

University of Houston Master Specification

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SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

Maintain Section format, including the UH master spec designation and version date in the center columns of the header and footer. Complete the header and footer with Project information.

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect" or "Engineer." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

1.2 SUMMARY

- A. Section includes:
 - 1. Formed reglets and counterflashing.
 - 2. Formed roof drainage sheet metal fabrications.
 - 3. Formed low-slope roof sheet metal fabrications.
 - 4. Formed steep-slope roof sheet metal fabrications.
 - 5. Formed wall sheet metal fabrications.

1.3 DEFINITIONS

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- A. Sheet Metal Terminology: See Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual – Sixth Edition" for definition of terms related to work in this Section.

1.4 PERFORMANCE REQUIREMENTS

Select first or second option in Paragraph below as appropriate for Project. If second option is selected ensure uplift pressures are, in fact, on the Drawings.

- A. General Performance: Installed sheet metal shall withstand specified uplift pressures [**Insert pressures**] [**as indicated on Drawings**], thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal units shall remain watertight.
- B. Material Compatibility: Provide sheet metal materials that are compatible with one another under conditions of service and application required, as demonstrated by the sheet metal manufacturer based on testing and field experience.
- C. Comply with governing codes and regulations. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer's instructions.
- D. Clear Lake Campus to meet the requirements of the Texas Windstorm Act.
- E. Reference Standards: Applicable portions of SMACNA, ANSI/SPRI ES-1, ASTM and NAAMM publications.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include material descriptions, ASTM standards, and dimensions of individual components and profiles.
- B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop-and field-assembled work.
 - 1. Submit the following: Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.
 - a. Counterflashing at roof edges
 - b. Coping and drip edge at roof edges
 - c. Counterflashing at doors/windows for protection of waterproofing

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- d. Receiver sections
 - e. Counterflashing at elevation transitions (doors to perimeter edges)
 - f. Through-wall flashing pans
 - g. Roof expansion joints
 - h. Penetration flashing (including rain hoods)
- C. Samples:
- 1. For each exposed product and for each finish specified. .
 - 2. Construct typical lap splice or seam for mechanically-jointed systems, and solder lap or seam for field-solderable systems.
- D. Warranty: Sample of special warranty
- E. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Sheet Metal flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- B. Copper Sheet Metal Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- C. All sheet metal copings, fasciae, gravel guards, and other metal edges shall be tested in accordance with ANSI/SPRI ES-1 to confirm and demonstrate performance under wind pressures generated by the design wind speeds.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical sheet metal flashing conditions at either a standalone mockup or on the building that, once accepted, can be included in the construction of the Project. Include perimeter flashings for fenestrations and through wall flashings including supporting construction cleats, seams, attachments, underlayment and accessories.
- E. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review Site use, access, staging and set-up location limitations.
 - 2. Review methods and procedures related to sheet metal installation, including manufacturer's written instructions, including, but not limited to

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the following: forecast weather conditions, storage and protection of materials prior to installation, surface preparation and pretreatment, environmental conditions.

3. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review all field conditions that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for sheet metal system and surrounding work during and after installation.
9. Review sheet metal observation and repair procedures.
10. Review reporting procedures.
11. Review related project details and interfaces with adjacent work.
12. Review testing and inspection requirements.
13. Review notification procedures for inspections.
14. Review documentation of modifications and repairs for project record.
15. Review documentation required for manufacturer's warranty.
16. Review governing regulations and requirements for insurance and certificates if applicable.

17. Review quality control and quality assurance plans.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials requiring fire resistant classifications packaged with labels intact and legible.
- B. Protect existing building construction and all work in place from damage resulting from the storage, preparation, handling and application of roofing materials.
- C. Keep all material dry while they are transported, stored and installed. Do not allow materials to be exposed to any moisture anywhere, at any time, during transportation, storage, handling and installation.
- D. Store all materials on raised platforms with weather protective coverings. The manufacturer's standard packaging and covering is not considered adequate weather protection. Tarpaulins are preferred for protection of all roof materials. If visqueen coverings are used, venting of each package is required.
- E. Material storage procedures will be constantly monitored and strictly enforced.

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- F. Handle all materials to avoid damage.
- G. Storage of all materials shall conform to the limitations recommended by the material manufacturer, including restrictions on ambient temperatures and shelf life.
- H. Materials stored on roofs shall be limited to the safe loading of structural framing, and only at locations designated and approved by the Architect/Engineer and Owner. Storage of materials shall not be allowed at any locations where new roofing insulation or roofing membrane materials have been installed

1.8 PROJECT CONDITIONS

- A. Safety
 - 1. Take all necessary precautions regarding worker health and safety when using solvents, adhesives and primers.
 - 2. Store flammable liquid and materials away from open sparks, flames and extreme heat.
 - 3. Take necessary precautions when using solvents and adhesives near fresh air intakes.
 - 4. Comply with all OSHA requirements for construction.
- B. Daily site cleanup shall be performed to minimize debris and hazardous congestion.
- C. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions, e.g. extreme temperature, high winds, high humidity and moisture, will permit sheet metal system to be installed according to manufacturer's written instructions and warranty requirements.
- D. Verify existing dimensions and details prior to installation of materials. Notify Architect/Engineer of conditions found to be different than those indicated in Contract Documents. Architect/Engineer will review situation and inform Contractor and installer of changes.
- E. Comply with Owner's limitations and restrictions for site use and accessibility.
- F. Install materials in strict accordance with safety requirements required by roofing manufacturer, Material Safety Data Sheets, and local, state, and federal rules and regulations.

G. Protection

1. Schedule installation sequence to limit access and utilization of the newly installed roofing system for material storage, construction staging, mechanical and/or excessive foot traffic.
2. Protect roofing membrane, building surfaces, paving and landscaping from traffic and roofing equipment. Provide temporary walkways constructed of plywood and set on protective material in traffic and construction areas.
3. Restore or replace all work or materials damaged by the sheet metal operation.
4. Remove protection materials upon completion of work.
5. Adverse weather could have a detrimental effect on adhesives, general production efforts or the quality of the finished installation. Contact manufacturer for recommendations and acceptable tolerances.

H. Daily seal: Ensure that moisture does not penetrate beneath any completed sections of the sheet metal by installing temporary terminations at the end of each work day and prior to the arrival of inclement weather. Inspect existing components for moisture intrusion along the temporary terminations at temporary cut-offs, tie-ins and night seals after opening the seal on the next workday. Remove any wet, damp or moisture-damaged materials. All construction debris shall be removed from the construction site and legally disposed of offsite.

I. Coordination with Other Trades - The Work of this Section shall be coordinated with and properly integrated into related Work covered by other Sections.

1.9 WARRANTY

- A. Manufacturer's Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.
- B. Installer's Warranty: Submit sheet metal Installer's warranty, signed by installer, covering the Work of this Section, including all components of sheet metal system for five years from date of Substantial Completion. Warranty shall include all materials, labor, tools and equipment necessary for repair, restoration or replacement of all new work damaged as a result of defects, imperfections, or faults in Materials and Workmanship.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
 - 1. Non-Patinated Exposed Finish: Mill.
- C. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - 1. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 - 2. Color: As selected by Architect from manufacturer's full range.
- D. Stainless Steel Sheet (all metal flashings except through-wall flashing pans): ASTM A167, Type 304, dull cold rolled finish.
- E. Stainless-Steel Sheet (Through-wall Flashing Pans): ASTM A 240/A 240M or ASTM A 666, Type 316, dead soft, fully annealed; 2D (dull, cold rolled) finish.
- F. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 - 1. Surface: Manufacturer's standard clear acrylic coating on both sides.
 - 2. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 3. Color: As selected by Architect from manufacturer's full range.

2.2 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 40 mils thick, consisting of

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slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants and other miscellaneous items as required for complete sheet metal flashing and trim installation and 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.
 - 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 Copper Sheet: Copper, hardware bronze or Series 300 stainless steel.
 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
 1. For Copper: ASTM B 32, Alloy grade 50A, 50 percent tin and 50 percent lead.

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- i. Flux: Rosin, muriatic acid neutralized with zinc or approved equal.
2. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape ½ inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, 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.

2.4 REGLETS

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.
 1. Material: Stainless steel, 24 gauge thick.
 2. Finish: Mill.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" and ANSI/SPRI ES-1 that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 1. Obtain field measurements for accurate fit before shop fabrication.
 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

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3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- C. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant and in compliance with recommendations in SMACNA's Architectural Sheet Metal Manual.
- B. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- C. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- D. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Seams: 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.
- F. 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: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
 1. Accessories: Wire ball downspout strainer.
 2. Fabricate from the following materials:
 - a. Aluminum: 0.032 inch thick
- B. Built-in Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum 96-inch long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.

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1. Accessories: Wire ball downspout strainer.
2. Fabricate from the following materials:
 - a. Stainless Steel: 24 gauge thick.
- C. Downspouts: Fabricate downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
3. Hanger Style: Same profile as the Downspout.
4. Fabricate from the following materials:
 - a. Aluminum: 0.032 inch thick.
- D. Parapet Scuppers: Fabricate scuppers of 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. Stainless Steel: 24 gauge thick.
- E. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim and built-in overflows. Fabricate from the following materials:
 1. Aluminum: 0.032 inch thick.
- F. Splash Pans: Fabricate from the following materials:
 1. Stainless Steel: 24 gauge 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 10-foot-long, sections. Furnish with 6-inch-wide, joint cover plates. Fabricate from the following materials:
 1. Aluminum: 0.050 inch thick.
- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 10-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, seal and solder or weld watertight. Fabricate from the following materials:

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- 1. Aluminum: 0.050 inch thick.
- C. Base Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 24 gauge.
- D. Counterflashing and Flashing Receivers: Fabricate from the following materials:
 - 1. Stainless Steel: 24 gauge.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 24 gauge.

2.8 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.
- B. Valley Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.
- C. Drip Edges: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.

2.9 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashing to extend 6 inches beyond each side of wall openings. Form with 2-inch high, end dams where flashing is discontinuous. Fabricate from the following materials:
 - 1. Type 316 Stainless Steel: 24 gauge.
- B. Opening Flashing in Frame Construction: Fabricate head, sill, jamb and similar flashings to extend to the sealant line of the wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:

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1. Type 316 Stainless Steel: 24 gauge.
- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
 1. Type 304 Stainless Steel: 24 gauge.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails 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 with roller. Cover underlayment with final roof within 14 days.

3.2 INSTALLATION, GENERAL

- A. General: Install sheet-metal flashings and trim according to recommendations in SMACNA's Architectural Sheet Metal Manual and as indicated. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak or loosen and shall remain watertight. Use fasteners, solder, welding rods, 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 and levels indicated. 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 apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling and tool marks.
 5. Install sealant tape where indicated.

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6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and over with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner of intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws and for metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder aluminum sheet.
 2. 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.
 3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended 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.
 4. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
- G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with butyl sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored twisted straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Install gutter with expansion joints with caps at locations indicated, but not exceeding 50 feet apart. Install expansion-joint caps.
 - 2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
- C. Built-in Gutters: Join sections with riveted and soldered or lapped joints sealed with sealant. Provide end closures and seal watertight with sealant.
 - 1. Install self-adhering sheet underlayment layer in built-in gutter trough and extend to drip edge at eaves and under felt underlayment on roof sheathing. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with roofing nails.
 - 2. Install gutter with expansion joints at locations indicated, but not exceeding 50 feet apart. Install expansion-joint caps.
- D. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely 1 inch away from walls. Locate hangers at top and bottom and spaced approximately 60 inches in between.
- E. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in adhesive material compatible with the roofing.
- F. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- G. Conductor Heads: Anchor securely to wall with elevation of conductor head rim

1 inch below scupper or gutter discharge.

- H. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line and level as indicated. Install work with laps, joints and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 16-inch centers.
 - 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes and 24-inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a 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. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant.
- F. 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.

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- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as 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 2000 "Unit Masonry."
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb and similar flashings to extend to the required sealant line of wall openings.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean spillage and soiling from adjacent surfaces using cleaning agents and procedures recommended by manufacturer of affected surface. Exercise care to avoid scratching or damage to surfaces.
- C. Clean and neutralize flux materials. Clean off excess solder and 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.
- E. Protect sheet-metal flashings and trim from damage and wear during remainder of construction period.

END OF SECTION 07 6200