

## **Division 07**

## SECTION 071326

### SELF-ADHERING SHEET WATERPROOFING

#### 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.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Self-adhering sheet waterproofing.
  - 2. Blindside sheet waterproofing.
  - 3. Protection course.

##### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
  - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

- C. Samples: For each exposed product and for each color and texture specified, including the following products:

- 1. 8-by-8-inch square of waterproofing and flashing sheet.
- 2. 4-by-4-inch square of drainage panel.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Research Reports: For modified bituminous sheet waterproofing/termite barrier, showing compliance with ICC AC308.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer with minimum five (5) years of experience.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

- 1. Do not apply waterproofing in snow, rain, fog, or mist.

- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

#### 1.7 WARRANTY

- A. Manufacturer's Warranty:

1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

- a. Warranty Period: 15 years from date of Substantial Completion.

- B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.

1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

## 1.8 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to project site in original, factory-sealed, unopened containers bearing manufacturer's name and label intact and legible with the following information.

1. Name of material
  2. Manufacturer's stock number and date of manufacture
  3. Material's Safety Data Sheet

- B. Store membrane and accessory products in a protected area out of direct sunlight and between 40°F and 100°F. Protect from rain, physical damage and construction traffic.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course, from single source from single manufacturer.

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## 2.2 BLINDSIDE SHEET WATERPROOFING

- A. Blindside Sheet Waterproofing for Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the following physical properties:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Carlisle Coatings & Waterproofing Inc.; MiraPLY-H (Basis of Design)
    - b. W. R. Meadows, Inc.
  2. Physical Properties:
    - a. TPO Thickness: mils 45
    - b. Butyl Alloy Thickness mils 25
    - c. Total Membrane Thickness: ASTM D5147 mils 70
    - d. Water Vapor Transmission (Water Method): ASTM E96 perms 0.090
    - e. Tensile Strength<sup>1</sup>: ASTM D882 psi 1,500
    - f. Tensile Strength<sup>1</sup>: ASTM D412 psi 2,100
    - g. 300% Modulus<sup>1</sup>: ASTM D412 psi 1,000 ± 10%
    - h. 90° T-Peel: ASTM D1876 pli > 5.0
    - i. Elongation @ Break @ 23°C (Die C)<sup>1</sup>: ASTM D412 % 500
    - j. Flexibility Temperature @ -20°F<sup>1</sup>: ASTM D1970 pass/fail No Cracking @ -20°F.
    - k. Hydrostatic Pressure Resistance: ASTM D5385 ft. >231 ft. (100 psi)
    - l. Peel Strength Over Poured Concrete: ASTM D903 lb. >5.0
    - m. Resistance to Puncture: ASTM E154 lb. 300
    - n. Tear Strength of Vulcanized Rubber and Thermoplastics Die C<sup>1</sup>: ASTM D624 psi 250

- o. Soil Decay: E 96 Testing Water Vapor Transmission: ASTM E154 Pass
  - p. Soil Decay Testing (Weight Loss): ASTM E154 Pass
  - q. Lateral Water Migration Resistance<sup>2</sup>: ASTM D5385 modified Pass at 100 psi (231 ft) of hydrostatic pressure
- B. Mastic, Adhesives, and Detail Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- C. Auxiliary Materials
  - 1. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
  - 2. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
    - a. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet waterproofing material manufacturer.
    - b. Double-sided seam tape: Shall be Manufacturers Seam Tape for sealing non-factory and cut edges, and for detailing.
    - c. Self-adhering detail tape: Shall be Manufacturers Detail Tape with pre-applied adhesive coating for detailing
    - d. Pre-formed, high-impact resistant, heavy-duty thermoplastic tie-back cover: Shall be Manufacturers Cover for protecting the integrity at soil retention tie-back systems.
    - e. Swellable Sealant: Shall be per manufacturers for use in non-moving joints to create watertight concrete joints and as an adhesive for Manufacturers waterstop strips.
    - f. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
    - g. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
    - h. Pre-formed Non-Bentonite hydrophilic waterstop strip: Shall be per manufacturer for use in non-moving joints to create watertight concrete joints.

- i.     Injectable waterstop (grout tube): Shall be per manufacturer for use as an injectable waterstop for use in non-moving joints to create watertight concrete joints.
- j.     Chemical grout: Shall be per manufacturer requirements.
- k.     Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9-inch centers.
- l.     Protection Course, Extruded-Polystyrene Board Insulation, Unfaced: ASTM C578, Type X, 1/2 inch thick.

### 2.3     SELF-ADHERING SHEET WATERPROOFING

- A.     Self-Adhesive Sheet Membrane Waterproofing for Vertical Applications: Minimum 60-mil nominal thickness, self-adhering sheet consisting of a 56-mil rubberized-asphalt membrane laminated to 4 mil cross-laminated polyethylene film, and shall meet or exceed the following requirements:
  - 1.     Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a.     Carlisle Coatings & Waterproofing Inc.; MiraDRI 860/861 (Basis of Design)
    - b.     W.R. Meadows, Inc
- B.     Physical Properties:
  - 1.     Thickness: 60 mils, ASTM D 3767
  - 2.     Tensile Strength (Membrane): 325 psi, ASTM D 412
  - 3.     Tensile Strength (Film): 5000 psi, ASTM D 882
  - 4.     Elongation: 350% minimum, ASTM D 412
  - 5.     Permeance: 0.05 Perm maximum, ASTM E 96
  - 6.     Flexibility, 180° bend over 1 in. mandrel at -45°F: Unaffected, ASTM D 1970
  - 7.     Crack Cycling at -25°F (100 cycles): Unaffected, ASTM C 836

8. Peel Strength: 10.0 lb/in, ASTM D 903
9. Lap Adhesion: 19.0 lb/in, ASTM D 1876
10. Puncture Resistance: 60 lb (min), ASTM E 154
11. Soil Burial 16 weeks: No Effect, GSA-PBS 07121
12. Water Absorption: 0.1% by wt., ASTM D 570
13. Hydrostatic Head: 230 ft., ASTM D 5385

C. Auxiliary Materials

1. Surface Primer: Shall be per manufacturers recommendations.
2. Mastic: Shall be per manufacturers recommendations.
3. Sealants: Shall be per manufacturers recommendations.
4. Backer Rod: Shall be closed-cell polyethylene foam rod.
5. Protection Course: Shall be per manufacturers recommendations.
6. Swellable Sealant: Shall be per manufacturers recommendations for use in non-moving joints to create watertight concrete joints and as an adhesive for waterstop strips.
7. Pre-formed non-Bentonite hydrophilic waterstop strip: Shall be per manufacturers recommendations for use in non-moving joints to create watertight concrete joints.
8. Injectable waterstop (grout tube): Shall be per manufacturers recommendations for use as an injectable waterstop for use in non-moving joints to create watertight concrete joints.
9. Chemical grout: Shall be per manufacturers recommendations.
10. Miscellaneous products: accessory products approved by per manufacturers recommendations.
11. Protection Board: Cover with CCW protection board.



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
  - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
  - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
  - 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections.
- E. Fill form tie holes, honeycomb, aggregate pockets, holes, and other voids.
- F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D4258.

1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.
- G. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
- H. Corners: Prepare, prime, and treat inside and outside corners in accordance with manufacturer's instructions.
1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
    - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
    - b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- I. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.
- J. Cast-In-Place Concrete Substrates:
1. Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete and minimum 14 days for lightweight structural concrete).
  2. Concrete shall be cured by water curing method. Any curing compounds must be of the pure sodium silicate type or clear resin-based materials without waxes, oils or pigments and be approved by the manufacturer.
  3. Form release agents must not transfer to the concrete. Remove forms as soon as possible from below horizontal slabs to prevent entrapment of excess moisture. Excess moisture may lead to blistering of the membrane.

4. Voids, rock pockets and excessively rough surfaces shall be repaired with approved non-shrink grout or grout to match the unrepaired areas. Fill form tie rod holes with concrete and finish flush with surrounding surface.
5. Surfaces at cold joints shall be on the same plane. Grind irregular construction joints to suitable flush surface.

### 3.3 INSTALLATION OF BLINDSIDE SHEET WATERPROOFING

- A. Install blindside sheet waterproofing according to manufacturer's written instructions.
- B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.
- C. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.
- D. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
- E. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
- F. Install sheet waterproofing and accessory materials to produce a continuous watertight tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

### 3.4 INSTALLATION OF SELF-ADHERING SHEET WATERPROOFING

- A. Refer to manufacturer's literature for recommendations on installation, including but not limited to, the following:

1. Apply primer/contact adhesive at rate recommended by manufacturer. Recoat areas which were not waterproofed the same day or if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of primer.
2. Do not install membrane until primer/contact adhesive is completely dry. Dry time will vary with weather conditions.
3. Seal installation at the end of the day with troweled bead per manufacturer recommendations.
4. Apply protection board and other related materials in accordance with manufacturer's recommendations.

### 3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.
- B. Waterproofing will be considered defective if it does not pass tests and inspections.

### 3.6 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 071326

SECTION 072100

THERMAL INSULATION

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.

1.2 SUMMARY

A. Section Includes:

- 1. Polyisocyanurate foam-plastic board insulation.
- 2. Extruded polystyrene board insulation.

B. Related Requirements:

- 1. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 ACTION SUBMITTALS

A. Product Data:

- 1. Polyisocyanurate foam-plastic board insulation.
- 2. Extruded polystyrene board insulation.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
  - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
  - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
  - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

#### PART 2 - PRODUCTS

##### 2.1 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation, ASTM C1289, glass-fiber-mat faced, Type II, Class 2.
  - 1. Location: Cavity walls and Roof
  - 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Hunter Panels, XCI CG
    - b. Carlisle Coatings & Waterproofing Inc.
    - c. Firestone Building Products.

- d. Johns Manville; a Berkshire Hathaway company.
- 3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
- 4. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- 5. Minimum R-value: R-5.7/inch.
- 6. Size: 24-inches-wide x 96-inches-long.
- 7. Edges: Square.
- B. Extruded Polystyrene Board Insulation, Type IV: ASTM C578, Type IV, 40-psi minimum compressive strength; unfaced.
  - 1. Location: Foundations and Underslab
  - 2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Dow Chemical Company (The).
    - b. Owens Corning.
  - 3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
    - a. Minimum R-value: R-5.0/inch.
  - 4. Size: 24-inches-wide x 96-inches-long.
  - 5. Edges: Square.

6. Water Absorption: 0.1 percent by volume maximum in accordance with ASTM D2842.
7. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
8. Smoke-Developed Index: Not more than 450 when tested in accordance with ASTM E84.

## 2.2 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
  1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
  2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- B. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

## 2.3 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
  1. Spray Polyurethane Foam Insulation: ASTM C1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.



## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.3 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

### 3.4 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
  1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions.
  2. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application.
  3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
  4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

### 3.5 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer.
  1. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions, and with faces flush.

2. Press units firmly against inside substrates.
3. Supplement attachment of insulation by securing boards with two-piece wall ties designed for this purpose.

### 3.6 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
  1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb./cu. ft.
  2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

### 3.7 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

## SECTION 07 26 00

## VAPOR RETARDERS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Modified Bitumen vapor retarders.
- B. Related Requirements:
  - 1. Section 03 30 00 "Cast-in-Place Concrete" for under-slab vapor retarders.

## 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Modified Bitumen vapor retarders.

## 1.4 QUALITY ASSURANCE

- A. Mockups: Furnish vapor retarders as needed for installation in mockups specified in other sections.

## PART 2 - PRODUCTS

## 2.1 MODIFIED BITUMEN VAPOR RETARDERS

- A. Modified Bitumen Vapor Retarders: Comprised of SBS modified bitumen adhesive, factory-laminated to a tri-laminate woven, high-density polyethylene top surface. Release liner protecting adhesive.
  - 1. Intended for use as a direct to deck air/vapor barrier in roofing systems and may be used as a temporary roof membrane for up to ninety (90) days.
  - 2. Thickness: 0.0325-in minimum, where tested in accordance with ASTM D 5147.
  - 3. Max Load at Breaks at 73-degrees F: 64 lbf/in, MD 88 lbf/in, XMD when tested in accordance with ASTM D 5147.
  - 4. Moisture Vapor Permeance, 0.02 perms maximum, when tested in accordance with ASTM E 96.
  - 5. Air Permeability: 0.001114 ft<sup>3</sup>/min\*ft<sup>2</sup> maximum, when tested in accordance with ASTM E 2178

## 2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

### 3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Place vapor retarders on side of construction indicated on Drawings.
- B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
- D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

### 3.3 PROTECTION

- A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION

## SECTION 07 27 26

### FLUID-APPLIED MEMBRANE AIR BARRIERS

#### 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.

##### 1.2 SUMMARY

- A. Section Includes:
  - 1. Spray-applied air/vapor barrier.

##### 1.3 DEFINITIONS

- A. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- B. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- C. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
  - 1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
  - 2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
  - 3. Include details of interfaces with other materials that form part of air barrier.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
  - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

## 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
  - 1. Protect substrates from environmental conditions that affect air-barrier performance.
  - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

## 1.8 COORDINATION

- A. Ensure continuity of the air seal throughout the scope of this section.

## 1.9 WARRANTY

- A. Provide manufacturer's standard 10-year material warranty.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain primary air-barrier materials and air-barrier accessories from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested in accordance with ASTM E2357.



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- C. Air Permeance: Maximum 0.00012 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. pressure difference; ASTM E2178.
  - D. Ultimate Elongation: Minimum 800 percent; ASTM D412, Die C.
  - E. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
  - F. Resistance to Fungal Growth: No Growth; ASTM D5590.
  - G. Water Vapor Permeance: 0.08 perms; ASTM E90, procedure A.
  - H. VOC Content: Maximum 100 grams/liter.
  - I. Elastic Recovery: 90%; CAN/CGSB 37.58M86,

## 2.3 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with requirements, provide Henry Company: Air-Bloc 32MR or comparable product by one of the following:
  - 1. Dupont Tyvek: Fluid Applied WB.
  - 2. Substitutions: Section 012500 "Substitution Procedures".

## 2.4 ACCESSORY MATERIALS

- A. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
  - 1. Primer: Henry Company: Blueskin Primer or #545 Aquatac (Basis of Design).
  - 2. Transition strips: Henry Company Blueskin (Basis of Design).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
  - 3. Verify that substrates are visibly dry and free of moisture.
  - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

- F. Bridge movement joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

### 3.3 INSTALLATION OF ACCESSORIES

- A. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
  - 3. Apply primer to substrates at required rate and allow it to dry.
  - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
  - G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
  - H. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.
  - I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
  - J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

### 3.4 INSTALLATION OF PRIMARY AIR-BARRIER MATERIAL

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier in accordance with air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
  1. Apply primer to substrates at required rate and allow it to dry.
  2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
  3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

### 3.5 INSTALLATION OF TERMINATION SEALANT

- A. Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, duct work, electrical and other apparatus extending through the primary water resistive air barrier membrane and around the perimeter edge of membrane terminations at window and door frames with specified termination sealant.

### 3.6 INSTALLATION OF INSULATION

- A. Apply insulation adhesive in a serpentine pattern over the air barrier membrane.
- B. Dab Method: Apply walnut-sized dabs of insulation adhesive spaced 6 inches on center to substrate. Apply insulation using sufficient hand pressure to compress dabs up to 2 inches in diameter.
- C. Bead Method: Apply 1/4-inch beads 6 inches on center in a serpentine pattern.
- D. Immediately embed insulation into the adhesive and press firmly into place to ensure full contact. Apply additional adhesive if allowed to skin over.

### 3.7 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.
  - 1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.
  - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

- C. Remove masking materials after installation.

END OF SECTION 072726

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SECTION 073113

ASPHALT SHINGLES

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.

1.2 SUMMARY

- A. Section Includes:

- 1. Glass-fiber reinforced asphalt shingles.
- 2. Underlayment materials.

- B. Related Requirements:

- 1. Section 076200 "Sheet Metal Flashing and Trim" for flashings and trims.

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D1079 for definitions of terms related to roofing Work in this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

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1. Asphalt shingles.
2. Underlayment materials.

B. Samples: For each exposed product and for each color and blend specified, in sizes indicated.

1. Asphalt Shingles: Full size.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For asphalt shingles to include in maintenance manuals.
- B. Materials warranties.
- C. Roofing Installer's warranty.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Asphalt Shingles: 100 sq. ft. of each type and in each color and blend, in unbroken bundles.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized installer who is trained and approved by manufacturer.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.
- B. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double-stack rolls.



- C. Protect unused roofing materials from weather, sunlight, and moisture when left overnight or when roofing Work is not in progress.
- D. Handle, store, and place roofing materials in a manner to prevent damage to roof deck or structural supporting members.

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.
  - 1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

#### 1.10 WARRANTY

- A. Materials Warranty: Manufacturer agrees to repair or replace asphalt shingles that fail within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Manufacturing defects.
  - 2. Materials Warranty Period: 25 years from date of Substantial Completion, prorated, with first 10 years nonprorated.
- B. Roofing Installer's Warranty: Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain each type of product from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Wind Resistance: Provide asphalt shingles that comply with requirements of ASTM D3161/D3161M, Class F, and with ASTM D7158/D7158M, Class H.
- B. Energy Performance, ENERGY STAR: Provide asphalt shingles that are listed on the DOE's "ENERGY STAR Roof Product List" for steep-slope roof products.

### 2.3 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminated-Strip Asphalt Shingles: ASTM D3462/D3462M, laminated, multi-ply overlay construction; glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Certainteed; SAINT-GOBAIN; Landmark (Basis of Design)
    - b. Owens Corning.
    - c. PABCO Roofing Products.
  - 2. Butt Edge: Straight cut.
  - 3. Strip Size: Manufacturer's standard.
  - 4. Algae Resistance: Granules resist algae discoloration.
  - 5. Color and Blends: As selected by Architect from manufacturer's full range.

6. Weight: 240 lbs per square.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

## 2.4 UNDERLAYMENT MATERIALS

A. Glass-Reinforced Felt: ASTM D6757/D6757M, asphalt-saturated, glass-reinforced organic felt or inorganic fiber-based felt.

B. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 40-mil-thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-resistant top surface and release backing; cold applied.

1. Location: At eave, rakes, ridges, and sidewalks.

## 2.5 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

B. Roofing Nails: ASTM F1667, aluminum, stainless steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch-diameter, sharp-pointed, with a 3/8- to 7/16-inch-diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through sheathing less than 3/4 inch thick.

1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

C. Underlayment Nails: Aluminum, stainless steel, or hot-dip galvanized-steel wire nails with low-profile metal or plastic caps, 1-inch-minimum diameter.

1. Provide with minimum 0.0134-inch-thick metal cap, 0.010-inch-thick power-driven metal cap, or 0.035-inch-thick plastic cap; and with minimum 0.083-inch-thick ring shank or 0.091-inch-thick smooth shank of length to penetrate at least 3/4 inch into roof sheathing or to penetrate through roof sheathing less than 3/4 inch thick.

## 2.6 METAL FLASHING AND TRIM

- A. Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim".
- B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item unless otherwise specified in this Section or indicated on Drawings.
  - 1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches over and 4 inches beyond each side of downslope asphalt shingles and 6 inches up the vertical surface.
  - 2. Counter flashings: Fabricate to cover 4 inches of base flashing measured vertically; and in lengths required so that no step exceeds 8 inches and overall length is no more than 10 feet.
  - 3. Provide metal reglets for installation.
  - 4. Drip Edges: Fabricate in lengths not exceeding 10 feet with minimum 2-inch roof-deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
  - 5. Vent-Pipe Flashings: ASTM B749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored and that provisions have been made for flashings and penetrations through asphalt shingles.

3. Verify that vent stacks and other penetrations through roofing are installed and securely fastened.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION OF UNDERLAYMENT MATERIALS

- A. Comply with asphalt shingle and underlayment manufacturers' written installation instructions and with recommendations in NRCA's "The NRCA Roofing Manual: Steep-Slope Roof Systems" applicable to products and applications indicated unless more stringent requirements are specified in this Section or indicated on Drawings.
- B. Asphalt-Saturated Felt: Install on roof deck parallel with and starting at eaves.
  1. Single-Layer Installation:
    - a. Lap sides a minimum of 2 inches over underlying course.
    - b. Lap ends a minimum of 4 inches.
    - c. Stagger end laps between succeeding courses at least 72 inches.
- C. Self-Adhering, Polymer-Modified Bitumen Sheet: Install, wrinkle free, on roof deck.
  1. Comply with low-temperature installation restrictions of underlayment manufacturer.
  2. Install lapped in direction that sheds water.
    - a. Lap sides not less than 4 inches.
    - b. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses.
    - c. Roll laps with roller.
  3. Eaves: Extend from edges of eaves 24 inches beyond interior face of exterior wall.

4. Rakes: Extend from edges of rakes 24 inches beyond interior face of exterior wall.
5. Ridges: Extend 36 inches on each side.
6. Sidewalls: Extend 18 inches beyond sidewalls and return vertically against sidewalls not less than.
7. Cover underlayment within seven days.

### 3.3 INSTALLATION OF METAL FLASHING AND TRIM

- A. Install metal flashings and trim to comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim."
- B. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 2 inches and extend over underlying shingle and up the vertical face.
  1. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying shingle.
  2. Fasten to roof deck only.
- D. Counterflashings: Coordinate with installation of base flashing and fit tightly to base flashing. Lap joints a minimum of 4 inches secured in a waterproof manner.
  1. Install in reglets or receivers.
- E. Rake Drip Edges: Install over underlayment materials and fasten to roof deck.
- F. Eave Drip Edges: Install below underlayment materials and fasten to roof deck.
- G. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

### 3.4 INSTALLATION OF ASPHALT SHINGLES

- A. Install asphalt shingles in accordance with manufacturer's written instructions and recommendations in NRCA's "NRCA Guidelines for Asphalt Shingle Roof Systems."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed with self-sealing strip face up at roof edge.
  - 1. Extend asphalt shingles 1/2 inch over fasciae at eaves and rakes.
  - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of laminated asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Fasten asphalt shingle strips with a minimum of four roofing nails, but not less than the number indicated in manufacturer's written instructions for roof slope and design wind speed indicated on Drawings and for warranty requirements specified in this Section.
  - 1. Locate fasteners in accordance with manufacturer's written instructions.
  - 2. When ambient temperature during installation is below 50 deg F, hand seal self-sealing asphalt shingles by applying asphalt roofing cement spots between course overlaps after nailing the upper course.
- E. Hip and Ridge Shingles: Maintain same exposure of cap shingles as roofing-shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds.
  - 1. Fasten with roofing nails of sufficient length to penetrate sheathing.

END OF SECTION 073113

SECTION 074293

SOFFIT PANELS

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.

1.2 SUMMARY

- A. Section Includes:

- 1. Metal soffit panels.

- B. Related Requirements:

- 1. See section 09 29 00 "Gypsum Board" for Gypsum soffit panels.

1.3 ACTION SUBMITTALS

- A. Product Data:

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

- B. Shop Drawings:



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1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

## 1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

## 1.7 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:

- a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.

- 2. Warranty Period: Two (2) years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show 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 according to ASTM D2244.
    - b. Chalking in excess of a No. 8 rating when tested according to 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. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
  1. Wind Loads: As indicated on Drawings.
  2. Other Design Loads: As indicated on Drawings.
  3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing 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 (Range): 120 deg F, ambient; 180 deg F, material surfaces.

### 2.2 METAL SOFFIT PANELS

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile Metal Soffit Panels: Solid panels formed with vertical panel edges and a flat pan between panel edges; with flush joint between panels.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Firestone Metal Products; Una-Clad UC500 Flush Seam Panels (Basis of Design).

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- b. CENTRIA, a Nucor Brand.
  - c. Dimensional Metals, Inc.
  - d. PAC-CLAD; Petersen Aluminum Corporation; a Carlisle company.
2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
- a. Thickness: 0.032 inch.
  - b. Surface: Smooth, flat finish.
  - c. Exterior Finish: Fluoropolymer.
  - d. Color: As selected by Architect from manufacturer's full range.
3. Panel Coverage: 20 inches.
4. Panel Height: 1.0 inch.

### 2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
  - 1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
  - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

## 2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

## 2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations

in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
  1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
  2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

### 3.3 INSTALLATION OF METAL SOFFIT PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Shim or otherwise plumb substrates receiving metal panels.
  - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
  - 3. Install screw fasteners in predrilled holes.
  - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 5. Install flashing and trim as metal panel work proceeds.
  - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
  - 1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
  - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
  - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
  - 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

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4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
- E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
  2. 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 or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

### 3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.



- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074293

## SECTION 076200

### SHEET METAL FLASHING AND TRIM

#### 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.

##### 1.2 SUMMARY

- A. Section Includes:

- 1. Roof-drainage sheet metal fabrications.
  - 2. Wall sheet metal fabrications.
  - 3. Miscellaneous sheet metal fabrications.

- B. Related Requirements:

- 1. Section 042613 "Masonry Veneer" for installation of manufactured sheet metal through-wall flashing and trim integral with masonry.
  - 2. Section 073113 "Asphalt Shingles" for installation of sheet metal flashing, trim and underlayments integral with roofing.

##### 1.3 COORDINATION

- A. 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.

076200-1

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- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

- 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.
  - 12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

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

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

#### 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 roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop is to be listed as able to fabricate required details as tested and approved.

- B. Mockups: Furnish flashings for installation in mockups specified in Section 042613 "Masonry Veneer."

- C. DELIVERY, STORAGE, AND HANDLING

- 1. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
    - a. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
    - b. Protect stored sheet metal flashing and trim from contact with water.
  - 2. 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.

## 1.7 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: 20 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, are to 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 are not to rattle, leak, or loosen, and are to 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 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 per BCNYS

- 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 deg F, ambient; 180 deg F, material surfaces.

## 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 surface.

1. 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.

2. Color: As selected by Architect from manufacturer's full range.

3. 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. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

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

## 2.3 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 Stainless Steel Sheet: Series 300 stainless steel.
- C. Solder:
  - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

- E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane, polysulfide, or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.
- G. 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. Source Limitations: Obtain reglets from single source from single manufacturer.
  - 2. Material: Stainless steel, 0.0188 inch thick.
  - 3. 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.
  - 4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
  - 5. 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.
  - 6. Finish: Mill.

## 2.4 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 within 1/8-inch 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 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 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. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

- G. Do not use graphite pencils to mark metal surfaces.

## 2.5 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 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.
4. Fabricate gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.
5. Gutter Profile: Style K in accordance with cited sheet metal standard.
6. Expansion Joints: Lap type.
7. Gutters with Girth up to 15 Inches (380 mm): Fabricate from the following materials:
  - a. Aluminum: 0.032 inch thick.

- B. Downspouts: Fabricate rectangular downspouts to dimensions indicated on Drawings, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricate from the following materials:
  - a. Aluminum: 0.024 inch thick.

## 2.6 SLOPED ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick

B. Drip Edges: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick

C. Eave, Rake, and Ridge Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick

D. Roof-Penetration Flashing: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick

## 2.7 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, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.0156 inch thick.

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

1. Stainless Steel: 0.0156 inch thick.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with installer present, 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 that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **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, or 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.
  9. Do not use graphite pencils to mark metal surfaces.
- 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 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.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
- 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.
- 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. Form joints to completely conceal sealant.
    - b. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.

- c. 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. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
  - 2. Do not solder aluminum sheet.
  - 3. Do not use torches for soldering.
  - 4. Heat surfaces to receive solder, and flow solder into joint.
    - a. Fill joint completely.
    - b. Completely remove flux and spatter from exposed surfaces.
  - 5. Stainless Steel Soldering:
    - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
    - b. Promptly remove acid-flux residue from metal after tinning and soldering.
    - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

### 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 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. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
7. Anchor gutter with straps spaced not more than 30 inches apart to roof deck unless otherwise indicated, and loosely lock to front gutter bead.

## C. 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.

## 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 centers.
- C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric 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, and similar flashings to extend 4 inches beyond wall openings.

### 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. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. 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

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including modified General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Penetrations in fire-resistance-rated construction.
- 2. Construction-gap firestopping at connections of same or different materials in fire-rated construction.
- 3. Construction-gap firestopping occurring within fire-rated wall, floor, or floor-ceiling assemblies.
- 4. Construction-gap firestopping occurring at the top of fire-rated walls.
- 5. Through-penetration smoke-stopping in smoke partitions.
- 6. Construction-gap smoke stopping in smoke partitions.

B. Related Requirements:

- 1. Section 042200 "Concrete Unit Masonry"
- 2. Section 042613 "Masonry Veneer"
- 3. Section 092900 "Gypsum Board"

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### 1.3 ACTION SUBMITTALS

- A. Product Data: Firestopping systems.
- B. Product Schedule: For each firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

### 1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install firestopping system when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

### 1.5 COORDINATION

- A. Coordinate construction of openings, joints and penetrating items to ensure that firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.
- C. Coordinate sizing of joints to accommodate joint firestopping systems.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:

1. Perform firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test in accordance with testing standards referenced in "Penetration Firestopping Systems" and "Joint Firestopping Systems" Articles. Provide rated systems complying with the following requirements:
  - a. Firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.
    - 1) UL in its online directory "Product iQ".

## 2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.
  1. Acceptable Manufacturers and Products: Those listed in the UL Fire Resistance directory for the UL System involved.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.
  1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
  2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined in accordance with ASTM E814 or UL 1479.
  1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.

2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined in accordance with UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, in accordance with ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

## 2.3 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
1. Joint firestopping systems that are compatible with one another, with the substrates forming openings, and with penetrating items, if any.
  2. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
  3. Provide firestop products that do not contain ethylene glycol.
  4. Acceptable Manufacturers and Products: Those listed in the UL Fire Resistance directory for the UL System involved.
- B. Intumescent Gypsum Wall Framing Gaskets (Applied to Steel Tracks, Runners, and Studs prior to Framing Installation): Provide products with fire, smoke, and acoustical ratings that allow movement up to 100 percent compression and/or extension in accordance with UL 2079 or

ASTM E1966; have an L Rating less than 1 cfm/ft. in accordance with UL 2079; and a minimum Sound Transmission Class (STC) rating of 56 in accordance with ASTM E90 or ASTM C919.

- C. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
  - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- D. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
  - 1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- F. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

## 2.4 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- D. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

- E. Intumescent Wrap Strips: Single-component intumescent elastomeric strips for use around combustible penetrants.
- F. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- G. Pillows/Bags: Compressible, removable, and reusable intumescent pillows encased in fire-retardant polyester or glass-fiber cloth. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## 2.5 MIXING

- A. Firestopping Materials: For those products requiring mixing before application, comply with firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Before installing firestopping systems, clean out openings and joints immediately to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
  - 2. Clean substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.3 INSTALLATION OF FIRESTOPPING SYSTEMS

- A. General: Install firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, joints, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.



2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items and joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
  1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections according to ASTM E2174.
- B. Where deficiencies are found or firestopping system is damaged or removed because of testing, repair or replace firestopping system to comply with requirements.
- C. Proceed with enclosing firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove

damaged or deteriorated firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078400

078400-9

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SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including modified General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Joint Sealants

1.3 ACTION SUBMITTALS

- A. Product Data:

- 1. Each joint sealant product.

- B. Samples: Manufacturer's standard color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

- C. Joint-Sealant Schedule: Include the following information:

- 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.

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3. Joint-sealant formulation.
4. Joint-sealant color.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by a qualified testing agency.

#### 1.5 MOCKUPS

- A. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

#### 1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Five (5) years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  1. BASF Corporation.
  2. Dow Chemical.
  3. GE Silicones.
  4. Sika Corporation; Joint Sealants.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.2 ELASTOMERIC JOINT SEALANTS

- A. Sealant Type A: Polyurethane: Single-component, nonsag, nontraffic-use, plus 35 percent and minus 35 percent movement capability, polyurethane joint sealant; Type II, Class A, ASTM C920, Type S, Grade NS, Class 35.

1. Basis of Design: Sikaflex 1a.
  2. Applications: For exterior joints in vertical surfaces and non-traffic horizontal surfaces including, but not limited to, the following:
    - a. Control and expansion joints in cast-in-place concrete.
    - b. Joints between architectural pre-cast concrete units.
    - c. Control and expansion joints in unit masonry.
    - d. Butt joints between metal panels.
    - e. Joints between different materials listed above.
    - f. Perimeter joints between materials listed above and frames of doors, windows, storefronts, louvers and similar openings.
    - g. Control and expansion joints in ceiling and overhead surfaces.
    - h. Joints in brickwork and masonry.
- B. Sealant Type B: Silicone, S, NS, 25, T, NT: Single-component, nonsag, nontraffic-use, plus 25 and minus 25 percent movement capability; ASTM C920, Type S, Grade NS, Class 25.
1. Basis of Design: Sikasil -N Plus US.
  2. Applications: For interior joints in vertical surfaces and non-traffic horizontal surfaces including, but not limited to, the following:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints on exposed interior surfaces of exterior openings.
    - c. Joints on pre-cast beams and planks.
    - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
    - e. Trim or finish joints subject to movement.
- C. Sealant Type C: Polyurethane: Single-component, nonsag, nontraffic-use, plus 100 percent and minus 50 percent movement capability, polyurethane joint sealant; Type II, Class A, ASTM C920, Type S, Grade NS, Class 100/50.

1. Basis of Design: Sikaflex 15LM.
  2. Applications: For exterior and interior joints in horizontal and sloped traffic surfaces including, 2- and 3-hour fire rated joint system, but not limited to, the following:
    - a. Control expansion and isolation joints in cast-in-place concrete.
    - b. Control expansion and isolation joints in structural pre-cast concrete units.
    - c. Joints between architectural pre-cast concrete units.
    - d. Tile control and expansion joints.
    - e. Joints between different materials listed above.
    - f. Rated wall construction joints.
- D. Sealant Type D: Polyurethane, S or M, NS, 25: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S or M, Grade NS, Class 25.
1. Basis of Design: Sikaflex Textured Sealant.
  2. Applications: For interior or exterior joints in vertical surfaces between laps in fabrications of sheet metal.
- E. Sealant Type E: Butyl-Rubber, ASTM C 920, Grade NS, Class 12-1/2, Use NT; single component, solvent release, non-skinning, non-sagging, plus and minus 12-12 percent.
1. Basis of Design: Pecora BA-98.
  2. Applications: For joints under metal thresholds and saddles or as bedding sealant for sheet metal flashing and frames of metal or wood.

## 2.3 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.



### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
  3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants in accordance with requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile in accordance with Figure 8A in ASTM C1193 unless otherwise indicated.

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200