SECTION 076200 - SHEET METAL FLASHING AND TRIM

1. GENERAL
	* + 1. RELATED DOCUMENTS

Retain or delete this article in all Sections of Project Manual.

* + - * 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			1. SUMMARY
				1. Section Includes:

Manufactured reglets [**with counterflashing**].

Formed roof-drainage sheet metal fabrications.

Formed low-slope roof sheet metal fabrications.

Formed steep-slope roof sheet metal fabrications.

Formed wall sheet metal fabrications.

* + - 1. COORDINATION
				1. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
				2. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.
			2. PREINSTALLATION MEETINGS
				1. Preinstallation Conference: Conduct conference at Project site.

Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.

Review requirements for insurance and certificates if applicable.

Review sheet metal flashing observation and repair procedures after flashing installation.

* + - 1. SUBMITTALS
				1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
				4. Product Data: For each of the following

Underlayment materials.

Elastomeric sealant.

Butyl sealant.

Epoxy seam sealer.

Manufacturer’s Installation Instructions.

* + - * 1. Sustainable Design Submittals:

Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.

Retain "Product Data" subparagraph below to require minimum recycled content for LEED 2009 MR Credit 4 - "Recycled Content.

Use below for complicated details and details not covered by contract drawings. Retain items in the subparagraph below as appropriate.

* + - * 1. Shop Drawings: For sheet metal flashing and trim.

Include plans, elevations, sections, and attachment details.

Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.

Include identification of material, thickness, weight, and finish for each item and location in Project.

Include details for forming, including profiles, shapes, seams, and dimensions.

Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.

Include details of termination points and assemblies.

Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.

Include details of roof-penetration flashing.

Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.

Include details of special conditions.

Include details of connections to adjoining work.

Revise subparagraph below to suit Project. Delete if manufacturer's product data are adequate. Sheet metal flashing and trim fabricators do not custom form all accessory types.

Detail formed flashing and trim at scale of not less than [**1-1/2 inches per 12 inches] [3 inches per 12 inches] <Insert scale**>.

Retain "Samples" paragraph below for single-stage Samples, with a subordinate list if applicable. Retain "Samples for Initial Selection" and "Samples for Verification" paragraphs for two-stage Samples.

* + - * 1. Samples: For each exposed product and for each color and texture specified, 12 inches long by actual width.

Retain "Sheet Metal Flashing" subparagraph below if sheet metal flashing and trim are prefinished. If custom color is specified, Sample in subparagraph may be nearly impossible to obtain.

Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.

Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.

Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

* + - * 1. Contract Closeout Submittals:

Special Warranty.

* + - * 1. Qualification Data: For fabricator.

Retain "Product Certificates" paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of coping and roof edge flashing that is [**ANSI/SPRI/FM 4435/ES-1 tested] [and] [FM Approvals approved**].
				2. Product Test Reports: For each product, for tests performed by a qualified testing agency.
				3. Evaluation Reports: For copings and roof edge flashing, from [**an agency acceptable to authority having jurisdiction] [ICC-ES] <Insert evaluation agency**> showing compliance with ANSI/SPRI/FM 4435/ES-1.

Design Consultant to review code references and verify that the referenced sections/tables are current. Note that code references shall be based on the current version of the Uniform Code.

* + - * 1. Sample Warranty: For special warranty.
			1. CLOSEOUT SUBMITTALS
				1. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
				2. Special warranty.
			2. QUALITY ASSURANCE
				1. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

Retain “Mockups” article if required. Edit as necessary.

* + - * 1. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

Build mockup of typical roof [**edge] [eave**], including [**built-in gutter] [fascia] [fascia trim] [apron flashing] <Insert item**>, approximately [**10 fee**t] <**Insert dimension**> long, including supporting construction cleats, seams, attachments, [underlayment, ]and accessories.

Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Director’s Representative specifically approves such deviations in writing.

Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

* + - 1. SITE CONDITIONS
				1. Do not execute the Work of this Section unless the Director’s Representative is present, or unless they direct that the Work be performed during their absence.
				2. Make the roof and uncompleted flashings watertight at the end of each work day.
			2. DELIVERY, STORAGE, AND HANDLING
				1. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

Store sheet metal flashing and trim materials away from uncured concrete and masonry.

Protect stored sheet metal flashing and trim from contact with water.

* + - * 1. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.
			1. WARRANTY

Retain this article only for coil-coated sheet metal. Delete if metal is left uncoated or field finished. Coordinate with finishes retained in Part 2.

* + - * 1. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.

Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.

Cracking, checking, peeling, or failure of paint to adhere to bare metal.

Finish Warranty Period: 20 years from date of Substantial Completion.

1. PRODUCTS
	* + 1. PERFORMANCE REQUIREMENTS
				1. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
				2. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
				3. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
				4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

Insert additional performance requirements here; verify system compliance with manufacturers.

* + - 1. SHEET METALS
				1. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
				2. Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 or H01 temper.

Retain "Nonpatinated, Exposed Finish"; "Nonpatinated, Exposed, Lacquered Finish"; or "Prepatinated Copper-Sheet Finish" subparagraph below. Retain first subparagraph for natural-color copper finish that weathers and changes color naturally over time. If retaining more than one finish, indicate locations of each on Drawings.

Nonpatinated, Exposed Finish: Mill.

Finishes in "Nonpatinated, Exposed, Lacquered Finish" subparagraph below do not weather naturally due to the application of clear organic coating.

Nonpatinated, Exposed, Lacquered Finish: Finish designations for copper alloys comply with system defined in NAAMM/NOMMA 500.

Retain "Brushed Satin (Lacquered)" or "Mirror Polished (Lacquered)" subparagraph below.

Brushed Satin (Lacquered): M32-06x (Mechanical Finish: directionally textured, medium satin; with clear organic coating); coating of "Incralac," [**waterborne**,] [**solvent-borne**,] methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats in accordance with manufacturer's written instructions to total thickness of 1 mil.

Mirror Polished (Lacquered): M22-06x (Mechanical Finish: buffed, specular; with clear organic coating); coating of "Incralac," [**waterborne,] [solvent-borne**,] air-drying, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats in accordance with manufacturer's written instructions to total thickness of 1 mil.

Retain "Prepatinated Copper-Sheet Finish" subparagraph below for prepatinated finishes, which reduce nonuniform weathering of exposed copper sheet. Verdigris is the ultimate, light-green color of aged copper.

Prepatinated Copper-Sheet Finish: [**Dark brown] [Verdigris] <Insert color**>, prepatinated in accordance with ASTM B882.

* + - * 1. Aluminum Sheet: ASTM B209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

Retain "Recycled Content" subparagraph below to specify recycled content if required. An alternative method of requiring recycled content is to retain requirement in Project's Division 01 sustainable design requirements Section that gives Contractor the option and responsibility to determine how recycled content requirements will be met.

Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert value> percent.

Retain one of the next three subparagraphs for finish required.

Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

Color: As selected by Director’s Representative from full range of industry colors and color densities.

Color Range: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

Retain "Exposed Coil-Coated Finish" subparagraph below for factory-coil-coated finish.

Exposed Coil-Coated Finish:

Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[ **for seacoast and severe environments**].

Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[ **for seacoast and severe environments**].

Finish in "Concealed Finish" subparagraph below is often retained as a factory finish for interior surfaces of coil-coated sheet. Usually delete for other finishes.

Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

* + - * 1. Stainless Steel Sheet: ASTM A240, Type 304, dead soft, fully annealed; with smooth, flat surface.

Retain "Recycled Content" subparagraph below to specify recycled content if required. An alternative method of requiring recycled content is to retain requirement in Project's Division 01 sustainable design requirements Section that gives Contractor the option and responsibility to determine how recycled content requirements will be met.

Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <**Insert value**> percent.

Finish: ASTM A480, No. 2D (dull, cold rolled).

Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

* + - * 1. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B370, cold-rolled copper sheet, H00 temper; coated on both sides with zinc-tin alloy (50 percent zinc, 50 percent tin).

Source Limitations: Obtain sheet from single source from single manufacturer.

Retain "Recycled Content" subparagraph below to specify recycled content if required. An alternative method of requiring recycled content is to retain requirement in Project's Division 01 sustainable design requirements Section that gives Contractor the option and responsibility to determine how recycled content requirements will be met.

Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than <Insert value> percent.

* + - * 1. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653, G90 coating designation; prepainted by coil-coating process to comply with ASTM A755.

Retain first option for prefinished PVDF finish. Retain second option only for field painting galvanized-steel sheet.

Surface: [**Smooth, flat] [and mill phosphatized for field painting**].

Retain "Exposed Coil-Coated Finish" subparagraph below for factory-coil-coated finish.

Exposed Coil-Coated Finish:

Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[ **for seacoast and severe environments**].

Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[ **for seacoast and severe environments**].

Retain "Color" subparagraph below for factory-coil-coated finish.

Color: [As selected by Director’s Representative from manufacturer's full range] <Insert color>.

Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

* + - * 1. Lead Sheet: ASTM B749 lead sheet.
			1. UNDERLAYMENT MATERIALS

Retain applicable paragraphs in this article for sheet metal flashing and trim applied directly over metal deck, solid sheathing, dissimilar metals, or corrosive substrates. Rosin-sized building paper is used as a slip sheet over other types of underlayment materials.

* + - * 1. Felt: ASTM D226, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

Underlayment in "Self-Adhering, High-Temperature Sheet Underlayment" paragraph below is suitable for higher temperatures associated with exposed sheet metal flashing and trim. This underlayment is used to resist leaks from roof areas where ice dams may form. Revise if high-temperature underlayment is not required. Slopes are typically limited to not less than 2:12 in accordance with manufacturers' published literature. Verify, with underlayment manufacturer, acceptability of use on shallower slopes.

* + - * 1. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.

Source Limitations: Obtain underlayment from single source from single manufacturer.

Low-Temperature Flexibility: ASTM D1970; passes after testing at minus 20 deg F or lower.

Retain "Slip Sheet" paragraph below for separating sheet metal from underlayment. Heavier rosin-sized paper is generally unavailable. See the Evaluations and consult sheet metal manufacturer.

* + - * 1. Slip Sheet: Rosin-sized building paper, 3 lbs./100 sq. ft. minimum.
			1. MISCELLANEOUS MATERIALS
				1. Provide materials and types of fasteners[, **solder**], protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal[ or manufactured item] unless otherwise indicated.
				2. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal**[ or manufactured item**].

General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.

Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.

Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

Retain applicable fastener subparagraph(s) below.

Fasteners for [**Copper] [Zinc-Tin Alloy-Coated Copper**] Sheet: Copper or hardware bronze.

Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel.

Use below to fasten flashings to concrete or masonry surfaces.

* + - * 1. Anchors: Provide one of the following types:

Hammer driven anchors, consisting of a stainless steel drive pin and a plastic or corrosion resistant metal expansion shield inserted thru a stainless steel disc with an EPDM sealing washer.

Self-tapping, corrosion resistant, concrete and masonry screw inserted thru a stainless steel disc with an EPDM sealing washer.

* + - * 1. Solder:

Retain applicable materials in five subparagraphs below. Soldering requires removal of painted, coated, or lacquered finishes.

For Copper: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead.

For Stainless Steel: ASTM B32, [**Grade Sn60] [Grade Sn96**], with acid flux of type recommended by stainless steel sheet manufacturer.

For Zinc-Tin Alloy-Coated Copper: ASTM B32, 100 percent tin, with maximum lead content of 0.2 percent, as recommended by sheet metal manufacturer.

For Zinc-Coated (Galvanized) Steel: ASTM B32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

* + - * 1. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

Omit the next three “Sealant” paragraphs below if Section 079200 is used.

Revise "Elastomeric Sealant" paragraphs below if sealant of specific type, grade, class, and use is required.

* + - * 1. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

Type 2 Sealant: One-part acrylic polymer sealant;

Products: Subject to compliance with requirements, provide the following:

Bostik; Duo-Sil.

GE Sealants; All Weather Pro Sealant.

Pecora Corporation; AVW-920; AC-20.

Approved Equivalent.

Use below for high temperature applications, such as heating pipes.

* + - * 1. Type 4 Sealant: One-part silicone sealant for high temperatures.

Products: Subject to compliance with requirements, provide the following:

Dowsil 736 Heat Resistant Sealant.

Dowsil Hi-Temp Sealant Red.

Henkel Adhesives Loctite SI 596.

TremPro 644 HT.

Approved Equivalent.

Retain "Butyl Sealant" paragraph below for expansion joints with limited movement.

* + - * 1. Type 3 Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

Products: Subject to compliance with requirements, provide the following:

Pecora Corporation; BC-158.

PTI; 707.

Tremco; Butyl Sealant.

Approved Equivalent.

Retain "Epoxy Seam Sealer" paragraph below if required for aluminum sheet without painted or coated finish.

* + - * 1. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
				2. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187.
				3. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

Use below for cant type factory fabricated gravel stops. Delete fascia sump when not required.

* + - * 1. Extruded Aluminum Gravel Stop and Fascia Sump: Complete system including fascia, water dam, splice plates, corners, and intersections, and other accessory components.

Manufacturers: Subject to compliance with project requirements:

Viridian Systems

Metal ERA.

IMETCO.

Approved Equivalent.

Face Height: Closest manufacturer’s standard dimension to face height shown on Drawings.

Edit the next 3 subparagraphs.

Style: Specifically Designed For:

Conventional Built-Up roofing Membrane.

Protected Built-Up Roofing Membrane.

One Ply Roofing Membrane.

Protected One Ply Roofing Membrane.

Finish: [**Fluorocarbon Coating (Polyvinylidene Fluoride, PVDF)][Clear Anodized][Color Anodized**].

Edit subparagraph below if custom color is required. Delete subparagraph below if clear anodized is specified in subparagraph above.

Color: As selected by the Director’s Representative from manufacturer’s standard colors.

Use below for low profile type extruded gravel stops.

* + - * 1. Extruded Aluminum Gravel Stop (Type F): Complete system including gravel stop, extruded aluminum joint cover plates, concealed 0.025 inch aluminum joint flashing, fasteners, corners, and intersections and other accessory components.

Manufacturers: Subject to compliance with project requirements:

Architectural Products Company

Approved Equivalent.

Face Height: Closest manufacturer’s standard dimension to face height shown on drawings.

Finish: [**Fluorocarbon Coating (Polyvinylidene Fluoride, PVDF)][Clear Anodized][Color Anodized**].

Edit subparagraph below if custom color is required. Delete subparagraph below if clear anodized is specified in subparagraph above.

Color: As selected by the Director’s Representative from manufacturer’s standard colors.

* + - * 1. Factory Fabricated Formed Coping: Complete system including 0.063 inch aluminum coping, anchor plates, joint drainage system, concealed joint covers, corners, and intersections, and other accessory components.

Manufacturers: Subject to compliance with project requirements:

Viridian Systems

Metal ERA.

IMETCO.

Approved Equivalent.

Finish: [**Fluorocarbon Coating (Polyvinylidene Fluoride, PVDF)][Clear Anodized][Color Anodized**].

Edit subparagraph below if custom color is required. Delete subparagraph below if clear anodized is specified in subparagraph above.

Color: As selected by the Director’s Representative from manufacturer’s standard colors.

* + - * 1. Bellows Type Expansion Joint Cover: Factory fabricated unit with neoprene bellows backed with closed cell foam, anchored to metal flange. Include prefabricated corners, and intersections (if any), joint splice plater, and all other accessory components.

Metal Flange: [**Copper][Galvanized Steel][Aluminum**].

Use below for 2 piece cap flashings on new work only. Edit heading for in wall or thru wall receiver.

* + - * 1. Cap Flashing With In-Wall or Thru-Wall Cap Receiver: Three way mortar bond type receiver with snap fit cap flashing;

Product: Keystone Flashing Co.; Keystone Two-Piece Cap Flashing, approved equivalent.

* + - * 1. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated [with factory-mitered and -welded corners and junctions] [and] [with interlocking counterflashing on exterior face, of same metal as reglet].

Source Limitations: Obtain reglets from single source from single manufacturer.

Material: [**Stainless steel, 0.0188 inch thick] [Copper, 16 oz./sq. ft.] [Aluminum, 0.024 inch thick] [Galvanized steel, 0.022 inch thick**].

Retain one or more reglet types and accessories from "Surface-Mounted Type," "Stucco Type," "Concrete Type," "Masonry Type," and "Accessories" subparagraphs below to suit Project.

Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

Accessories:

Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.

Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

Before retaining "Finish" subparagraph below, verify availability of finishes with manufacturers.

Finish: [**Mill] [With manufacturer's standard color coating] <Insert finish**>.

* + - 1. FABRICATION, GENERAL
				1. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

Fabricate sheet metal flashing and trim in shop to greatest extent possible.

Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.

Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

* + - * 1. Fabrication Tolerances:

Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

* + - * 1. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

Revise both subparagraphs below to suit Project.

Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

Use lapped expansion joints only where indicated on Drawings.

* + - * 1. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
				2. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
				3. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
				4. Seams:

Retain one of three subparagraphs below; revise to suit Project. Retain first for metals being soldered. Soldering requires removal of painted, coated, or lacquered finishes.

Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

Retain first subparagraph below for aluminum sheet and metals with painted, coated, or lacquered finishes. If required, retain option for sheet aluminum and zinc.

Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.[ **Rivet joints where necessary for strength**.]

Retain "Seams for Aluminum" subparagraph below only for aluminum sheet without painted or coated finish. If required, retain option.

Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.[ **Rivet joints where necessary for strength**.]

Retain paragraph below if required to prevent galvanic corrosion between graphite and aluminum or aluminum-zinc alloy-coated steel.

* + - * 1. Do not use graphite pencils to mark metal surfaces.
			1. ROOF-DRAINAGE SHEET METAL FABRICATIONS

Retain formed items required in this article. Although the most common fabrications are included, insert descriptions of others if required.

* + - * 1. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.[ **Fasten gravel guard angles to base of scupper**.] Fabricate from the following materials:

Copper: 20 oz./sq. ft..

Stainless Steel: 0.025 inch (24 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft..

Galvanized Steel: 0.028 inch thick.

* + - 1. LOW-SLOPE ROOF SHEET METAL FABRICATIONS

Retain formed items required in this article.

* + - * 1. Roof Edge Flashing (Gravel Stop)[ **and Fascia Cap**]: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates.[ **Shop fabricate interior and exterior corners.**]

Options in "Joint Style" subparagraph below describe joint configurations detailed by NRCA and SMACNA. Revise to suit Project. Insert descriptions here or indicate special corner and edge styles on Drawings if required.

Joint Style: [**Overlapped, 4 inches wide] [Butted with expansion space and 6-inch-wide, concealed backup plate] [Butted with expansion space and 6-inch-wide, exposed cover plate] <Insert description**>.

Retain first subparagraph below if combining scuppers with roof edge flashing (gravel stop) or fascia caps. These scuppers discharge into hanging gutters or conductor heads.

Fabricate with scuppers spaced [10 feet] <Insert dimension> apart, to dimensions required with 4-inch-wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.

Fabricate from the following materials:

Copper: 20 oz./sq. ft..

Aluminum: 0.050 inch thick.

Stainless Steel: 0.025 inch (25 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft..

Galvanized Steel: 0.028 inch thick.

Hypalon Coated Metal.

PVC Coated Metal.

* + - * 1. Copings: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and[ **drill elongated holes for fasteners on**] interior leg. Miter corners, [**fasten and seal] [solder or weld] watertight.[ Shop fabricate interior and exterior corners**.]

Profiles in "Coping Profile" subparagraph below refer to SMACNA figure designations for shapes of fabricated copings; NRCA does not have numerical designations for coping profiles. Delete SMACNA designations and revise the Section Text if not using SMACNA designations or if Drawings indicate cross section or profile in sufficient detail.

Coping Profile: [**Fig. 3-4A] [Fig. 3-4B] [Fig. 3-4C] [Fig. 3-4D] [Fig. 3-4E] [Fig. 3-4F] [Fig. 3-4G**] in accordance with SMACNA's "Architectural Sheet Metal Manual."

Options in "Joint Style" subparagraph below describe joint configurations detailed by SMACNA and NRCA. Revise to suit Project. Insert descriptions here or indicate special corner and edge styles on Drawings if required.

Joint Style: [**Butted with expansion space and 6-inch-wide, concealed backup plate] [Butted with expansion space and 6-inch-wide, exposed cover plate] <Insert description**>.

Fabricate from the following materials:

Copper: 24 oz./sq. ft.

Aluminum: 0.050 inch thick.

Stainless Steel: 0.0250 inch (24 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 24 oz./sq. ft.

Galvanized Steel: [**0.040 inch**] 0.023 inch thick.

* + - * 1. Base Flashing: [**Shop fabricate interior and exterior corners**. ]Fabricate from the following materials:

Copper: 20 oz./sq. ft.

Aluminum: 0.040 inch thick.

Stainless Steel: 0.025 inch (25 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft.

Galvanized Steel: 0.028 inch thick.

* + - * 1. Counterflashing: [**Shop fabricate interior and exterior corners**. ]Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Stainless Steel: 0.0188 inch (26 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

Galvanized Steel: 0.023 inch (24 ga.) thick.

Use below for 2 piece cap flashings on new work only. Edit heading for in wall or thru wall receiver.

* + - * 1. Flashing Receivers: Fabricate from the following materials:

Copper: 16 oz./sq. ft.

Stainless Steel: 0.0188 inch (26 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

* + - * 1. Roof-Penetration Flashing: Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Stainless Steel: 0.0188 inch (26 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

Before retaining "Roof-Drain Flashing" paragraph below, coordinate with applicable low-sloped roof membrane Section. Most single-ply membranes do not require metal flashing at internal roof drains. Asphalt-based roof systems require lead flashings, which are included in the respective Section, at internal roof drains.

* + - * 1. Roof-Drain Flashing: Fabricate from the following materials:

Sheet Lead: 4 lbs. per square.

* + - 1. STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

Retain paragraphs in this article to suit Project. Although the most common fabrications are included, insert descriptions of others if required.

* + - * 1. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

Copper: 20 oz./sq. ft.

Aluminum: 0.032 inch thick.

Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft.

Galvanized Steel: 0.023 inch thick.

* + - * 1. Valley Flashing: Fabricate from the following materials:

Copper: 16 oz./sq. ft.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft.

Galvanized Steel: 0.028 inch thick.

Aluminum: 0.032 inch thick.

* + - * 1. Drip Edges: Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Aluminum: 0.032 inch thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

* + - * 1. Eave, Rake[, **Ridge, and Hip**] Flashing: Fabricate from the following materials:

Copper: 16 oz./sq. ft.

Aluminum: 0.032 inch thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

Galvanized Steel: 0.023 inch thick.

* + - * 1. Counterflashing: [**Shop fabricate interior and exterior corners.** ]Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Stainless Steel: 0.0188 inch (26 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

Galvanized Steel: 0.023 inch (24 ga.) thick.

Use below for 2 piece cap flashings on new work only. Edit heading for in wall or thru wall receiver.

* + - * 1. Flashing Receivers: Fabricate from the following materials:

Copper: 16 oz./sq. ft.

Stainless Steel: 0.0188 inch (26 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

* + - * 1. Roof-Penetration Flashing: Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Stainless Steel: 0.0188 inch (26 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft.

* + - 1. WALL SHEET METAL FABRICATIONS

Retain paragraphs in this article to suit Project. Although the most common fabrications are included, insert descriptions of others if required.

* + - * 1. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Stainless Steel: 0.0156 inch thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

Use below in masonry wall construction.

* + - * 1. Thru Wall Flashing:

Copper Fabric: 7 oz./sq. ft. copper sheet with asphalt impregnated glass fabric bonded to both sides.

Joint Sealant: Trowel grade asphalt roofing cement.

Use below in masonry wall construction. Add or delete items in heading.

* + - * 1. Door and Window Flashing:

Copper Fabric: 7 oz./sq. ft. copper sheet with asphalt impregnated glass fabric bonded to both sides.

Joint Sealant: Trowel grade asphalt roofing cement.

Retain "Opening Flashings in Frame Construction" paragraph below for nonmasonry-clad wood or cold-formed steel-framed walls. Claddings may include exterior insulation and finish systems (EIFS), siding, wood shingles, or shakes. Flashing is usually required to surround wall-opening components such as windows, doors, and louvers.

* + - * 1. Opening Flashings in Frame Construction: Fabricate head, sill,[ **jamb**,] and similar flashings to extend [**4 inches**] beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

Copper: 10 oz./sq. ft.

Aluminum: 0.032 inch thick.

Stainless Steel: 0.0156 inch (30 ga.) thick.

* + - * 1. Wall Expansion-Joint Cover: Fabricate from the following materials:

Copper: 20 oz./sq. ft.

Aluminum: 0.040 inch thick.

Stainless Steel: 0.025 inch (25 ga.) thick.

Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft.

Galvanized Steel: 0.028 inch thick.

* + - 1. MISCELLANEOUS SHEET METAL FABRICATIONS

Retain paragraphs in this article to suit Project.

* + - * 1. Cleats:

Copper: 16 oz./sq. ft.

Galvanized Steel: 0.023 inch (24 ga.) thick.

Aluminum: 0.040 inch thick.

* + - * 1. Continuous Edge Strip:

Copper: 20 oz./sq. ft.

Galvanized Steel: 0.023 inch (24 ga.) thick.

Aluminum: 0.040 inch thick.

* + - * 1. Pitch Pockets:

Copper: 16 oz./sq. ft.

Zinc-Tin Coated Copper: 16 oz./sq. ft.

Stainless Steel: 0.018 inch (26 ga.) thick.

* + - * 1. Snow Guards:

Product: Subject to compliance with requirements, provide the following:

Zaleski Snow-Guards for Roofs, Inc., 11 Alden St., New Britain, CT 06053, (860) 225-1614, www.snowguards.com,

Approved Equivalent.

Designed specifically for installation on:

Edit below for type of roof.

Slate Roof: Model No. 4 snow guard.

Asphalt Shingle Roof: Model No. 4 snow guard with hook tab removed and drilled for nailing.

Tile Roof: Model No. 6 snow guard.

Copper Roof: Model No. 7 snow guard.

Adhesive: Snow guard manufacturer’s standard or recommended sealant adhesive or 2 sided tape to suit roofing material.

* + - * 1. Standing Seam Snow Guard Flashing: Fabricate from the following materials:

Copper: 16 oz./sq. ft..

Aluminum: 0.032 inch thick.

Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft..

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

Retain first subparagraph below if retaining requirements for tolerances.

Verify compliance with requirements for installation tolerances of substrates.

Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

Retain subparagraph below for sheet metal flashing and trim that are part of roof assembly that depends on air- or water-resistant barriers to prevent air infiltration or water penetration and that are located immediately beneath roofing.

Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

* + - * 1. Proceed with installation only after unsatisfactory conditions have been corrected.
			1. INSTALLATION OF UNDERLAYMENT

Retain "Felt Underlayment"; or "Self-Adhering, High-Temperature Sheet Underlayment" paragraph below based on products retained in Part 2.

* + - * 1. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.

Install in shingle fashion to shed water.

Lap joints not less than 2 inches.

* + - * 1. Self-Adhering, High-Temperature Sheet Underlayment:

Install self-adhering, high-temperature sheet underlayment; wrinkle free.

Prime substrate if recommended by underlayment manufacturer.

Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.

Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.

Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.

Roll laps and edges with roller.

Cover underlayment within 14 days.

Retain paragraph below if slip sheet is required.

* + - * 1. Install slip sheet, wrinkle free, [**over underlayment] [directly on substrate] <Insert requirement**> before installing sheet metal flashing and trim.

Install in shingle fashion to shed water.

Lapp joints not less than 4 inches.

* + - 1. INSTALLATION, GENERAL
				1. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

Delete references to “solder” if flashings are aluminum.

Install fasteners[, **solder**], protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of [**solder] [welds] [sealant**].

Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.

Install sheet metal flashing and trim to fit substrates and to result in watertight performance.

Retain one or both of first two subparagraphs to suit Project.

Install continuous cleats with fasteners spaced not more than 12 inches o.c.

Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.

Do not field cut sheet metal flashing and trim by torch.

Retain subparagraph below to prevent galvanic corrosion between graphite and aluminum or aluminum-zinc alloy-coated steel.

Do not use graphite pencils to mark metal surfaces.

* + - * 1. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

Coat concealed side of [**uncoated-aluminum] [and] [stainless steel**] sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

* + - * 1. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

Space movement joints at maximum of [**10 feet] <Insert dimension**> with no joints within 24 inches of corner or intersection.

Revise both subparagraphs below to suit Project.

Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

Use lapped expansion joints only where indicated on Drawings.

* + - * 1. Fasteners: Use fastener sizes that penetrate [wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws] [substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance] <Insert size requirement>.
				2. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
				3. Seal joints as required for watertight construction.

Use sealant-filled joints unless otherwise indicated.

Retain first subparagraph below when fabrications with hooked flanges are specified.

Embed hooked flanges of joint members not less than 1 inch into sealant.

Form joints to completely conceal sealant.

When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.

Adjust setting proportionately for installation at higher ambient temperatures.

Do not install sealant-type joints at temperatures below 40 deg F.

Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

* + - * 1. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.

Retain metals in first two subparagraphs below that are specified in Part 2; revise to suit Project. Soldering requires removal of painted, coated, or lacquered finishes. Although unusual, zinc-coated (galvanized) steel, a type of metallic-coated steel, may be soldered.

Do not solder [**metallic-coated steel] [and] [aluminum**] sheet.

Do not pretin zinc-tin alloy-coated copper.

Do not use torches for soldering.

Heat surfaces to receive solder, and flow solder into joint.

Fill joint completely.

Completely remove flux and spatter from exposed surfaces.

Stainless Steel Soldering:

Tin edges of uncoated sheets, using solder for stainless steel and acid flux.

Promptly remove acid-flux residue from metal after tinning and soldering.

Comply with solder manufacturer's recommended methods for cleaning and neutralization.

Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

Retain "Rivets" paragraph below if required for aluminum or zinc sheet.

* + - * 1. Rivets: Rivet joints in [**uncoated aluminum] [zinc**] where necessary for strength.
			1. INSTALLATION OF ROOF-DRAINAGE SYSTEM
				1. Install sheet metal roof-drainage items to produce complete roof-drainage system in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
				2. Parapet Scuppers:

Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

Retain first subparagraph below if scupper terminates at exterior wall. Retain second subparagraph, with first, if scupper discharges into conductor head set immediately below base elevation of scupper. Retain third subparagraph if scupper discharges directly into back of conductor head.

Anchor scupper closure trim flange to exterior wall and [**solder] [or] [seal with elastomeric sealant**] to scupper.

Loosely lock front edge of scupper with conductor head.

[Solder] [or] [seal with elastomeric sealant] exterior wall scupper flanges into back of conductor head.

* + - * 1. Expansion-Joint Covers:

Use below for metal expansion joint covers.

Install expansion-joint covers at locations and of configuration indicated on Drawings. Lap joints minimum of 4 inches in direction of water flow.

Install combination edge strip and cap flashing over the base flashing.

Form the expansion joint cover with standing seam joints not to exceed 10’-0” o.c.

Turn the edges of the cover over the edge strip. Allow clearance of one half the width of the expansion joint between edges of cover and edge strip.

Use below for bellows type factory fabricated expansion joints.

Installing Bellows Type Expansion Joint Cover:

Install the expansion joint in continuous lengths. No more than one splice joint will be allowed on straight runs less than 50 feet long. Install the expansion joint in accordance with the manufacturer’s written instructions unless shown or specified otherwise.

Use below if expansion joint intersects a gravel stop

Where expansion joints intersect gravel stops, provide the manufacturer’s prefabricated expansion joint section. Install the expansion joint before installing the gravel stop.

* + - 1. INSTALLATION OF ROOF FLASHINGS

Retain this article for low-slope and steep-slope roof flashing. Coordinate steep-slope roof flashing requirements with applicable steep-slope roofing Section.

Retain option in first paragraph below if manufactured reglets are required.

* + - * 1. Install sheet metal flashing and trim to comply with performance requirements[, **sheet metal manufacturer's written installation instructions,**] and cited sheet metal standard.

Provide concealed fasteners where possible, and set units true to line, levels, and slopes.

Install work with laps, joints, and seams that are permanently watertight and weather resistant.

* + - * 1. Installing Cap Flashing:

Form and install the cap to provide a spring tight fit against the base flashing. Lap all end joints and base flashing a minimum of 3 inches. Extend the cap continuously around corners or provide lock seams.

Edit types of cap flashings below. Coordinate with drawings.

Cap Flashing for Installation In Reglets:

Extend the built in portion of the cap a min of 3/4-inch into the reglet. Form the edge of the built in portion with a 1/4-inch hook dam.

Secure the cap with lead wedges 8 inches o.c. Fill joint completely with Type 2 sealant and tool to a slightly concave surface.

Surface Mounted Cap Flashing:

Form the top portion of the cap flashing which comes in contact with the wall surface with a one-inch wide bearing surface. Form a 45 degree x 1/4 inch wide stiffener and caulking flange along the top edge.

Apply Type 2 sealant on the back side of the bearing surface.

Secure the cap flashing to the wall with fasteners spaced one foot o.c. thru the bearing surface.

Apply Type 2 sealant along the caulking flange.

Use below on new masonry construction only.

In-Wall Cap Flashing:

Extend the built-in portion of the cap a minimum of 4 inches into the wall. Form the edge of the built in portion with a 1/4 inch hook dam.

Set the cap so there is mortar above and below the built-in portion.

Use below for 2 piece cap flashings with “in wall” or “thru wall” receivers. New masonry construction only.

Cap Flashing For Installation in Receivers:

Insert the cap flashing into the receiver locking slot. Apply upward pressure along the entire length of the cap flashing so that it is securely locked into position.

Use below when existing cap flashings are to remain.

* + - * 1. Dressing Down Existing Cap Flashing:

Turn up all cap flashings as required to perform the Work. Upon completion of the Work dress down all disturbed cap flashings so they lay flat against the base flashing.

Secure the cap flashing to the wall surface with fasteners spaced 18 inches oc.

Install matching metal patches at corners of cap flashings that have been cut to perform the Work. Lap the patches a minimum of one inch on each side of the cap flashing.

Secure the patch by pop riveting or by soldering.

Use one of the next 2 paragraphs below. Use first paragraph below with copper or stainless steel on built up roofs only.

* + - * 1. Installing Base Flashings:

Form the base flashing with locked and soldered joints into lengths not more than 24 feet oc.

Provide expansion joints a maximum of 24 feet o.c. on straight runs and a maximum of 4 feet from corners. Form expansion joints with a 3 inch loose locked seam filled with Type 3 Sealant.

Expansion Joint: Slit the cross folded portion of the flashing where it is bent at a right angle. Solder a patch over the slit to avoid binding at the cross fold.

Extend the vertical portion of the base flashing a minimum of 3 inches up behind the cap flashing.

Delete below if not shown on drawings.

Where shown on the drawings lock the base flashing to the cap flashing with a minimum 3/4 inch loose lock joint.

Extend the horizontal portion of the base flashing onto the roof surface a minimum of 4 inches and terminate in a 1/2 inch folded edge. Secure with nails spaced 3 inches o.c. staggered.

Use below for Hypalon or PVC coated metal base flashings. Coordinate with drawings.

* + - * 1. Installing Base Flashing:

Form the base flashing into lengths not more than 8 feet long. Install the base flashing with a 1/4 inch space between each length to accommodate expansion.

Extend the vertical position of the base flashing a minimum of 3 inches up behind the cap flashing.

Extend the horizontal portion of the base flashing onto the roof surface a min of 4 inches and terminate in a 1/2 inch folded edge. Secure with nails spaced 3 inches o.c. staggered.

Use below for stepped base flashings on shingle roofs.

* + - * 1. Installing Base Flashing:

Form the base flashing from individual pieces 9 inches long. Extend the base flashing onto the roof surface 5 inches and up beneath cap flashings a minimum of 3 inches.

Lap the base flashing in with the shingles. Set each piece 1/2 inch up from the butt of the shingles. Nail the flashing to the roof surfaces only, with 2 nails along the concealed top edge.

Use below for continuous length base flashings on shingle roofs.

* + - * 1. Installing Base Flashing:

Form the base flashing into lengths not exceeding 8 ft long.

Extend the vertical portion of the base flashing a min of 3 inches up behind the cap flashing.

Extend the horizontal portion of the base flashing onto the roof surface a min of 4 inches and terminate in a 1/2 inch folded edge.

Lap ends a min of 6 inches. Apply type 3 sealant between the mating surfaces of each length of flashing.

Secure the flashing to the roof surfaces with 2 inch wide cleats (same material) hooked over the folded edge and nailed to the roof deck. Install cleats 8 inches oc.

* + - * 1. Installing Formed Metal Gravel Stops:

Form the gravel stop into lengths not exceeding 8’-0”. Allow 1/4 inch between sections for expansion.

Install a continuous edge strip secured 8 inches oc.

Install a 12 inch wide concealed splice plate at all joints. Form the splice plate to the exact shape of the gravel stop. Center the splice plate beneath the joints of the gravel stop and secure to the roof deck.

Use below with EPDM, or Hypalon single ply membranes.

Apply the membrane manufacturer’s recommended sealant between the contact surface of the horizontal portion of the splice plate and the gravel stop.

Extend the horizontal portion of the gravel stop onto the roof surface a minimum of 4 inches and terminate in a 1/2 inch folded edge. Secure with nails spaced 3 inches oc staggered. Hook the drip edge of the gravel stop over a continuous metal edge strip.

Use below when face height exceeds 8 inches.

Where gravel stop face height exceeds 8 inches provide a longitudinal break at the center line unless shown otherwise on the Drawings.

* + - * 1. Installing Thru Wall Scupper:

Form the scupper with 4 inch wide flashing flanges.

Use below with copper, galvanized steel, or stainless steel.

Lock and solder, or rivet and solder all construction joints of the scupper.

Use below with Hypalon or PVC coated metal.

Lock, or lap and rivet all construction joints of the scupper.

Secure the scupper to the roof deck and the inside face of the wall with fasteners installed thru the flashing flanges.

On the outside face of the wall lock the scupper on four sides to a surface mounted receiver formed from the same metal as the scupper.

Form the receiver with a 1/4 inch wide caulking flange.

Apply Type 2 sealant on the lock side of the flange.

Secure the flange to the wall with fastener 6 inches o.c.

Apply Type 2 sealant along the caulking flange.

Use below for cant type factory fabricated gravel stops. Delete fascia sump when not required.

* + - * 1. Installing Extruded Aluminum Gravel Stops/and Fascia Sump:

Install the gravel stop in accordance with the manufacturer’s written instructions unless shown or specified otherwise.

Use below for low profile extruded gravel stops.

* + - * 1. Installing Extruded Aluminum Gravel Stop:

Install 12 inches wide 0.025 inch concealed aluminum flashing beneath the gravel stop at all joints.

Use below with EPDM or Hypalon single ply membranes.

Apply the membrane manufacturer’s recommended sealant between the contact surfaces of the horizontal portion of the splice plate and the gravel stop.

Secure the gravel stop at the midpoint, and at ends of each 10 ft. section. Allow a 1/2 inch space between each section for expansion.

Install a 4 inch wide exposed aluminum cover plate at all joints.

* + - * 1. Roof Edge Flashing:

Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

* + - * 1. Copings:

Use below for shop or job formed copings.

Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.

Form the coping into lengths not exceeding 8’-0”.

Join coping sections with 1-1/2 inch loose locked seams filled with Type 3 sealant.

Hook the front and back edges of the coping over continuous metal edge strips. Nail the edge strip 6 inches oc.

Use below for factory fabricated coping.

Install in accordance with the manufacturer’s written instructions unless shown or specified otherwise.

Use below for built up roofs.

* + - * 1. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing and terminate in a 1/2 inch folded edge. Install stainless steel draw band and tighten.

Solder the base flashing to the tube flashing. Provide one of the following cap flashings.

Provide a cap flashing fabricated to slip over the tube flashing and the pipe. Lap the tube flashing a minimum of 3 inches and the pipe a minimum of one inch. Solder all seams.

Provide a split cap and compression clamp fabricated of the same material and gage as the tube and base flashing. Form the cap with a caulking flange. Apply Type 2 sealant around the pipe. Install the split cap and secure with compression clamp. Pop rivet the lap joint of the cap. Apply additional Type 2 sealant around the caulking flange.

Use below on shingle roofs only.

* + - * 1. Pipe or Post Counterflashing:

Extend the base flashing a minimum of 5 inches onto the roof surface. Terminate the bottom exposed edge with a 1/2 inch folded seam. Solder the base flashing to the tube flashing.

Install the flashing after the course of shingles immediately below the pipe is installed so that the bottom side of the flashing is over the shingle and the sides and top are beneath the shingles. Nail the top and sides of the flashing only.

Provide a cap flashing fabricated to slip over the tube flashing and the pipe. Lap the tube flashing a minimum of 3 inches and the pipe a minimum of one inch. Solder all seams.

* + - * 1. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

Insert counterflashing in reglets or receivers and fit tightly to base flashing.

Extend counterflashing 4 inches over base flashing.

Lap counterflashing joints minimum of 4 inches.

First two options in first subparagraph below are based on NRCA and SMACNA recommendations;

Secure in waterproof manner by means of [**snap-in installation and sealant or lead wedges and sealant] [interlocking folded seam or blind rivets and sealant**] unless otherwise indicated.

* + - * 1. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with [**elastomeric] [butyl**] sealant and clamp flashing to pipes that penetrate roof.
				2. Installing Valley Flashing:

Install in lengths not to exceed 10’-0”. Lap ends a minimum of 8 inches and nail on the concealed top edge only.

The exposed portion of the valley must be 5 inches wide at the top and increase in width 1/8 inch per ft toward the eaves. The concealed portion of the valley must extend 5 inches beneath the shingles.

Terminate the concealed edges in a 1/2 inch fold and secure 2 ft. o.c. with 2 inch wide cleats.

* + - * 1. Installing Eave and Rake Flashing:

Install in lengths not to exceed 10’0”. Lap ends a minimum of 3 inches.

At eaves install the flashing under the 15 lb. felt. At rakes install the flashing over the 15 lb. felt.

Secure the flashing to the roof deck with nails spaced 8 inches o.c.

* + - 1. INSTALLATION OF WALL FLASHINGS
				1. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

Use below for 2 piece cap flashings on new work only. Edit heading for type of receiver.

* + - * 1. Installing In-Wall and Thru-Wall Cap Flashing Receivers:

Set the receiver so there is mortar above and below the built-in portion.

Do not mallet, bend or deform the exposed portion.

Lap all end joints so they interlock at the first raised rib. Apply Type 3 sealant between the mating surfaces of the built-in portion of the receiver before interlocking end joints.

* + - * 1. Opening Flashings in Frame Construction: Install continuous head, sill,[ **jamb**,] and similar flashings to extend [**4 inches] <Insert dimension**> beyond wall openings.
				2. Reglets: Installation of reglets is specified in [**Section 033000 "Cast-in-Place Concrete."] [Section 042000 "Unit Masonry."] [Section <Insert Section number> "<Insert Section title**>."]

Use below on masonry construction. Add or delete items in heading.

* + - * 1. Installing Thru Wall, and Door and Window Flashing:

Install the flashing in continuous lengths with the minimum number of joints.

At corners, beams, columns, cut out fit flashing to the proper contour.

Form joints with 1-1/2 inch folded lock seams filled with trowel grade asphalt roof cement. Roll or press the joints firmly to insure complete adhesion of the cement.

Build the flashing into masonry walls so there is mortar above and below the flashing.

Terminate the flashing 1/2 inch back from the exposed face of masonry wall.

Use below for doors, window, and other wall openings.

Extend the flashing 6 inches beyond the sides of openings and turn up 1/4 inch to form a pan.

Use below on wood frame construction. Add or delete items in heading.

* + - * 1. Door and Window Flashing:

Install the flashing in one continuous length from side to side.

* + - 1. INSTALLATION OF MISCELLANEOUS FLASHING

Use below for new drains, built up roofs only.

* + - * 1. Roof Drain Flashing: Install 30 inch square lead flashing over the roofing membrane. Turn flashing into drain body.

Use below for existing drains, built up roofs only.

* + - * 1. Re-flashing Existing Drains:

Remove the existing dome strainer, clamping ring and lead flashing from existing roof drains. Install 30 inches square lead flashing turned into drain body and reinstall clamping ring and strainer. If necessary, tap existing clamping ring bolt holes and install new clamping ring bolts.

* + - * 1. Installing Pitch Pockets:

Form the pitch pocket with 4 inch wide flashing flanges. Extend the pitch pocket a minimum of 3 inches above the roof membrane and a minimum of one inch beyond the roof penetration.

Use below with copper or stainless steel.

Solder construction joints.

Use below with PVC or Hypalon coated metal.

Lock, or lap and rivet all construction joints.

Secure the pitch pocket thru the flashing flanges with nails 3 inches oc.

* + - * 1. Installing Standing Seam Snow Flashing:

Equally space seams at centers not to exceed 24 inches.

Form all seams with a double lock to a finished height of 1-1/4 inches. Install 2 inches wide cleats 1’-0” o.c. in seams.

Hook the front edge of the snow flashing over the continuous edge strip and terminate the concealed edge in a 1/2 inch fold. Secure with 2 inches wide cleats spaced 1’-0” o.c.

* + - * 1. Installing Crickets:

Form the cricket with flanges that extend onto the roof surface 6 inches and up beneath the cap flashing a min of 3 inches. Extend the roof deck flange a min of 5 inches beneath the shingles and terminate with a 1/2 inch folded edge. Secure the cricket to the roof deck with 2 inch wide cleats one ft. o.c.

* + - * 1. Installing Snow Guards:

Unless shown otherwise, install a minimum of 30 snow guards per 100 sq. ft. Space and install the snow guards in accordance with the manufacturer’s instructions.

Use below on metal roofs only.

Set each snow guard in a full bed of adhesive with no skips or voids. Remove excess adhesive from the edges of snow guards after each piece is installed.

* + - 1. INSTALLATION TOLERANCES
				1. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
			2. CLEANING

Retain first paragraph below for metal surfaces unless metal is painted, coated, or lacquered.

* + - * 1. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

Retain first paragraph below for soldered joints.

* + - * 1. Clean and neutralize flux materials. Clean off excess solder.
				2. Clean off excess sealants.
			1. PROTECTION
				1. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
				2. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
				3. Maintain sheet metal flashing and trim in clean condition during construction.
				4. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Director’s Representative.

END OF SECTION 076200