

## SECTION 076200 – SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Manufactured reglets [**with counterflashing**].
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

##### B. Related Sections:

1. Section 042000 – Unit Masonry
2. Section 072419 – Water Drainage Exterior Insulation Facade System
3. Section 073113 – Asphalt Shingles
4. Section 074616 – Aluminum Siding
5. Section 074646 – Fiber-Cement Siding
6. Section 077100 – Roof Specialties

##### C. Reference and Industry Standards

1. The following reference standards are applicable to this Section:
  - a. The current Enterprise Green Communities (EGC) Criteria, and the current New York City Overlay.
2. Industry Standards
  - ANSI (American National Standards Institute)
  - ASTM (American Society for Testing and Materials)
  - NRCA (National Roofing Contractors Association)
  - SMACNA (Sheet Metal & Air Conditioning Contractors National Association)
  - SPRI (Single Ply Roofing Industry)

##### D. The current NYC Overlay of the current Enterprise Green Communities Criteria:

1. Mandatory Requirements: See the NYC Overlay of the EGC reference standard for full specifications.
  - a. All projects must achieve compliance with the mandatory criteria measures that are applicable:
    - Criterion 6.9: Managing Moisture: Roofing and Wall Systems
    - Criterion 6.10: Construction Waste Management
2. Additionally, rehab projects are required to achieve **55** optional points. Criteria with optional points related to this Specification Section include, but are not limited to:

- Criterion 6.2: Recycled Content and Ingredient Transparency
- Criterion 6.7: Regional Materials
- Criterion 6.10: Construction Waste Management

## 1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

## 1.3 ACTION SUBMITTALS

- A. Environmental Product Declaration (EPD) for each of the following:

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

- B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested [**and**] [**FM Approvals approved**].
- B. Sample warranty.
- C. Documentation for compliance with Enterprise Green Communities Criteria.

## 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.
- B. Special warranty.

## 1.6 QUALITY ASSURANCE

- A. 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.
  - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested [**and**] [**FM Approvals approved**], shop shall be listed as able to fabricate required details as tested and approved.

## 1.7 WARRANTY

- A. 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.
  - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. 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.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's *The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing* and SMACNA's *Architectural Sheet Metal Manual* requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install [**copings**] [**roof edge flashings**] tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:

1. Design Pressure: **[As indicated on Drawings]** **<Insert design pressure>**.
- D. FM Approvals Listing: Manufacture and install **[copings]** **[roof edge flashings]** that are listed in FM Approvals' *RoofNav* and approved for windstorm classification, **[Class 1-60]** **[Class 1-75]** **[Class 1-90]** **[Class 1-105]** **[Class 1-120]** **<Insert class>**. Identify materials with name of fabricator and design approved by FM Approvals.
- E. 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.
  1. Temperature Change: **[120 deg F, ambient; 180 deg F, material surfaces]** **<Insert temperature change>**.

## 2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. 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]** **[embossed]** surface.
  1. As-Milled Finish: **[Mill]** **[One-side bright mill]** **[Standard one-side bright]** **[Standard two-side bright]**.
  2. Alclad Finish: Metallurgically bonded surfacing alloy on both sides, forming aluminum sheet with reflective luster.
  3. Factory Prime Coating: Where painting after installation is required, pretreat metal with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil.
  4. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
  5. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
    - a. Color: **[Champagne]** **[Light bronze]** **[Medium bronze]** **[Dark bronze]** **[Black]** **[As selected by Design-Professional-of-Record from full range of industry colors and color densities]** **As selected by Owner from full range of industry colors and color densities]**.
    - b. 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.
  6. Exposed Coil-Coated Finish:
    - a. 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**].
- b. 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**].
  - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
1. Color: [As selected by Design-Professional-of-Record from manufacturer's full range] [As selected by Owner from manufacturer's full range].
  2. 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.
- C. Metallic-Coated Steel Sheet: Provide [**zinc-coated (galvanized) steel sheet in accordance with ASTM A653, G90 coating designation**] [or] [**aluminum-zinc alloy-coated steel sheet in accordance with ASTM A792, Class AZ50 coating designation, Grade 40**]; pre-painted by coil-coating process to comply with ASTM A755.
1. Surface: [Smooth, flat] [Embossed] [and mill phosphatized for field painting] [and with manufacturer's standard clear acrylic coating on both sides].
  2. Exposed Coil-Coated Finish:
    - a. 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**].
    - b. 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**].
    - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
  3. Color: [As selected by Design-Professional-of-Record from manufacturer's full range] [As selected by Owner from manufacturer's full range].
  4. 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.
- D. Lead Sheet: ASTM B749 lead sheet.

## 2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D226, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D226 for Type I and Type II felts.
- C. 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.
  - 1. Low-Temperature Flexibility: ASTM D1970; passes after testing at minus 20 deg F or lower.
- D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. minimum.

## 2.4 MISCELLANEOUS MATERIALS

- A. 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.
- B. 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**].
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. 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.
    - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for [**Zinc-Coated (Galvanized)**] [**Aluminum-Zinc Alloy-Coated**] Steel Sheet: hot-dip galvanized steel in accordance with ASTM A153 or ASTM F2329.
- C. Solder:
  - 1. 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**] [**with maximum lead content of 0.2 percent**].

- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric [polyurethane] [polysulfide] [silicone] polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187.
- I. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- J. 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**].
  - 1. Material: [**Aluminum, 0.024 inch thick**] [**Galvanized steel, 0.022 inch thick**].
  - 2. 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.
  - 3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
  - 4. 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.
  - 5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
  - 6. Accessories:
    - a. 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.
    - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
  - 7. Finish: [**Mill**] [**With manufacturer's standard color coating**] <Insert finish>.

## 2.5 FABRICATION, GENERAL

- A. 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.
  - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
  - 2. 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.
  - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
  - 4. 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.
  - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
  - 1. 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.
  - 2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, non-expansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. 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.
- G. Seams:
  - 1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 2. 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.** ]
  - 3. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. [ **Rivet joints where necessary for strength.** ]



## 2.6 ROOF-DRAINAGE SHEET METAL FABRICATIONS

### A. Hanging Gutters:

1. Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required.
2. Fabricate in minimum 96-inch-long sections.
3. Furnish flat-stock gutter brackets and **[flat-stock]** **[twisted]** gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard, but with thickness not less than **[twice the gutter thickness]** **[dimension indicated on Drawings]** **<Insert dimension>**.
4. Fabricate expansion joints, expansion-joint covers, **[gutter bead reinforcing bars,]** and gutter accessories from same metal as gutters.**[ Shop fabricate interior and exterior corners.]**
5. Accessories: **[Continuous, removable leaf screen with sheet metal frame and hardware cloth screen]** **[Wire-ball downspout strainer]** **[Valley baffles]**.
6. Gutters with Girth up to 15 Inches: Fabricate from the following materials:
  - a. Aluminum: **[0.032 inch]** **<Insert dimension>** thick.
  - b. Galvanized Steel: **[0.022 inch]** **<Insert dimension>** thick.
  - c. Aluminum-Zinc Alloy-Coated Steel: **[0.022 inch]** **<Insert dimension>** thick.
7. Gutters with Girth 16 to 20 Inches: Fabricate from the following materials:
  - a. Aluminum: **[0.040 inch]** **<Insert dimension>** thick.
  - b. Galvanized Steel: **[0.028 inch]** **<Insert dimension>** thick.
  - c. Aluminum-Zinc Alloy-Coated Steel: **[0.028 inch]** **<Insert dimension>** thick.
8. Gutters with Girth 21 to 25 Inches: Fabricate from the following materials:
  - a. Aluminum: **[0.050 inch]** **<Insert dimension>** thick.
  - b. Galvanized Steel: **[0.034 inch]** **<Insert dimension>** thick.
  - c. Aluminum-Zinc Alloy-Coated Steel: **[0.034 inch]** **<Insert dimension>** thick.
9. Gutters with Girth 26 to 30 Inches: Fabricate from the following materials:
  - a. Aluminum: **[0.063 inch]** **<Insert dimension>** thick.
  - b. Galvanized Steel: **[0.040 inch]** **<Insert dimension>** thick.
  - c. Aluminum-Zinc Alloy-Coated Steel: **[0.040 inch]** **<Insert dimension>** thick.
10. Gutters with Girth 31 to 35 Inches: Fabricate from the following materials:
  - a. Galvanized Steel: **[0.052 inch]** **<Insert dimension>** thick.
  - b. Aluminum-Zinc Alloy-Coated Steel: **[0.052 inch]** **<Insert dimension>** thick.

### B. Downspouts: Fabricate **[round]** **[rectangular]** **[open-face]** downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from **[same material as downspouts and anchors]** **<Insert material>**.**[ Shop fabricate elbows.]**

1. Hanger Style: **<Insert description>**.
2. Fabricate from the following materials:

- a. Aluminum: **[0.024 inch]** <Insert dimension> thick.
  - b. Galvanized Steel: **[0.022 inch]** <Insert dimension> thick.
  - c. Aluminum-Zinc Alloy-Coated Steel: **[0.022 inch]** <Insert dimension> thick.
- C. 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:
1. Aluminum: **[0.032 inch]** <Insert dimension> thick.
  2. Galvanized Steel: **[0.028 inch]** <Insert dimension> thick.
  3. Aluminum-Zinc Alloy-Coated Steel: **[0.028 inch]** <Insert dimension> thick.
- D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes[, **exterior flange trim,**] [**and**] [**built-in overflows**]. Fabricate from the following materials:
1. Aluminum: **[0.032 inch]** <Insert dimension> thick.
  2. Galvanized Steel: **[0.028 inch]** <Insert dimension> thick.
  3. Aluminum-Zinc Alloy-Coated Steel: **[0.028 inch]** <Insert dimension> thick.
- E. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
1. Aluminum: **[0.040 inch]** <Insert dimension> thick.

## 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. 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.**]
1. Fabricate from the following materials:
    - a. Aluminum: **[0.050 inch]** <Insert dimension> thick.
    - b. Galvanized Steel: **[0.028 inch]** <Insert dimension> thick.
    - c. Aluminum-Zinc Alloy-Coated Steel: **[0.028 inch]** <Insert dimension> thick.
- B. 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.**]
1. Fabricate from the following materials:
    - a. Aluminum: **[0.050 inch]** <Insert dimension> thick.
    - b. Galvanized Steel: **[0.040 inch]** <Insert dimension> thick.
    - c. Aluminum-Zinc Alloy-Coated Steel: **[0.040 inch]** <Insert dimension> thick.
- C. Base Flashing: [**Shop fabricate interior and exterior corners.**] Fabricate from the following materials:
1. Aluminum: **[0.040 inch]** <Insert dimension> thick.
  2. Galvanized Steel: **[0.028 inch]** <Insert dimension> thick.
  3. Aluminum-Zinc Alloy-Coated Steel: **[0.028 inch]** <Insert dimension> thick.

- D. Counterflashing: [**Shop fabricate interior and exterior corners.**] Fabricate from the following materials:
  - 1. Aluminum: [**0.032 inch**] <Insert dimension> thick.
  - 2. Galvanized Steel: [**0.022 inch**] <Insert dimension> thick.
  - 3. Aluminum-Zinc Alloy-Coated Steel: [**0.022 inch**] <Insert dimension> thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: [**0.028 inch**] <Insert dimension> thick.
  - 2. Aluminum-Zinc Alloy-Coated Steel: [**0.028 inch**] <Insert dimension> thick.
  - 3. Lead: [**4 lb**] <Insert weight>.
- F. Roof-Drain Flashing: Fabricate from the following materials:
  - 1. Copper: [**12 oz./sq. ft.**] <Insert value>.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION OF UNDERLAYMENT

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.
  - 1. Install in shingle fashion to shed water.
  - 2. Lap joints not less than 2 inches.
- B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, in accordance with manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.
  - 1. Lap horizontal joints not less than 4 inches.
  - 2. Lap end joints not less than 12 inches.
- C. Self-Adhering, High-Temperature Sheet Underlayment:
  - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
  - 2. Prime substrate if recommended by underlayment manufacturer.
  - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
  - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses.
  - 5. Overlap side edges not less than 3-1/2 inches. Roll laps and edges with roller.
  - 6. Roll laps and edges with roller.
  - 7. Cover underlayment within 14 days.
- D. Install slip sheet, wrinkle free, [**over underlayment**] [**directly on substrate**] <Insert requirement> before installing sheet metal flashing and trim.
  - 1. Install in shingle fashion to shed water.
  - 2. Lap joints not less than 4 inches.

### 3.2 INSTALLATION, GENERAL

- A. 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.
  - 1. Install fasteners [, **solder**], protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of [**solder**] [**welds**] [**sealant**].
  - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
  - 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
  - 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
  - 8. Do not field cut sheet metal flashing and trim by torch.
- B. 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.
  - 1. Coat concealed side of sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
  - 1. Space movement joints at maximum of [**10 feet**] <Insert dimension> with no joints within 24 inches of corner or intersection.
  - 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  - 3. Use lapped expansion joints only where indicated on Drawings.
- D. 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>.
- E. 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.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.
  - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
  - b. Form joints to completely conceal sealant.
  - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
  - d. Adjust setting proportionately for installation at higher ambient temperatures.
    - 1) Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pre-tin edges of sheets with solder to width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work.
2. Do not solder **[metallic-coated steel]** **[and]** **[aluminum]** sheet.
3. Do not pre-tin zinc-tin alloy-coated copper.
4. Do not use torches for soldering.
5. Heat surfaces to receive solder, and flow solder into joint.
  - a. Fill joint completely.
  - b. Completely remove flux and spatter from exposed surfaces.
6. Copper Soldering: Tin edges of uncoated sheets, using solder for copper.

H. Rivets: Rivet joints in where necessary for strength.

3.3 INSTALLATION OF ROOF-DRAINAGE SYSTEM

- A. 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.
- B. Hanging Gutters:
  1. Join sections with **[riveted and soldered joints]** **[or]** **[joints sealed with sealant]**.
  2. Provide for thermal expansion.
  3. Attach gutters at eave or fascia to firmly anchor them in position.
  4. Provide end closures and seal watertight with sealant.
  5. Slope to downspouts.
  6. Install gutter with expansion joints at locations indicated on Drawings, but not exceeding, **[50 feet]** **<Insert dimension>** apart. Install expansion-joint caps.
  7. Install continuous gutter screens on gutters with noncorrosive fasteners, **[removable]** **[hinged to swing open]** for cleaning gutters.

C. Built-in Gutters:

1. Join sections with [**riveted and soldered joints**] [**or**] [**joints sealed with sealant**].
2. Provide for thermal expansion.
3. Slope to downspouts.
4. Provide end closures and seal watertight with sealant.
5. Install underlayment layer in built-in gutter trough and extend to drip edge at eaves and under underlayment on roof sheathing.
  - a. Lap sides minimum of 2 inches over underlying course.
  - b. Lap ends minimum of 4 inches.
  - c. Stagger end laps between succeeding courses at least 72 inches.
  - d. Fasten with roofing nails.
  - e. Install slip sheet over underlayment.
6. Install gutter with expansion joints at locations [**indicated on Drawings**] [**as directed by Design-Professional-of-Record**] but not exceeding, [**50 feet**] apart. Install expansion-joint caps.

D. Downspouts:

1. Join sections with 1-1/2-inch telescoping joints.
2. Provide hangers with fasteners designed to hold downspouts securely to walls.
3. Locate hangers at top and bottom and at approximately 60 inches o.c.
4. Provide elbows at base of downspout to direct water away from building.
5. Connect downspouts to underground drainage system.

E. Splash Pans:

1. Install where downspouts discharge on [**low-slope roofs**] <Insert surface>.
2. Set in [**asphalt roofing cement**] [**or**] [**elastomeric sealant**] compatible with the substrate.

F. Parapet Scuppers:

1. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
2. Anchor scupper closure trim flange to exterior wall and [**solder**] [**or**] [**seal with elastomeric sealant**] to scupper.
3. Loosely lock front edge of scupper with conductor head.
4. [**Solder**] [**or**] [**seal with elastomeric sealant**] exterior wall scupper flanges into back of conductor head.

G. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch below [**scupper**] [**or**] [**gutter**] discharge.

H. 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.

### 3.4 INSTALLATION OF ROOF FLASHINGS

- A. Install sheet metal flashing and trim to comply with performance requirements[, **sheet metal manufacturer's written installation instructions,**] and cited sheet metal standard.
  - 1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
  - 2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing:
  - 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
  - 2. 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**] <**Insert spacing**> centers.
  - 3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Copings:
  - 1. Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
  - 2. Anchor to resist uplift and outward forces in accordance with recommendations in cited sheet metal standard unless otherwise indicated.
    - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at [**24-inch**] [**16-inch**] <**Insert dimension**> centers.
    - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at [**24-inch**] <**Insert dimension**> centers.
  - 3. Anchor to resist uplift and outward forces in accordance with recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
- D. 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. Install stainless steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.
  - 1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
  - 2. Extend counterflashing 4 inches over base flashing.
  - 3. Lap counterflashing joints minimum of 4 inches.
- F. 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.

### 3.5 INSTALLATION OF WALL FLASHINGS

- A. 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.
- B. Opening Flashings in Frame Construction: Install continuous head, sill,[ **jamb,**] and similar flashings to extend [**4 inches**] <Insert dimension> beyond wall openings.
- C. Reglets: Installation of reglets is specified in Section 077100 Roof Specialties.

### 3.6 INSTALLATION TOLERANCES

- A. 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.

### 3.7 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

### 3.8 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. 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 Architect.

**END OF SECTION 076200**