

DIVISION 7

THERMAL AND MOISTURE PROTECTION

Sizeier Thompson Brown Architects
300 Lafayette Street, Suite 200
New Orleans, LA 70130
Phone: 504-523-6472
Fax: 504-529-1181

www.sizeierthompsonbrown.com



SECTION 07140

COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Single-component polyurethane waterproofing at elevator pit and a polypropylene drain board system applied over the polyurethane waterproofing membrane.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Product test reports.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.

1.5 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer and Installer agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SINGLE-COMPONENT POLYURETHANE WATERPROOFING

- A. Single-Component, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Henry Company; Aquabloc SB (Basis-of-Design)
 - b. BASF Building Systems; HLM 5000
 - c. Prior approved equal.
- B. Polypropylene drain board system
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonoshield DBS Drain Board System
 - b. Prior approved equal.

2.2 AUXILIARY MATERIALS

- A. Primer: Manufacturer's standard, factory-formulated polyurethane or epoxy primer.
- B. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- C. Joint Sealant: Aliphatic Polyurethane; BASF Sonolastic Ultra.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- E. Before applying the membrane, all joints, cracks and openings around protrusions must be sealed by caulking or pre-striping (a preliminary coating of the liquid membrane). Allow to dry overnight before applying the membrane.
- F. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 898 for horizontal surfaces and ASTM C 1471 for vertical surfaces and manufacturer's written instructions.
 - 1. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.
- G. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 898 for horizontal surfaces and ASTM C 1471 for vertical surfaces and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks, complying with ASTM D 4258, before coating surfaces.
- H. All joints over 1/8 inch must be sealed with "Sonolastic Ultra" aliphatic polyurethane sealant prior to installing the membrane.

3.2 WATERPROOFING APPLICATION

- A. Apply waterproofing according to ASTM C 898 for horizontal surfaces and ASTM C 1471 for vertical surfaces and manufacturer's written instructions.
- B. Waterproofing Applications:
 - 1. Apply two coats of waterproofing to obtain a seamless membrane free of entrapped gases, at a rate of 60 mils wet mils EACH coat. Allow overnight curing between coats.
 - 2. Where horizontal mud slabs will be utilized, coat the cured mud slab following the procedure above. Apply membrane directly to the cured slab.
- C. Drain board system installation: For all vertical wall surfaces, place and secure molded-sheet drainage panels, with geotextile facing away from wall or concrete footing substrate, so that the backfill will be placed against the fabric. Use adhesives that do not penetrate waterproofing. Tightly abutt edges and ends of geotextile fabric to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.3 CURING, PROTECTION, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 07162

CRYSTALLINE WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Crystalline waterproofing at elevator pit walls and floors, negative pressure side (inside).
- B. Related Sections:
 - 1. Section 03300 - Cast-in-Place Concrete.
 - 2. Section 05500 - Metal Fabrications: Elevator pit ladder and sill angles.
 - 3. Section 14210 - Electric Traction Elevators.

1.2 REFERENCES

- A. Industry Standards: The Industry Standards listed below refer to the latest date of issue or edition, unless otherwise indicated.
 - 1. AASHTO T 259 - Standard Test Method for Resistance of Concrete to Chloride Ion Penetration; American Association of State Highway and Transportation Officials; 1980.
 - 2. ASTM C 109/C 109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50 mm) Cube Specimens); 1995.
 - 3. ASTM C 321 - Standard Test Method for Bond Strength of Chemical-Resistant Mortars; 1994.
 - 4. ASTM C 348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars; 1995.
 - 5. ASTM C 452 - Standard Test Method for Potential Expansion of Portland-Cement Mortars Exposed to Sulfate; 1995.
 - 6. ASTM C 596 - Standard Test Method for Drying Shrinkage of Mortar Containing Hydraulic Cement; 1996.
 - 7. ASTM C 944 - Standard Test Method for Abrasion Resistance of Concrete or Mortar Surfaces by the Rotating-Cutter Method; 1995.
 - 8. COE CRD-C 48 - Method of Test for Water Permeability of Concrete; Corps of Engineers; current edition.
 - 9. NSF 61 - Drinking Water System Components - Health Effects; NSF International; 1997.

1.3 SYSTEM DESCRIPTION

- A. Cementitious Crystalline Waterproofing: Mix of Portland cement, fine treated silica sand and active proprietary chemicals which when mixed with water and applied as a cementitious coating, causes a catalytic reaction which generates a non-soluble crystalline formation of dendritic fibers within the pores and capillary tracts of concrete. This process shall cause concrete to become permanently sealed against the penetration of water or liquids from any direction.

1.4 PERFORMANCE REQUIREMENTS

- A. Testing Requirements: Perform the following tests according to the standards listed. Follow the conditions as listed.
 - 1. Testing shall be performed by an independent laboratory meeting the requirements of ASTM E 329-90, and certified by the United States National Bureau of Standards. Testing Laboratory shall obtain concrete samples and waterproofing product samples.
 - 2. Perform independent testing according to CRD C48-73 Permeability of Concrete under the following conditions:
 - a. Concrete samples shall be 6 inches (150 mm) in diameter and no thicker than 2 inches (50 mm).
 - b. Coatings shall be a maximum thickness of 0.05 inches (1 mm) per coat with up to 2 coats permitted.
 - c. Concrete samples shall have a design strength of 2000 psi or less. No admixtures will be permitted.
 - d. A minimum of four samples shall be tested; 2 treated and 2 untreated. Untreated samples shall exhibit leakage at 10 psi or less.
 - e. Test samples to a pressure of 175 psi (405 foot head of water). Treated samples, after crystalline growth has occurred, shall exhibit no measurable leakage whatsoever.

1.5 SUBMITTALS

- A. Product Data: Submit product data including installation methods, for each type of product required, to demonstrate products comply with Contract Documents.
- B. Test Reports: Submit and obtain acceptance of independent laboratory test reports of tests specified herein, prior to application of cementitious crystalline waterproofing material.
- C. Manufacturer's Certification: Provide a copy of manufacturer's representative's report certifying that surfaces to which waterproofing is to be applied are in an acceptable condition to receive same, that materials to be installed comply with specified requirements, and that applicator has the experience to install the materials in accord with manufacturer's product data.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide products of a manufacturer with satisfactory experience in manufacturing the principal materials for the required work. Manufacturers, which cannot supply the performance test data specified here-in will not be considered for use on this project.
- B. Applicator Qualifications: Waterproofing applicator shall have documented satisfactory experience and training provided by the product manufacturer. Waterproofing applicator shall be acceptable to the manufacturer and such acceptance shall be indicated in writing.
- C. Pre-Installation Conference: Schedule a meeting, before start of construction of surfaces to receive waterproofing, with waterproofing applicator, applicators of work adjacent to or which penetrates waterproofing and Architect to review procedures for substrate preparation and waterproofing application.
 - 1. Review Contract Document requirements for waterproofing and waterproofing manufacturer's product data including application instructions.

2. Document discussion in writing, including issues requiring action, and distribute report to entities concerned with waterproofing work.
- D. Waterproofing manufacturer's representative shall advise and/or supervise the waterproofing application.
- 1.7 DELIVERY, STORAGE AND HANDLING
- A. Store waterproofing materials off the ground and covered; protect products from moisture in accordance with manufacturer's instructions.
 - B. Deliver materials in manufacturer's unopened containers, fully identified with brand, type, grade, class and all other qualifying information. Provide Material Safety Data Sheets for each product.
 - C. Take necessary precautions to keep products clean, dry and free of damage.
- 1.8 PROJECT CONDITIONS
- A. Coordinate waterproofing work with work of other trades.
 - B. Provide materials and accessories in timely manner so as not to delay work.
 - C. Maintain surfaces to be waterproofed and surrounding air temperature at not less than 40 degrees F (5 degrees C) for at least 48 hours before, during and after application of waterproofing.
 - D. Do not apply materials to frozen or frost-filled surfaces.
 - E. Exercise caution when temperatures exceed 90 degrees F (32 degrees C). It may be necessary to apply waterproofing during times when the sun is not at its strongest (i.e. early morning, evening or night).
- 1.9 WARRANTY
- A. Applicator, individually and separate from performance bonds, shall warrant his work from the Date of Substantial Completion, covering the surfaces treated, and binding him to repair, at his expense, any and all leaks through the surfaces treated which are not due to structural weaknesses or other causes beyond his control, such as fire, earthquake, tornado, and hurricanes, for a period of five (5) years after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturers/Products:
 1. VANDEX SALES AND SERVICES, INC.:
 - a. Vandex Super
 2. XYPEX CHEMICAL CORPORATION
 - a. "Xypex Concentrate Slurry Coat".
 3. Chem-Cretex; Chem-Cretex Cem600 Crystalline Water Proofing

2.2 MATERIALS

- A. Crystalline Waterproofing: Blend of rapid-hardening portland cement, specially treated quartz sand and a compound of active chemicals, with the following characteristics:
1. Color: Cement gray.
 2. Aggregate: Powder.
 3. Water: Clean, clear, non-alkaline and free of salts and other harmful elements; comply with NSF (NSF Standard 61).
 4. Potable Water Certification: NSF (NSF Standard 61).
 5. Permeability in accordance with CRD-C 48: 0.00 cm/sec permeability at 210 psi (1.5 MPa) or 484 feet (148 m) over 20 days testing period on negative side.
 6. Compressive Strength when measured in accordance with ASTM C 109/C 109M: 10,200 psi (70.3 MPa) at 28 days.
 7. Flexural Strength when measured in accordance with ASTM C 348: 730 psi (5.0 MPa) at 28 days.
 8. Bond Strength when measured in accordance with ASTM C 321: 690 psi (4.7 MPa) at 14 days.
 9. Abrasion resistance when measured in accordance with ASTM C 944: 1.28 g (10 kg/sq ft on 4000 psi concrete at 28 days).
 10. Sulfate Resistance when measured in accordance with ASTM C 452: 0.0012 percent (28 days).
 11. Chloride Ion Penetration when measured in accordance with AASHTO T-259: 99.99 percent resistant at 1/4 inch (6 mm), 100 percent at 1 inch (25 mm) depth.
 12. Bond of Reinforcement when measured in accordance with ASTM C 321: No loss of bond due to waterproofing material.

2.3 MIXES

- A. General: Mix waterproofing material by volume with clean water, which is free from salt and deleterious materials. Mix materials in quantities, which can be applied within 20 to 30 minutes from the time of mixing. As mixture thickens, stir frequently, but do not add additional water.
1. Do not mix bonding agents or admixtures with crystalline waterproofing materials.
- B. Brush Application Mix: Measure dry powder and place in mixing container. Measure water and mix into powder with a paddle on a slow speed electric drill (250 RPM) or other type mixer, which will ensure mixing and is acceptable to manufacturer.
1. Mixing proportions shall be as recommended by manufacturer, but not less than the following:

<u>Coverage</u>	<u>Proportions (by Vol.)</u>
1.5 lbs. per sq. yd.	5 powder to 2 water
2.0 lbs. per sq. yd.	3 powder to 1 water

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to start of waterproofing installation arrange a visit to project site by waterproofing material manufacturer's representative. Representative shall inspect and certify that surfaces to which waterproofing is to be applied are in acceptable condition.
- B. Verify that surfaces are sound and clean.
- C. Verify that form release agents, methods, and materials used to cure concrete surfaces are compatible with waterproofing materials.

3.2 PREPARATION

- A. General: Examine surfaces to be waterproofed for form tie holes and structural defects such as honeycombing, rock pockets, faulty construction joints, and cracks. Repair these defects in accord with manufacturer's product data and as follows:
 - 1. Form tie holes, faulty construction joints and cracks: Chip defective areas in a "U" shaped slot 3/4 inch to 1 inch wide and a minimum of 1 inch deep. Clean slot of debris and dust. Soak with water and remove surface water. Apply a slurry coat of waterproofing materials at the rate of 1.5 lb. per sq. yd. to the slot. Allow slurry to reach an initial set, then fill cavity with dry pack mortar. Compress into cavity using pneumatic packer or block and hammer.
 - 2. Rock pockets, honeycombing or other defective concrete: Rout out defective areas to sound concrete. Remove loose materials and saturate with water. Remove surface water and apply one slurry coat of waterproofing material. After slurry has set, but while it is still "green", fill cavity to surface with non-shrink grout.
- B. Construction Joints: Apply waterproofing materials in slurry form at rate of 2.0 lb. per sq. yd. to joint surfaces between pours. Moisten surfaces prior to slurry application.
 - 1. Where joint surfaces are not accessible prior to pouring new concrete, consult manufacturer for application.
- C. Coves and Sealing Strips: Prepare concrete surfaces which will come into contact with coves and sealing strips by applying one coat of waterproofing material in slurry form at rate of 1.5 lb. per sq. yd. Apply dry-pack or mortar while slurry coat is still "green" but after it has reached an initial set. Install flexible sealant in expansion joints as specified in Sealant section.
 - 1. Coves: Trowel and pack waterproofing mortar into cove shape where indicated on Drawings. This application relates to block/slab interfaces or planter construction joints only.
 - 2. Sealing Strips: Where indicated on the Drawings, preformed grooves 3/4 inch wide by a minimum of 1 inch deep, located at construction joints, shall be filled with waterproofing dry-pack and compacted using a pneumatic packer or hammer and block. Forming of sealing strip grooves shall be responsibility of General Contractor.
- D. Concrete Finish: Concrete surfaces shall have an open capillary system to provide tooth and suction and shall be clean; free from scale, excess form oil, laitance, curing compounds and foreign matter. Smooth surfaces caused by steel forms and surfaces covered with excess form oil or other contaminants shall be washed, lightly sandblasted, water-blasted, or acid-etched with muriatic acid as necessary to provide

a clean absorbent surface. Saturate surfaces to be acid-etched with water prior to application of acid.

1. Vertical surfaces may have a sacked finish.
2. On horizontal surfaces where a trowel finish is required, apply waterproofing by dry shake method in accordance with manufacturers product data.
3. On horizontal surfaces, which do not require a trowel finish a broom finish shall be provided. Do not apply waterproofing material to this surface if concrete is less than 20 hours old.
4. Apply waterproofing material to "green" concrete as soon as possible after forms have been stripped, or to existing concrete which has been saturated with water. Moisten surfaces to be treated prior to application, as required to insure migration of crystalline chemicals into capillary voids in concrete. Remove free water prior to treatment with waterproofing material.

3.3 APPLICATION

- A. Surface Application: After repair, patching and sealing strip placement has been completed in accord with manufacturer's product data and as specified herein, treat concrete surfaces with waterproofing material slurry applied at rates and locations indicated on Drawings and in accord with manufacturer's product data.
- B. Brushing: Use a semi-stiff bristle brush or broom to work slurry into concrete surface, filling hairline cracks and surface pores.
- C. Second Coat: When indicated on Drawings or required by manufacturer's product data, a second coat of waterproofing material may be necessary. Apply while first coat is still "green", but after it has reached an initial set. Lightly pre-water when rapid drying conditions occur.
- D. Do not conceal installed waterproofing before it has been observed by Architect, waterproofing manufacturer's representative and other designated entities.

3.4 CURING

- A. General: Begin curing as soon as waterproofing materials have set up sufficiently so as not to be damaged by a fine spray. Fog-spray treated surfaces three times a day for a two-day period, or cover treated surfaces with damp burlap for the prescribed period.
 1. In warm climates, more than 3 sprayings per day may be necessary to prevent excessive drying of coating.
 2. Do not lay plastic sheeting directly on waterproofing coating as air contact is required for proper curing.
 3. If there is poor air circulation in treated areas, provide fans or blown air to aid in curing of waterproofing.
 4. Horizontal surfaces: Begin curing as soon as final set has occurred but before surface starts to dry. Conventional moist procedures such as water spray, and wet burlap may be used. Cure for a minimum of 48 hours.
 5. In hot dry sunny conditions, consult manufacturer's product data.
- B. If moist curing is not possible, a chemical curing agent manufactured for or compatible with each approved waterproofing material shall be available for the work. Chemical agent shall have at least 2 years of successful field use to be eligible for acceptance.

- C. Protect cured surfaces from damage to wind, sun, rain and temperatures below 36 degrees F. for a period of not less than 48 hours after application. If plastic sheeting is used as protection, it shall be raised off waterproofing coating to allow air circulation.

END OF SECTION

SECTION 07210
BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Glass Fiber Blanket Insulation for thermal batt insulation.
 - 2. Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation.
 - 3. Perimeter Safing Insulation.
 - 4. Closed-cell Spray-Applied Polyurethane Foam Insulation for insulating the bottom side of deck.
 - 5. Foamed-in-place insulation for hollow metal frames at metal stud framed walls.
- B. Related Sections:
 - 1. Section 07812 - Cementitious Fireproofing for spray applied fireproofing for foam insulation.
 - 2. Section 08110 - Hollow Metal Doors and Frames

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product test reports: Submit product test reports from tests performed by qualified independent testing laboratory evidencing compliance of insulation products with requirements including R-values, fire performance characteristics, perm ratings, water absorption ratings, and other properties, based on comprehensive testing of current products.

1.3 QUALITY ASSURANCE

- A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics; Class A Fire Rating: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.
- C. Curtainwall, Storefront and Safing Insulation: Curtainwall and safing insulation shall be 2 hour fire-tested under simulated field conditions using ASTM E119 guidelines.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers:
 - 1. CertainTeed Corporation.
 - 2. Knauf Fiber Glass.
 - 3. Owens Corning.
- B. Unfaced, Flexible Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, passing ASTM E 136 for combustion characteristics.

2.2 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BLANKET INSULATION

- A. Manufacturers:
 - 1. Fibrex Insulations Inc.
 - 2. Owens Corning.
 - 3. Thermafiber.
- B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics. Complying with ASTM E 413 - Rating for sound insulation.
 - 1. Thickness and Density per ASTM C 167 for a minimum thickness of 2-inches with the density to be 2.5 lbs/cubic foot.
 - 2. Acoustical Performance rating per ASTM C 423 with an Absorption Co-efficient at frequencies (NRC). For 2-inches thick the NRC shall be a minimum of 0.95.
- C. To be utilized at all interior partitions where sound attenuation (acoustical) insulation is indicated on the Drawings.

2.3 SAFING INSULATION AND ACCESSORIES

- A. Slag-Wool-Fiber Board Safing Insulation: Semi-rigid boards designed for use as a fire stop at openings between edge of slab and exterior wall panels, produced by combining slag-wool fibers with thermosetting resin binders to comply with ASTM C 612, Type IA and IB; nominal density of 4.0 pcf; passing ASTM E 136 for combustion characteristics; r-value of 4.0 at 75 deg F (23.9 deg C).
- B. Sealing Compound: Material approved by safing insulation manufacturer for dealing joints between foil backing of safing insulation and edge of concrete floor slab against penetration of smoke.
- C. Safing Clips: Galvanized steel safing clips approved by manufacturer of safing insulation for holding safing insulation in place.

2.4 CLOSED CELL SPRAY-APPLIED POLYURETHANE FOAM INSULATION

- A. Manufacturer:
1. Henry Company; Permax (Basis-of-Design)
 2. CertainTeed; CertaSpray.
 3. Dow; Styrofoam SPF.
- B. Spray-Applied Rigid Polyurethane Insulation: Two component spray-applied polyurethane foam insulation to create a seamless, monolithic barrier for protection against water and air. Closed cell spray foam with zero-ozone-depleting HFC blowing agents.
- C. Composition/Materials: Medium density closed cell foam, MDI-based polyurethane thermoset rigid foam. R-value: 6.4 per inch.
- D. Physical Properties:
- | <u>Method:</u> | <u>Description:</u> | <u>Value:</u> |
|----------------|----------------------------------|---------------|
| ASTM D1622 | Density (core) | 2.2 pcf |
| ASTM C518 | Thermal Resistance @ 75F /BTU | 6.4 |
| ASTM D2842 | Closed Cell Content (%) | >92 percent |
| ASTM D1621 | Compressive Strength (psi) | >25 psi |
| ASTM D1623 | Tensile Strength (psi) | 23 psi |
| ASTM E84 | Flame Spread Index | <25 |
| | Smoke developed | <450 |
| ASTM E 96 | Permeance (perms) @ 2-inch thick | 0.5 perms |
- E. Provide at the underside of the deck on the first floor as indicated on the drawings.

2.5 FOAMED-IN-PLACE INSULATION

- A. Foamed-In-Place Insulation (for filling voids in exterior hollow metal door frames and other locations where indicated):
1. Product Density: Nominal 0.70 pcf in accordance with ASTM D 1622.
 2. Thermal Resistance: Minimum R-value of 4.5 at one inch nominal thickness at 75 degrees F mean temperature in accordance with ASTM C 177.
 3. Fire Characteristics:
 - a. Flame Spread: Flame spread not to exceed 25 when tested in accordance with ASTM E 84 or UL 723.
 - b. Smoke Developed: Not more than 450 when tested in accordance with ASTM E 84 or UL 723.

2.6 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically to metal studs.
- D. Installation of curtain wall and storefront insulation: Install curtain wall and storefront insulation in accordance with manufacturer's instructions. Attach curtain wall and storefront insulation with wire impaling clips secured with shields at 24' o.c. minimum.
- E. Apply self-supported, spray-applied cellulosic insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make it flush with face of studs by using method recommended by insulation manufacturer.
- F. Installation of safing insulation: Install safing insulation to fill gap between edge of concrete floor slab and back of exterior spandrel panels on safing clips spaced as needed to support insulation but not further apart than 24 inches o.c. Cut safing insulation wider than gap to be filled to ensure compression fit and seal joint between insulation and edge of slab with caulking approved by safing insulation manufacturer for this purpose. Leave no voids in completed installation.

- G. Installation of foamed-in-place insulation: Install foamed-in-place insulation at exterior non-masonry walls and in accordance with manufacturer's instructions. At all masonry walls provide grouted frames as indicated in Section 04200 Unit Masonry and Section 08110 Hollow Metal Doors and Frames. Completely fill voids in exterior steel door frames and other irregular voids where indicated on the Drawings. The liquid ratios at the mixing gun shall be in accordance with the manufacturer's specified range.

3.3 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

- A. Install 3-inch- (76-mm-) thick, unfaced slag-wool-fiber/rock-wool-fiber blanket insulation over suspended ceilings at partitions in a width that extends insulation 48 inches (1219 mm) on either side of partition.

END OF SECTION

SECTION 07270

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fluid-applied membrane air barrier, vapor permeable. Liquid applied membrane shall be applied as a flashing system to all window and door penetrations. System includes membrane and fabric counter-flashing required for complete installation.
 - 2. All concealed wood nailers and blocking shall be coated by liquid applied membrane product.
 - 3. Provide at brick veneer assemblies with metal stub backup as indicated on the drawings.
- B. Related Sections include the following:
 - 1. Division 06 - Rough Carpentry for concealed wood nailers and blocking.

1.2 DEFINITIONS

- A. Air Barrier Assembly: The collection of air barrier materials and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Membrane Air Permeance: Not to exceed 0.0004 cfm/sq. ft. of surface area (at specified thickness) at 1.57 lbf/sq. ft. pressure difference (0.002 L/s x sq. m of surface area at 75 Pa) when applied to CMU wall; when tested per ASTM E 2178.
- C. Membrane Vapor Permeance: Not less than 11.2 perms (649.6 ng/Pa x s x sq. m); when tested per ASTM E 96.
- D. UV Exposure Limit: Not more than 180 calendar days: per ASTM D 412 and ASTM E 96 Method B.

1.4 AIR BARRIERS

- A. The building envelope shall be designed and constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:
 - 1. It must be continuous, with all joints made airtight.

2. It shall have an air permeability not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf.)(equal to 0.02L/sq. m @ 75 Pa.).
3. It shall be capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
4. It shall be durable or maintainable.
5. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
 - a. Foundation and walls.
 - b. Walls and windows or doors.
 - c. Different wall systems.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.
 - g. Walls, floors and roof to utility, pipe and duct penetrations.
6. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

1.5 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of air barrier.
- B. Shop Drawings: Show locations and extent of air barrier. Include details for substrate joints and cracks, counter-flashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 1. Include details of interfaces with other materials that form part of air barrier.
 2. Include details of mockups.
- C. Product Certificates: For air barriers, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for air barriers.
 1. Provide independent agency testing reports for ASTM E 2357.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Preinstallation Conference: Conduct conference at Project site.
 1. Include installers of other construction connecting to air barrier, including waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.

- C. Source Limitations: Obtain primary air barrier material and wall flashing through one source from a single manufacturer.
- D. Mockups: Before beginning installation of air barrier, provide air barrier work for exterior wall assembly mockups, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of air barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by Owner's testing agency of air barrier before external insulation and cladding is installed.
 - 2. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by air barrier manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Store rolls according to manufacturer's written instructions.

1.8 PROJECT CONDITIONS

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

1.9 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer will replace or repair fluid applied membrane systems that do not comply with requirements within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR BARRIER

- A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, silylterminated polyether coating membrane. Manufacturer of air barriers shall provide accessory products, like through wall flashing and opening flashing, to complete the air barrier system.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Henry Company; Air-Bloc 31.
 - b. W.R. Grace; Perm-A-Barrier VP (Basis of design).
 - c. Sto Corp.; Sto-Guard
 - 2. Perm Rating:
 - a. Products shall have a rating of perms from 10-12 perms and must submit proof of such perm rating.

2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Liquid Membrane for Details and Terminations: Provide Bituthene Liquid Membrane per air barrier manufacturer.
- C. Wall Primer (for use with throughwall flashing and tapes applied to substrate): Liquid waterborne primer, recommended for substrate by manufacturer of air barrier material.
- D. Flexible Membrane Wall Flashing: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mils) of cross-laminated, high-density polyethylene film to provide a minimum 1.0 mm (40 mils) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.
- E. Joint Reinforcing Strip: Air barrier manufacturer's approved tape.
- F. Transition Tape: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 (8 mils) of cross-laminated, high density polyethylene film to provide a minimum 1.0 mm (40 mils) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.
- G. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- H. Sprayed Polyurethane Foam Sealant: 1 or 2 component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 ft/cu. ft. (24 to 32 kg/cu. m) density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- I. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
 - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. 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 membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

- A. Concrete: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

3.4 AIR BARRIER MEMBRANE INSTALLATION

- A. Apply air barrier membrane to form a seal with strips and transition strips and to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
- D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuous structural support of air barrier system has been provided.
 - 2. Concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 - 3. Site conditions for application temperature and dryness of substrates have been maintained.
 - 4. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 5. Surfaces have been primed, if applicable.
 - 6. Compatible materials have been used.
 - 7. Transitions at changes in direction and structural support at gaps have been provided.
 - 8. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 - 9. All penetrations have been sealed.

- C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:
 - 1. Qualitative Testing: Air barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber depressurization using detection liquids.
 - 2. Quantitative Air Leakage Testing: Testing not to exceed the test pressure differential, positive and negative, indicated in "Performance Requirements" Article for air barrier assembly air leakage according to ASTM E 283.
- D. Remove and replace deficient air barrier components and retest as specified above.

3.6 CLEANING AND PROTECTION

- A. Protect air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace air barrier exposed for longer than Manufacturer recommends.
 - 2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, 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 by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

SECTION 07410

METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Preformed, prefinished metal roofing and flashings to form a weather tight system as shown on the drawings. The system shall include but is not limited to the following:
 - 1. Standing-seam metal roof panels.
 - 2. Rigid insulation.
 - 3. Self-adhering moisture vapor barrier.
 - 4. Metal flashing and trim coordinated with roofing.
- B. Related Work:
 - 1. Division 09 Section "Exterior Sheathing."
 - 2. Division 07 Section "Sheet Metal Flashing and Trim."

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide complete sheet metal roofing system, including but not limited to, custom-fabricated metal roof pans, factory rolled metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing and drainage components related to sheet metal roofing, fascia panels, trim, underlayment, and accessories as indicated and as required for a weather tight installation.
- B. Provide engineered roofing, capable of withstanding UL 580 wind uplift resistant, wind-borne debris, basic wind speed and The International Building Code, provide the most stringent. Wind-Uplift Resistance - Provide metal roof panels capable of resisting the design negative uplift pressure. Provide clips, fasteners, and clip spacing capable to sustain, without failure, a load equal to 2.5 times the design negative uplift pressure.
- C. Air Infiltration: Provide roof panel system with an air infiltration rate of not more than 0.036 cfm per sq. ft. of fixed wall area when tested in accordance with ASTM E 1680 or ASTM E 283 at a static air pressure differential of 4.0 psf.
- D. Provide roof panels system with no evidence of uncontrollable leakage under 5 gal/hr spray at 9.2 psf pressure differential per ASTM E 1646 or ASTM E 331.
- E. Movement: System to accommodate, without damage to system, components or deterioration of seals: movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; deflection of structural support framing.
- F. Design Loads for Roof panel system, components and cladding wind loads determined in accordance with ASCE 7-05, for the parameters specified.
 - 1. Importance Factor: 1.15
 - 2. Occupancy Category: Category IV
 - 3. Basic Wind Speed: 130 miles per hour.
 - 4. Comply with the Large Missile Impact requirements.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product specifications, standard details, expansion and contraction joint location and details certified product test results, installation instructions and general recommendations, as applicable to materials and finishes for each component and for total panel system proposed.
 - 1. Include specimen copy of manufacturer's finish warranty.
 - 2. Include specimen copy of manufacturer's weather-tightness guaranty.
- B. Shop Drawings: Show layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points. Include conductor heads, gutters and downspouts, details of edge conditions, joints, corners, panel profiles, supports, anchorages, trim, flashing, closures, and special details. Distinguish between factory and field assembly work.
 - 1. Manufacturer shall review and approve shop drawings prior to submitting to Architect.
 - 2. Approved shop drawings shall be kept on Project site at all times.
 - 3. Include details for forming, joining, and securing sheet metal roofing, including pattern of seams, roof penetrations, special conditions, connections to adjoining work, and accessory items.
- C. Samples: Provide sample panels 12-inches long by actual panel width, in the profile, style, color and texture indicated. In addition, submit the following:
 - 1. Trim, soffit panels and closures: 12-inches long. Include fasteners and other exposed accessories.
 - 2. Vapor Retarder: 6-inch square.
 - 3. Sheathing: 12-inches long.
 - 4. Rigid Insulation Board: 6-inch square.
 - 5. Accessories: 12-inch long for each type of accessory.
- D. Test Reports: Submit results indicating compliance with minimum requirements of the following performance tests:
 - 1. Air Infiltration: ASTM E 1680 or ASTM E 283
 - 2. Water Infiltration: ASTM E 1646 or ASTM E 331
 - 3. Wind Uplift: Criteria per ASCE 7-05 as in Performance Requirements.
- E. Calculations: Submit shop drawings and design calculations signed, sealed and dated by a professional structural engineer registered in the State of Louisiana, indicating compliance with specified performance criteria, including thermal movement and fastener pullout calculations. Indicate fasteners types and spacing.

1.4 QUALITY ASSURANCE

- A. Roof panels must be produced in continuous lengths from ridges to the eaves. Horizontal joints will NOT be allowed.
- B. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer's instructions.
- C. Panels must be factory fabricated. On site roll forming will only be acceptable when panel lengths exceed legal shipping limitations.
- D. Field Measurements: Where possible, prior to fabrication of panels, take field measurements of structure or substrates to receive panel system. Allow for trimming panel units where final dimensions cannot be established prior to fabrication.

- E. Installer Qualifications: Engage an experienced installer who has completed metal roof panel projects similar in material, design and extent to that indicated for this Project and with a record of successful in-service performance for a minimum of five (5) years. An employer of workers trained and approved by manufacturer.
 - 1. Installer's responsibilities include fabricating and installing metal roof panel assemblies and providing professional engineering services needed to assume engineering responsibility.
 - 2. Contractor is responsible for the fascia break metal, to match material and finish of roof panels.
 - 3. Installer must execute 100% of roof system installation, utilizing employees that are confirmed as full time employees of the contractor. Second and third tier subcontractors for the installation of the work in this section shall not be permitted.
 - 4. Contractor must provide letter from Approved Manufacturer that states they are an approved installer capable of meeting the requirements of this project. Contractor must verify that this approval was established prior to bid date of this project.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Build mockup of typical roof eave , including fascia,; approximately 48 inches (1200 mm) square by full thickness, including attachments, underlayment, and accessories.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal roof panel assemblies that fail in materials or workmanship and that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Failure include, but are not limited to, the following:
 - a. Structural failures, including rupturing, cracking, or puncturing.
 - b. Warranty shall not exclude salt-water environment.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 20 years from date of Substantial Completion.
 - 3. Provide 20 years non-prorated weather tightness warranty (to include all edge and penetrations.)
 - 4. Provide a complete full roofing warranty including all flashing and trim either adjacent or connected to roofing.
- B. Special Project Warranty: Submit roofing Installer's Warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for the following warranty period.
 - 1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet "Galvalume": ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 2. Surface: Smooth, flat finish.
 3. Thickness: A minimum of 22 gauge, as required to comply with the International Building Code, unless otherwise indicated.
 4. Exposed Finishes:
 - a. High-Performance Organic Finish: Three-coat thermocured system with fluoropolymer coats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
 - 1) Humidity Resistance: 2000 hours.
 - 2) Salt-Spray Resistance: 2000 hours.
 - 3) Color: As selected by Architect from manufacturer's full range.
 - b. Factory Prime Coating: White or light-colored, factory-applied, baked-on epoxy primer coat.
- B. Panel Sealants:
1. Provide two-part polysulfide class "B" non-sag type for vertical and horizontal joints or one-part polysulfide not containing pitch or phenolic extenders or exterior grade silicone sealant recommended by roofing manufacturer or one-part non-sag, gun grade, exterior type polyurethane recommended by roofing manufacturer.

2.2 INSULATION

- A. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation with core formed by using HCFC's as blowing agents to comply with ASTM C 1289, TYPE II, felt or glass fiber mat facer on both major surfaces.
1. The roof insulation specified shall be two layers, of 1-1/2-inches thick for a total of 3-inches.
- B. Insulation Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions of FM 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
1. Roof insulation accessories to be recommended by insulation manufacturer for intended use and compatible with roofing material.
- C. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: 40 mils (1.0 mm) thick minimum, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D 1970.

2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
 - b. Grace Construction Products; a unit of Grace, W. R. & Co.; Ultra.
 - c. Owens Corning; WeatherLock Metal High Temperature Underlayment.
 - d. Soprema; Lastobond HT

2.4 ROOF BOARD

- A. Provide roof board of thickness and at locations as indicated on the drawings and as required to meet wind speed and fire load requirements, as requested by roofing manufacturer.
- B. Refer to Division 09 Section "Exterior Sheathing."

2.5 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal roof panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Architectural Building Components; 238 T or comparable product by one of the following:
 - a. Architectural Building Components
 - b. Imetco, Innovative Metals Company, Inc.; Series 300.
 - c. Centria
 - d. Prior approved equal.
 2. Type: Vertical rib, mechanical joint.
- B. Materials: Aluminum-Zinc Alloy-Coated Steel Sheet "Galvalume", thickness to comply with the wind loads and the International Building Code.
- C. Clips: Provide all clips in Stainless steel or extruded aluminum.
- D. Type: Vertical rib, minimum height of 2-3/8-inch.
- E. Sealant: Factory applied.
- F. Panel Coverage: 16-inches wide
- G. Color: As selected by Architect from manufacturer's full range, including metallic.
- H. Panel must be symmetrical, and can be replaced without damage to the seam, one panel at a time.

2.7 ACCESSORIES

- A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 - 2. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 - 3. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 - 1. Finish: 2B (bright, cold rolled).
 - 2. Surface: Smooth, flat.
- C. Roof Curbs: Roof curbs shall be coordinated between the roofing and mechanical contractor. The roof curbs shall be installed and flashed as required for weather tightness.
- D. Copings: Fabricate from Stainless Steel, minimum 0.025-inch thick in minimum 96-inch long, but not exceeding 10-foot long sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal and solder or weld watertight.
- E. Base Flashing: Fabricate from Stainless Steel, minimum 0.019-inch thick.
- F. Drip Edges: Fabricate from Aluminum-Zinc Alloy-Coated Steel, minimum 0.0217-inch thick.

2.8 FABRICATION

- A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. 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 roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
- E. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.
- B. Verify that roof openings and penetrations are in place and set and braced.
- C. Verify that wood nailers are in place, wrapped as required and secured and match thicknesses of insulation required.
- D. Do not proceed with installation until unsatisfactory conditions have been corrected. Once substrate has been accepted, Roofing Contractor takes full responsibility.

3.2 PREPARATION

- A. Lay out and nail blocking as required, before installation of sheet metal roofing. Space fasteners as required to resist design uplift, but not more than 18 inches (457 mm) o.c.
- B. Roof Board: Install substrate boards over roof sheathing on entire roof surface. Attach with substrate-board fasteners.
 - 1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - 2. Comply with UL requirements for fire-rated construction.
- C. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.
- D. Install flashings and other sheet metal to comply with roofing manufacturer's recommendation.

3.3 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.

3.4 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten insulation to resist uplift pressure at corners, perimeter and field of roof.

3.5 ROOF BOARD INSTALLATION

- A. Provide roof board where indicated on drawings using fastening system specified.

- B. Use maximum lengths possible to minimize number of joints. Support edge joints with deck ribs. Stagger end joints of adjacent lengths of roof board. Ends and edges are typically butted.
- C. Mechanically Attached System: Install per FM guidelines for wind uplift resistance and per the International Building Code.

3.6 METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.

3.7 ACCESSORY INSTALLATION

- A. General: 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 roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. 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 will be permanently watertight and weather resistant.
 - 3. Provide elbows at base of downspouts to direct water away from building.

3.8 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

3.9 DAMAGED MATERIAL

- A. Upon determination of responsibility, repair or replace damaged metal panels and trims to the satisfaction of the Architect and Owner.

END OF DOCUMENT

(ROOFING GUARANTEE ON FOLLOWING PAGE)

ROOFING GUARANTEE

Owner: _____

WHEREAS _____

ADDRESS _____ Telephone: (_____) _____

herein called the Contractor, has provided pre-formed, pre-finished metal roofing, flashing, accessories and miscellaneous items required for a complete roof system installation in accordance with the Contract Documents for the PROJECT:

Name of Project: _____

Location/Address: _____

Name and Type of Building(s): _____

Type of System: (Standing Seam, SR, Flat Seam, etc.) _____

Total Roof Area: _____ SF; Total Length of Ridge: _____ LF

Total Length of Valley: _____ LF; Total Length of gutter/fascia trim: _____

Date of Acceptance: _____ Two year Guarantee Expiration:

AND WHEREAS the Contractor has contracted to guarantee said work against water entry faulty or Defective materials and workmanship for the designated Guarantee period of TWO (2) YEARS from the date of the Final acceptance of the Project;

NOW THEREFORE the Contractor guarantees, subject to the terms and conditions herein set forth, that during the Guarantee Period the Contractor will at his own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work (including any wetted thermal insulation) resulting from water entry or faults or defects of said Work as are necessary to maintain said Work in watertight conditions and further, respond on or within TWO (2) work days upon written notification of leaks or defects by the Owner.

This Guarantee is made subject the following terms and conditions

1. Specifically excluded from this guarantee are damages to the Work, other parts of the building (s) and building contents caused by: A) lightning; windstorm (including hurricanes and tornadoes), hailstorm, earthquake and other unusual phenomena of the elements; B) fire; and C) structural failures causing excessive roof deck, edges and related roof component movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be suspended until such time as the damage has been repaired, and until the cost and expense thereof has been assigned or paid by the Owner or the responsible party. The guarantee shall be reinstated upon Final Acceptance of the damage repair Work by both the Owner & Contractor.

2. During the Guarantee Period, if the Owner allows alteration of the Work by anyone other than a Contractor approved in writing by the original Contractor and/or Roofing Material Supplier prior to the work being performed, including cutting, patching and maintenance in connection with penetrations, attachment of other work, and positioning of anything (i.e. signs) onto the roof, this Guarantee shall become null and void as of the date of said alterations. If the Owner engages the original Contractor for said alterations, the Guarantee shall be maintained in force unless the Contractor presents written notification to the Owner that the intended work will likely damage or cause deterioration of the base work, thereby justifying a termination of the original Guarantee.
3. The Owner shall promptly notify the Contractor in writing of observed, known or suspected leaks, defects or condition deterioration and shall afford a reasonable opportunity for the Contractor to inspect the work and examine evidence of such leaks, defects and deterioration.
4. This guarantee is recognized to be the only guarantee of the Contractor of said work, and shall not operate to restrict or cut-off the Owner from any other remedies and recourse lawfully available to him in case of roofing failure to any cause or degree. Specifically, this Guarantee shall not operate to relieve the Contractor of his responsibility for the performance of the original work.

IN WITNESS THEREOF, this instrument has been duly executed

This _____ day of _____, 20____.

Contractor's Signature: _____

Typed Name: _____

Telephone Number: _____

WITNESS: _____

And if applicable, is countersigned by the following Subcontractor, Installer or other party (as indicated) who acted as agent or represented the Contractor during the performance of the work:

Countersignee Name: _____

(type or print)

Date: _____ Signature: _____

Representing: _____

Address: _____

Telephone Number: _____

Witness: _____

END OF SECTION

SECTION 07413

METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Perforated screen metal wall panels and associated flashing and fasteners to form the exterior perforated screen wall system as shown on the drawings.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer in the State of Louisiana, using performance requirements and design criteria indicated. Submit structural design calculations, in accordance with the ASCE Specification for Design of Cold-Formed Stainless Steel Structural Members for the metal wall panel system.
- B. System Description: Provide the following design requirements:
 - 1. Single skin exposed fastener metal panel screen wall system with ribs/corrugations oriented in the horizontal direction.
 - 2. Wall panel system shall be manufactured and installed to withstand specified design loads and maintain performance requirements without defects, damage, or failure.
- C. Design Loads for wall panel system, components and cladding wind loads determined in accordance with ASCE 7-05, and tested to Level E Projectiles for the parameters specified.
 - 1. Importance Factor: 1.15
 - 2. Occupancy Category: Category IV
 - 3. Basic Wind Speed: 130 miles per hour.
 - 4. Comply with the Large Missile Impact requirements.
 - 5. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal maximum deflection under loading of L/120.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Submit product data, test reports and certifications in accordance with quality assurance and performance requirement specified herein.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, and field-assembled work. Drawings must be approved prior to fabrication.
- C. Samples: For each type of exposed finish required. Provide the following samples:
 - 1. Panel: Full panel width by 12 inches long.
 - 2. Fasteners: Two (2) of each type with statement of intended use.
 - 3. Closure: One (1) metal closure.
- D. Product test reports.
- E. Maintenance data.
- F. Warranties: Samples of special warranties.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualification: The manufacturer shall have had a minimum of ten (10) years experience in the successful completion of projects.
- B. Installer Qualifications: The installer shall have had a minimum of ten (10) years experience in the successful completion of projects and trained within the manufacturer's panel assembly.
- C. Fire-Resistance Ratings: Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- D. Pre-installation Conference: Conduct conference at Project site.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 - 1. Surface: Smooth, flat finish.
- B. Panel Sealants:
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
 - 2. Joint Sealant: ASTM C 920 as recommended in writing by metal wall panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

2.3 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Wall panel system fasteners shall be a minimum #14 diameter, self-tapping, with hex head. Exposed fasteners shall be 300 series stainless steel with 5/8-inch bonded neoprene and stainless steel washers coated to match the exterior panel.
- B. Metal closures shall be fabricated from the same material and gage as the exterior metal panel.

2.4 PERFORATED SCREEN METAL WALL PANELS

- A. Provide factory-roll-forming metal wall panels designed to be field assembled by using exposed fasteners. Include accessories required for weathertight installation.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Centria; Perforated screen BR5-36 or comparable product by one of the following:
 - a. CENTRIA Architectural Systems (Basis-of-Design)
 - b. Architectural Building Components
 - c. Imetco, Innovative Metals Company, Inc.;
 - 2. Profile: Corrugated.
 - 3. Material: Type 304 stainless steel conforming to ASTM A 666, 20 gage minimum nominal thickness.
 - a. Exterior Finish: 2b (Bright, cold rolled).
 - 4. Panel width: 36-inches
 - 5. Panel depth: 1-1/2 inches with ribs spaced at 7.2 inches on center.
 - 6. Yield Strength: 38 ksi minimum
 - 7. Metal panels shall have a 40 percent free area consisting of 1/8-inch diameter holes spaced at 3/16-inch on center staggered pattern.

2.5 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from 0.019-inch minimum thickness, stainless steel with a 2b finish. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

2.6 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, 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. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
- B. Wall panel systems contractor shall check the alignment of the structural supports. Alignment exceeding tolerances defined in the AISC Code of Standard Practice shall be corrected prior to proceeding with the installation of the wall panel systems.

3.2 METAL WALL PANEL INSTALLATION

- A. Manufacturer shall provide detailed instructions covering the tools, fasteners, and assembly procedures required to achieve the structural performance specified.
- B. Perforated Screen Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall 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.
 - 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.
 - 5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
 - 6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
 - 7. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.

3.3 ACCESSORY INSTALLATION

- A. General: 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 wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. 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 will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

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

END OF SECTION

SECTION 07416

METAL WALL PANEL ASSEMBLY SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel faced factory in-place wall panel units. Flat panels with integral reveals and universal joinery for use in either vertical or horizontal orientations.
 - 2. Integrated window system with integral insulated glazing.
 - 3. Integrated louvers.
 - 4. Extruded aluminum trim related to the wall and window system and its intersection with adjacent materials.
 - 5. Sealants and gasketing between panels, windows and their intersections.
- B. Related Sections:
 - 1. Section 05400 - Cold Formed Metal Framing for exterior wall panel support and attachments.
 - 2. Section 07413 - Metal Wall Panels for exposed fastener profile wall system.
 - 3. Section 07620 - Sheet Metal Flashing and Trim for ES-1 certification of flashing.
 - 4. Section 08800 - Glazing for glass requirements.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer licensed in the State of Louisiana, using performance requirements and design criteria indicated.
- B. Design Loads for wall panel system, components and cladding wind loads determined in accordance with ASCE 7-05, and tested to Level E Projectiles for the parameters specified.
 - 1. Importance Factor: 1.15
 - 2. Occupancy Category: Category IV
 - 3. Basic Wind Speed: 130 miles per hour.
 - 4. Comply with the Large Missile Impact requirements.
 - 5. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than L/180 of the span.
- C. The wall and window system or secondary supports shall be designed to allow differential movement of the building's roof and floor structures. Movement of roof and/or floor systems shall not exceed 1/4-inch.
- D. Performance of the wall and window system shall verifiable with tests conducted by an independent agency.
 - 1. Structural performance of the wall panels shall be derived from ASTM E72 Chamber Method with a deflection limit of L/180 applied to positive load. Ultimate structural values shall be achieved without the use of backside mechanical attachments to the structure.
 - 2. R-Value for 3-inch flat panel: R21.
 - 3. Air infiltration of the wall panels and windows shall not exceed 0.06 CFM/sq.ft. at a static pressure of 6.24 PSF (equivalent to 49 mph wind) when tested in accordance with ASTM E283.

4. There shall be no uncontrolled water penetration through the panel joints and integrated window, louver or wall panel components at 12 PSF (equivalent to 68.5 mph wind) when tested in accordance with ASTM E 331.
5. The standard horizontal panel joint shall demonstrate effective rain screen and pressure equalization principles with interior seal broken and any exterior seal removed when tested at a static pressure of 12 PSF (equivalent to 68.5 mph wind) in accordance with ASTM E 331. Effective performance shall mean no water rising within the equalization chamber, leakage to the interior and the ability of any dynamically driven water to drain to the exterior.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Submit product data, test reports and certifications in accordance with quality assurance and performance requirement specified herein.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, and field-assembled work.
 1. Erection procedures will be included where required to clearly explain proper installation of fasteners, trim, gaskets and sealants.
 2. Calculation supporting structural performance shall be prepared and drawings stamped by a Professional Engineer in the State of Louisiana.
- C. Samples: For each type of exposed finish required. Provide the following samples:
 1. Panel: Full panel width by 12 inches long.
 2. Fasteners: Two (2) of each type with statement of intended use.
 3. Closure: One (1) metal closure.
- D. Submit Product test reports and Certifications to demonstrate compliance with performance requirements and building code acceptance.
- E. Maintenance data.
- F. Warranties: Samples of special warranties.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualification: The manufacturer shall have had a minimum of ten (10) years experience in the successful completion of projects.
- B. Installer Qualifications: The installer shall have had a minimum of ten (10) years experience in the successful completion of projects and trained within the manufacturer's panel assembly. Installers of panels, windows and other components shall be factory trained, tested and certified by the manufacturer to erect products specified.
- C. Fire-Resistance Ratings: Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Foam core and interior surface of the complete panel system shall demonstrate compliance with the following criteria for surface burning characteristics per UL Standard 723 (ASTM E 84).
 - a. Flame Spread: 25 or less.
 - b. Smoke Developed: 450 or less.
- D. Pre-installation Conference: Conduct conference at Project site.

- E. Mock-up test sample: Shall be approx. 10 feet by 10 feet in size to simulate actual field conditions for air infiltration, water penetration and rain screen and pressure equalization static pressure testing.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: One year 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 wall panel system and assemblies that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Exterior skin of the flat panels with integral reveals shall be ASTM A 653, grade 37, minimum 22 gage G90 galvanized steel in smooth exterior texture.
- B. Interior skin for flat panels shall be ASTM A 653, grade 37, minimum 26 gage G90 galvanized steel.
- C. Exterior finish on G90 galvanized steel shall be 3 coat metallic Sundance Series MICA.
 - 1. Exterior Color: #9989 Platinum metallic finish as selected by Architect from Architect's sample.
- D. Integrated Windows:
 - 1. Extrusion material shall be 6063-T5 aluminum.
 - 2. All exposed extrusion areas shall be finished.
 - a. Exterior shall be finished with matching coating and color of adjacent panel exterior skin.
 - b. Interior shall be finished as above.
- E. Trim:
 - 1. Extrusion material shall be 6063-T5 aluminum.
 - 2. All exposed areas shall be finished with same coating and color as panels exterior.

2.2 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 (Z180) hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated. Refer to Section 05400 - Cold Formed Metal Framing.

2.3 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable stainless steel fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 FOAM IN-PLACE METAL WALL PANEL SYSTEM

- A. Provide panels shall be foamed in-place between the metal skins so that no internal voids exist that could trap moisture or condensation and so that the initial insulating integrity of the foam core is preserved by the impermeable steel skins. Mechanically attach panels to metal framing supports as recommended per panel manufacturer. Include accessories required for weathertight installation.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Centria; Formawall Dimension System; Flat panels with integral reveals or comparable product by one of the following:
 - a. CENTRIA Architectural Systems (Basis-of-Design)
 - b. Imetco, Innovative Metals Company, Inc.
 - c. Kingspan Insulated Panels.
 2. Thickness: 3-inches in the main panel field and 13/16-inch thick in the reveal area.
 3. Reveal Width: 1/2-inch for horizontal panels
 4. Face of panel shall be non-directionally embossed and liner of panel shall be non-directionally embossed and planked.
 5. Joinery for flat panels:
 - a. Universal double tongue and groove
 - b. Adjustable plus 1/16-inch to minus 1/8-inch from the specified panel module
 - c. Horizontal joints shall have a positive drip edge and integral venting to the exterior where required along the panel length and a 2-3/8-inch gutter interlock to provide effective rain screen and pressure equalized performance as demonstrated by testing specified in 1.04, D, 6.
 - d. Joinery shall be designed to be fully drainable to prevent entrapment of moisture present during the storage and construction processor due to dynamically driven rain. Gutter interlock shall be designed to prevent moisture from becoming trapped within the foam core and shall clearly demonstrate the ability of moisture to escape to the exterior.
 6. Trimless ends where used shall be integral to the panel face or tabbed and effectively sealed to the inside surface of the panel face with no edges exposed to view.
 7. All panel skins shall be roll formed to insure consistency of shape and joinery.
 8. Panel attachment clips shall be designed to prevent crushing of the foam core during fastening and shall mechanically engage both face and liner elements to the panel supports.
 9. The urethane foam core shall have a minimum density of 2.7 PCF and minimum tensile and compressive strength of 20 PSI.
 10. Where shown on drawings, all type panel corners shall be trimless, mitered and factory formed to dimensions required for design. Bent corners shall have backside reinforcement and sealing.

2.5 PANEL INTEGRATED WINDOW DESIGN

- A. Windows shall be designed for fixed 1-3/32-inch thick insulated impact rated glazing, including a thermal barrier and be designed to be fully compatible with the panel joinery and secondary support system.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Centria; Formavue FV 400 HR or comparable product by one of the following:
 - a. CENTRIA Architectural Systems (Basis-of-Design)
 - b. Imetco, Innovative Metals Company, Inc.

- c. Kingspan Insulated Panels.
2. Head and sill shall be designed to achieve the same rain screen and pressure equalization performance as the horizontal panel system and shall one-piece designs integrating directly with the panel joinery without the use of receptor extrusions.
3. Minimum extrusion thickness shall be 1/16-inch for trim, stops and appendages and 3/32-inch for structural components.
4. Design shall provide for cladding of any secondary structural elements that pass through the window area.
5. The window system shall allow up to 1/4-inch of differential floor movement.
6. Glazing gaskets, sealants, fasteners, setting and splice blocks shall be included as required for a complete window system.
7. Units shall be re-glazeable without dismantling the system.
8. Head, sill, and jamb extrusion shall be one piece, maintain the liner sealant plane and be installed without the use of exposed wet seals.
9. Head, sill and jamb extrusion shall be thermally broken or isolated from concealed and exposed interior surfaces. Where extrusions are not so designed, provision shall be made for directing condensation to the exterior.

2.6 INTEGRATED LOUVERS

- A. Extruded louvers integrated with wall panel and window systems. The complete system will be engineered and installed as a single source responsibility of the wall system including wall panels, louvers, and windows. The louvers will include blades; special heads, sill and jambs that integrate with the metal panels joinery; and accessories at locations as shown on the drawings.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Centria; Louvers - Dimension Series Wall Panels and Formavue or comparable product by one of the following:
 - a. CENTRIA Architectural Systems (Basis-of-Design)
 - b. Imetco, Innovative Metals Company, Inc.
 - c. Kingspan Insulated Panels.
 2. Depth: 6-inches
 3. Free Area Require: 50 percent
 4. Storm proof blades.
 5. Flashing at louver penetrations will not be accepted. Louvers must integrate with wall panel joinery.

2.7 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from 0.016-inch minimum thickness, stainless steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim as selected and approved by architect.

2.8 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, 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. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
- B. Acceptance of Substrate - An Acceptance of substrate shall precede any wall panel assembly prep or installation, including mock-ups. This Acceptance of Substrate shall be on the Manufacturer's corporate letterhead and be signed by the Manufacturer's representative, the installer and the General Contractor. This Acceptance of substrate shall not include any exceptions to the quality of the surface to which the product is applied. The General Contractor shall insure that all the necessary steps are taken in the proper preparation of this surface.

3.2 INSTALLATION

- A. Manufacturer shall provide detailed instructions covering the tools, fasteners, sealants, gaskets, and procedures required to assure performance of the wall and window assembly as specified.
- B. Install the wall and window system, fasteners, trim and related items in accordance with dimensions and procedures shown on the approved shop drawings.

- C. Sealants and gaskets shall be installed where shown and in accordance with the approved shop and erection drawings to assure air and water infiltration performance specified.
- D. Windows shall be glazed in accordance with the approved shop drawings and to comply with Division 08 section "Glazing."
- E. Paint, bituminous coating, or sealant as recommended by the manufacturer shall separate dissimilar metals.
- F. Work shall be coordinated with other trades as required to insure proper flashing and seals to intersecting construction.
- G. Damage caused by the manufacturer or wall systems contractor shall be replaced or repaired to as new condition.

3.3 ACCESSORY INSTALLATION

- A. General: 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 wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. 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 will be permanently watertight and weather resistant.

3.4 CLEANING AND PROTECTION

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

END OF SECTION

SECTION 07460

SIDING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fiber-cement siding boards

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: Full-size units of each type of siding and trim in each color, texture, and pattern required.
- C. Research/Evaluation Reports: For each type of siding required.

PART 2 - PRODUCTS

2.1 SIDING

- A. Fiber-Cement Siding: Siding made from fiber-cement board that complies with ASTM C 1186, Type A, Grade II; is classified as noncombustible when tested according to ASTM E 136; and has a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.
 - b. GAF Materials Corporation
 - c. James Hardie Inc. (Basis-of-Design).
 - 2. Siding Type: Hardie Board.
 - 3. Width and Exposure: 4 by 8 feet
 - 4. Texture: Smooth
 - 5. Provide butt joint installation.
 - 6. Factory Priming: Manufacturer's standard acrylic primer.
 - 7. Painting: Refer to Division 09 Section "Painting" for field painting.

2.2 ACCESSORIES

- A. Siding Board Accessories: Provide starter strips, edge trim, corner cap, and other items as recommended by siding manufacturer for building configuration.
 - 1. Provide accessories matching color and texture of siding, unless otherwise indicated.
- B. Fasteners: Siding shall be face fastened per manufacturer's recommendations to comply with the International Building Code. Use only stainless steel fasteners.
- C. Caulking: All joints shall be caulked with Low-Modulus Neutral-Curing Sealant as specified in Division 07 Section "Joint Sealant." Provide an 1/8-inch gap at trim for caulk.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.
- B. Comply with siding manufacturer's written installation instructions unless more stringent requirements apply.

END OF SECTION

SECTION 07525

MODIFIED BITUMEN ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Modified bitumen (SBS) "cool roof" roofing system over rigid insulation over steel deck, with highly reflective mineral-surfaced cap sheet or LEED type coating.
- B. Related Sections:
 - 1. Section 06100 - Rough Carpentry: Wood nailers, curbs, plywood sheathing, and blocking.
 - 2. Section 07620 - Sheet Metal Flashing and Trim: Metal coping, flashings and trim.
 - 3. Section 09255 - Exterior Sheathing: Provide roof boards to comply with wind speed and fire load requirements as requested by roofing manufacturers.
 - 4. Division 15 - MECHANICAL: Requirements for plumbing connections to roof drains.

1.2 DEFINITIONS

- A. Roofing System Definition: The roofing system, as defined in this Section, includes all roofing related materials and methods used, from the structural roof deck up, including but not limited to the membrane, insulation, cant strips, flashing and stripping, and surfacing. Not included are metal cap flashings, scuppers, manufactured roof specialties, and similar roof-related items specified in other Sections.

1.3 DESCRIPTION OF ROOFING SYSTEMS

- A. Flat Structure: Roofing Membrane System over Rigid Insulation over Structural Steel Deck:
 - 1. Deck: Structural steel deck as indicated on Drawings and specified in Division 5.
 - 2. Insulation - Bottom Layer: 2-1/2" rigid isocyanurate board (in a solid mopping of hot roofing asphalt).
 - 3. Insulation - Top Layer: Must comply with manufacturer's requirements for specified guarantees and with required fire resistive and wind uplift ratings.
 - a. Factory tapered Panels and standard fill panels composed of isocyanurate with a 1/4-inch gypsum based overlay board. Panels shall be in compliance with ASTM C 728. The system shall provide for a roof slope of 1/4 inch per foot minimum (solid mopped).
 - 4. Roof Membrane System: Two-ply modified bitumen system with granular-faced cap sheet applied with Type IV asphalt or torch applied.
 - 5. Flashing System: Aluminum-clad modified bitumen flashing sheet.
 - 6. Specified Guarantee: 20 years, NDL, Non-Pro-Rated.
 - 7. Slope: 1/4" per foot.
 - 8. Crickets: Tapered isocyanurate, 1/2-inch per foot slope.

1.4 ROOF MEMBRANE DESCRIPTION

- A. Modified Bitumen Roofing Membrane Assembly: The roof membrane assembly shall consist of two (2) plies of a prefabricated, fiberglass reinforced, homogeneous Styrene-Butadiene-Styrene (SBS) copolymer modified asphalt membrane secured to a prepared substrate.
 - 1. The modified base ply shall be identical in design and manufacture, excluding granular surfacing to the modified cap sheet.
 - 2. The modified base ply shall be fully adhered to the prepared substrate as specified herein, and shall possess waterproofing capability.
 - 3. The modified cap sheet membrane shall be fully adhered to the modified base ply membrane as specified herein.
- B. Modified Bitumen Flashing Membrane Assembly: The flashing membrane assembly shall consist of a prefabricated, fiberglass scrim-mat reinforced, Styrene-Butadiene-Styrene (SBS) copolymer modified asphalt membrane with a continuous, channel-embossed metal-foil surfacing.
 - 1. A low softening point asphalt shall be incorporated into the membrane between the metal foil surfacing and the SBS modified asphalt membrane, at the channels, in order to preclude foil delamination during daily thermal cycling.
 - 2. The foil-clad modified asphalt membrane shall be fully adhered to a prepared substrate as specified herein.

1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Install modified bituminous sheet roofing to withstand wind loads, structural movement, thermally induced movement, and exposure to weather, without failure.
- B. UL Listing: Provide modified bituminous sheet roofing and flashing systems including mopping asphalt that have been tested for application and slopes indicated and are listed by Underwriters Laboratories, Inc. (UL) for Class A external fire exposure.
 - 1. Provide roof-covering materials bearing UL Classification Marking on bundle, package, or container indicating that materials have been produced under UL's Classification and Follow-up Service.
- C. FM Compliance: Installation of roofing system and component materials must meet an FM 1-135 wind-up lift based on FM Document 1-29 or ASCE-7 05 calculations (stamped by a license Engineer in the State of LA).

1.6 GENERAL REQUIREMENTS

- A. Deviations: In the event these Specifications or the Drawings deviate from the manufacturer's current specifications, these specifications prevail, except where they conflict with the manufacturer's requirements for the specified guarantee. In this case, the manufacturer's specifications prevail.
- B. Specification Amendments: Drawings, addenda and modifications may be issued subsequent to the printing of these Specifications. Ascertain that such amendments to these Specifications are workable alterations.

- C. Contractor Acceptance: Prior to the project start, ascertain that all aspects of these Specifications and possible modifications are workable and do not conflict with the manufacturer's requirements for the specified guarantee. Upon commencement of the work, it will be presumed that these Specifications and drawings, addenda and modifications are satisfactory to both the Contractor and the manufacturer in their entirety.
- D. Supplied Materials: Supply all materials of the roofing system, including accessory products. The bidding Contractor, by making his bid, represents that his bid price is based on the use of the materials listed in Part 2 - Products.

1.7 SUBMITTALS

- A. Submittals prior to Contract Award shall include:
 - 1. Letter from the proposed primary roofing manufacturer confirming that the bidder is an acceptable Contractor at the highest level, authorized to install the proposed system.
 - 2. Letter from the primary roofing manufacturer stating that the proposed application will comply with the manufacturer's requirements in order to qualify the project for the specified guarantee.
 - a. Warranty shall not exclude random areas of ponding water from coverage.
- B. Product Data: Submit latest edition of the roofing system manufacturer's specifications and installation instructions.
- C. Sample Warranty: Submit manufacturer's sample warranty with a list of components of the roofing system, which will be guaranteed.
 - 1. Submit letter from manufacturer stating that this warranty shall not exclude random areas of ponding water from coverage.
- D. Samples: Submit two (2) 12 inch x 12 inch samples of the primary roofing and flashing sheets.
 - 1. Submit two (2) representative samples of each type of roofing insulation.
 - 2. Submit representative samples of fasteners and roofing accessories as requested by the Architect for verification of compliance with these specifications.
- E. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Base flashings and membrane terminations.
 - 2. Crickets, saddles, and tapered edge strips, including slopes.
 - 3. Insulation and Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- F. Material List: Submit a descriptive list of all component parts of the roofing system that shall be guaranteed.
- G. Certificates: Submit the following:
 - 1. Evidence of Underwriter's Laboratories or equivalent testing agency's (in the opinion of the Architect) Class A acceptance of the proposed roofing system (including mopping asphalt).
 - 2. Evidence of Factory Mutual Approval Standard 4470 for the proposed membrane system.
 - 3. Evidence the roof configuration (including adhering of base sheet, etc.), is approved by FM for a minimum rating of wind-up lift based on FM Document 1-29 or ASCE-7 05 calculations (stamped by a license Engineer in the State of LA) for wind speeds required by local code.

4. Manufacturer's Certificate of Analysis: Provide manufacturer's certificate of analysis for each production run of base ply and finish ply. If a production run is longer than 24 hours, a new lot number shall be assigned and a new Certificate of Analysis shall be generated. Information required on Certificate of Analysis shall be:
 - a. Length (ft.).
 - b. Width (in.)
 - c. Thickness at Selvage (mils).
 - d. Total Thickness (mils).
 - e. Weight (lbs/roll).
 - f. Selvage Width (in.).
 - g. Low Temperature Flexibility (0 deg. F.), ASTM D-5147.
 - h. Granule Embedment (avg. grams loss/sample), ASTM D-5147.
 - i. Breaking Load (lbf/in.), ASTM D-5147.
 - j. Ultimate Elongation (%).
 - k. Compound Stability (0 deg F.), ASTM D-5147.
 - l. Dimensional Stability (%), ASTM D-5147.
 - m. Resistance to Thermal Shock (%), UEAtc.
- H. Manufacturer's Letter: Submit letter from the proposed primary roofing manufacturer confirming the number of years it has directly manufactured the proposed primary roofing system under the trade name and/or trademarks as proposed.
- I. Manufacturer's Experience: Submit a list of three (3) of the manufacturer's projects, located in the United States, of equal size and degree of difficulty, which have been performing successfully for a period of at least 10 years.
- J. Fastening pattern, including both field and perimeter conditions, as required by FM per 1A-90 requirements for fasteners to secure insulation boards over steel decks.
- K. Delivery Tickets: Provide Contractor and Architect with bills of lading for roofing system products, including bitumen, at time of delivery to the project site.
- L. Roofing Manuals: Submit, in a 3-ring binder, three (3) copies each of all roofing data, including manufacturer's catalogs/manuals of materials and accessories used in the Project, including manufacturer's guarantee and maintenance recommendations as specified in "Section 01770".
 1. Submit copies of record (as-built) roof specifications, drawings, and roofing-related details, and copies of submittals required under Division 1

1.8 QUALITY ASSURANCE

- A. Roofing Manufacturer Requirements: Obtain primary products, including each type of roofing and composition flashing sheet, from a single manufacturer. Provide insulation and other related products recommended by manufacturer of primary products for use with roofing system specified.
 1. The roofing manufacturer shall have been continuously producing roofing products of the type required for this project in the same climactic zone as the geographic location of this project.
- B. Acceptable Roofing Contractor: The Contractor shall have a minimum of five (5) years experience in successfully installing the same or similar roofing materials and shall be certified in writing by the roofing materials manufacturer at the highest level to install the primary roofing products.
 1. Provide a list of five (5) complete projects installed in this area.

2. The roofing superintendent shall take readings and LDG temperature of asphalt at point of application with an infrared hand-held gun.
- C. Project Acceptance: The Contractor shall submit a completed manufacturer's application for roof guarantee form along with shop drawings of the roofs showing all dimensions, penetrations, and details.
 1. The form shall contain all the technical information applicable to the project including deck types, roof slopes, base sheet and/or insulation assemblies (with method of attachment, and fastener type), and manufacturer's membrane assembly proposed for installation.
 2. The form shall also contain accurate and complete information requested including proper names, addresses, zip codes and telephone numbers.
 3. The project must receive approval, through this process, prior to shipment of materials to the project site.
- D. Scope of Work: The work to be performed under this specification shall include but is not limited to the following:
 1. The Contractor shall attend necessary job meetings and shall furnish competent and full time supervision, experienced roof mechanics, all materials, tools and equipment necessary to complete, in an acceptable manner, the roof installation in accordance with this specification.
 2. Application shall be in strict compliance with the latest written application instructions of the manufacturer of the primary roofing products.
 3. Application practice shall comply with requirements and recommendations contained in the latest edition of the Handbook of Accepted Roofing Knowledge (HARK) as published by the National Roofing Contractors Association, amended to include the acceptance of a phased roof system installation.
 4. Comply with latest edition of SMACNA "Architectural Sheet Metal Manual".
- E. Local Regulations: The Contractor shall conform to regulations of public agencies, including any specific requirements of the city and/or state of jurisdiction.
- F. Material Safety Data: The roofing system manufacturer shall furnish Material Safety Data Sheet/Sheets (MSDS), in the OSHA-approved form current at the time data is furnished. Installer shall assure that these MSDS are available at the project site at all times until project completion.
- G. A full time manufacturer's representative shall be on site during the roofing installation who may inspect and survey roofing prior to approval and acceptance of the roofing system.
- H. Testing Agency: The Owner at its option and expense, may select and employ:
 1. A roofing systems consultant to review the Construction Documents and/or perform surveillance during installation of substrate, roofing, flashing and any other part of the total roofing system. The Owner reserves the right to sample roofing products for testing on site without advance notice.
 2. An independent roofing inspection service, specializing in non-destructive evaluations (NDE), for moisture detection purposes, before final acceptance, or before the end of the roofing guarantee period.
- I. Recommended Maintenance: In addition to the guarantee, the Contractor shall furnish to the Owner the manufacturer's printed recommendations for proper maintenance of the specified roof system including inspection frequencies, penetration addition policies, temporary repair, and leak call procedures.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to work site in manufacturer's unopened and undamaged container and in quantities required to allow continuity of application.
 - 1. Each pallet, container or unit shall have the material manufacturers name and brand designation clearly listed.
- B. Storage: Store materials out of direct exposure to the elements.
 - 1. Store rolled goods on a clean, flat and dry surface.
 - 2. All material stored on the roof overnight shall be stored on pallets.
 - 3. Rolls of roofing must be stored on ends.
 - 4. Store materials on the roof in a manner so as to preclude overloading of deck and building structure.
 - 5. Store materials such as solvents, adhesives and asphalt cutback products away from open flames, sparks or excessive heat.
 - 6. Cover all material using a breathable cover such as a canvas. Polyethylene or other non-breathable plastic coverings are not acceptable.
- C. Handling: Handle all materials in such a manner as to preclude damage and contamination with moisture or foreign matter; rolled goods shall be handled to prevent damage to edges or ends.
- D. Damaged Material: Any materials that are found to be damaged or stored in any manner other than stated above shall be automatically rejected and shall be removed and replaced at the Contractor's expense.

1.10 REQUIREMENTS PRIOR TO JOB START

- A. Notification: Give a minimum of five (5) days notice to the Architect and manufacturer prior to commencing any work and notify both parties on a daily basis of any change in work schedule.
- B. Permits: Obtain all permits required by local agencies and pay all fees that may be required for the performance of the work.
- C. Safety: Familiarize every member of the application crew with all fire and safety regulations recommended by NRCA and other industry or local governmental groups.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Precipitation: Do not apply roofing materials during precipitation or in the event there is a probability of precipitation during application. Take adequate precautions to ensure that materials, applied roofing, and building interiors are protected from possible moisture damage or contamination.
- B. Water Infiltration: If water infiltrates under or in between the roof membranes, that area of the roof shall be removed, including roof insulation that is contaminated with moisture.
 - 1. New, dry roofing components shall then be installed to that area.
- C. Night Seals: The installed roof shall be made watertight at the end of every work day, as per manufacturer's requirements, and this night seal shall be removed at the beginning of the next work day, if so directed by manufacturer's instructions.
- D. Temperature Restrictions - Asphalt:
 - 1. At ambient temperatures of forty, (40) degrees F and below, special precautions must be taken to ensure that the specified Type IV asphalt maintains a minimum acceptable 400 degrees F temperature at the point of sheet application.
 - 2. The asphalt must not be overheated to compensate for cold conditions.

3. The use of insulated handling equipment is strongly recommended.
4. Hot luggers, mop carts, and kettle-to-roof supply lines should be insulated.
5. Hand mops should be constructed with a smaller yarn head to facilitate short moppings.
6. Luggers and mop carts should never be more than half filled at all times.

1.12 PROTECTION REQUIREMENTS

- A. Membrane Protection: Provide protection against staining and mechanical damage for newly applied roofing and adjacent surfaces throughout this project.
- B. Torch Safety: Designate one person on each crew to perform a daily fire watch. The designated crewmember shall watch for fires or smoldering materials on all areas of roof construction. Continue the fire watch for one hour after roofing material application has been suspended for the day.
- C. Limited Access: Prevent access by the public to materials, tools and equipment during the course of the project.
- D. Debris Removal: Remove all debris daily from the project site and take to a legal dumping area authorized to receive such materials.
- E. Site Condition: Complete, to the owner's satisfaction, all job-site clean up including building interior, exterior and landscaping where affected by the construction.

1.13 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bitumen roofing with related units of Work specified in other Sections to ensure that roof assemblies, including roof accessories, flashing, trim, and joint sealers, are protected against damage from effects of weather, corrosion, and adjacent construction activity.

1.14 ROOFING CONFERENCES

- A. Pre-Installation Conference: A pre-installation conference shall be arranged by Contractor, and shall be attended by Roof Contractor, roofing foreman, modified bitumen manufacturer's representative, General Contractor's representative, and Architect.

1.15 ROOFING WARRANTIES

- A. Special Project Guarantee: Submit two executed copies of 2-year Roofing Guarantee on the form included at end of this Section, covering the work of this Section and related work of "Section 07620 - Sheet Metal Flashing and Trim" including roofing membrane, membrane flashings, roof insulation, roofing accessories and sheet metal flashings, signed and countersigned by Roofing Contractor.
- B. Manufacturer's Warranty: Upon inspection and acceptance of the completed roofing system, the Roofing System Manufacturer shall furnish the Owner with its twenty (20) year No Dollar Limit (NDL), Non-Pro-Rated factory warranty covering leaks from all roof membrane, insulation, fasteners, flashings, sheet metal details (pitch pans, counter-flashings, edge flashings, drain flashings, etc.), and other specified components. Warranty shall also cover all labor required for proper repairs as required under the warranty including replacement of wet insulation and roof membrane caused by a covered leak.
 1. Manufacturer's warranty shall also cover damage due to windstorms up to Hurricane force winds.

2. This warranty shall not exclude random areas of ponding water from coverage.
 - a. This requirement requires prior approval from Manufacturer. Contractor must obtain prior approval and shall be required to include this in warranty.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMEN MEMBRANE SYSTEM MANUFACTURERS

- A. Approved Manufacturers/Products: The following systems are approved. Systems of other manufacturers require pre-bid approval in accordance with the Instructions to Bidders.
 1. SIPLAST, INC.: "Paradiene 20 EG/30CRFR"
 - a. Cap Sheet: "Paradiene 30 CR FR" (110 mils thick; weight 75 lbs. per square; with fiberglass mat).
 - b. Base Ply: "Paradiene 20 EG" (118 mils thick; weight 85 lbs. per square; with fiberglass mat).
 - c. Flashing: "Veral Aluminum" (138 mils thick; weight 92 lbs. per square; with fiberglass scrim mat).
 2. SOPREMA, INC.: "Soprastar Sanded/Elastophene HR 3.0"
 - a. Cap Sheet: "Soprastar Sanded" (110 mils thick; weight 75 lbs. per square; with fiberglass mat).
 - b. Base Ply: "Elastophene HR 3.0" (118 mils thick; weight 85 lbs. per square; with fiberglass mat).
 - c. Flashing: "Base ply of Elastophene HR 3.0 and Sopralst TV Aluminum" (138 mils thick; weight 92 lbs. per square; with fiberglass scrim mat).
 3. FIRESTONE BUILDING PRODUCTS, INC.: "SBS Base/ SBS Glass FR Cap"
 - a. Cap Sheet: "SBS Glass FR" (146 mils thick; weight 91 lbs. per square; with fiberglass mat).
 - b. Base Ply: "SBS Smooth" (140 mils thick; weight 84.5 lbs. per square; with fiberglass mat with glass reinforcement.)
 - c. Flashing: "Base of SBS Smooth and SBS Metal Flash-AL" (150 mils thick; weight 100 lbs. per square; with glass fiber reinforcement).

2.2 ROOFING MEMBRANE ASSEMBLY/PRODUCTS

- A. Roofing Membrane Assembly: Two (2) plies, each constructed of a blend of high quality asphalt and Styrene-Butadiene-Styrene (SBS) copolymer thermoplastic rubber, having a fiber glass reinforcement. Each sheet of the roof membrane assembly shall meet the following physical requirements as a minimum.
 1. Modified Bitumen Base Ply:
 - a. Approvals: UL Class A, FM Class 1 (products shall bear seals of approval).
 - b. Elongation of base modified bitumen (%): 1000+.
 2. Modified Bitumen Cap Sheet:
 - a. Approvals: UL Class A, FM Class 1 (products shall bear seals of approval).
 - b. Elongation of base modified bitumen (%): 1000+.
 - c. Granule Color: Reflective, White Synthetic Chips.
 - d. CA Title 24 (CRRC) Compliant
 - 1) Reflectivity: >.76
 - 2) Emissivity: >.85
 3. Modified Bitumen Stripping Ply:
 - a. (Same as modified base ply).

- B. Flashing Membrane Assembly: The flashing membrane shall consist of a prefabricated woven glass-mat scrim reinforced, Styrene-Butadiene-Styrene (SBS) copolymer modified asphalt having a continuous, channel embossed metal foil surfacing. The flashing membrane shall meet the following minimum physical requirements.
1. Metal-Clad Modified Bitumen Flashing Membrane:
 - a. Approvals: UL Class A, FM Class 1, (products shall bear seals of approval).
 - b. Elongation of base modified bitumen (%): 1000+.
 - c. Tensile strength in pound force:
 - @ 23 degree C - 135 md/135 xd.
 - @ -18 degree C - 200 md/200 xd.
 2. Modified Bitumen Flashing Reinforcing Sheet: (Same as modified base ply).

2.3 ROOF INSULATIONS

- A. Isocyanurate Foam Board Insulation (includes tapered boards): 2-1/2-inch minimum nominal thickness (or as otherwise indicated on Drawings), closed cell, rigid isocyanurate foam core material, integrally laminated between glass fiber facers. Comply with ASTM C-1289, Type II.
- B. Roof Board: Refer to Section 09255 - Exterior Sheathing.
1. Roof board shall be used to create an assembly to with stand wind and fire load requirements, per Roofing Manufacturer.

2.4 CRICKET AREAS

- A. Isocyanurate Foam Board Insulation Crickets: Comply with ASTM C-1289, Type II. Crickets shall have a finished slope of 1/2-inch: 12-inches minimum.

2.5 MISCELLANEOUS ROOFING MATERIALS

- A. Mopping Asphalt: Mopping asphalt shall be certified for full compliance with the requirements for type IV asphalt listed in Table I, ASTM D-312-84. Each container or bulk shipping ticket shall indicate the equiviscous temperature, EVT, the finished blowing temperature, FBT, and the flash point, FP.
- B. Cold Adhesive: A blend of special adhesive asphalts and safe, high flash, quick drying solvents that meets or exceeds ASTM D 4479, TYPE II requirements.
- C. Asphaltic Primer: Asphalt primer shall consist of a high flash, quick drying, asphalt solvent blend which meets or exceeds ASTM D41 requirements.
- D. Mastic: The mastic, used as a base for setting metal flanges, shall be asphalt cutback, reinforced with non-asbestos fibers, conforming to ASTM-D 4586 Type II requirements.
- E. Pitch Pan Filler: A single component, cold applied urethane compound of pouring consistency, exhibiting no weathering or cracking when tested according to ASTM D 920 Type S. (See pitch pan preparation for proper mixing and use.)
- F. Mastic Sealant: Polyisobutylene; non-hardening, non-skinning, non-drying and non-migrating sealant.
- G. Caulking/Sealants: Silicone, single component, high performance, elastomeric sealant conforming to ASTM C 920 in accordance with "Section 07920 - Joint Sealants".
- H. Ceramic Granules: Ceramic granules of same composition and color as the modified bitumen cap sheet membrane.

- I. Metallic Powder: The metallic powder, used for covering of bitumen overruns over the foil surfaced membrane, shall consist of a finely graded metal dust as supplied or approved by the membrane manufacturer.

2.6 FASTENERS

- A. Fasteners for Insulation and Wood Nailers: Provide insulation fasteners and plates that are FM Approved, and/or approved by the manufacturer of the primary roofing products. The insulation fasteners shall provide attachment required to meet the specified uplift performance and to restrain the insulation panels against the potential for ridging, etc. The fastening pattern for each insulation panel to be used shall be as recommended by the insulation manufacturer and approved by the manufacturer of the primary roofing products.

2.7 RELATED COMPONENTS

- A. Lumber for Nailers and Blocking: Nominal sizes are indicated except as shown by detail dimensions. Provide actual sizes as required by PS 20 for maximum 19 percent moisture content.
 1. Grade and Species: No. 2 grade light framing size lumber, any west coast or southern pine species; southern pine board size lumber.
 2. Preservative Treatment: Comply with applicable requirements of AWWA C2 (lumber) and AWWA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC/s Board of Review.
 - a. Pressure-treat all lumber with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft (6.4 kg/cu. m).
 3. Nailers used for edge metal securement shall be a minimum six (6) inches wide with a thickness to match the height of the new insulation assembly.
- B. Lead Drain Flashings: Lead flashing for drains shall be formable type weighing a minimum of 2-1/2 pounds per square foot, in sheets of minimum 36 by 36 inch dimension or as required, complying with FED SPEC NO. QQ-L-201.
- C. Lead Pipe Flashings: Lead pipe flashing sleeves shall be preformed and soldered with a minimum four (4) inch perimeter flange and a sleeve opening fabricated to fit closely around the penetration without forcing, complying with FED SPEC NO. QQ-L-201. Lead sleeves shall be two-piece, of sufficient height to allow a minimum of one (1) inch to be crimped inside of the pipe stack.
- D. Fabricated Metal: All fabricated metal components incorporated into the roofing system shall comply with "Section 07620 - Sheet Metal Flashing and Trim".
 1. Metal pipe flashings shall consist of a two (2) component assembly:
 - a. The first component shall be a metal roof jack having a minimum four (4) inch perimeter flange, and a sleeve opening to fit closely around the penetration without forcing, with a minimum six (6) inch height. All metal laps shall be fastened and soldered.
 - b. The second component shall be a metal, watertight umbrella, fabricated to be mechanically secured tightly around the roof penetration and extend beyond the roof jack opening by a minimum radius of three (3) inches. The top edge of the watertight umbrella shall be caulked using an approved sealant.

- E. Roof Protection Material: Modified bitumen sheet material composed of an asphalt-impregnated, puncture-resistant polyester fabric core, coated with a polymer-modified bitumen and topped with a ceramic-coated granule-wearing surface. Manufacture in roll form with a 30 inch width and minimum thickness of 217 mils:

PART 3 - EXECUTION

3.1 INSPECTION

- A. Meetings: Conduct a pre-job conference including the Architect, Roofing Contractor and Manufacturer's Representative prior to application of roofing.
- B. Foreman: The roofing foreman shall have a copy of these specifications on the job site at all times. The presence of specifications and an inspector shall not relieve the Contractor of strict compliance with the manufacturer's specifications, detail drawings, and/or approved material requirements.
- C. Deck Penetrations: Contractor shall verify that work penetrating the roof deck, or which may otherwise affect the roofing application, has been properly completed.

3.2 PREPARATION

- A. General: All surfaces shall be swept or vacuumed, removing all loose aggregate and foreign substances prior to commencement of roofing.
- B. Examine substrate surfaces to receive modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to Installer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 SUBSTRATE REQUIREMENTS

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
 - 1. Prime surface of concrete deck with asphalt primer at a rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m) and allow primer to dry.

3.4 INSULATION INSTALLATION

- A. Insulation, General: Comply with roofing system manufacturer's written instructions for installing roof insulation. Insulation panels shall be installed with ends offset; edges of the panels shall be in moderate contact, and without forcing, applied in strict accordance with the insulation manufacturer's requirements and the following instructions:
 - 1. Adhered Insulation: Install each layer of insulation and adhere to substrate as recommended per manufacturer.
 - 2. Set each layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.

3. Install insulation boards with edges in moderate contact, without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
 4. Apply no more insulation than can be sealed with membrane in same day
- B. Cricket Areas: Construct crickets of tapered insulation panels between roof drains, or where otherwise indicated. Install each cricket directly over the surface of the top layer of insulation. Construct to facilitate prompt and complete removal of water to each roof drain.

3.5 ROOF MEMBRANE INSTALLATION - GENERAL

- A. Membrane Application: Application of roofing shall be in accordance with roofing system manufacturer's instructions and the following requirements.
1. Application of roofing shall immediately follow application of base sheet and/or insulation as a continuous operation.
 2. Apply modified sheets smooth, free from air pockets, wrinkles, fishmouths, lap joints, or tears.
- B. Aesthetic Considerations: The overall appearance of the finished roofing application is a standard requirement for this project. The Roofing Contractor shall make necessary preparations, utilize recommended application techniques, apply the specified materials (ie. granules and metallic powder) and ensure that the finished application is acceptable to the Owner.
- C. Priming: Prime both sides of metal flanges (all jacks, edge metal, lead drain flashings, etc.) and concrete and masonry surfaces with a uniform coating of asphalt primer ASTM D-41, 24 hours prior to use.
- D. Kettles and Tankers: Kettles and tankers shall be equipped with accurate, fully readable thermometers. Asphalt shall not be heated to or above its flash point. Avoid heating at or above the FBT, should conditions make this impractical, heating must be no more than 25 degrees below the EVT and no more than 25 degrees F above EVT.
- E. Asphalt Temperatures: If the EVT information is not provided, the following asphalt temperature shall be observed. Maximum heating temperature shall be 525 degrees F. Minimum application temperature shall be 400 degrees F.
- F. Bitumen Consistency: Cutting or alterations of bitumen, primer, and sealant will NOT be permitted.
- G. Asphalt Moppings: All moppings shall be maximum 25 pounds/square, and shall be total in coverage, leaving no breaks or voids.
- H. Roofing Application: All layers of roofing shall be laid free of wrinkles, creases or fishmouths. Sufficient pressure shall be exerted on the roll during application to ensure prevention of air pockets. Lap seams in the base ply layer shall be staggered with the lap seams of the cap sheet layer.
1. All layers of roofing shall be laid perpendicular to the slope of the deck.
 2. The modified bitumen base ply shall be fully bonded to the prepared substrate and shall have a minimum of three (3) inch side and end laps.
 3. The modified bitumen cap sheet shall be bonded to the base ply and have a minimum of three (3) inch side and end laps.
 4. Maximum sheet lengths and special fastening of the specified roof membrane system may be required at various slope increments where the roof deck slope exceeds 1/2-inch per foot. The manufacturer shall provide acceptable sheet lengths and the required fastening schedule for all roofing sheet applications to applicable roof slopes.

- I. Granule Embedment: Mineral granules shall be broadcast over all bitumen overruns on the cap sheet surface, while the bitumen is still hot, to ensure a monolithic surface color.
- J. Flashing Application: Flashing shall be accomplished using the modified base ply as the reinforcing sheet and metal foil surfaced modified bitumen flashing membrane.
 1. The metal foil flashing shall be applied in three foot lengths (cut from the end of roll) using the factory selvage edge for laps.
 2. The reinforcing sheet shall be lapped a minimum of three inches to itself and shall extend a minimum of six inches onto the base surface and three inches up the parapet wall above the cant.
 3. Lap seams in the reinforcing layer shall never coincide with the laps of the metal foil flashing layer.
 4. The reinforcing sheet shall be fully adhered by a mopping of asphalt (both wall and sheet).
 5. After the cap sheet has been applied to the top of the cant, the granular surface area that is to receive flashing coverage shall be prepared by torch heating or application of asphalt primer.
 6. The metal foil flashing sheet shall be torched in place. Pressure shall be exerted on the flashing sheet during application to ensure complete contact with the wall/roof surfaces, preventing air pockets.
 7. All loose laps and edges shall be checked and sealed.
 8. The top edge of the metal-foil flashing shall be terminated with an aluminum bar or as recommended by manufacturer.
- K. Use Of Metallic Powder: Metallic powder shall be broadcast over all bitumen overruns on the metal foil membrane surface while the bitumen is still hot, to ensure a monolithic surface color.
- L. Water Cut-Offs: At end of day's work, or when precipitation is imminent, a water cut-off shall be built at all open edges.
 1. Cut-offs can be built using asphalt or plastic cement and roofing felts, constructed to withstand protracted periods of service.
 2. Cut-offs must be completely removed prior to the resumption of roofing.

3.6 COATING FOR HIGH REFLECTIVITY

- A. Coat complete granular surface with either a highly reflective mineral-surface cap sheet or LEED type coating at a rate of 1 to 1-1/2 gal. per square.

3.7 RELATED COMPONENTS - INSTALLATION

- A. General: The following is a list of descriptions for correct installation of components integrated into the roof membrane assembly. In all cases, unless otherwise approved, flanged components shall be incorporated into the system between the application of the modified bitumen base ply and the modified bitumen cap sheet. The flange must be primed with a uniform coating of ASTM D41 asphalt primer and allowed to dry thoroughly; all flanges must be set in approved mastic.
- B. Lead Pipe Flashings: The lead flanges shall be completely primed (on both sides) and allowed to dry prior to installation.
 1. After the modified bitumen base ply has been applied, the flange shall be set in mastic and stripped in using nine (9) inch wide strips of the modified bitumen base ply.

2. The modified bitumen cap sheet membrane shall then be applied, terminating at the flange-sleeve juncture of the pipe flashing.
 3. See Item "Sealant" for finish of this detail.
- C. Roof Drain Flashings: The lead drain flashing shall be completely primed and allowed to dry prior to installation.
1. After the modified bitumen base ply has been applied, the lead flashing sheet shall be set in mastic and formed to turn down inside of the drain bowl.
 2. The perimeter of the lead flashing shall be plied-in using an additional layer of the base ply material, overlapping the perimeter of the lead a minimum of three (3) inches.
 3. The modified bitumen cap sheet membrane shall then be applied, extending beyond the clamping ring seal.
 4. The clamping ring shall then be installed with all clamps, bolts, etc. in place.
- D. Roof Drain Connection: Roofing contractor shall be responsible for furnishing the roof drain assemblies, excluding the actual connection to the storm drain line which shall be the responsibility of the plumbing contractor.
- E. Light Equipment Supports: Air handling units and miscellaneous light equipment which are not supported by wood sleepers shall be separated from the roof assembly using the manufacturer's walk tread-roof protection material.
1. Each walk tread pad shall be cut to a size, which extends a minimum of two (2) inches beyond the perimeter of each sleeper block.
 2. The walk tread pad shall be set dry over the roof assembly.
 3. Each sleeper block shall be set dry over the walk tread pad.
- F. Small Pipe Supports: All gas lines, conduits or other pipes which are a maximum of one (1) inch diameter and run horizontally to the roof deck shall be supported using wood blocking and the manufacturer's walk tread-roof protection material.
1. The blocking shall be four (4) inches by four (4) inches by twelve (12) inches in size.
 2. Each walk tread pad shall be cut to a size, which extends a minimum of two (2) inches beyond the perimeter of the blocking.
 3. The pipe shall be loosely secured to allow movement over the six (6) inch center of each block; the spacing for the blocks shall be of adequate distance to prevent sagging of the pipe and to prevent the pipe from coming into contact with the roof assembly.
 4. The walk tread pad shall be set dry over the new roof assembly.
 5. Each pipe support block shall be set dry over the walk tread pad.
- G. Edge Metal: The metal flanges shall be completely primed and allowed to dry prior to installation.
1. The modified bitumen base ply shall be turned down two (2) inches past the roof edge, over the nailer.
 2. After the base ply and continuous cleat have been installed, the flange shall be set in mastic and stagger nailed every three (3) inches on center.
 3. The flange shall be stripped in using nine (9) inch wide strips of the base ply material.
 4. The modified bitumen cap sheet shall then be applied, terminating at the gravel stop rise of the edge metal.
- H. Pitch Pans: The metal penetration must be completely cleaned of all roofing materials.
1. The inside wall of the pitch pan must be cleaned of any residual oil shop coatings using Naptha solvent. The pitch pan wall shall then be etched using a 5 percent acetic acid solutions.

2. The flange of the pitch pan shall be completely primed and allowed to dry prior to installation.
 3. After the base ply has been applied, the flange shall be set in mastic and secured to the deck.
 4. The flanges shall be stripped-in using nine (9) inch wide strips of the base ply material.
 5. The pitch pan shall be filled with non-shrink grout to a level approximately 1-1/2-inch below the top rim.
 6. Duct tape shall be installed around the pitch pan wall to act as a form for the pitch pan filler.
 7. Follow pitch pan filler manufacturer's instructions and recommendations for mixing.
 8. Slowly and carefully fill pitch pan to the top level of the duct tape ensuring the finished level is above the top rim.
 9. The cap sheet shall then be applied, terminating at the flange-pitch pan wall juncture. Refer to paragraph "Sealant" for finish of this detail.
 10. A watertight umbrella shall be installed to the penetration completely covering the opening of the pitch pan.
- I. Walk Pads: Cut the walk pads into maximum five (5) foot panels. Install the walk pads where designated, inverted, which will display the manufacturer's product label turned up. Use a ribbon mopping of the Type IV asphalt as the adhesive. Use a minimum spacing of one and one half (1 ½) inches between panels to allow for expansion. Install around equipment ladders and roof hatches and as indicated on Drawings.
 - J. Equipment Support Flashings: The metal pipe flanges shall be completely primed and allowed to dry prior to installation. After the base ply has been applied, the flanges shall be set in mastic and stripped-in using nine (9) inch wide strips of the base ply material. The cap sheet shall then be applied, terminating at the flange-sleeve juncture of the pipe flashing. A watertight umbrella shall be installed to the penetration, completely covering the opening of the pipe flashing. Refer to paragraph "Sealant" for finish of this detail.
 - K. Sealant: All modified bitumen cap sheet edges exposed at gravel stops, waste stacks, pitch pans, vent stacks, etc., shall be caulked with a smooth continuous bead of approved sealant.

3.8 FIELD QUALITY CONTROL

- A. Notification of Completion: Contractor shall notify manufacturer by means of manufacturer's printed Notification of Completion form of job completion in order to schedule a final inspection date.

3.9 FINAL INSPECTION

- A. Post-Installation Meeting (Final Inspection): A meeting shall be held and attended by all parties that were present at the pre-job conference. A punch list of items required for completion shall be compiled by the Contractor and the manufacturer's representative. The Contractor shall complete, sign, and mail the punch list form to the manufacturer's headquarters.
- B. Drain Verification: At final inspection of all work, contractor shall verify that all drains, scuppers, etc., are functioning properly.

- C. Air Handling Units: Contractor shall be responsible for the proper connecting and/or reconnecting of all duct work, electrical and supply connections. At final inspection, contractor shall verify that all connections are restored to a complete working, watertight, and safe condition.
- D. Standing Water: There shall be no visual evidence of standing water on the roof 48 hours after it stops raining.

3.10 WARRANTY/GUARANTEE

- A. Special Project Guarantee: Submit two executed copies of 2-year Roofing Guarantee on the form included at end of this Section
- B. Issuance of the Warranty: All post installation procedures shall be completed and meet the manufacturer's final endorsement for issuance of the specified warranty.

3.11 TWO-YEAR INSPECTION

- A. Two-Year Inspection: Contact the manufacturer during the ninety (90) day period immediately preceding the two (2) year anniversary of the guarantee date to arrange for a mandatory two-year inspection. The inspection shall be attended by the Contractor and the manufacturer's representative. A two-year inspection punchlist shall be compiled by the manufacturer and submitted to the Contractor for his completion. Upon completion, the Contractor shall sign and mail the punchlist form to the manufacturer's headquarters, verifying that all items are in accordance with the manufacturer's recommendations.

3.12 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. Cleaning: In areas where finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.13 PROTECTION

- A. Protect building surfaces against damage from roofing work.
- B. Roof Traffic: Where traffic must continue over finished roof membrane, protect surfaces.

END OF TEXT (Roofing Guarantee follows)

ROOFING GUARANTEE

OWNER: _____

WHEREAS: _____

ADDRESS: _____

Telephone: () _____, herein called the "Roofing Contractor," has performed roofing and flashing in accordance with the Contract Documents, for _____ (hereinafter called the "Work") under a

Subcontract with _____

General Contractor on the Following Project: _____

Name of Project: _____

Location/Address: _____

Name of Building: _____

Type(s) of Roof Deck(s): _____

Total Roof Area: _____ SF; Flashing, Edge: _____ LF; Base: _____ LF

Guarantee Period: Two(2) years.

Date of Acceptance: _____ Date of Expiration: _____

AND WHEREAS the Roofing Contractor has contracted (as a Subcontractor) to guarantee said work against water entry due to faulty or defective materials and workmanship for designated Guarantee Period,

AND WHEREAS the General Contractor, by its acceptance of the Contract for the above described project, has jointly assumed with the Roofing Contractor the obligations to the Owner of said guarantee against leaks and faulty or defective materials and workmanship;

NOW THEREFORE the Roofing Contractor and the General Contractor jointly and severally guarantee, subject to the terms and conditions herein set forth, that during the Guarantee Period they will at their own cost and expense, make or cause to be made with approved procedures and materials such repairs to or replacements of said work resulting from water entry or faults or defects of said Work as are necessary to correct faulty and defective work and as are necessary to maintain said Work in watertight conditions and further to respond on or within two (2) working days upon written notification of leaks or defects by the Owner. Furthermore, they will at their own cost and expense maintain the roof for (2) years after acceptance, in accordance with the current edition of the Roof Maintenance Manual published by the Roofing Industry Educational Institute. The roof shall be inspected a minimum of twice each year, and a report prepared documenting the conditions observed at each inspection. These inspections shall be made once during the months of April or May and once during the months of September and October. Two copies of each report shall be forwarded to the Owner.

This Guarantee is made subject to the following terms and conditions:

1. Specifically excluded from this Guarantee are damages to the Work and other parts of the building, and to building contents, caused by: a) earthquake, lightning, hailstorm or windstorm, including hurricanes and tornadoes; b) fire; and c) structural failures causing excessive roof deck, edgings and related roof components movement. When the Work has been damaged by any of the foregoing causes, the Guarantee will be null and void until such damage has been repaired by the Roofing Contractor, and until the cost and expense thereof has been paid by the Owner or another responsible party so designated.
2. During Guarantee Period, if the Owner allows alteration of work by anyone other than a Contractor approved in writing by the Roofing Contractor, General Contractor, and Roofing Material Manufacturer prior to the work being performed, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Guarantee shall become null and void upon date of said alterations. If the Owner engages the Roofing Contractor to perform said alterations, Guarantee shall not become null and void, unless the Roofing Contractor, prior to proceeding with said work, shall have notified the Owner in writing, showing reasonable cause for claim that said alterations would likely damage or deteriorate the Work, thereby reasonably justifying a limitation or termination of this Guarantee.
3. During the Guarantee Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Guarantee shall become null and void upon date of said change, but only to extent said change affects work covered by this Guarantee.
4. During the Guarantee Period, if the buildings or areas of buildings are changed to uses creating extremes of interior temperature and/or humidity, but for which it was not originally designed and specified, without provisions and alterations made to the building which effectively contain or control these conditions, this Guarantee shall become null and void upon the date of said change.

5. The Owner shall promptly notify the Roofing Contractor in writing of observed, known or suspected leaks, defects, or deterioration, and shall afford reasonable opportunity for Roofing Contractor to inspect the Work, and to examine evidence of such leaks, defects, or deterioration.

6. This Guarantee is recognized to be the only guarantee of General Contractor and Roofing Contractor on said work and shall not operate to restrict or cut off the Owner from other remedies and resources lawfully available to him in cases of roofing failure. Specifically, this Guarantee shall not operate to relieve the Roofing Contractor of responsibility for performance of the original work, in accordance with requirements of the Contract Documents, regardless of whether the Contract was a contract directly with the Owner or a subcontract with the Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, 20____.

Roofing Contractor's Signature: _____

Typed Name: _____

Representing: _____

Telephone No: _____

And has been countersigned by the General Contractor issuing the Roofing Contractor's Subcontract for said work:

Name of General Contractor: _____

Date: _____ Authorized Signature: _____

Representing: _____

Typed Name: _____

Telephone Number: _____

WITNESS: _____

END OF SECTION

SECTION 07620

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Manufactured reglets.
 - 2. Formed roof drainage system.
 - 3. Roof flashing and trim.
- B. Related Sections include the following:
 - 1. Division 04 Section "Unit Masonry".
 - 2. Division 07 Section "Modified Bitumen Roofing."
 - 3. Division 07 Section "Metal Roof Panels."
 - 4. Division 07 Section "Metal Wall Panels."
 - 5. Division 07 Section "Metal Wall Panel Assembly System."

1.2 FLASHING PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as specified in this and other sections, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak or loosen and shall remain watertight.
- B. Provide edge metal flashings (coping, fascia, gravel stop), except gutters to be designed, tested and installed in accordance with ANSI/SPRI ES-1, "American National Standard for Edge Systems Used for Low Slope Roof Systems" to comply with IBC 2006 Edition. Metal edge flashings shall be tested to meet a basic wind speed of 130 mph.
- C. Provide edge metal flashing by manufacturers with ANSI/SPRI ES-1 certification of compliance for all its qualified products. NRCA has performed testing and maintains a certification listing based on ANSI/SPRI ES-1 for specific edge metal flashing that are included in the construction detail section of the NRCA Roofing and Waterproofing Manual, fifth edition and the NRCA Roofing Manual: Membrane Roof Systems - 2007. NRCA has a certified listing of authorized fabricators and details of edge metal flashing acceptable.
- D. Edge details may be selected from manufacturers who certify minimum performance to meet design requirements, based upon testing. Other designs may be used, provided that they are tested and certified by an independent testing laboratory to meet the wind and pullout resistance design standards suggested in the ES-1 Wind Design Standards.

1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show layouts, profiles, shapes, seams, dimensions, and details for fastening, joining, supporting, and anchoring sheet metal flashing and trim.
- C. Samples: For each type of sheet metal flashing and trim.
- D. Provide ANSI/SPRI ES-1 certification.

1.4 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof eave fascia, approximately 48 inches (1200 mm) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, No. 2D finish.
- B. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet "Galvalume": ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
 - 2. Exposed Finishes: Apply the following coil coating:
 - a. High-Performance Organic Finish: Three-coat thermocured system containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with physical properties and coating performance requirements of AAMA 2605, except as modified for below:
 - 1) Humidity and Salt Spray Resistance: 2000 hours.
 - 2) Color: As selected by Architect from manufacturer's full range.
 - 3. Location: Provide at metal roof panels as required for location tight assembly.
- C. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Felt Underlayment: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
- C. Fasteners: Stainless steel screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 - 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 - 3. Blind Fasteners: High-strength stainless-steel rivets.
- D. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound.
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat.

2.3 REGLETS

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory- mitered and -welded corners and junctions.
 - 1. General: Reglets shall be compatible with counterflashing and roofing material.
 - 2. Manufacturers:
 - a. Fry Reglet Corporation.
 - b. Hickman, W. P. Company.
 - c. O' Keefe's Inc.
 - 3. Material:
 - a. Stainless steel, Type 304, 0.020 inch thick
 - 4. Type:
 - a. Masonry: Manufactured reglet with offset top flange for embedment in masonry mortar joint.
 - 1) Product: MI (O'Keefe Inc); MA (Fry Reglet Corp.)

2.4 FABRICATION, GENERAL

- A. General: Custom 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 item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- D. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.
- E. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal, and in thickness not less than that of metal being secured.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Fabricate downspouts from the following material:
 - a. Stainless Steel: Minimum 0.016 inch thick.
- B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - 1. Fabricate parapet scuppers from the following material:
 - a. Stainless Steel: Minimum 0.019 inch thick.
- C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim.
 - 1. Fabricate conductor heads from the following material:
 - a. Stainless Steel: Minimum 0.016 inch thick.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96-inch-long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide joint cover plates.
 - 1. Fabricate flashing from the following material:
 - a. Stainless Steel: Minimum 0.016 inch thick.
- B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - 1. Fabricate copings from the following material:
 - a. Stainless Steel: Minimum 0.025 inch thick.
- C. Base Flashing: Fabricate from the following material:
 - 1. Stainless Steel: Minimum 0.019 inch thick.
- D. Counterflashing and Flashing Receivers: Fabricate from the following material:
 - 1. Stainless Steel: Minimum 0.019 inch thick.
- E. Roof-Penetration Flashing: Fabricate from the following material:
 - 1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.
 - 2. Provide at modified bitumen roofing
- F. Roof-Drain Flashing: Fabricate from the same material as drainage material.
- G. Drip Edges: Fabricate from the following material:
 - 1. Stainless Steel: Minimum 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Torch cutting of sheet metal flashing and trim is not permitted.

- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 1. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with elastomeric sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
 - 1. Use stainless-steel fasteners.
- H. Seal joints as shown and as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm) except where pre-tinned surface would show in finished Work.
 - 1. Do not solder aluminum sheet.

3.2 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c. in between. Attach at scuppers/conductors as indicated on drawings.
- C. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
- D. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch (25 mm) below scupper discharge.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
 - 1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at spacing required to accommodate wind speeds and the Florida Building Code.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at spacing required to accommodate wind speeds and the Florida Building Code.
 - 2. Anchor interior leg of coping with screw fasteners and washers at spacing required to accommodate wind speeds and the International Building Code.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Secure in a waterproof manner. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with elastomeric sealant.
- E. Metal Base Flashing: Locate over membrane base flashing and secure with continuous cleat form compression seal. Fasten cleat at maximum 4 inches on center. Extend bottom flange of metal base flashing over roofing assembly and hold in place with insulation. Fill top well of cleat serving as metal base flashing termination bar with joint sealant.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.
- G. Reglets: Shall be fasten, a maximum of 12-inches o.c., unless otherwise recommended per manufacturers written instructions.
 - 1. Insert counterflashing into reglet to form tight fit. Secure in place with wedges at maximum of 12-inches o.c. Seal flashing into reglets with sealant.

END OF SECTION

SECTION 07812

CEMENTITIOUS FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes the following:
 - 1. Interior, exposed, spray-applied, cementitious fireproofing for exposed steel and spray polyurethane foam insulation for fire rating as required and shown on the drawings.
- B. Related Sections:
 - 1. Section 01450 - Testing Laboratory Services
 - 2. Section 04200 - Unit Masonry Assemblies: Masonry based fireproofing for structural steel.
 - 3. Section 05120 - Structural Steel: Surface conditions required for structural steel receiving fireproofing.
 - 4. Section 05310 - Steel Deck: Surface conditions required for metal decking receiving fireproofing.
 - 5. Section 07210 - Building Insulation: For spray applied polyurethane insulation.
 - 6. Section 07840 - Firestopping: For through-penetration firestop sealant.
 - 7. Section 09250 - Gypsum Board: Gypsum board based fireproofing.

1.2 DEFINITIONS

- A. Exposed Sprayed Fire-Resistive Materials: Applied to surfaces that are exposed to view when the Work is completed and surfaces that are accessible through acoustical panel ceilings.
 - 1. System Description: The thermal barrier products shall be applied at the required thickness to provide the required protection for sprayed polyurethane foam to meet the requirements of the building code, insurance rating organizations and all other authorities having jurisdiction.
- B. Reference: Underwriters laboratories Inc. (UL) 1715 - Fire Test of Interior Finish Material.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's instructions for proper application of cementitious fireproofing.
- B. Fire Testing: Submit evidence that the cementitious fireproofing has been subjected to full-scale ASTM E 119 fire testing at Underwriters Laboratories Inc. by the manufacturer.
- C. Test Data: Submit independent laboratory test results for fireproofing for the following performance criteria:
 - 1. Bond Strength per ASTM E736.
 - 2. Compressive Strength per ASTM E761.
 - 3. Deflection per ASTM E 759
 - 4. Bond Impact per ASTM E 760
 - 5. Air Erosion per ASTM E 859.
 - 6. Corrosion Resistance per ASTM E 937
 - 7. High Speed Air Erosion per ASTM E 859
 - 8. Surface Burning Characteristics of Building Materials per ASTM E84.
 - 9. Combustibility per ASTM E 1354 Cone Calorimeter.

- D. Schedule: Submit a Fireproofing Schedule indicating the following:
 - 1. Material to be used and building elements to be protected.
 - 2. UL Design numbers and hourly ratings for each component/assembly.
 - 3. Fireproofing thicknesses for each individual structural steel member to be protected.
 - a. Contractor shall adjust thickness of fire protection on members to compensate for various steel thickness based on UL assemblies.
- E. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Sprayed Fiber Type Fireproofing: SPRAYED FIBER IS NOT PERMITTED as a substitution for cementitious fireproofing.
- B. Installer Qualifications: Fireproofing work shall be performed by a firm acceptable to the cementitious fireproofing material manufacturer. Provide manufacturer's certification with submittals.
- C. Testing Agency Qualifications: To qualify for acceptance, an independent testing laboratory must demonstrate to Authorized Representative's, with approval of Architect, satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.
- D. Single Source Responsibility: Obtain each type of fireproofing material from one source and by a single manufacturer.
- E. Fire-Test-Response Characteristics: Provide spray-applied fire resistive materials and assemblies identical to those tested for the following fire-test-response characteristics per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify packages (bags) containing spray applied fire resistive material with appropriate markings of applicable testing and inspecting agency.
 - 1. Fire-Resistance Ratings: As indicated by reference to fire-resistive designs listed in UL's "Fire Resistance Directory," or in the comparable publication of another testing and inspecting agency acceptable to authorities having jurisdiction, for sprayed fire-resistive material serving as direct-applied protection, tested per ASTM E 119.
 - 2. Surface-Burning Characteristics: ASTM E 84.
- F. Codes: Products, execution, and fireproofing thicknesses shall conform to the applicable code requirements for the required fire-resistance ratings. Any deviations must be reviewed and approved by the authority having jurisdiction.
- G. Pre-Installation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.
- B. Shelf Life: Use materials with limited shelf life within period indicated. Remove from Project site and discard any materials whose shelf life has expired.
- C. Store fireproofing materials inside, under cover, above ground, so they are kept dry until ready for use. Remove from Project site and discard any materials that have deteriorated.

1.6 PROJECT/SITE CONDITIONS

- A. Environmental Conditions: Do not apply fireproofing when ambient or substrate temperatures are 40 deg F (4 degrees C) and falling, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after applying fireproofing.
- B. Ventilation: Ventilate building spaces during and after application of sprayed fire-resistive material. Use natural means or, where this is inadequate, forced-air circulation until fire-resistive material dries thoroughly.

1.7 SEQUENCING

- A. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:
 - 1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
 - 2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
 - 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 - 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
 - 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
 - 6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
 - 7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
 - 8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace sprayed fire-resistive materials that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of sprayed fire-resistive materials from substrates.
 - 2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
- B. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS/PRODUCTS

- A. Approved Products/Manufacturers for medium-density fireproofing over structural steel and over polyurethane insulation : Subject to compliance with requirements, provide one of the following:
1. "Monokote Type Z-106/HY"; W.R. Grace & Co. (Basis-of-Design)
 2. Isolatek International Corp., Cafco Products.
 3. Carboline Co., Fireproofing Products Div.

2.2 CEMENTITIOUS SPRAYED FIREPROOFING MATERIALS

- A. General: For exposed applications of sprayed fire-resistive materials, provide manufacturer's standard products complying with requirements indicated for material composition and physical properties representative of installed products.
- B. Material Composition: Cementitious sprayed fire-resistive material consisting of factory-mixed, dry formulation of Portland cement based cementitious fireproofing and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application. Approved by manufacturer and authorities having jurisdiction for indicated use.
- C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
1. Dry Density: The field density shall be measured, in accordance with ASTM Standard E 605. Minimum average density shall be that listed in the UL Fire Resistance Directory, ICBO Evaluation Report or as required by the authority having jurisdiction.
 2. Deflection: Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E 759.
 3. Bond Impact: Material subject to impact tests in accordance with ASTM E 760 shall not crack or delaminate from the surface to which it is applied.
 4. Bond Strength: Fireproofing, when tested in accordance with ASTM E 736, shall have a minimum average bond strength of 2000 psf and a minimum individual bond strength of 1500 psf.
 5. Air Erosion: Maximum allowable weight loss of the fireproofing material shall be 0.000 gm per sq ft when tested in accordance with ASTM E 859.
 6. Compressive Strength: The fireproofing shall not deform more than 10 percent when subjected to compressive forces of 100 psi when tested in accordance with ASTM E 761.
 7. Corrosion Resistance: Steel with applied fireproofing shall be tested in accordance with ASTM E 937 and shall not promote corrosion of steel.
 8. Surface Burning Characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E 84.
 9. Resistance to Mold: The fireproofing material shall be formulated at the time of manufacturing with a mold inhibitor. Fireproofing material shall be tested in accordance with ASTM G 21 and shall show resistance to mold growth for a period of 28 days for general use.
- D. Water: Clean, fresh, and suitable for domestic consumption and free from mineral and organic substances that would affect the set of fireproofing material.
1. Provide water with sufficient pressure and volume to meet the fireproofing application schedule.

2.3 ACCESSORIES

- A. Provide accessories to comply with spray-applied fireproofing manufacturer's recommendations, are approved by UL and meet fire resistance design and code requirements.
 - 1. Accessories include, but are not limited to, any required or optional items such as bonding agents, primers, accelerators, mechanical attachments, metal lath, scrim, or netting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates with Installer present to determine if they are in satisfactory condition to receive sprayed fire-resistive material. A substrate is in satisfactory condition if it complies with the following:
 - 1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
 - 2. Substrates are free of oil, grease, rolling compounds, primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fireproofing with substrate under conditions of normal use or fire exposure.
 - 3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
- B. Conduct tests according to fire-resistive material manufacturer's recommendations to verify that substrates are free of oil, rolling compounds, and other substances capable of interfering with bond.
- C. Unsatisfactory Conditions: Do not proceed with installation of fire-resistive material until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances that could impair bond of fire-resistive material, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
 - 1. Concrete Substrates: Prior to application of fire-resistive material, apply approved bonding agent to all concrete substrates as recommended per manufacturer.
 - 2. Confirm compatibility of surfaces to receive cementitious fireproofing.
- B. For exposed spray-applied fireproofing applications, repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished fireproofing surface. Remove minor projections and fill voids that would telegraph through fireproofing after application.
- C. Protection: Cover other work subject to damage from fallout or overspray of fire-resistive material during application.
 - 1. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintenance of adequate ambient conditions for temperature and ventilation.
- D. Coordination with Other Trades: Coordinate installation of fireproofing with other construction to minimize the need to cut or remove fireproofing. As installation of other construction proceeds, inspect fireproofing and patch damaged or removed areas.

E. Work by Other Trades:

1. Other trades shall install clips, hangers, support sleeves and other attachments required to penetrate the fireproofing, prior to application of the fireproofing material.
2. Other trades shall not install ducts, piping, equipment or other suspended items until the fireproofing is complete.

3.3 APPLICATION

- A. Manufacturer's Instructions: Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fire-resistive materials, as applicable to the particular conditions of installation and as required to achieve fire-resistance ratings indicated.
1. The fireproofing shall be applied at the required thickness per the applicable test standard.
- B. Apply exposed sprayed fire-resistive material in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition.
- C. Signage: Post appropriate cautionary "Slippery When Wet" signs in all areas in contact with wet fireproofing material. Erect appropriate barriers to prevent entry by non-fireproofing workers into the fireproofing spray and mixing areas and other areas exposed to wet fireproofing material.
- D. Extend fireproofing in full thickness over entire area of each substrate to be protected.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing and inspecting agency to perform to sample and verify thickness, density, and bond strength of sprayed fire-resistive application in accordance with the provisions of the following:
- B. Extent and Testing Methodology: Testing of completed fireproofing will take place in successive stages in areas of extent described below; do not proceed with fireproofing of the next area until test results for previously completed fireproofing show compliance with requirements.
1. Extent of Each Test Area: Each bay, 10,000 sq. ft. of floor area, or total floor area, whichever produces greatest number of test areas.
 2. Within each area, testing agency will randomly select one structural member of each type (primary beam, secondary beam, steel deck and column) and test fireproofing as follows:
 - a. For cohesion and adhesion per ASTM E 736.
 - b. For thickness per ASTM E 605-93
 - c. Lower flanges and webs of beams, column webs, column flanges, and floor deck for density per ASTM E 605-93 or Appendix A "Alternate Method for Density Determination" of AWCI Technical Manual 12-A.
 - d. When testing discovers fireproofing not in compliance with requirements, testing agency will perform additional random testing to determine extent of noncompliance.
- C. Test Results: Testing agency will report test results promptly and in writing to Contractor, Authorized Representative and Architect.
- D. Non-Compliance: Remove and replace fireproofing where test results indicate that it does not comply with specified requirements for cohesion and adhesion or for density or both.
- E. Insufficient Thickness: Apply additional fireproofing per manufacturer's directions where test results indicate that the thickness does not comply with specified requirements.

- F. Additional Testing: Where fireproofing is removed and replaced or repaired, additional testing will be performed to determine compliance with specified requirements.

3.5 CLEANING, PROTECTION, AND REPAIR

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material over-spray and fall-out from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protection: Protect fireproofing from damage resulting from construction operations or other causes so fireproofing will be without damage or deterioration at time of Substantial Completion.
- C. Repair: Repair or replace work that has not been successfully protected.
 - 1. Damage by Other Trades: All patching and repairing of spray-applied fireproofing, due to damage by other trades, shall be performed with same materials under this Section, and paid for by the trades responsible for the damage.

END OF SECTION

SECTION 07840

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements for furnishing and installing firestopping for fire-rated construction at the following locations:
 - a. Penetrations through fire-rated walls including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - b. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - c. Architectural/Construction joint firestops within walls, or the intersection of floors to exterior walls, or the intersection of top of walls to ceilings.
 - d. Top of wall firestopping in all fire-rated partitions.
 - e. Top of wall and construction joint smoke-stopping in all smoke partitions.

B. Related Sections:

1. Section 03300 - Cast-In-Place Concrete.
2. Section 04200 - Unit Masonry.
3. Section 07920 - Joint Sealants: Non-fire-resistive-rated joint sealants.
4. Section 09250 - Gypsum Board Assemblies: Gypsum board fireproofing and for partition identification (stenciling fire-rated walls).
5. DIVISION 15: Sections specifying duct and piping penetrations.
6. DIVISION 16: Sections specifying cable and conduit penetrations.

1.2 REFERENCES

A. Reference Standards: The Reference Standards listed below refer to the latest date of issue or edition, unless otherwise indicated.

1. ASTM E 814: Standard Method of Fire Tests of Through-Penetration Firestops.
2. ASTM E119: Standard Method of Fire Tests of Building Construction and Materials.
3. UL 1479: Fire Test of Through-Penetration Firestops.
4. UL 723: Surface Burning Characteristics of Building Materials.
5. UL 2079: Standard for Tests for the Fire Resistance of Building Joint Systems.
6. Published Through-Penetration and Joint Systems by recognized independent testing agencies:
 - a. UL (Underwriters Laboratories Inc.) Fire Resistance Directory (volume 2&3).
 - b. Warnock Heresy Certification Listings, current year.
 - c. Omega Point Laboratory, current year.
 - d. Factory Mutual, current year.

1.3 DEFINITIONS

- A. Definitions: As used in this Section, the following definitions apply:
1. Firestop systems: Complete, tested assemblies including wall/floor construction, penetrating items, and field-applied materials designed to prevent the spread of fire through openings.
 2. Firestop devices: Factory-built products designed to resist the spread of fire through floor and wall openings, and require only assembly and installation at the project site.
 3. Firestopping: Field-applied component materials of firestop systems, which form the seal against spreading fire.
 4. Smoke seal systems: Systems designed to stop the spread of smoke through smoke walls. To be a smoke seal system, the system must have at least a one-hour fire-rating.

1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide firestop systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
- B. F-Rated Systems: Provide firestop systems with F ratings indicated, as determined per ASTM E 814 and UL 1479, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- C. T-Rated Systems: Provide firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814 and UL 1479, where any of the following conditions exist:
1. Penetrations that incorporate penetrating items that is in contact with combustible materials in acceptable areas.
 2. Penetrations that is located outside of wall cavities and fire-resistive shaft enclosures.
 3. Penetrations that are located in construction containing doors required to have a temperature rise rating.
 4. Penetrations that incorporate penetrating items larger than a 4 inch diameter nominal pipe or 16 sq. in. in overall cross-sectional area.
- D. Special Conditions: For firestopping exposed to traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant firestop systems.
 2. For penetrations involving insulated piping, provide firestop systems not requiring removal of insulation.
 3. For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.

THROUGH-PENETRATION UL CLASSIFICATION SYSTEM

Fire Stopping Systems		UL Classification System		
		Construction Penetrated	Type Of Construction	System Identification
1	No Penetrating Items:	F, W, C	A, B, J, K, L	0001-0999
2	Metallic Pipes, Conduit or Tubing:	F, W, C	A, B, J, K, L	1001-1999
3	Nonmetallic Pipe, Conduit or Tubing:	F, W, C	A, B, J, K, L	2001-2999
4	Electric Cables:	F, W, C	A, B, J, K, L	3001-3999
5	Cable, Trays with Electric Cables:	F, W, C	A, B, J, K, L	4001-4999
6	Insulated Pipes:	F, W, C	A, B, J, K, L	5001-5999
7	Electrical Busduct Penetrations:	F, W, C	A, B, J, K, L	6001-6999
8	Mechanical Ductwork Penetrations: Multiple Penetrations Through Common	F, W, C	A, B, J, K, L	7001-7999
9	Openings: Construction Penetration	F, W, C	A, B, J, K, L	8000-8999
	F penetration			
	W penetration			
	C penetration			
	Type of Construction			
	A- Concrete floors equal to or less than 5- inches thick			
	B- Concrete floors greater than 5-inches thick			
	J- Concrete or masonry walls equal to or less than 8-inches thick			
	K- Concrete or masonry walls greater than 8- inches thick			
	L- Framed walls			

JOINT UL CLASSIFICATION SYSTEM

Fire-Resistant Joint Systems		UL Classification System		
		Joint System	Movement Capability	Joint Width
1	Fir-to-Fir	FF	D	0000-0999
2	Wall-to-Wall	WW	D	0000-0999
3	Floor-to-Wall:	FW	D	0000-0999
4	Head of Wall:	HW	D	0000-0999
	Movement Capability			
	D=Dynamic			
	Has movement capability			
	S=Static			
	Joint Width			
	0000-0999			Less than or equal to 2"
	1000-1999			Greater than 2" Less than or equal to 6"
	2000-2999			Greater than 6" Less than or equal to 12"

1.5 SUBMITTALS

- A. Submit the following:
1. List of proposed firestop systems with system drawings, arranged according to construction type and penetrating items, with design designation of firestop systems proposed, as listed by UL, Warnock Heresy, Omega Point Laboratory, Factory Mutual or other qualified testing and inspection agency.
 2. Testing and inspection agencies complete design designation description and drawings of firestop systems proposed.
 3. Manufacturer's product specifications and application recommendations for each product are to be used.
 4. Material Safety Data Sheets (MSDS) for each firestop product used.
 5. Qualifications: Submit letter from firestop manufacturer approving installer as qualified to install the specified firestop products.

1.6 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Comply with the following requirements in addition to those specified under "System Performance Requirements" in PART 1 of this Section.
1. Provide systems that have been tested by UL, Warnock Hersey, Omega Point or by another qualified testing and inspecting agency acceptable to authorities having jurisdiction, and that correspond to design designation listings published by the testing agency.
 2. Provide systems tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly.
 3. Provide firestopping products that bear the classification marking of qualified testing and inspecting agency.
- B. Installer Qualifications: Engage an experienced Installer who has completed firestopping that is similar in material, design, and extent to that indicated for Project and that has performed successfully. Assign installation of through-penetration firestop systems and fire-resistive joint systems in project to a single firestop specialty contractor. The contractor shall have a minimum of 3 years experience and the contractor shall be approved with UL and FM 4991 firestopping requirements.
- C. Single Source Responsibility: Obtain firestopping for each type of penetration and construction condition from a single manufacturer.
- D. Firestopping Contractor Qualifications: Due to life safety considerations, all firestopping applications shall be performed by a single specialty contractor that is trained and licensed specifically in this discipline. Said contractor will be used to install firestopping in all disciplines. To ensure consistency, quality and proper installations, application of firestopping products by any other contractor or subcontractor will not be acceptable. Firestopping contractor's personnel shall have received specific training and certification or approval from the proposed firestop material manufacturer and shall have a minimum of two (2) years experience installing firestop systems of the type specified in this Section.
- E. Selection: Contractor shall select firestop systems, based on information in the Contract Drawings and on conditions that are expected to exist during installation, from the acceptable types specified in this Section, to satisfy all of the following criteria:
1. Systems shall meet or exceed the required fire-resistance-rating of the construction involved at each penetration.
 2. Systems shall be rated for installation in the type of construction involved at each penetration.

3. Systems shall be rated for use in conjunction with penetrating items of the type, size, and number involved at each penetration.
- F. Asbestos: Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy."
- G. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements of "Section 01314 - Project Meetings".
- I. Engineering Judgments: For those firestop applications that exist for which no approved tested system is available through a manufacturer, an engineering judgment derived from similar system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time) and be provided via approved manufacturer.

1.7 MOCK-UPS

- A. Job Mock-Ups: Prepare job mock-up of the material proposed for use in the project as directed by Authorized Representative with approval of Architect. Approved mock-ups may be left in place as part of the finished project and shall constitute the standard for remaining work, including aesthetics.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.
- B. Storage and Handling: Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.9 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilation: Ventilate application areas per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.
- C. Sequencing and Scheduling: Commence firestopping in each location after penetrating items are complete and tested but prior to concealing the openings.
 1. Firestopping shall precede gypsum board finishing.
- D. Agency Inspections: Do not conceal firestopping installations behind other construction until authorities having jurisdiction, if required, have examined each installation.
- E. Existing Construction: Include firestopping at newly formed penetrations and at existing unprotected penetrations, which are disclosed during performance of the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approved Firestopping Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include but are not limited to the following:
 - 1. 3M Company.
 - 2. Hilti, Inc. 1-800-879-8000 (Basis-of-Design)
 - 3. Tremco Inc. 1-800-321-7906
- B. Approved Firestopping Contractors: Subject to compliance with requirements, firestopping applications shall be performed by the following contractors (other contractors will require pre-bid approval):
 - 1. Hefflin & Brannon Services, Inc.; Pensacola, FL (850) 912-4709
 - 2. Acadian Firestopping of Lafayette, Inc. Phone: 1-337-981-0621, Fax: 1-337-981-0644
 - 3. J-Kaulk Firestopping, Carriere, MS., Phone: (601) 798-0828

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide components that are compatible with each other, the substrates forming openings, and the penetrating items, if any, under conditions of service and application, as demonstrated by firestopping manufacturer's testing and field experience.
- B. Accessories: Provide accessory components for each firestopping system specified by the firestopping manufacturer and approved for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
 - 1. Permanent forming/damming/backing materials including the following:
 - a. Semi-refractory fiber (mineral wool) insulation.
 - b. Ceramic fiber.
 - c. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - d. Fire-rated formboard.
 - e. Joint fillers for joint sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Metal collars and sleeves.

2.3 FIRESTOPPING MATERIALS

- A. Firestop Mortars:
 - 1. Hilti, Inc. "FS 635 mortar"
 - 2. 3M "Fire Barrier Mortar".
 - 3. Tremco Inc. "Tremstop M"
- B. Firestop Sealants and Caulks:
 - 1. Hilti, Inc. "Intumescent and Non-Intumescent sealants", consisting of FS-ONE, CP-606, and CP-601S
 - 2. 3M "Intumescent and Non-Intumescent Caulks".
 - 3. 3M "Electrometric Sealant."
 - 4. Tremco Inc. "Intumescent and Non-Intumescent Sealants"

- C. Firestop Putty:
 - 1. Hilti, Inc. "Fire Rated Putty and Putty Pads", consisting of CP-618 putty stick and CP-617 putty pads.
 - 2. 3M "Fire Rated Putty and Putty Pads".
 - 3. Tremco, Tremstop MP
- D. Firestop Plastic Pipe Devices:
 - 1. Hilti, Inc. "Intumescent Collars"
 - 2. Hilti, Inc. CP 643 N or CP 644 Firestop collars.
 - 3. 3M "Plastic Pipe Devices".
 - 4. Tremco, Inc. "Fyre-Can/Sleeve"
- E. Intumescent Wrap Strips:
 - 1. Hilti, Inc. "Intumescent Wrap Strips"
 - 2. Hilti, Inc. CP 648E Endless Wrap Strips
 - 3. Hilti, Inc. CP 648S Single Wrap Strips.
 - 4. 3M "Intumescent Wrap Strips".
 - 5. Tremco, Inc. "Tremstop WS"
- F. Firestop Mastic and Wrap Materials:
 - 1. Hilti, Inc. "Speed Spray", mastic.
 - 2. Hilti, Inc. "CP 604 Self-Leveling Firestop Sealant."
 - 3. 3M "Mastic Sprays".
 - 4. 3M "Electrometric Spray"
 - 5. 3M "Duct Wrap and Plenum Wraps".
 - 6. Tremco, Inc. Tremstop "Acrylic-SP"
- G. Firestop Pillows:
 - 1. Hilti, Inc. "Fire Block", FS-657
 - 2. Tremco, Inc. "Tremstop PS"
 - 3. Equivalent products listed in the U.L. Fire Resistance Directory
- H. Sealants, caulking or spray materials for use with fire-rated construction joints,
For openings between structurally separate sections of wall and floors,
And other gaps, the following products are acceptable:
 - 1. Hilti, Inc. FS-ONE Intumescent Firestop Sealant.
 - 2. Hilti, Inc. CP-601S, Electrometric Firestop Sealant
 - 3. Hilti, Inc. CP-606, Flexible Firestop Sealant
 - 4. Tremco "Fyre-Sil"
 - 5. Equivalent products listed in the U.L. Fire Resistance Directory-Volume 2
- I. Firestop System: Provide a fire protection system at the floor slabs and external wall
junctions as required to provide a 1 and 2 hour fire rating as indicated.
 - 1. Rockwool Fire pro; SP Firestop Systems
- J. Cast - In Place Firestop Device for use with non-combustible and combustible plastic
pipe (closed and open piping systems) penetrating concrete floors, the following
products are acceptable:
 - 1. Hilti, Inc. "CP-680 cast - in place

- a. Add Aerator adapter when used in conjunction with an Aerator (solvent system).
 - b. Add height extension if utilizing CP 680P or M in concrete slabs thicker than 8-inches.
 - c. Add Hilti Water Module (2 to 6 inch) to achieve UL W-Rating.
 - d. Add Hilti TOP SEAL (1/2 to 2-inches) to achieve UL W-Rating.
 - e. Provide Hilti Toilet Flange for use with floor outlet water closets.
 - f. Provide coupling sleeve for use with floor, shower or general purpose drains.
2. Tremco, Inc. "Tremstop Fyre-Can"
 3. Equivalent products listed in the U.L. Fire Resistance Directory- Volume 2

2.4 ACCESSORIES

- A. Forming/Damming Materials: Mineral fiberboard, or other type, is recommended by firestopping manufacturer.
- B. Primer, Sealant and Solvent Cleaner: Types as recommended by firestopping manufacturer.

2.5 MIXING

- A. General: For those products requiring mixing prior to application, comply with firestopping manufacturer's directions to produce firestopping products of uniform quality for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

- A. Examination: Examine substrates and conditions for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected, and penetrating items are complete and tested.
- B. Environmental Conditions: Verify that environmental conditions are safe and suitable for installation of firestop products.

3.2 CONDITIONS REQUIRING FIRESTOPPING

- A. General: Provide firestopping for conditions specified whether or not firestopping is indicated, and if indicated, whether such material is designed as insulation, safig, or otherwise.
- B. Through-Penetrations: Firestopping shall be installed in all open penetrations and in the annular space in all penetrations in any bearing or non-bearing fire-rated barrier.
- C. Membrane-Penetrations: Where required by code, all membrane-penetrations in rated walls shall be protected with firestopping products that meet the requirements of third party time/temperature testing.
- D. Construction Joints/Gaps: Firestopping shall be provided at the following locations:
 1. Between the edges of floor slabs and exterior walls
 2. In the control joint in masonry walls and floors
 3. In expansion joints
- E. Smoke-Stopping: Smoke-Stops shall be provided for Through-Penetrations, Membrane-Penetrations, and Construction Gaps with a material approved and tested for such application as required by other Sections as listed in 1.1. B "Related Sections".

3.3 INSTALLATION

- A. General: Installation of firestops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
 - 1. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations.
 - 2. Coordinate with plumbing, mechanical, electrical and other trades, to assure that all pipe, conduit, cable, and other items, which penetrate fire-rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other construction, which would conceal penetrations are not erected prior to the installation of firestops.
 - 3. Unless specified and approved, all insulation used in conjunction with through-penetrants shall remain intact and undamaged and may not be removed.
 - 4. Seal holes and penetrations to ensure an effective smoke seal.
 - 5. In areas of high traffic, protect firestopping materials from damage. If the opening is large, install firestopping materials capable of supporting the weight of a human.
 - 6. Insulation types specified in other Sections shall not be installed in lieu of firestopping material specified herein.
 - 7. All combustible penetrants (e.g. non-metallic pipes or insulated metallic pipes) shall be firestopped using products and systems tested in a configuration representative of the field condition.
- B. Dam Construction: When required to properly contain firestopping materials within openings, damming or packing materials may be utilized. Combustible damming material must be removed after appropriate curing. Noncombustible damming materials may be left as a permanent component of the firestop system.

3.4 FIELD QUALITY CONTROL

- A. Maintain onsite copy of submittal package including system drawings.
- B. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
- C. Follow safety procedures recommended in the Material Safety Data Sheets.
- D. Finish surfaces of firestopping, which are to remain exposed in the completed work to a uniform and level condition.
- E. Accessibility: All areas of work must be accessible until inspection by the applicable Code Authorities.
- F. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

3.5 CLEANING

- A. Cleaning: Remove excess firestopping materials as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

3.6 PROTECTION

- A. Protection: Protect firestopping during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so that firestop systems are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs,

cut out and remove damaged or deteriorated firestopping immediately and install new materials to produce firestop systems complying with specified requirements.

3.7 SYSTEMS AND APPLICATIONS SCHEDULES (FOLLOWING PAGES)

Schedule of UL through Penetration Firestop Systems

CONCRETE FLOORS		UL-CLASSIFIED SYSTEMS				CONCRETE OR BLOCK WALLS		UL-CLASSIFIED SYSTEMS			
TYPE PENETRANT	F-RATING (HR)	STI	HILTI	3M	TREMCO	TYPE PENETRANT	F-RATING	STI	HILTI	3M	TREMCO
CIRCULAR BLANK OPENINGS	1	CAJ 0014	FA 0006, CAJ 0070	CAJ 0009	CAJ 0011	CIRCULAR BLANK OPENINGS	1	CAJ 0014	CAJ 0055, CAJ 0070	CAJ 0009	CAJ 0011
	2	CAJ0014	FA 0006, CAJ 0070	CAJ 0009	CAJ 0011		2	CAJ 0014	CAJ 0055, CAJ 0070	CAJ 0009	CAJ 0011
	3	CAJ0014	CAJ 0055	CAJ 0009	N/A*		3	CAJ 0014	CAJ 0055	CAJ 0009	N/A*
SINGLE METAL PIPES OR CONDUIT	1	CAJ1079	CAJ 1226, CAJ 1382	CAJ 1058	CAJ 1064, CAJ 1302	SINGLE METAL PIPES OR CONDUIT	1	CAJ 1079	CAJ 1226, WJ 1021	CAJ 1058	CAJ 1064, CAJ 1302
	2	CAJ1079	CAJ 1226, CAJ 1382	CAJ 1058	CAJ 1064, CAJ 1302		2	CAJ 1079	CAJ 1226, WJ 1021	CAJ 1058	CAJ 1064, CAJ 1302
	3	CAJ1079	FA 1017, CAJ 1226, CAJ 1382	CAJ 1058	CAJ 1064		3	CAJ 1079	CAJ 1226, WJ 1041, WJ 1042	CAJ 1058	CAJ 1064
	4	CAJ1079	CBJ 1037, CBJ 1034	CAJ 1044	CAJ 1064		4	WJ 1070, CAJ 1079	CBJ 1034, CBJ 1037, WJ 1041, WJ 1042	CAJ 1044	CAJ 1064
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2125	FA 2053, CAJ 2109, CAJ 2098, CAJ 2141, CAJ 2167, CBJ 2021	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2075, CAJ 2116, CAJ 2229	SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, ENT)	1	CAJ 2125	CAJ 2109, CAJ 2098	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2075, CAJ 2116, CAJ 2229
	2	CAJ 2125	FA 2053, CAJ 2109, CAJ 2098, CAJ 2141, CAJ 2167, CBJ-2021	CAJ 2189, CAJ 2117	CAJ 2075, CAJ 2116, CAJ 2229, FA 2024		2	CAJ 2125	CAJ 2109, CAJ 2098	CAJ 2189, CAJ 2117, CAJ 2027	CAJ 2075, CAJ 2116, CAJ 2229
	3	CAJ 2125	FA 2054, CAJ 2109, CAJ 2098	CAJ 2005, CAJ 2117	CAJ 2075		3	CAJ 2125	CAJ 2109, CAJ 2098	CAJ 2005, CAJ 2117, CAJ 2027	CAJ 2075
	4	N/A*	N/A*	N/A*	N/A*		4	WJ 2061	WJ 2057	N/A*	N/A*
SINGLE OR BUNDLED CABLES	1	CAJ 3154	FA 3007, CAJ 3095, CAJ 3096	CAJ 3021	CAJ 3141	SINGLE OR BUNDLED CABLES	1	CAJ 3154, WJ 3043	WJ 3036, CAJ 3095, CAJ 3096	CAJ 3021	CAJ 3141
	2	CAJ 3154	FA 3007, CAJ 3095, CAJ 3096	CAJ 3021	CAJ 3141		2	CAJ 3154, WJ 3043	WJ 3036, CAJ 3095, CAJ 3096	CAJ 3021	CAJ 3141
	3	CAJ 3154	CAJ 3095, FA 3007	CAJ 3030	CAJ 3141		3	CAJ 3154	CAJ 3095, CAJ 3096	CAJ 3030	CAJ 3141
	4	N/A*	N/A*	N/A*	N/A*		4	WJ 3091	WJ 3050	N/A*	N/A*
CABLE TRAY	1	CAJ 4029	CAJ 4034, CAJ 4054	CAJ 4003	N/A*	CABLE TRAY	1	WJ 4021, WJ 4022	WJ 4016, CAJ 4034, CAJ 4054	CAJ 4003	WJ 4012
	2	CAJ 4029	CAJ 4034, CAJ 4054	CAJ 4003	N/A*		2	WJ 4021, WJ 4022	WJ 4016, CAJ 4034, CAJ 4054	CAJ 4003	WJ 4012
	3	CAJ 4029	CAJ 4034, CAJ 4035	CAJ 4003	N/A*		3	CAJ 4029	CAJ 4034, CAJ 4035	CAJ 4003	N/A*
	4	N/A*	N/A*	N/A*	N/A*		4	CAJ 4029	WJ 8007	N/A*	N/A*

SINGLE INSULATED PIPES	1	CAJ 5087	FA 5015, FA 5016, CAJ 5090, CAJ 5091, CAJ 5098	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5111, CAJ 5121	SINGLE INSULATED PIPES	1	WJ 5046	CAJ 5090, CAJ 5091, CAJ 5061	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5111, CAJ 5121
	2	CAJ 5087	FA 5015, FA 5016, CAJ 5090, CAJ 5091, CAJ 5098	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5111, CAJ 5121		2	WJ 5046	CAJ 5090, CAJ 5091, CAJ 5061	CAJ 5080, CAJ 5024, CAJ 5017	CAJ 5111, CAJ 5121
	3	CAJ 5021	FA5016, CAJ 5090	CAJ 5024, CAJ 5017	N/A*		3	WJ 5046	CAJ 5090, CAJ 5061	CAJ 5024, CAJ 5017	N/A*
	4	N/A*	CBJ 5006	N/A*	N/A*		4	WJ 5072	WJ 5028, CBJ 5006	N/A*	N/A*
ELECTRICAL BUSWAY	1	CAJ 6018	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6007	ELECTRICAL BUSWAY	1	CAJ 6018	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6007
	2	CAJ 6018	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6007		2	CAJ 6018	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6007
	3	CAJ 6018	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6007		3	CAJ 6018	CAJ 6006, CAJ 6017	CAJ 6001, CAJ 6002	CAJ 6007
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	CAJ 7027	CAJ 7046, CAJ 7051	CAJ 7003, CAJ 7021	CAJ 7005, CAJ 7044	NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1		CAJ 7046, CAJ 7051, WJ 7021, WJ 7022	CAJ 7003, CAJ 7021	CAJ 7005, CAJ 7044
	2	CAJ 7027	CAJ 7046, CAJ 7051	CAJ 7003, CAJ 7021	CAJ 7005, CAJ 7044		2		CAJ 7046, CAJ 7051, WJ 7021, WJ 7022	CAJ 7003, CAJ 7021	CAJ 7005, CAJ 7044
	3		CAJ 7046, CAJ 7051	CAJ 7003, CAJ 7021	CAJ 7005		3		CAJ 7046, CAJ 7051	CAJ 7003, CAJ 7021	CAJ 7005
MIXED PENETRANTS	1	CAJ 8113	CAJ 8041, CAJ 8056, CAJ 8096	CAJ 8001, CAJ 8013	CAJ 8057	MIXED PENETRANTS	1	CAJ 8113	CAJ 8041, CAJ 8096, WJ 8007	CAJ 8001, CAJ 8013	CAJ 8057
	2	CAJ 8113	CAJ 8041, CAJ 8056, CAJ 8096	CAJ 8001, CAJ 8013	CAJ 8057		2	CAJ 8113	CAJ 8041, CAJ 8096, WJ 8007	CAJ 8001, CAJ 8013	CAJ 8057
	3	CAJ 8093	CAJ 8041, CAJ 8056	CAJ 8001, CAJ 8013	N/A*		3	CAJ 8093	CAJ 8041, CAJ 8056, WJ 8007	CAJ 8001, CAJ 8013	N/A*
	4	CAJ 8093	CBJ 8010	N/A*	N/A*		4	CAJ 8093	CBJ 8010, WJ 8007	N/A*	N/A*

WOOD FLOORS		UL-CLASSIFIED SYSTEMS				GYPSUM WALLBOARD ASSEMBLIES		UL-CLASSIFIED SYSTEMS			
TYPE OF PENETRANT	F-RATING	STI	HILTI	3M	TREMCO	TYPE OF PENETRANT	F-RATING	STI	HILTI	3M	TREMCO
METAL PIPES OR CONDUIT	1	FC 1074	FC 1009, FC 1059	FC 1002	FC 1050, FC 1054	METAL PIPES OR CONDUIT	1	WL 1079 WL 1049	WL 1054, WL 1058, WL 1164	WL 1146	WL 1158
	2	FC 1074	FC 1009, FC 1059	FC 1002	N/A*		2	WL 1079 WL 1049	WL 1054, WL 1058, WL 1164	WL 1010, WL 1146	WL 1019, WL 1020, WL 1158
							4	WL 1172	WL 1110, WL 1111	WL 1001	N/A*
NON-METALLIC PIPE OR CONDUIT	1	FC 2158	FC 2025, FC 2030	FC 2024	FC 2049, FC 2135	NON-METALLIC PIPE OR CONDUIT	1	WL 2074	WL 2078, WL 2075, WL 2128	WL 2088, WL 2002	WL 2083, WL 2129
	2	FC 2158	FC 2025, FC 2029	FC 2024	FC 2049, FC 2083		2	WL 2074	WL 2078, WL 2075, WL 2128	WL 2088, WL 2002	WL 2063, WL 2129, WL 2159
							4	WL 2198	WL 2184	N/A*	N/A*
SINGLE OR BUNDLED CABLES	1	FC 3057	FC 3012, FC 3044	FC 3017	FC 3037	SINGLE OR BUNDLED CABLES	1	WL 3210	WL 3065, WL 3111, WL 3112	WL 3032, WL 3030	WL 3131
							2	WL 3210	WL 3065, WL 3111, WL 3112	WL 3032, WL 3030	WL 3017, WL 3131
							4	WL 3211	WL 3139	N/A*	N/A*
	2	FC 3057	FC 3012	FC 3017	N/A*	CABLE TRAY	1	WL 4029	WL 4011, WL 4019, WL 4054	WL 4004	N/A*
							2	WL 4029	WL 4011, WL 4019, WL 4054	WL 4004	WL 4012
							4	N/A*	WL 8014	N/A*	N/A*
INSULATED PIPES	1	FC 5043	FC 5004, FC 5036, FC 5037	FC 5014	FC 5055	INSULATED PIPES	1	WL 5014	WL 5028, WL 5029, WL 5047	WL 5040, WL 5001, WL 5032	WL 5070, WL 5081
							2	WL 5014	WL 5028, WL 5029, WL 5047	WL 5040, WL 5001, WL 5032	WL 5070, WL 5081
	2	FC 5043	FC 5004, FC 5036, FC 5037	N/A*	N/A*		4	WL 5158	WL 5073	N/A*	N/A*
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	FC 7014	FC 7013	FC 7001	N/A*	NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	WL 7025 WL 7033 WL 7026	WL 7017, WL 7040, WL 7042	WL 7008	WL 7039
							2	WL 7025 WL 7033 WL 7026	WL 7040, WL 7042	WL 7008, WL 7013, WL 7016	WL 7039
							4				
MIXED PENETRANTS	1	FC 8029	FC 8009, FC 8014	FC 8013	N/A*	MIXED PENETRANTS	1	WL 8003 WL 8045	WL 1095, WL 8013	WL 8010	N/A*
							2	WL 8003 WL 8045	WL 1095, WL 8013	WL 8010, WL 8002	N/A*
	2	N/A*	N/A*	N/A*	N/A*		4	N/A*	WL 8014	N/A*	N/A*
							4		WL 8014		

* No UL-Classified systems for this manufacturer. Engineer Judgement Drawing Required

NOTES:

- Jobsite conditions of each through-penetration firestop system must meet ALL details of the UL-Classified System selected.
- If jobsite conditions do not match any UL-classified systems in the schedules above, contact firestop manufacturer for alternative systems or Engineer Judgement Drawings.
- Where more than one applicable UL-Classified System is listed in the schedules, choose the UL System which is most economical for each through-penetration firestop system.
- Coordinate work with other trades to assure that penetration opening sizes are appropriate for penetrant locations, and vice versa.
- For 3-hour rated gypsum walls, contact the firestop manufacturer for a UL-classified system or engineer judgement drawing.

SCHEDULES OF UL-2079 (DYNAMIC) JOINT FIRESTOP SYSTEMS

		UL-CLASSIFIED SYSTEM							
		JOINT WIDTH LESS THAN OR EQUAL TO 2"				JOINT WIDTH GREATER THAN 2", LESS THAN OR EQUAL TO 6"			
JOINT TYPE	F-RATING	STI	HILTI	3M	TREMCO	HILTI	3M	STI	TREMCO
CONCRETE FLOOR-TO-FLOOR	1	FFD 1025 FFD 0015	-	FF-D-0002	FF-D-0009	FF-D-1012, FF-D-1013	FF-D-1002, FF-D-1003, FF-D-1004	FFD 1025	
	2	FFD 1025 FFD 0015	-	FF-D-0002	FF-D-0009	FF-D-1012, FF-D-1013	FF-D-1002, FF-D-1003, FF-D-1004	FFD 1025	
	3	FFD 1025 FFD 0015	-	N/A**	FF-D-0010	FF-D-1011, FF-D-1026	N/A**	FFD 1025	
EDGE OF CONCRETE FLOOR SLAB-TO-WALL (USE ONLY CWS OR CWD SYSTEMS PER UL)	1	CWS 1003 CWS 2050 CWS 2051 CWS 2052	N/A***	N/A***	N/A***	N/A***	N/A***	CWS 1003 CWS 2050 CWS 2051 CWS 2052	N/A***
	2	CWS 1003 CWS 2050 CWS 2051 CWS 2052	N/A***	N/A***	N/A***	N/A***	N/A***	CWS 1003 CWS 2050 CWS 2051 CWS 2052	N/A***
	3	CWS 2050 CWS 2051 CWS 2052	N/A***	N/A***	N/A***	N/A***	N/A***	CWS 2050 CWS 2051 CWS 2052	N/A***
CONCRETE OR BLOCK WALL TO FLAT CONCRETE SLAB FLOOR (TOP-OF-WALL)	1	HWD 1034	HW-D-0097	HW-D-0023, HW-D-0029	HW-D-0017	HW-D-1008, HW-D-1009	HW-D-1003	HWD 1034	HWD 1011
	2	HWD 1034	HW-D-0097	HW-D-0023, HW-D-0029	HW-D-0017	HW-D-1008, HW-D-1009	HW-D-1003	HWD 1034	HWD 1011
	3	HWD 1034	-	-	N/A**	HW-D-1008	HW-D-1002, HW-D-1007	HWD 1034	HWD 1011
CONCRETE OR BLOCK WALL TO CONCRETE OVER FLUTED METAL DECK (TOP-OF-WALL)	1	HWD 0086 HWD 0139	HW-D-0080, HW-D-0081, HW-D-0098, HW-D 0181	HW-D-0022, HW-D-0030, HW-D-0040 HW-D-0013	HW-D-0092	N/A**			
	2	HWD 0086 HWD 0139	HW-D-0080, HW-D-0081, HW-D-0098, HW-D 0181	HW-D-0022, HW-D-0030, HW-D-0040 HW-D-0013	HW-D-0092				
	3	HWD 0086 HWD 0139	N/A**	N/A**	N/A**				
CONCRETE WALL-TO-WALL	1	WWD 0018	WW-D-0017	-	WW-D-0009	WW-D-1011, WW-D-1012	WW-D-1003, WW-D-1004, WW-D-1010	WWD 1007	N/A**
	2	WWD 0018	WW-D-0017	-	WW-D-0009	WW-D-1011, WW-D-1012	WW-D-1003, WW-D-1004, WW-D-1010	WWD 1007	N/A**
	3	WWD 0018	-	-	WW-D-0010	WW-D-1011	WW-D-1003, WW-D-1010	WWD 1007	N/A**

** CONTACT MANUFACTURER FOR CURRENT UL-CLASSIFIED SYSTEM OR ENGINEER JUDGEMENT DRAWING

*** UL REQUIRES CWS OR CWD SYSTEMS FOR PERIMETER FIRE CONTAINMENT SYSTEMS. USE SYSTEMS LISTED IN THE XHDG SECTION OF THE UL FIRE RESISTANCE DIRECTORY VOLUME II ONLY.

Notes:

1. CLASSIFIED SYSTEMS FOR 2"-6" WIDE JOINTS MAY BE USED FOR JOINTS 2" WIDE AND LESS.
2. CONFIRM THAT MOVEMENT CAPABILITIES OF THE SELECTED UL SYSTEM MEETS OR EXCEEDS THE SPECIFIED MOVEMENT RANGE OF THE PARTICULAR JOINT.
3. SYSTEMS MARKED WITH ASTERIK (*) ARE SUIT ABLE FOR TOP OF WALL JOINTS WHERE THE FLUTED METAL DECK HAS SPRAY ON MONOKOTE MK-6/HY FIREPROOFING.

END OF SECTION

SECTION 07920

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section Includes: Joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3 and following applications, including those specified by reference to this Section:
1. Provide sealant/caulk at all dissimilar materials on the exterior and interior surfaces. When joints or the connection of dissimilar materials are large enough backer rod and sealant.
 2. Exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints in unit masonry.
 - b. Joints in stucco system.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - e. Control and expansion joints in soffits and other overhead surfaces.
 - f. Other joints as indicated.
 3. Exterior joints in the following horizontal traffic surfaces:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 4. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
 - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - f. Other joints as indicated.
 5. Interior joints in the following horizontal traffic surfaces:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated.
- B. Related Sections include the following:
1. Division 3 Section 03300, "Cast-in-Place Concrete"
 2. Division 4 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 3. Division 7 Section "Sheet Metal Flashing and Trim" for sealing joints in sheet metal.
 4. Division 8 Section "Glazing" for glazing sealants.

5. Division 9 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
6. Division 9 Section "Tiling" for sealing tile joints.
7. Division 9 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
 1. Architect may select more than one color for any of the sealants depending on the location.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- E. Qualification Data: Submit qualification data for firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- F. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, submit the following reports:
 1. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's recommendations for primers and substrate preparation needed to obtain adhesion.
 2. Product test reports for each type of joint sealer, evidencing compliance with requirements specified.
- G. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion
- C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.
- D. Exclusions: Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural 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 MATERIALS, 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 sealant manufacturer, based on testing and field experience.

- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Continuous-Immersion-Test-Response Characteristics: Where elastomeric sealants will be immersed continuously in water, provide products that have undergone testing according to ASTM C 1247, including initial six-week immersion period and additional immersion periods specified below, and have not failed in adhesion or cohesion when tested with substrates indicated for Project.
 - 1. One additional four-week immersion period.
- D. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Single-Component Neutral-Curing Silicone Sealant - Type 1:
 - 1. Available Products:
 - a. Dow Corning Corporation; 795
 - b. GE Silicones; SilPruf NB SCS9000.
 - c. Pecora Corporation; 865.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 50.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, (as applicable to joint substrates indicated) O.
 - 6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
- F. Multicomponent Pourable Urethane Sealant - Type 2:
 - 1. Available Products:
 - a. Pecora Corporation; Dynatrol II-SG
 - b. Sika Corporation, Inc.; Sikaflex - 2c SL.
 - c. Sonneborn, Division of ChemRex, Inc.; SL 2.
 - 2. Type and Grade: M (multicomponent) and P (pourable).
 - 3. Class: 25.
 - 4. Use Related to Exposure: T (traffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

- G. Single-Component Nonsag Urethane Sealant - Type 3:
 - 1. Available Products:
 - a. Sika Corporation, Inc.; Sikaflex - 1a.
 - b. Sonneborn, Division of ChemRex Inc.; NP 1.
 - c. Tremco; Vulkem 116.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Uses Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.

- H. Single-Component Mildew-Resistant Neutral-Curing Silicone Sealant - Type 4:
 - 1. Available Products:
 - a. Dow-Corning; 786 Mildew Resistant.
 - b. G.E.; Sanitary 1700.
 - c. Tremco; Tremsil 600 White.
 - 2. Type and Grade: S (single component) and NS (nonsag).
 - 3. Class: 25.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: G, A, and as applicable to joint substrates indicated, O.

2.3 LATEX JOINT SEALANTS

- A. Latex Sealant - Type 5: Comply with ASTM C 834, Type P, Grade NF.

- B. Available Products:
 - 1. Pecora Corporation; AC-20+.
 - 2. Sonneborn, Division of ChemRex Inc.; Sonolac.
 - 3. Tremco; Tremflex 834.

2.4 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints - Type 6: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:
 - 1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 2. Available Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

2.5 PREFORMED JOINT SEALANTS

- A. Preformed Foam Sealant - Type 7: Manufacturer's standard preformed, precompressed, open-cell foam sealant that is manufactured from high-density urethane foam impregnated with a nondrying, water-repellent agent; is factory produced in precompressed sizes in roll or stick form to fit joint widths indicated; is coated on one side with a pressure-sensitive adhesive and covered with protective wrapping; develops a watertight and airtight seal when compressed to the degree specified by manufacturer; and complies with the following:
 - 1. Available Products:
 - a. EMSEAL Joint Systems, Ltd.; Emseal 25V.
 - b. illbruck Sealant Systems, Inc.; Wilseal 600.
 - c. Polytite Manufacturing Corporation; Polytite Standard.
 - 2. Properties: Permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and other joint sealants.
 - a. Density: Manufacturer's standard.

2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) polyurethane foam rod, oversized 20-50 percent larger than joint width as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F (minus 32 deg C). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.7 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.

2.8 SEMI-RIGID EPOXY JOINT FILLER

- A. Semi-rigid epoxy joint filler for control, tooled and saw-cut construction joints in floor slabs scheduled to receive a dry-shake surface hardener finish specified in Section 03300.
 - 1. Product: 100% solids, two component, moisture insensitive, semi-rigid epoxy complying with the following:
 - a. Color: Gray.
 - b. Consistency: Self-leveling.
 - c. Shore A Hardness: 75-80.
 - d. Tensile Strength: ASTM D-638, 600 psi.
 - e. Ultimate Elongation: ASTM D-638, 35%.
 - 2. Available Products:
 - a. "Poxy-Fil (J-52)" as manufactured by Dayton Superior Chemical Division, Houston, TX 77008, (800) 745-3706 or an approved equal.

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 joint-sealant performance.
- 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, blast cleaning, 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 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. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on 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 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 C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. 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.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. 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.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified 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 configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.

- I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- J. Installation of Semi-Rigid Epoxy Joint Filler: Comply with manufacturers written instructions for application of filler.

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 and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application JS-1: Exterior vertical and horizontal nontraffic construction joints in cast-in-place concrete.
 - 1. Joint Sealant (Type 1): Single-component neutral-curing silicone sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- B. Joint-Sealant Application JS-2: Exterior horizontal traffic joints in cast-in-place concrete slabs.
 - 1. Joint Sealant (Type 2): Multicomponent pourable urethane sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- C. Joint-Sealant Application JS-3: Exterior vertical control and expansion joints in unit masonry.
 - 1. Joint Sealant (Type 1): Single-component neutral-curing silicone sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- D. Joint-Sealant Application JS-4: Exterior vertical joints between different materials listed above.
 - 1. Joint Sealant (Type 1): Single-component neutral-curing silicone sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- E. Joint-Sealant Application JS-5: Exterior perimeter joints between different materials and frames of doors, windows and louvers.
 - 1. Joint Sealant (Type 1): Single-component neutral-curing silicone sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.
- F. Joint-Sealant Application JS-6: Exterior control and expansion joints in soffits and other overhead surfaces.
 - 1. Joint Sealant (Type 1): Single-component neutral-curing silicone sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

- G. Joint-Sealant Application JS-7: Vertical control and expansion joints on exposed interior surfaces of exterior walls.
 - 1. Joint Sealant (Type 3): Single-component nonsag urethane sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

- H. Joint-Sealant Application JS-8: Interior perimeter joints of exterior openings.
 - 1. Joint Sealant (Type 5): Latex sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

- I. Joint-Sealant Application JS-9: Interior ceramic tile expansion, control, contraction, and isolation joints in horizontal traffic surfaces.
 - 1. Joint Sealant (Type 2): Multicomponent pourable urethane sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

- J. Joint-Sealant Application JS-10: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 1. Joint Sealant (Type 4): Single-component mildew-resistant neutral-curing silicone sealant.
 - 2. Joint-Sealant Color: White.

- K. Joint-Sealant Application JS-11: Vertical joints on exposed surfaces of interior unit masonry, concrete walls and partitions.
 - 1. Joint Sealant (Type 3): Single-component nonsag urethane sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

- L. Joint-Sealant Application JS-12: Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
 - 1. Joint Sealant (Type 5): Latex sealant.
 - 2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION