SECTION 076210

MANUFACTURED Copper Roofing Specialties

THIS SECTION USES THE TERM "ARCHITECT." CHANGE THIS TERM AS NECESSARY TO MATCH THE ACTUAL TERM USED TO IDENTIFY DESIGN PROFESSIONAL AS DEFINED IN THE GENERAL AND SUPPLEMENTARY CONDITIONS.

**section typically includes items that are factory fabricated – not field fabricated.**

1. - GENERAL
	1. SUMMARY

EDIT EXAMPLES BELOW BY DELETING ITEMS NOT REQUIRED, ADDING OTHERS, OR REVISING TEXT TO CLARIFY DESCRIPTIONS.

* + 1. Section Includes: Copper roofing specialties and accessories of standard manufactured components. Includes accessories installed on and in roofing other than mechanical and structural items, such as:
			1. Factory-manufactured curbset wall counterflashing and expansion joints.
			2. Factory-manufactured miscellaneous sheet copper fascia, copings, trim and accessories.

FOLLOWING ARE EXAMPLES OF SEVERAL POSSIBLE CROSS REFERENCES WHICH MAY BE NECESSARY TO CLARIFY WHAT WORK IS SPECIFIED WHERE.

* + 1. Related Requirements:
			1. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to work of this Section.
			2. Integral masonry flashings are specified as masonry work in sections of Division 04.
			3. Roofing flashing and trim installed integral with roofing membrane are specified in roofing system sections as roofing work.
			4. Coordinate installation with mechanical equipment specified in Division 23.
	1. COORDINATION
		1. Coordinate work of this section with interfacing and adjacent work for proper sequencing. Ensure weather resistance and durability of work and protection of materials and finishes.
	2. PERFORMANCE REQUIREMENTS

design professional is responsible for designING system, including anchorage, fastener size, and spacing.

* + 1. Installation Requirements: Installation contractor is responsible for installing system, including anchorage to substrate and necessary modifications to meet specified and drawn requirements and maintain visual design concepts in accordance with Contract Documents and following installation methods as stipulated by the manufacturer.
		2. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
			1. Make modifications only to meet field conditions and to ensure fitting of system components.
			2. Obtain Architect’s approval of modifications.
			3. Provide concealed fastening wherever possible.
			4. Attachment considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
			5. Obtain Architect’s approval for connections to building elements at locations other than indicated in Drawings.
			6. Accommodate building structure deflections in system connections to structure.
		3. Performance Requirements:
			1. System shall accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to seasonal temperature changes and live loads.
			2. Design system capable of withstanding building code requirements for negative wind pressure.
	1. SUBMITTALS
		1. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
		2. Product Data: Manufacturer's technical product data, installation instructions, and general recommendations for each specified sheet material and fabricated product.

DELETE BELOW IF NONE OF WORK SUFFICIENTLY COMPLEX TO JUSTIFY SHOP DRAWINGS; EDIT TO DELETE NONAPPLICABLE UNITS. POSSIBLY INSERT PRODUCT-HANDLING ARTICLE WHERE SUBSTANTIAL VOLUME OF HIGHLY FINISHED WORK IS REQUIRED.

* + 1. Shop drawings showing layout, profiles, methods of joining, and anchorage details, including major trim systems. Provide layouts at 1/4 inch (1:50) scale and details at 3-inch (1:4) scale.

RETAIN ABOVE AND INSERT SPECIFIC DATA SUBMITTALS AS DESIRED.

* + 1. Samples of the following items:
			1. 6-inch (150 mm) or 12-inch (300 mm) square samples of specified sheet materials to be exposed as finished surfaces.

DELETE ABOVE AND BELOW IF NO CONTROL REQUIRED ON SHEET MATERIALS. DELETE BELOW IF VISUAL CONTROL OF TRIM UNITS, ETC. IS NOT DESIRED.

* + - 1. 6-inch (150 mm) or 12-inch (300 mm) long samples of factory-fabricated products exposed as finished work. Provide complete with specified factory finish.
	1. CLOSEOUT SUBMITTALS
		1. Provide maintenance data in Operations and Maintenance manual for maintaining applied coatings on copper panels.

POSSIBLY INSERT QUALITY ASSURANCE ARTICLE HERE FOR LIMITATIONS ON FABRICATORS OR INSTALLERS OF COMPLEX SYSTEMS OF FLASHING, RAIN DRAINAGE, EXPANSION JOINTS, ETC.

* 1. QUALITY ASSURANCE
		1. Fabricator’s Qualifications: Company specializing in copper sheet metal roof specialties work with three years experience in similar size and type of installations.
		2. Installer: A firm with 3 years of successful experience with installation of copper roof specialties of type and scope equivalent to Work of this Section.
		3. Industry Standard: Except as otherwise shown or specified, comply with applicable recommendations and details of the "Copper in Architecture” handbook published by the Copper Development Association (CDA). Conform to dimensions and profiles shown.

DELETE ENTIRE MOCK-UP PROVISION BELOW UNLESS THE EXPENDITURE IS JUSTIFIED BY AN EXTENSIVE, UNUSUAL, OR CRUCIAL APPLICATION OF METAL ROOFING.

* + 1. Mock-Up: Before proceeding with final purchase of materials and fabrication of copper roof specialty components, prepare a mock-up of work. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at location directed by Architect. Retain accepted mock-up as quality standard for acceptance of completed copper work. If accepted, mock-up may be incorporated as part of copper work.
			1. Mock-up area is indicated on Drawings.

DELETE EITHER ABOVE OR BELOW.

* + - 1. Provide mock-up of sufficient size and scope to show typical pattern of seams, fastening details, edge construction, and finish texture and color.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Packing, Shipping, Handling, and Unloading: Protect finish metal faces.
		2. Acceptance at Site: Examine each component and accessory as delivered and confirm that material and finish is undamaged. Do not accept or install damaged materials.
		3. Storage and Protection:
			1. Stack pre-formed material to prevent twisting, bending, and abrasions.
			2. Provide ventilation.
			3. Prevent contact with materials which may cause discoloration or staining.

POSSIBLY INSERT HERE SPECIAL PROJECT WARRANTY REQUIREMENTS FOR EXTENSIVE/ ELABORATE (ESPECIALLY PREFAB) SYSTEMS.

1. - PRODUCTS
	1. MATERIALS
		1. Copper: ASTM B370; temper H00 (cold-rolled) except where temper 060 is required for forming; 16 oz. per sq. ft. (0.0216-inch thick) (0.55 mm) except as otherwise indicated.

INSERT OTHER primary MATERIALS AS REQUIRED FOR PROJECT. accessories listed later in this section.

* 1. ACCESSORIES:

REVISE ABOVE IF CELLULAR PLASTIC OR OTHER TYPES DESIRED.

* + 1. Wood Nailers: Softwood lumber, pressure treated with water-borne preservatives for above-ground use, complying with AWPB LP-2; not less than 1-1/2-inch (38 mm) thick.
		2. Solder: ASTM B32; Provide 50-50 tin/lead or lead free alternative of similar or greater strength solder.
		3. Flux: Muriatic acid neutralized with zinc or approved brand of soldering flux.
		4. Fasteners: Same metal as flashing/sheet metal or other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
		5. Bituminous Coating: SSPC - Paint 12, Cold-Applied Asphalt Mastic (Extra Thick Film), nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
		6. Joint Sealant: One-part, copper compatible elastomeric polyurethane, polysulfide, butyl or silicone rubber sealant as tested by sealant manufacturer for copper substrates. Refer to Division 07.
		7. Sheet Copper Accessories: Provide sheet copper cleats, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.
		8. Roofing Cement: ASTM D2822, asphaltic.
		9. High Temperature Grade Water Barrier Underlayment: Cold applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of butyl rubber or high temperature asphalt adhesive. Provide primer when recommended by water barrier manufacturer.
			1. Minimum Thickness: 30 mil.
			2. Tensile Strength: ASTM D412 (Die C Modified); 250 psi.
			3. Membrane Elongation: ASTM D412 (Die C Modified); 250%
			4. Permeance (Max): ASTM E96; 0.05 Perms.
			5. Acceptable Products:
				1. Blueskin PE 200 HT, Henry.
				2. Ultra, W.R. Grace Company.
				3. CCW MiraDRI WIP 300 High Temperature, Carlisle Coatings and Waterproofing.

DELETE ABOVE and retain below IF ALTERNATIVE UNDERLAYMENT IS USED.

* + 1. Roofing Felt Underlayment: Asphalt saturated felt weighing not less than 30 lbs per 100 square feet.

USE BELOW UNDER COPPER INSTALLED ON roofing felt underlayment.

* + 1. Paper Slip Sheet: Minimum 4-lb. red rosin-sized building paper.
		2. Rivets:
			1. Pop Rivets: 1/8-inch (3 mm) to 3/16-inch (4.5 mm) diameter, with solid brass mandrels.
			2. Provide solid copper rivet (tinner’s rivets) where structural integrity of seam is required.

INSERT OTHER MATERIALS AS REQUIRED FOR PROJECT.

* 1. FABRICATION
		1. General Sheet Copper Fabrication: Provide materials of standard factory fabrication to greatest extent possible. Comply with details shown and with applicable requirements of CDA "Copper in Architecture Handbook" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet copper work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.
			1. Fabricate to allow for adjustments in field for proper anchoring and joining.
			2. Form sections true to shape, accurate in size, square, free from distortion and defects.
			3. Cleats: Fabricate cleats of same material as sheet, interlockable with sheet in accordance with CDA recommendations.
		2. Seams: Fabricate nonmoving seams in sheet copper with flat-lock seams. Tin edges and cleats to be seamed, form seams, and solder. Use 1 inch (25 mm) wide lapped rivet and soldered joints where required.
		3. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
		4. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form copper to provide for proper installation of elastomeric sealant, in compliance with CDA standard details.

INSERT SPECIFIC LISTING (BELOW) OF SEPARATIONS KNOWN TO BE REQUIRED FOR WORK AS DETAILED. ATTEMPT SHOULD BE MADE (IN DETAILING AND SELECTING MATERIALS) TO AVOID THIS NEED.

* + 1. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.
		2. Preformed Gravel Stop/Fascia:
			1. Copper water dam with fascia.
			2. Provide with continuous cleat mechanically fastened to be secured and engaged against roofing membrane.
			3. Secure to obtain wind uplift resistance to comply with code.
			4. Provide with flowover scupper [spillout scupper] [downspout starter].
			5. Provide with splice plates to conceal and weatherseal joints between sections of dam and fascia.
		3. Preformed Coping:
			1. Coping: 16 oz. per sq. ft. (0.0216-inch thick) (0.55 mm) unless otherwise indicated.
			2. Anchor Cleat: 20 oz. per sq. ft. (0.0270-inch thick) (0.69 mm) unless otherwise indicated.
			3. Gutter/Splice Plate: Anchor cleat with integral drainable gutter or manufacturer’s standard closed cell composition compressible material gasket between anchor plate and coping finish top match coping.
			4. Secure to obtain wind uplift resistance to comply with code.
			5. Slope coping towards roof.
			6. Provide gutter/splice plates at joints between sections of coping.
		4. Fabrication:
			1. Form sections true to shape, accurate in size, square, free from distortion and defects, to profiles indicated.
			2. Shop fabricate intersections, inside corners, and outside corners with miters welded in factory prior to finishing.
			3. [Shop fabricate radius curved corners.]
	1. FINISHES
		1. Natural weathering mill finished copper. No applied finish.

\*\*\*\*\* OR \*\*\*\*\*

REVIEW PAINT SELECTION WITH COATINGS MANUFACTURER, REFER TO DIVISION 09.

* + 1. To retard natural weathering, apply a uniform coating of high grade paraffin oil (brown tones), or a clear lacquer coat.

clear coatings to retard weathering not recommended due to maintenance requirements.

* + 1. Clear Lacquer Coating
			1. Clear, Organic Coating: Clear, air‑drying, acrylic lacquer specially developed for coating copper alloy products, equivalent to Incralac by StanChem applied by air spray in 2 coats per manufacturer's directions, with interim drying, to total thickness of 1.0 mil.
1. - EXECUTION
	1. EXAMINATION
		1. General: Examine conditions and proceed with work when substrates are ready.
		2. Confirm that substrate system is even, smooth, sound, clean, dry, and free from defects.
	2. INSTALLATION
		1. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with CDA "Copper in Architecture Handbook". Anchor units of work securely in place by methods indicated, providing for thermal expansion of copper units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.
			1. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
			2. Securely anchor roof specialties to supporting substrates with appropriate type fasteners.
			3. Coordinate with installation of roofing system and related flashings.
		2. Parapet Cap Water Barrier Membrane Underlayment:
			1. Clean substrate of dirt, dust, and materials which may impair adhesion.
			2. Apply primer, when required, in accordance with manufacturer's requirements.
			3. Apply to top of parapet wall under coping and gravel stops.
			4. Turn membrane down exterior wall face and parapet wall face 2 inches (50 mm).
			5. Install without fishmouths and wrinkles.
			6. Press tape into firm contact with substrate.
			7. Lap tape ends minimum of 2 inches (50 mm).

DELETE ABOVE and retain below IF ALTERNATIVE UNDERLAYMENT IS USED.

* + 1. Underlayment: Where units are to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper on a course of asphalt saturated felt.
		2. Bed flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
		3. Fascia:
			1. Secure in place with concealed fasteners and cleats using methods as recommended by manufacturer and CDA to maintain sightlines and wind resistance.
			2. Seal joints and splice plates watertight.
		4. Coping:
			1. Secure in place with concealed fasteners and cleats using methods as recommended by manufacturer and CDA to maintain sightlines and wind resistance.
			2. Seal joints and splice plates watertight.
	1. CLEANING
		1. Remove protective film (if any) from exposed surfaces of copper promptly upon installation. Strip with care to avoid damage to finishes.
		2. Clean exposed copper surfaces, removing substances that might cause corrosion of copper or deterioration of finishes.
		3. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with baking soda solution, and then flushing clear water rinse. Use special care to neutralize and clean crevices.
		4. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering.
	2. PROTECTION
		1. Protection: Advise Contractor of required procedures for surveillance and protection of flashings and sheet copper work during construction to ensure that work will be without damage or deterioration other than natural weathering at time of Substantial Completion.

END OF SECTION