JOINT BASE LEWIS McCHORD DESIGN STANDARDS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION SECTION 07 31 13

ASPHALT SHINGLES

# 07/18

PART 1 GENERAL

**Note: No mechanical Equipment on Roof. Mechanical Equipment shall be installed on the ground.**

* 1. REFERENCES

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 D1970/D1970M (2017) Standard Specification for

Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection

ASTM D226/D226M (2017) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing

ASTM D3018/D3018M (2011; R 2017) Standard Specification for Class A Asphalt Shingles Surfaced With Mineral Granules

ASTM D3161/D3161M (2016a) Standard Test Method for

Wind-Resistance of Steep Slope Roofing Products (Fan-Induced Method)

ASTM D3462/D3462M (2016) Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules

ASTM D41/D41M (2011; R 2016) Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing

ASTM D4586/D4586M (2007; E 2012; R 2012) Asphalt Roof

Cement, Asbestos-Free

ASTM D4869/D4869M (2016a) Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing

ASTM D6380/D6380M (2003; E 2013; R 2013) Standard

Specification for Asphalt Roll Roofing (Organic Felt)

ASTM D7158/D7158M (2016) Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)

NATIONAL ROOFING CONTRACTORS ASSOCIATION (NRCA)

NRCA 0437 (2017) The NRCA Roofing Manual: Steep-slope Roof Systems

U.S. DEPARTMENT OF ENERGY (DOE)

Energy Star (1992; R 2006) Energy Star Energy Efficiency Labeling System (FEMP)

UNDERWRITERS LABORATORIES (UL)

UL 2218 (2010; Reprint Jan 2018) UL Standard for Safety Impact Resistance of Prepared Roof Covering Materials

UL 790 (2004; Reprint Jul 2014) Standard Test

Methods for Fire Tests of Roof Coverings

* 1. DEFINITIONS
		1. Top Lap

That portion of shingle overlapping shingle in course below.

* + 1. 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. Exposure

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

* 1. SUBMITTALS

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NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19. Include items noted at SD-01 and SD-11 as applicable, based on project scope.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the [Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING]‌[Environmental Records Binder, in conformance to Section 01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS]. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Roof Materials (Recycled Content); S

SD-03 Product Data Shingles

Submit data including type, weight, class, UL labels, and special types of underlayment and eave flashing.

 SD-04 Samples

Shingles; G

Full shingle sample and manufacturer's standard size samples of materials and products requiring color or finish selection.

 Color Charts; G

 SD-08 Manufacturer's Instructions Application

SD-11 Closeout Submittals

Roof Materials (Recycled Content); S

Heat Island Reduction; S

 Manufacturer's Warranty Contractor's Warranty

* 1. 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. Immediately before laying, store roofing felt for 24 hours in an area maintained at a temperature not lower than 10 degrees C 50 degrees F.

* 1. WARRANTIES

Warranties must begin on the date of Government acceptance of the work.

* + 1. Manufacturer's Warranty

Furnish the asphalt shingle manufacturer's standard 30 year warranty for the asphalt shingles. The warranty must run directly to the Government.

* + 1. 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

* 1. PRODUCT SUSTAINABILITY CRITERIA

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NOTE: If 01 33 29 is incorporated in the specifications, select that option below. If not, select the option for 01 57 19.

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* + 1. Recycled Content

 Provide products with recycled content and provide documentation in accordance with Section [01 33 29 SUSTAINABILITY REPORTING][01 57 19 TEMPORARY ENVIRONMENTAL CONTROLS] paragraph RECYCLED CONTENT. For more information see https://sftool.gov/greenprocurement/green-products/1/construction-materials/231/roofing-materials/0?addon=False and https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program.

* 1. MATERIALS
		1. Shingles

Mineral granule-surfaced asphalt shingles, self-sealing, square tab, strip fungus-resistant and impact resistant shingles conforming to UL 2218,

Class 4. ASTM D3018/D3018M, Type I, or ASTM D3462/D3462M, architectural shingles weighing not less than 14.2 kilograms per square meter 290 pounds per 100 square feet]. Shingles must meet the fire resistance requirements of UL 790 for Class A and the wind resistance requirements of 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 asphalt shingle that is Energy Star labeled. Provide data identifying Energy Star label for asphalt shingle product. Provide emittance and reflectance percentages, solar reflectance index values, and slopes, to meet sustainable third party certification requirements for Heat Island Reduction.

* + 1. Mineral-Surfaced Asphalt Roll Roofing ASTM D6380/D6380M.
		2. Smooth-Surfaced Asphalt Roll Roofing ASTM D6380/D6380M, Type II.
		3. Underlayment

Asphalt-saturated felt conforming to ASTM D4869/D4869M or ASTM D226/D226M,

Type II, number 30, without perforations or other material specified by the shingle manufacturer for use as underlayment.

2.2.4.1 Leak Barrier Underlayment

Self-adhering leak barrier or ice dam underlayment must comply with ASTM D1970/D1970M for sealability around nails.

* + 1. Self-Adhering Membrane

Self-adhering rubberized asphaltic membrane, a minimum of 1 mm 40 mils thick, and recommended by the shingle manufacturer for use as eaves flashing.

* + 1. Nails for Applying Shingles and Asphalt-Saturated Felt

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.

* + 1. Asphalt Roof Cement ASTM D4586/D4586M, Type II.
		2. Asphalt Primer ASTM D41/D41M.
		3. Ventilators
			1. Nailable Plastic Shingle Over Type Ridge Vents

Ridge vents must be 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.

* + - 1. Nailable Mesh Shingle Over Type Ridge Vents

Ridge vents must be 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

* 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.

* 1. 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.

* 1. APPLICATION

Apply roofing materials as specified herein unless specified or recommended otherwise by shingle manufacturer's written instructions or by NRCA 0437.

3.3.1 Underlayment

 Provide for roof slopes between 1 in 6 2 inches per foot and 1 in 3 4 inches per foot]. Apply two layers to roof deck. Provide a 480 mm 19 inch wide strip as starter sheet to maintain specified number of layers throughout roof. 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. Nail sufficiently to hold until shingles are applied. Turn up vertical surfaces a minimum of 100 mm 4 inches.

]3.3.2 Drip Edges

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 millimeters

4 inches o.c. along inner edge.

* + 1. Starter Strip

Apply starter strip at eaves, using 225 mm 9 inch wide strip of

mineral-surfaced roll roofing of a color to match shingles. Optionally, use a row of shingles with tabs removed and trimmed to ensure that joints are not exposed at shingle cutouts. Apply starter strip along eaves, 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 edge. Place nails so top of nail is not exposed in cutouts of first course of shingles. When roll roofing is provided, seal tabs of first course of shingles with asphalt roof cement.

* + 1. Shingle Courses

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:

* + - 1. 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.
			2. Application of shingles on steep roof, 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 a minimum of 16 mm 5/8 inch above top of cutouts. Cement each tab with one spot of asphalt roof cement placed 25 to 50 mm 1 to 2 inches from bottom edge of shingle.

3.3.5 Hips and Ridges

Form with 225 by 300 mm 9 by 12 inch individual shingles or with 300 by 300

mm 12 by 12 inch shingles cut from 300 by 900 mm 12 by 36 inch strip shingles. Bend shingles lengthwise down center with equal exposure on each side of hip or ridge. Lap shingles to provide a maximum 125 mm 5 inch exposure, and nail each side in unexposed area 140 mm 5-1/2 inches from butt and 25 mm 1 inch in from edge.

* + 1. Valleys

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

3.3.6.1 Closed Cut Valleys

Provide 900 mm 36 inch wide valley lining of single layer of

smooth-surfaced or mineral-surfaced roll roofing, with mineral-surface facing down, for full length of valley as follows:

* + - 1. Center lining in valley over 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.
			2. 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.
			3. Apply succeeding courses in same manner as first course, extending across valley and onto adjoining roof.
			4. 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.
			5. 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.
			6. 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.
			7. Woven Valleys

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

* + - * 1. 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.
				2. 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.

* + - 1. Open Roll Roofing Valleys

Provide 450 mm 18 inch wide strip of mineral-surfaced asphalt roll roofing, of a color to blend with asphalt shingles, and with granular surface facing down, for the full length of valley as follows:

* + - * 1. Center roll roofing strip in valley over underlayment. Lay centered in valley over felt underlayment and with granular face down. Nail strip only enough to hold in place. Apply nails in rows 25 mm 1 inch from each edge. As fastening along second side proceeds, press strip firmly into valley.
				2. Center second strip 900 mm 36 inches wide in valley and lay it over first strip with granular face exposed and nail as specified for 450 mm

18 inch strip.

* + - * 1. Before applying roofing shingles, snap two chalk lines for full length of valley. Locate each line 75 mm 3 inches from centerline of valley at top, and increase width between lines by 25 mm for each 2440 mm 1 inch for each 8 feet of valley length, continuing to eaves.
				2. Apply a 50 mm 2 inch band of asphalt roof cement along each edge of 900 mm 36 inch strip from edge to chalk line. Cut regular shingle courses true along valley chalk lines, and nail in normal manner.
			1. 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:

* + - * 1. Install single layer of 900 mm 36 inch wide, asphalt-saturated felt, centered on valley and extending entire length of valley over felt underlayment.
				2. 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.
				3. Apply 50 mm 2 inch band of asphalt roof cement over flashing, along and under side of shingles adjoining valley.
				4. 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.
				5. Provide a 100 mm 4 inch band of asphalt roof cement for fastening shingle tabs down along open metal gutters.
		1. Flashing
			1. Eave Flashing

 Provide for roof slopes between 1 in 6 and 1 in 3 2 inches per foot and 4 inches per foot 1 in 34 inches per foot and greater. Provide either of the following types of eave flashing:

* + - * 1. 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.
				2. 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.

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

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.

] -- End of Section --