

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formed roof drainage sheet metal fabrications.
2. Formed low slope roof sheet metal fabrications.
3. Formed wall sheet metal fabrications.
4. Formed overhead piping safety pans.

1.2 PRICE AND PAYMENT PROCEDURES

- A. This specification Section shall be bid exactly as written. No substitutions, no changes in materials, no changes to configuration, and no changes to the requirements for fully manufactured and tested copings as required by Section 07 71 00 Roof Specialties.
1. All Roof Specialties shall be fully manufactured and tested only to meet the performance requirements of Section 07 71 00 Roof Specialties with special warranties attached. No consideration shall be given to fabricated items covered by 07 71 00 Roof Specialties regardless of fabricator qualifications or other considerations.
 2. All submittals shall be reviewed by Corgan TDS Roofing Specialists prior to return.

1.3 ACTION SUBMITTALS

- A. All submittals shall be reviewed by Corgan TDS Roofing Specialists prior to return.
- B. Product Data: Technical data for each type of product including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- C. Shop Drawings: Submit plans, elevations, sections, and attachment details.
1. Detail fabrication and installation layouts, expansion joint locations, and keyed details. Distinguish between shop and field assembled work.
 2. Include identification of material, thickness, weight, and finish for each item and location in Project.
 3. Include details for forming, including profiles, shapes, seams, and dimensions.
 4. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 5. Include details of termination points and assemblies.

6. Include details of expansion joints and expansion joint covers, including showing direction of expansion and contraction from fixed points.
 7. Include details of roof penetration flashing.
 8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 9. Include details of special conditions.
 10. Include details of connections to adjoining work.
 11. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).
- D. Samples: When requested by Architect, submit for each type of exposed finish.
1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
 3. Unit Type Accessories and Miscellaneous Materials: Full size Sample.
 4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Qualification Data: Submit data for fabricator.
- B. Product Certificates: Submit certificates for each type of coping and roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.
1. All coping for this Project must be manufactured and tested with special warranties attached. Refer to Section 07 71 00 and related requirements.
- C. Product Test Reports: Submit reports for each product, for tests performed by a qualified testing agency.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: Submit data for sheet metal flashing and trim, and its accessories, to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
- A. Fabricator Qualifications: Fabricator having minimum 5 years documented experience who employs skilled workers trained to custom fabricate sheet metal flashing and trim similar to that required.
1. For general items and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including, approximately long, including supporting construction cleats, seams, attachments , underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Conduct conference at site.
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates if applicable.
 - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.7 COORDINATION

- A. Heat Weldable Edge Metal: Coordinate all Work with Section 07 54 00 - Thermoplastic Membrane Roofing.
 - 1. For all PVC Roofing areas, provide Heat-weldable metal sheet, formed from roofing system manufacturer's standard unsupported thermoplastic sheet membrane, not less than 20 mils thick, laminated to 0.024 inch thick G90 galvanized steel sheet, and capable of being formed into a variety of shapes and profiles.
- B. 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.
- C. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. 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.

1.9 WARRANTY

- A. Finishes Warranty: Written warrant signed by Manufacturer in which 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 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies 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 The NRCA Roofing Manual and SMACNA Architectural Sheet Metal Manual requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.
- D. 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 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

2.2 MATERIALS

- A. Metal Finishes: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. Exposed Coil Coated Finish:

- a. Three Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent 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.
 - 1) Color: Selected by Architect.
 2. Concealed Finish: Pretreat with 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 (0.013 mm).
 3. Aluminum shall not be used as embedded into concrete, masonry nor shall they be used in direct contact with assemblies containing Portland Cement.
- C. Stainless Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
1. Finish: 3 (coarse, polished directional satin).
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 1.
- D. Heat Weldable Edge Metal for Roofing System: Coordinate all Work with Section 07 54 00 - Thermoplastic Membrane Roofing For all PVC Roofing areas, provide Heat-weldable metal sheet, formed from roofing system manufacturer's standard unsupported thermoplastic sheet membrane, not less than 30 mils thick, laminated to 0.022 inch thick G90 galvanized steel sheet, and capable of being formed into a variety of shapes and profiles.
- E. Underlayment Materials
1. Self Adhering, High Temperature Sheet: Minimum 30 mils (0.76 mm) 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 according to written recommendations of underlayment manufacturer.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Carlisle Coatings & Waterproofing Inc.
 - 2) Carlisle Residential; a division of Carlisle Construction Materials.
 - 3) GCP Applied Technologies Inc.
 - 4) Henry Company.
 - 5) Owens Corning.
 - 6) Polyguard Products, Inc.
 - 7) Protecto Wrap Company.
 - b. Thermal Stability: ASTM D 1970; stable after testing at 240 degrees F (116 degrees C) or higher.

- c. Low Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 degrees F (29 degrees C) or lower.
 2. Slip Sheet: Rosin sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.
- F. Miscellaneous Materials: Provide materials and types of fasteners , solder, protective coatings, sealants, and miscellaneous items necessary for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- G. Fasteners: Provide Type 316 stainless steel fasteners only.
 1. Wood screws, annular threaded nails, self tapping screws, self locking rivets and bolts, and suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - a. Blind fasteners or self drilling screws, gasketed, with hex washer head.
 - 1) 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.
 - 2) Blind Fasteners: High strength Type 316 stainless steel rivets suitable for metal being fastened.
 - 3) Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - b. Fasteners: passivated Type 316 stainless steel.
 - c. Do not use fasteners other than Type 316 stainless steel for roofing system related construction, blocking, coping and parapet construction.
 - d. All coping for this Project must be manufactured and tested with special warranties attached. Refer to Section 07 71 00 and related requirements.
 2. Solder:
 - a. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
 3. 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 (13 mm) wide and 1/8 inch (3 mm) thick.
 4. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight. Refer to Section 07 92 00.
 5. Butyl Sealant: ASTM C 1311, single component, solvent release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked type expansion joints with limited movement.
 6. Epoxy Seam Sealer: Two part, noncorrosive, aluminum seam cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
 7. Bituminous Coating: Cold applied asphalt emulsion according to ASTM D 1187.
 8. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through Wall, Ribbed, Sheet Metal Flashing: Manufacture through wall sheet metal flashing for embedment in masonry, with ribs at 3 inch (75 mm) intervals along length of flashing to provide integral mortar bond. Manufacture through wall flashing with snaplock receiver on exterior face to receive counterflashing where indicated.
1. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Cheney Flashing Company.
 - 2) Hohmann & Barnard, Inc.
 - 3) Keystone Flashing Company, Inc.
 - 4) Sandell Manufacturing Co., Inc.

2.4 FABRICATION

- A. Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. 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.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. 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.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8 inch (3 mm) offset of adjoining faces and of alignment of matching profiles.
- 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 (25 mm) deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

1. Do not use fasteners other than Type 316 stainless steel for roofing system related construction, blocking, coping and parapet construction.
 2. All coping for this Project must be manufactured and tested with special warranties attached. Refer to Section 07 71 00 and related requirements.
- F. Seams: Fabricate nonmoving seams with flat lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat lock seams. Form seams and seal with epoxy seam sealer.
- H. Do not use graphite pencils to mark metal surfaces.

2.5 ROOF DRAINAGE FABRICATIONS

- A. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.
Manufactured Hanger Style: Fig 1-35B according to SMACNA's Architectural Sheet Metal Manual or as indicated.
1. Hanger Style: as indicated.
 2. Fabricate from the following materials:
 - a. Aluminum: 0.024 inch (0.61 mm) thick minimum to meet Performance Requirements.
 - b.
- B. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4 inch (100 mm) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick minimum to meet Performance Requirements.
 - 2.
- C. 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 (0.81 mm) thick minimum to meet Performance Requirements.
- D. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
1. Stainless Steel: 0.019 inch (0.48 mm) thick.

2.6 LOW SLOPE ROOF SHEET METAL FABRICATIONS

- A. Refer to Section 07 71 00 Roof Specialties for all manufactured copings and other roof edge specialties.
1. All coping for this Project must be manufactured and tested with special warranties attached. Refer to Section 07 71 00 and related requirements.
 2. Fabricated copings are not acceptable for this Project regardless of Fabricator Qualification or other factors.
- B. Miscellaneous Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96 inch (2400 mm) long, but not exceeding 12 foot (3.6 m) long sections. Furnish with 6 inch (150 mm) wide, joint cover plates. Shop fabricate interior and exterior corners.
1. Joint Style: Butted with expansion space and 6 inch (150 mm) wide, concealed backup plate.
 2. Fabricate with scuppers spaced 10 feet (3 m) apart, to dimensions required with 4 inch (100 mm) wide flanges and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 3. Fabricate from the Following Materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick minimum to meet Performance Requirements.
 - b. .
 - c. .
 - d. .
 4. Provide Type 316 stainless steel fasteners; Do not use fasteners other than Type 316 stainless steel for roofing system related construction, blocking, coping and parapet construction.
- C. Miscellaneous Roof to Roof Edge Flashing (Gravel Stop) Transition Expansion Joint Cover: Fabricate from the following materials: Shop fabricate interior and exterior corners.
1. Aluminum: 0.050 inch (1.27 mm) thick minimum to meet Performance Requirements.
- D. Miscellaneous Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Stainless Steel: 0.019 inch (0.48 mm) thick minimum to meet Performance Requirements.
- E. Counterflashing: Manufactured; Refer to Section 07 71 00 Roof Specialties.
- F. Flashing Receivers: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick minimum to meet Performance Requirements.
 2. Stainless Steel: 0.016 inch (0.40 mm) thick minimum to meet Performance Requirements.
- G. Roof Penetration Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch (0.48 mm) thick minimum to meet Performance Requirements.

H. Miscellaneous Roof Drain Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.016 inch (0.40 mm) thick minimum to meet Performance Requirements.

2.7 WALL SHEET METAL FABRICATIONS

A. Through Wall Flashing: Fabricate continuous flashings in minimum 96 inch (2400 mm) long, but not exceeding 12 foot (3.6 m) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2 inch (50 mm) high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.016 inch (0.40 mm) thick minimum to meet Performance Requirements.
 - a. For flashing at all fenestration and through wall masonry conditions provide 0.028 inch thick stainless steel fabricated to match profiles indicated on the Drawings with hemmed edges.
 - 1) Minimum vertical return shall be 1.5 inches.
 - 2) Minimum hem shall be 5/8 inch.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2 inch (50 mm) high, end dams. Fabricate from the following materials:

1. Aluminum: 0.032 inch (0.81 mm) thick minimum to meet Performance Requirements.
2. Stainless Steel: 0.016 inch (0.40 mm) thick minimum to meet Performance Requirements.

C. Wall Expansion Joint Cover: Fabricate from the following materials:

1. Aluminum: 0.040 inch (1.02 mm) thick minimum to meet Performance Requirements.
2. Stainless Steel: 0.019 inch (0.48 mm) thick. minimum to meet Performance Requirements.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

1. Stainless Steel: 0.019 inch (0.48 mm) thick minimum to meet Performance Requirements.

B. Overhead Piping Safety Pans: Fabricate from the following materials:

1. Stainless Steel: 0.025 inch (0.64 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify air or water resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Coordination: Coordinate materials to be provided in all areas, contained within and in contact with other assemblies.
 - 1. Aluminum and aluminum clad materials shall not be used as embedded into concrete, masonry or other assemblies containing Portland Cement, nor shall they be used in direct contact with assemblies containing Portland Cement.
- C. Proceed with installation after correcting unsatisfactory conditions.

3.2 UNDERLAYMENT INSTALLATION

- A. Self Adhering Sheet Underlayment: Install self adhering 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 (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.
- B. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 SHEET METAL FABRICATION INSTALLATION

- A. Provide Type 316 stainless steel fasteners; Do not use fasteners other than Type 316 stainless steel for roofing system related construction, blocking, coping and parapet construction.
- B. Sheet Metal Fabrications: Anchor sheet metal flashing and trim and other components of the work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 5. Torch cutting of sheet metal flashing and trim is not permitted.
 6. Do not use graphite pencils to mark metal surfaces.
- C. 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 uncoated aluminum and stainless steel 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.
- D. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints where indicated on Drawings.
- E. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 3/4 inch (19 mm) for wood screws.
1. Provide Type 316 stainless steel fasteners; Do not use fasteners other than Type 316 stainless steel for roofing system related construction, blocking, coping and parapet construction.
- F. 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.
- G. Seal joints as required for watertight construction.
1. Use sealant filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 degrees F and 70 degrees F (4 degrees C and 21 degrees C), 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 degrees F (4 degrees C).
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00.
- H. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not solder metallic coated steel and aluminum sheet.
2. Do not pretin zinc tin alloy coated stainless steel and zinc tin alloy coated copper.
3. Do not use torches for soldering.
4. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
5. 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.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

- A. Install sheet metal roof drainage items to produce complete roof drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Downspouts: Join sections with 1-1/2 inch (38 mm) telescoping joints.
 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.
 2. Provide elbows at base of downspout to direct water away from building.
 3. Connect downspouts to underground drainage system.
- C. Splash Pans: Install where downspouts discharge on low slope roofs. Set in elastomeric sealant compatible with the substrate.
- D. 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.
 1. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
 2. Loosely lock front edge of scupper with conductor head.
 3. seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
- E. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below scupper or gutter discharge.
- F. Expansion Joint Covers: Install expansion joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

- A. Install sheet metal flashing and trim to comply with performance requirements 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.

- B. Roof Edge Flashing: Install roof edge flashings in accordance with ANSI/SPRI/FM 4435/ES-1.
 - 1. Anchor to resist uplift and outward forces according to 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 (75 mm)]centers.
 - 2. Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.
- D. Roof Penetration Flashing: Coordinate installation of roof penetration flashing with installation of roofing and other items penetrating roof. Seal with butyl sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. Wall Flashing: Install I wall flashing to intercept and exclude penetrating moisture according to 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. Through Wall Flashing: Installation of through wall flashing is specified in Section 04 20 00.
- C. Reglets: Installation of reglets is specified in other Sections for wall assemblies.
- D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Overhead Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.8 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8 inch (3 mm) offset of adjoining faces and of alignment of matching profiles.

- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA Guide Specification for Residential Metal Roofing.

3.9 CLEANING AND PROTECTION

- 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.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. 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.

END OF SECTION

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