof. Cap nail synthetic underlayment as required by IBC for wind resistance and in accordance with the manufacturer's instructions. Turn up vertical surfaces a minimum of **100 mm 4 inches**.] When a self-adhering membrane is used for eave flashing, start underlayment from upper edge of eave flashing. Provide required headlap.]

]3.3.2 Drip Edges

NOTE: Specify **100 mm 4 inch** spacing for nails for roofs in high wind areas (wind pressures of **220 kg/m² 45 lbs./ft.²** or more as determined by ASCE 7.

Provide metal drip edges as specified in Section 07 60 00 FLASHING AND SHEET METAL applied directly on the wood deck at eaves and over the underlayment at rakes. Extend back from edge of deck a minimum of 75 mm 3 inches, and secure with nails spaced a maximum of [100][250] millimeters [4][10] inches o.c. along inner edge.

3.3.3 Starter Strip

NOTE: Delete the first bracketed phrase unless eave flashing is specified. Otherwise, delete the second bracketed phrase.

Apply starter strip along eaves and rakes, [overlaying and finishing even with lower edge of eave flashing strip][overhanging the metal drip edge at eaves and rake edges 6 to 10 mm 1/4 inch to 3/8 inch]; fasten in a line parallel to and 75 to 100 mm 3 to 4 inches above eave or rake edge. Place nails so top of nail is not exposed in cutouts of first course of shingles.

3.3.4 Shingle Courses

NOTE: Apply shingles with the correct recommended exposure in accordance with the manufacturer's printed instructions as they appear on the bundle wrapping.

Start first course with full shingle, and apply succeeding courses with joints staggered at thirds or halves. Butt-end joints of shingles must not align vertically more often than every fourth course. Apply shingle courses as follows:

- a. Fastening: Do not drive fasteners into or above the factory-applied adhesive unless adhesive is located 16 mm 5/8 inch or closer to top of cutouts. Place fasteners so they are concealed by shingle top lap and penetrate the head lap.

NOTE: Delete item "b" and include items "c" and "d" for projects where:

1. Basic wind speed is 161 kilometers per hour (kph) 100 miles per hour (mph) and eave is 6100 mm 20 feet or higher above grade; or

2. Basic wind speed is 177 kph 110 mph.

- b. Shingles applied with nails: Nominal 125 mm 5 inch exposure. Apply each shingle with minimum of four nails. Place one nail 25 mm 1 inch from each end, and evenly space nails on a horizontal line.

- [c. Nailing: Fasten shingles with number of fasteners and location indicated in shingle manufacturer's installation instructions. Cut shingles must be fastened with nails at maximum 150 mm 6 inches on center and approximately 25 mm 1 inch from each edge of cut shingle.

]d. Sealing: On first course of shingles at eave, seal with continuous, 225 mm 9 inch long, 6 mm 1/4 inch diameter bead of asphalt roof cement, applied to the surface of course below. Place bead on horizontal line so bead will be 25 mm 1 inch from bottom edge to be sealed. After nailing each shingle, press down to ensure spreading and bonding of asphalt roof cement.

]3.3.5 Hips and Ridges

Utilize manufacturer's pre-manufactured hip and ridge shingles. Install in accordance with manufacturer's instructions.

3.3.6 Valleys

NOTE: Open metal valleys are preferred method for strip shingles, closed cut valley flashing may be used with architectural-grade shingles. Open sheet metal valleys may also be specified as a Contractor option. Do not provide woven valleys with architectural laminated shingles.

[Provide either closed cut, woven, or open sheet metal valleys.

]3.3.6.1 Closed Cut Valleys

Provide 900 mm 36 inch wide valley lining of single layer of self-adhering membrane, for full length of valley as follows:

- a. Center lining in valley under underlayment. Provide minimum 300 mm 12 inch end laps in the lining and seal laps with asphalt roof cement. Fasten lining to hold it in place until shingles are applied.
- b. Apply first regular course of shingles along eaves of one of the intersecting roof planes and across valley. Extend course at least 300 mm 12 inches onto adjoining roof.
- c. Apply succeeding courses in same manner as first course, extending across valley and onto adjoining roof.
- d. Press shingles tightly into valley and nail in normal manner, except apply nails not closer than 150 mm 6 inches to valley centerline, and apply additional nail in top corner of each shingle crossing valley.
- e. Apply shingles on the adjoining roof plane, starting along eaves and across valley onto previously applied shingles. Trim overlapping courses back to a line parallel to and a minimum of 50 mm 2 inches back from valley centerline.
- f. Trim 25 mm 1 inch on a 45-degree angle from upper corner of each end shingle. Embed end shingles in a 75 mm 3 inch wide band of asphalt roof cement.

3.3.6.2 Woven Valleys

NOTE: Do not provide woven valleys with

architectural laminated shingles.

Provide valley lining as specified for closed cut valley. Lay valley shingles over lining by either of the following methods:

- a. Method I: Apply regular shingles on both roofs simultaneously. Weave each course in turn over the valley. Lay the first regular course of shingles along eaves of roof up to and over valley. Extend course along adjoining roof deck at least **300 mm 12 inches**. Carry first regular course of shingles of adjoining roof over valley on top of previously applied shingles. Lay succeeding courses alternately, weaving valley shingles over each other for full length of valley.
- b. Method II: Apply regular shingles on each roof surface separately to a line about **900 mm 3 feet** from center of valley, and weave valley shingles in place later, as specified for Method I.

In following either method, press shingles tightly into valley, and fasten in normal manner; except apply nails not closer than **150 mm 6 inches** to valley centerline, and apply additional nail in top corner of terminal shingle on both sides of valley.

3.3.6.3 Open Sheet Metal Valleys

Sheet metal flashing for valleys is specified in Section **07 60 00 FLASHING AND SHEET METAL**. Before installing and fastening flashing in place with metal cleats:

- a. Install single layer of **900 mm 36 inch** wide, self-adhering membrane, centered on valley and extending entire length of valley under underlayment.
- b. Cut regular shingle courses on each roof on true line **50 mm 2 inches** from valley centerline at top of valley, and increase width between lines by **25 mm for each 2440 mm 1 inch for each 8 feet** of valley length, continuing to eaves.
- c. Apply **50 mm 2 inch** band of asphalt roof cement over flashing, along and under side of shingles adjoining valley.
- d. Press shingles tightly into cement, and nail in normal manner, except apply nails not closer than **125 mm 5 inches** to valley centerline. Do not drive nails through valley flashing.
- e. Provide a **100 mm 4 inch** band of asphalt roof cement for fastening shingle tabs down along open metal gutters.

3.3.7 Flashing

3.3.7.1 Eave Flashing

NOTE: Select the applicable paragraph(s) from the following.

NOTE: Where the average daily January temperature is

minus 4 degrees C 25 degrees F or below, or where there is the chance of ice dams forming along the eaves, use the second optional paragraph instead of the first optional paragraph. In areas where the designer has determined that eave flashing is not commonly provided, do not include either paragraph.

[Provide for roof slopes 1 in 3 4 inches per foot and greater. Provide eave flashing strips consisting of self-adhering membrane. Flashing strips must overhang metal drip edge 6 to 10 mm 1/4 inch to 3/8 inch and extend up the slope far enough to cover a point 300 mm 12 inches inside interior face of exterior wall. Where overhangs require flashings wider than 900 mm 36 inches, locate laps outside exterior wall face. Laps must be at least 50 mm 2 inches wide and cemented with asphalt roof cement over entire length of lap. Lap end 300 mm 12 inches and cement.

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NOTE: The requirements below are intended primarily for roof slopes between 1 in 6 and 1 in 3 2 and 4 inches per foot. Do not include for roof slopes 1 in 3 4 inches per foot and greater unless the condition of note above is met.

[Provide for roof slopes[between 1 in 6 and 1 in 3 2 inches per foot and 4 inches per foot][1 in 3 4 inches per foot and greater]. Provide either of the following types of eave flashing:

- a. From the eaves to a point 600 mm 24 inches inside interior wall line, apply solid coating of asphalt roof cement between overlapping layers of underlayment. Spread cement to a uniform thickness at rate of 7.5 liters per 10 square meters 2 gallons per 100 square feet of cemented roof area.
- b. From the eaves to a point 600 mm 24 inches inside interior wall line, apply one layer of self-adhering membrane. Follow membrane manufacturer's printed installation instructions.

]3.3.7.2 Stepped Flashing

For sloping roofs which abut vertical surfaces, provide stepped metal flashing as specified in Section 07 60 00 FLASHING AND SHEET METAL. At stepped flashing locations, install single layer of 900 mm 36 inch wide, self-adhering membrane, extending entire length of flashing under underlayment.

3.3.7.3 Vent and Stack Flashing

Apply shingles up to point where vent or stack pipe projects through roof, and cut nearest shingle to fit around pipe. Before applying shingles beyond pipe, prepare flange of metal pipe vent flashing as specified in Section 07 60 00 FLASHING AND SHEET METAL, by applying a 3 mm 1/8 inch thick coating of asphalt roof cement on bottom side of flashing flange. Slip flashing collar and flange over pipe, and set coated flange in 2 mm 1/16 inch coating of asphalt roof cement. After applying flashing flange, continue shingling up roof. Lap lower part of flange over shingles. Overlap flange with side and upper shingles. Fit shingles around pipe, and embed in 2 mm 1/16 inch thick coating of asphalt roof cement where

shingles overlay flange.

[3.3.7.4 Chimney Flashing

NOTE: Delete this paragraph unless a chimney is indicated on the project drawings. Coordinate with Sections 06 10 00 ROUGH CARPENTRY and 07 60 00 FLASHING AND SHEET METAL to ensure that crickets and metal chimney flashing are specified.

Provide treated wood crickets as specified in Section 06 10 00 ROUGH CARPENTRY. Provide metal base and counterflashing as specified in Section 07 60 00 FLASHING AND SHEET METAL. Uniformly coat masonry surfaces which are to receive flashing with asphalt primer applied at rate of 4 liters per 10 square meters 1 gallon per 100 square feet. Apply shingles over underlayment up to front face of chimney. Apply metal front base flashing with lower section extending at least 100 mm 4 inches over shingles. Set base flashing in a 2 mm 1/16 inch coating of asphalt roof cement on shingles and chimney face. Apply metal step flashing at sides in a coating of asphalt roof cement. Embed end shingles in each course that overlaps step flashing with asphalt roof cement. Apply metal rear base flashing over cricket and back of chimney in coating of asphalt roof cement. Apply end shingles in each course up to cricket, and cement in place. Lap base flashing minimum of 75 mm 3 inches with metal counterflashing.

]3.4 INFORMATION CARD

For each roof, provide a typewritten card, laminated in plastic and framed for interior display or a photoengraved 0.8 mm 0.032 inch thick aluminum card for exterior display. Card to be 220 by 280 mm 8 1/2 by 11 inches minimum and contain the following information at a minimum (as applicable): facility name and number; location; contract number; approximate roof area; detailed roof system description (as applicable), including deck type, membrane/surfacing, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, date of completion; installing contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information.

-- End of Section --