SECTION 07 13 26 - SELF-ADHERED SBS MODIFIED BITUMINOUS SHEET
POST APPLIED BELOW GRADE WATERPROOFING

PART 1 GENERAL

1.01 SUMMARY

A. Work shall include, but is not limited to, the following:
1. Preparation of all field and flashing substrates.
2. Drainage mat and protection board.
3. SBS-modified bitumen self-adhered membrane.
4. Liquid-applied, membrane reinforced flashings.
5. All related materials and labor required to complete specified waterproofing necessary to receive specified manufacturer's warranty.

1.02 RELATED SECTIONS

A. Division 01 00 00 - General Requirements
B. Division 01 10 01 - Multiple Contract Summary of Work

1.03 DEFINITIONS

A. ASTM D 1079 - Definitions of Term Relating to Roofing and Waterproofing.
B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

1.04 REFERENCES

A. AMERICAN STANDARD OF TESTING METHODS (ASTM):
1. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course for Crack Cycling at -32 C.
2. ASTM C 1305 – Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing.
3. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers.
4. ASTM D 570 – Standard Test Method for Water Absorption of Plastics.
5. ASTM D 882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
6. ASTM D 903 – Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
7. ASTM D 1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
8. ASTM D 1876 – Standard Test Method for Peel Resistance of Adhesives (T-Peel Test).
9. ASTM D 5147 – Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material.
10. ASTM D 5385 – Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
11. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
12. ASTM E 154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.05 ACTION SUBMITTALS

A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.
B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.
C. Sample/Specimen Warranty from the manufacturer and contractor.
D. Shop Drawings: Provide plan and applicable waterproofing system detail drawings.

1.06 INFORMATIONAL SUBMITTALS

A. Contractor Certification: Submit written certification from waterproofing manufacturer certifying that the applicator is authorized by the manufacturer to install the specified materials and system.

1.07 CLOSEOUT SUBMITTALS

A. Warranty: Provide manufacturer's and contractor's warranties upon substantial completion of the waterproofing.

1.08 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:
1. Manufacturer shall have 20 years of experience manufacturing SBS-modified bitumen waterproofing materials.
2. Provide specified warranty upon satisfactory project completion.

B. CONTRACTOR QUALIFICATIONS:
1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
2. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified waterproofing through satisfactory project completion.
3. Applicators shall be skilled in the application methods for all materials.
4. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
5. Contractor shall maintain a copy of all submittal documents, on-site, available at all times for reference.

1.09 DELIVERY, STORAGE AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.
B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.
D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in (100 mm) or more above ground level. Carefully cover storage with "breathable" tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
E. Carefully store waterproofing membrane materials delivered in rolls on-end with selvage edges up. Store and protect roll storage to prevent damage.
F. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

1.10 SITE CONDITIONS

A. SAFETY:

1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
2. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric hot-air welding equipment. The contractor shall determine when and where conditions are appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to accommodate requirements and conditions.
3. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot work operations.
4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid waterproofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. ENVIRONMENTAL CONDITIONS:

1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of waterproofing materials. Ensure all waterproofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.
3. Self-adhered membrane application: During cold weather, store the specified self-adhered membrane and primer materials in heated storage areas to ensure materials remain no less than 70°F (21°C) during application. Ensure conditions allow primer to remain tacky, but not wet so that primer will transfer to finger when touched. Self-adhered primer should not fully dry and lose tack before applying the self-adhered membrane. Ensure conditions remain satisfactory to achieve membrane adhesion as specified.
4. Heat-Welding Application: Take all necessary precautions and measures to monitor conditions to ensure all environmental conditions are safe to proceed with the use of torches and hot-air welding equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be eliminated. Flammable primers and cleaners shall be fully dry before proceeding with heat-welding operations. Prevent or protect wood, paper, plastics and other such combustible materials from direct exposure to open flames from roof torches. Refer to NRCA CERTA recommendations.

1.11 WARRANTY

A. Manufacturer's Warranty. The manufacturer shall provide the owner with the manufacturer's warranty providing materials to for 10 years from the date the warranty is issued.

B. The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty covering workmanship for a period of 2 years from completion date.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. SINGLE SOURCE MANUFACTURER: All products shall be provided by a single supplier with 20 years or more waterproofing manufacturing history in the US.
1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.

B. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company.

C. BASIS OF DESIGN:
1. SOPREMA, located at: 310 Quadral Dr.; Wadsworth, OH 44281
a. Contact: Maciej Tobolewski; cell: (908) 400-1369
b. Website: www.SOPREMA.us
2. Or Architect Approved Equal

2.02 WATERPROOFING SYSTEM

A. WATERPROOFING SYSTEM BASIS OF DESIGN:
1. SOPREMA

2.03 BELOW GRADE WATERPROOFING

A. VERTICAL MEMBRANE WATERPROOFING (BASE & CAP PLY):
1. SELF-ADHERED SBS-MODIFIED BITUMEN:
a. SOPREMA COLPHENE STICK: SBS-modified bitumen, self-adhesive membrane with release film on the bottom surface and a sanded top surface. Non-woven polyester reinforced. Meets or exceeds ASTM D6164, Type I, Grade S per ASTM D5147 test methods.
i. Thickness: 106 mils (2.7 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 49.2 ft (15 m)
iv. Roll weight: 105 lb (47.8 kg)
v. Net mass per unit area, lb/100 sq ft (g/sq m):
a) 65 lb (3188 g)
vi. Peak load @ 0°F (-18°C), lbf/in (kN/m).
a) MD 110 lbf/in (19.3 kN/m), XMD 85 lbf/in (14.9 kN/m)
vii. Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
a) MD 35%, XMD 40%
viii. Peak load @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
ix. Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 55%, XMD 60%
x. Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 60%, XMD 65%

xi. Tear Strength @ 73.4°F (23°C), lbf (N):
a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
xii. Low temperature flexibility, °F (°C):
a) MD/XMD: -15°F (-26°C)
xiii. Dimensional stability, %:
a) MD/XMD: Less than 0.5%
xiv. Compound stability, °F (°C):
a) MD/XMD: 240°F (116°C)
xv. ASTM D 5385:
a) Pass

2. HEAT WELDED SBS-MODIFIED BITUMEN (ALTERNATE):
a. SOPREMA COLPHENE FLAM 180: SBS-modified bitumen membrane with plastic burn-off film on top and bottom surfaces. Non-woven polyester reinforcement. Meets or exceeds ASTM D6164, Type I, Grade S per ASTM D5147 test methods.
i. Thickness: 114 mils (2.9 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 32.8 ft (10 m)
iv. Roll weight: 73 lb (36.2 kg)
v. Net mass per unit area, lb/100 sq ft (g/sq m):
a) 80 lb (3596 g)
vi. Peak load @ 0°F (-18°C), lbf/in (kN/m).
a) MD 115 lbf/in (20.1 kN/m), XMD 90 lbf/in (15.8 kN/m)
vii. Elongation at peak load @ 0°F (-18°C), lbf/in (kN/m):
a) MD 35%, XMD 40%
viii. Peak load @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 85 lbf/in (14.9 kN/m), XMD 65 lbf/in (11.4 kN/m)
ix. Elongation at peak load @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 55%, XMD 60%
x. Ultimate Elongation @ 73.4°F (23°C), lbf/in (kN/m):
a) MD 65%, XMD 80%
xi. Tear Strength @ 73.4°F (23°C), lbf (N):
a) MD 125 lbf (556 N), XMD 85 lbf (378 N)
xii. Low temperature flexibility, °F (°C):
a) MD/XMD: -15°F (-26°C)
xiii. Dimensional stability, %:
a) MD/XMD: Less than 0.5%
xiv. Compound stability, °F (°C):
a) MD/XMD: 240°F (116°C)
xv. ASTM D 5385:
a) Pass

B. FLASHING MEMBRANE:

1. POLYMETHACRYLATE LIQUID-APPLIED FLASHING (PMA):
a. SOPREMA ALSAN RS 260 LO FLASH System: Liquid-applied, catalyzed flashing membrane with an embedded polyester reinforcement fabric used for monolithic waterproofing flashing membranes.
i. SOPREMA ALSAN RS 260 LO FLASH: Low odor, rapid curing, polymethacrylate (PMA) liquid resin
a) VOC Content: 0.5 g/L
b) Color: Grey
ii. SOPREMA ALSAN RS CATALYST POWDER: Reactive agent used to induce curing of PMA resin products.

iii. SOPREMA ALSAN RS FLEECE: Woven polyester reinforcement used in PMA liquid membrane applications.
a) Thickness: 30-40 mils (0.8-1 mm)
b) Weights: 110 g/m^2
c) Width: 13 in (35 cm), 21 in (53 cm), 41 in (105 cm). Size as required.
d) Length: 164 ft (50 m)

2. ELASTOMERIC LIQUID-APPLIED FLASHING:
a. SOPREMA COLPHENE LIQUID MEMBRANE Flashing System: Two-component elastomeric, solvent free liquid membrane reinforced with self-adhesive modified bitumen membrane.
i. SOPREMA COLPHENE LIQUID MEMBRANE: Two component, elastomeric, solvent free liquid used to flash blindside waterproofing penetrations.

3. POLYMETHYL METHACRYLATE (PMMA) DETAILING FLASHING:
a. SOPREMA ALSAN RS DETAILER Flashing System: Rapid curing, catalyzed polymethyl methacrylate (PMMA) liquid resin with microfibers used as the waterproofing paste where it is difficult to install a conventional reinforced waterproofing membrane.
i. SOPREMA ALSAN RS DETAILER: Polymethyl methacrylate (PMMA) liquid resin with microfibers used as the waterproofing paste where it is difficult to install a conventional reinforced waterproofing membrane.
ii. SOPREMA ALSAN RS CATALYST POWDER: Reactive agent used to induce curing of PMMA resin products.

C. DRAINAGE MAT & PROTECTION BOARD:

1. SOPREMA SOPRADRAIN™ ECOVENT 2: Entangled polypropylene filament drainage mat with a geo-composite fabric on both sides used to drain vertical and horizontal waterproofing applications.
a. Core material: Polypropylene
b. Thickness in (mm): 0.50 (12.7)
a. Width: 48 in (1220 mm)
b. Length: 100 ft (30.5 m)
c. Compressive Strength psf (kPa): >30,000 (1436)
d. Core weight oz/yd^2 (g/m^2): 16 (543)
e. Fabric weight oz/yd^2 (g/m^2): 4 (152.6)
f. Flow rate gal/min/ft^2 (l/sec/m^2): 120 (4887)

1.04 ACCESSORIES

A. SELF-ADHERED MEMBRANE PRIMERS:
1. SOPREMA ELASTOCOL STICK ZERO Primer: 0 g/L VOC solvent, self-adhesive membrane primer. Low VOC, solvent-based primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhesive SBS flashing applications.
2. SOPREMA ELASTOCOL STICK (ELASTOCOL 600c) Primer: Self-adhesive membrane primer. SBS polymer, resin and, solvent-based primer for the preparation of membrane substrates for self-adhesive SBS membrane and self-adhered SBS flashing applications.

B. HEAT WELDED MEMBRANE PRIMERS:

1. SOPREMA ELASTOCOL 500 Primer: Asphalt cut-back primer. Primer for the preparation of membrane substrates for heat-welded and SOPREMA COLPLY ADHESIVE, solvent-based, cold adhesive-applied and cement applications. NOTE: Priming is not required for SOPREMA COLPLY EF ADHESIVE and SOPREMA COLPLY EF FLASHING CEMENT applications.
   a. Meets or exceeds ASTM D41
   b. VOC content: 350 g/L or less.
2. SOPREMA ELASTOCOL 350 Primer: Polymer emulsion primer, meeting low VOC requirements for the preparation of membrane substrates for torch and SOPREMA COLPLY adhesive and flashing cement applications.

C. LIQUID APPLIED PMA FLASHING PRIMERS:

1. SOPREMA ALSAN RS 222 PRIMER: Rapid curing, polymethyl methacrylate (PMMA) liquid resin used to promote adhesion of PMMA/PMA membranes over asphaltic substrates, wood, concrete and approved waterproofing board substrates.
   a. VOC content: 2.5 g/L
   b. Color: Clear
2. SOPREMA ALSAN RS METAL PRIMER: Solvent-based primer used to improve the adhesion of PMMA/PMA membranes to metal substrates.
   a. VOC content: 50 g/L
   b. Color: Off White

D. FLASHING CEMENT

1. SOPREMA COLPLY EF FLASHING CEMENT: Premium, non-toxic, low-odor, solvent-free, polymeric membrane flashing cement for use with sanded base ply and all sanded Cap Sheet flashing applications.
   a. VOC Content: 32 g/L or less VOC Content.

C. GENERAL PURPOSE SEALANT

1. SOPREMA SOPRAMASTIC SP1: General purpose, paintable, gun-grade, elastomeric, polyether moisture curing sealant for sealing SBS membrane terminations, Kynar 500 PVDF, horizontal and vertical construction joints.
   a. VOC Content: 20 g/L or less.
   b. Meets or exceeds ASTM C920, Type S, Grade NS, Class 50.
   c. Standard color.

D. TERMINATION BAR & FASTENERS

1. Termination Bar: Extruded aluminum, 1 in (25 mm) wide by .098 in (2.5 mm) thick with sealant edge and fastener holes at maximum 12 in (300 mm) centers anchored using appropriate and acceptable fasteners.

E. LIQUID APPLIED FLASHING MEMBRANE CLEANER:

1. SOPREMA ALSAN RS CLEANER: Clear, blended solvent used to clean and prepare plastic and metal surfaces or used to clean existing ALSAN RS surfaces prior to the application of PMMA/PMA liquid applied membrane and flashings.
   a. VOC content: <5 g/L
   b. Color: Clear

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.
B. The contractor shall examine all waterproofing substrates.
C. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified waterproofing materials.
D. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified waterproofing system.
E. No waterproofing membranes will be installed during rain or snowfall. Use of salt or calcium is prohibited to remove ice or snow.
F. Verify the compatibility of all membrane components with curing compounds, coatings or other materials which are already or will be installed on the surfaces to be treated.

3.02 HEAT WELDING

A. The Contractor is responsible for project safety. Where conditions are deemed unsafe to use open flames, manufacturer's alternate membrane application methods shall be used to install SBS modified bitumen membrane and flashings. Acceptable alternate installation methods include cold adhesive-applied and self-adhered membranes. Hot-air welding equipment may be used in lieu of roof torches to seal membrane side and end laps where heat welding the laps is necessary. Refer to NRCA CERTA, local codes and building owner's requirements for hot work operations.
Single or multi-nozzle, hand-held propane roof torches shall be used to install heat-welded membrane and flashing plies. Multi-nozzle carts (dragon wagons) may also be utilized to install membrane plies. Seven (7) nozzle carts are recommended for more uniform heat application in lieu of five (5) nozzle carts.

3.03 SUBSTRATE PREPARATION

A. Before commencing work each day, the contractor shall prepare all waterproofing substrates to ensure conditions are satisfactory to proceed with the installation of specified waterproofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.
C. Refer to manufacturer's literature for requirements for preparation of substrates. Surfaces shall be structurally sound and free of voids, spalled areas, loose aggregate and sharp protrusions. Remove contaminates such as grease, oil and wax from exposed surfaces. Remove dust, dirt, loose stone and debris. Use repair materials and methods which are acceptable to manufacturer of sheet membrane waterproofing. Meet requirements detailed in ASTM D 5295 "Preparation of Concrete Surfaces for Adhered (Bonded) Membrane Waterproofing Systems".
D. All joints must be properly grouted, sealed and have received the appropriate water stop as required. All such materials are to be fully cured and functioning as the primary joint seal, prepared to receive the waterproofing membrane.
E. Cast-In-Place Concrete Substrates:
    1. Do not proceed with installation until concrete has properly cured and dried (minimum 7 days for normal structural concrete poured on a vented deck and minimum 14 days for lightweight structural concrete). Horizontal slabs should be sloped for positive drainage.

2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
3. Repair substrate irregularities and imperfections, grouting and sealing joints and transitions as required to finish flush with surrounding surface areas.
4. All concrete shall be smooth and free of voids. All areas shall be free of honeycombs, sharp protrusions, fins, laitance, and will be free of damaged, spalled areas.
5. Grind irregular construction joints to suitable flush surface. Dissimilar materials must receive a reinforcing membrane.
6. Form Release Agents: Petroleum based products; distillates are not to be used.

F. Masonry Substrates: Apply waterproofing over concrete block and brick with smooth trowel-cut mortar joints or cementitious parge coat.

G. Wood Substrates: Apply waterproofing membrane over securely fastened, sound surface. All joints and fasteners shall be flush to create a smooth surface.

H. Related Materials: Treat joints and install flashing as recommended by waterproofing membrane manufacturer.

3.04 WATERPROOFING MEMBRANE PRIMER APPLICATION

A. Examine all substrates, and conduct adhesion peel tests as necessary, to ensure satisfactory adhesion is achieved.

B. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.

C. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet. Lightly prime for uniform coverage, do not apply heavy or thick coats of primer.

D. Asphalt Primer: Apply (SOPREMA ELASTOCOL 500 or SOPREMA ELASTOCOL 350) primer to dry compatible masonry, metal, wood and other required substrates before applying heat-welded membrane plies. Primer is optional for solvent based solvent based SBS adhesives and cements. Refer to product data sheets.

E. Self-Adhesive Membrane Primer: Apply (SOPREMA ELASTOCOL STICK or SOPREMA ELASTOCOL STICK ZERO) to dry, compatible substrates as required to enhance adhesion of self-adhesive membrane plies. Ensure self-adhered membrane primer is tacky to-the-touch, but not wet. Primer should not transfer to the fingertips when touched.

F. Primer is not required for SOPREMA COLPLY EF ADHESIVE and SOPREMA COLPLY EF FLASHING CEMENT.

G. Project conditions vary throughout the day. Monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.

3.05 WATERPROOFING MEMBRANE APPLICATION

A. GENERAL:
1. Follow material product data sheets and published general requirements for installation instructions.
2. Joints, control joints, and any crack over 1/16 in (1.5 mm) wide will be void free and stripped in with an additional 12 in (300 mm) reinforcing ply of waterproofing membrane centered over the joint, fully self-adhered or heat welded over primed surface.
3. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully sealed watertight. Inspect the installation each day to ensure the plies are secure and adhered.
4. Repair deficiencies using specified self-adhesive membrane. After cleaning, removal of all loose materials and proper surface preparation, all cuts, tears, abrasions, poor seam adhesion, and slit blemishes, fish mouths, wrinkles, and all other imperfections will be repaired with waterproofing membrane extending 6 in

(150 mm) in all directions from the point of repair. The edges of this patch will receive a trowel application of COLPHENE Liquid Membrane, SOPRAMASTIC SBS Elastic Cement, or SOPRAMASTIC SP1 Sealant.

5. Install waterproofing membrane in maximum 8 ft (2.4 m) or otherwise manageable lengths as required assuring waterproofing membrane is smoothly adhered and that there are no voids or fish mouths.
6. Trowel a bead of COLPHENE Liquid Membrane, SOPRAMASTIC SBS Elastic Cement, or SOPRAMASTIC SP1 Sealant to all horizontal and all vertical terminations at the end of each day, and to laps that occur within 12 in (300 mm) of a corner.
7. All penetrations are to be firmly anchored from the interior, immobilized and grouted flush to eliminate voids. Install waterproofing membrane to within ½ in (13 mm) of the penetration. Where appropriate, apply a continuous bead of COLPHENE Liquid Membrane at the base of the penetration extended onto the vertical wall 3 in (75 mm) and onto the penetration 12 in (300 mm) minimum.
8. Footer and all angle changes, (vertical wall to horizontal deck substrate; and inside corners, wall to wall) install a 12 in (300 mm) width of waterproofing membrane as a reinforcement membrane centered 6 in (75 mm) up the wall and 6" onto the footer/deck (wall to wall is to be centered 6" onto one wall and 6 in (75 mm) onto the opposing wall). Self-adhered waterproofing membrane shall be applied with a bead of COLPHENE Liquid Membrane applied to extend 3 in (75 mm) onto the vertical wall and 3 in (75 mm) onto the horizontal deck. Apply pressure to ensure membrane is fully adhered and sealed tightly.
9. Outside corners will receive a 12 in (300 mm) width of waterproofing membrane as a reinforcement, wrapping the corner 6 in (150 mm) in each direction (COLPHENE Liquid Membrane is not required). With self-adhered membranes, corners must be tightly seated and sealed from the finished side with COLPHENE Liquid Membrane as required.
10. As the field membrane is installed, ensure all reinforcement membrane is covered, providing a full two ply finished assembly. All perimeter wall terminations are required and must meet local building code requirements and SOPREMA Approved Details.
11. Terminations: Membrane shall be terminated in accordance with SOPREMA Approved Details. Waterproofing membrane will be terminated at or above grade by firmly seating and sealing top edge of the sheet and applying a bead of SOPRAMASTIC SP1 Sealant at the top edge of the sheet. The extruded aluminum termination bar will be fastened with appropriate, approved fasteners on not less than 12 in (300 mm) centers. The termination bar must provide constant, adequate, even pressure to hold the membrane in place. Add additional fasteners as conditions (and assembly) require. SOPRAMASTIC SP1 Sealant will be applied in the sealant ledge of the termination bar.
12. Following flashing installation, install waterproofing membrane cap-ply.

3.06 SELF-ADHESIVE MEMBRANE APPLICATION (2-PLY ASSEMBLY)

A. Follow material product data sheets and published general requirements for installation instructions.
B. Ensure environmental conditions are satisfactory, and will remain satisfactory, during the application of the self-adhesive membrane.
C. Unroll membrane onto the surface and allow time to relax prior to installing the membrane.
D. Starting at the low point of the surface, lay out the membrane to ensure the plies are installed perpendicular to the slope, shingled to prevent back-water laps.
E. Ensure all waterproofing and flashing substrates are prepared and acceptable to receive the self-adhesive membrane.
F. Ensure primer is tacky to-the-touch, but not wet. Primer should not transfer to the fingertips when touched. Do not proceed if primer is wet or becomes fully dry and dirty. If primer

becomes fully dry, dirty and loses all tack, re-prime the substrate as necessary to achieve membrane adhesion.

G. Cut rolls to working lengths and widths to conform to conditions and lay out to always work to a selvage edge.

H. Ensure membrane side-laps and end-laps are maintained.

I. Peel the release film from the underside of the membrane. Press and adhere the leading edge of the membrane to the substrate but leaving the 6 in end-lap un-adhered in order to heat weld the end-lap.

J. As the release film is peeled away, use a hand-roller to firmly set the sheet in place. Ensure full contact is made between the ply and the substrate for full adhesion. Roll-in vertical flashings and confined areas to firmly apply pressure.

K. Adhere all end-laps using torch or hot-air welder or adhere using specified cold adhesive.

L. At 6 in (150 mm) end-laps, cut a 45-degree dog-ear away from the 3 in (75 mm) selvage edge, or otherwise ensure the membrane is fully heat-welded or adhered watertight at all T-joints.

M. Offset self-adhered end-laps 3 ft (0.9 m).

N. Each day physically inspect all side and end-laps, and ensure the membrane is watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are fully sealed.

O. Inspect the installation each day to ensure the plies are fully adhered. Repair all un-adhered voids, wrinkles, open laps and all other deficiencies.

P. Offset cap sheet side and end-laps away from the base ply laps so that cap sheet laps are not located within 18 in (457 mm) of base ply laps.

3.07 ALTERNATE: HEAT-WELDED, FULLY ADHERED MEMBRANE APPLICATION (2-PLY ASSEMBLY)

A. Follow material product data sheets and published general requirements for installation instructions.

B. Ensure environmental conditions are safe and satisfactory, and will remain safe and satisfactory, during the application of the heat-welded membrane and flashings.

C. Ensure all primers are fully dry before beginning heat-welding operations.

D. Unroll membrane onto the waterproofing surface and allow time to relax prior to heat welding.

E. Starting at the low point of the surface, lay out the membrane to ensure the plies are installed perpendicular to the slope, shingled to prevent back-water laps.

F. Ensure all waterproofing and flashing substrates are prepared and acceptable to receive the heat-welded membrane.

G. Cut membrane to working lengths and widths to conform to conditions and lay out to always work to a selvage edge.

H. Ensure specified side-laps and end-laps are maintained. End-laps should be staggered 3 ft (0.9 m) apart.

I. Direct roof torch on the roll as necessary to prevent overheating and damaging the membrane and substrates.

J. As the membrane is unrolled, apply heat to the underside of the membrane until the plastic burn-off film melts away. Continuously move the torch side-to-side across the underside of the roll to melt the bitumen on the underside of the sheet, while continuously unrolling membrane.

K. While unrolling and heating the sheet, ensure approximately ¼ to 1/2 in (6 to 12 mm) of hot bitumen flows ahead of the roll as it is unrolled, and there is 1/8 to 1/4 in (3 to 6 mm) bleed out at all laps.

L. Adjust the application of heat to the underside of the membrane and to substrate as required for varying substrates and environmental conditions.

M. At the 6 in (150 mm) end-laps, melt the plastic burn-off film from the top surface or embed granules and remove surfacing, where present, using a torch or hot-air welder.

N. At end-laps where T-Joints exist, cut a 45-degree dog-ear away from the selvage edge, or otherwise ensure the membrane is fully heat-welded watertight at all T-joints.
O. Each day physically inspect all side and end-laps, and ensure the membrane is sealed watertight. Where necessary, use a torch or hot-air welder and a clean trowel to ensure all laps are fully sealed.
P. Inspect the installation each day to ensure the plies are fully adhered. Repair all voids, wrinkles, open laps and all other deficiencies.
Q. Offset cap sheet side and end-laps away from the base ply laps so that cap sheet laps are not located within 18 in (457 mm) of base ply laps.

3.08 PENETRATION FLASHINGS STAGING & INSTALLATION (GENERAL)

A. Refer to manufacturer's details drawings, product data sheets and published general requirements for specific flashing installation instructions.
B. Flashings should be applied to prepared and primed substrates overlapping the base-ply membrane 8 in (200 mm) minimum. After flashing has fully cured, apply a secondary overlapping ply of waterproofing membrane set in COLPHENE LIQUID MEMBRANE.
C. Prior to applying flashings on heat welded waterproofing membrane base-ply, remove polyolefin burn-off film to a point 1 in (25 mm) beyond liquid applied flashing overlap termination.
D. Install waterproofing membrane cap-ply following installation of all flashings.

3.09 PMMA PRIMER APPLICATION (SOPREMA ALSAN RS 222)

A. Refer to manufacturer's detail drawings, product data sheets and published general requirements for application rates and specific installation instructions.
B. Examine all substrates and conduct adhesion peel tests as necessary to ensure satisfactory adhesion is achieved.
C. Mix primer resin and catalyst approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of primer that can be used within the application time.
D. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.
E. Apply primer using brush or roller at the rate published on the product data sheet. Do not allow primer to pond or collect in low areas.
F. Project conditions vary throughout the day. Monitor changing conditions, and the curing time of primers.
G. Allow primer to fully cure before membrane application.

3.10 METAL PRIMER APPLICATION (SOPREMA ALSAN RS METAL PRIMER)

A. Mix primer resin approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of primer that can be used within the application time.
B. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.
C. Apply primer using brush or roller at the rate published on the product data sheet. Do not allow primer to pond or collect in low areas.
D. Project conditions vary throughout the day. Monitor changing conditions, and the curing time of primers.
E. Allow primer to fully cure before membrane application.

3.11 LIQUID-APPLIED, PMA MEMBRANE FLASHING APPLICATION (ALSAN RS LO)

A. Refer to manufacturer's details drawings, product data sheets and published general requirements for application rates and specific installation instructions.
B. Pre-cut SOPREMA ALSAN RS FLEECE polyester reinforcing fleece to conform to waterproofing terminations, transitions and penetrations being flashed. Ensure a minimum 2 in (50 mm) overlap of fleece at side and end-laps. Ensure the completed liquid-applied flashing membrane is fully reinforced.
C. Apply the base coat of catalyzed SOPREMA ALSAN RS resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion.
D. Immediately apply the SOPREMA ALSAN RS FLEECE reinforcing into the wet base coat of resin. Using a brush or roller, work the (SOPREMA ALSAN FLEECE reinforcing fabric into the wet resin while applying the second coat of catalyzed SOPREMA ALSAN RS resin to completely encapsulate the fleece.
E. Refer to reinforced, polymethacrylate (PMA) specification section and application instructions, details drawings, product data sheets and published general requirements for installation instructions.

3.12 WATERPROOFING CONTINUITY TESTING & QC EVALUATION

A. Prior to applying drainage layer, protection board or backfilling, contractor shall conduct a complete evaluation of the installed waterproofing membrane and flashings which shall include visual inspection as well as an acceptable method for (low voltage, high voltage or water-flood) continuity testing when required.
B. Immediately following evaluation and continuity testing, repair all deficiencies identified in liquid applied waterproofing membrane and flashings.
Upon satisfactory completion of all required repairs, proceed with application of drainage layer, protection board and backfilling.

3.13 DRAINAGE / PROTECTION BOARD INSTALLATION

A. HORIZONTAL INSTALLATION:

1. Install the specified drainage layer directly on the waterproofing membrane with the filter fabric up, according to membrane manufacturer's written instructions. Use methods that do not penetrate the waterproofing assembly. Abut the drainage panels and overlap the shiplap filter fabric over the adjacent board. Carefully cut the drainage panels to fit the surface, ensuring that the waterproofing membrane is not damaged. Protect installed drainage panels during subsequent construction.

B. VERTICAL INSTALLATION:

1. Place and secure prefabricated drainage panels with the filter fabric facing away from vertical wall substrate. Use methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed drainage panels during subsequent construction. Install drainage panels or approved protection board in accordance with membrane manufacturer's written instructions.
2. If required, apply adhesive with spots 3 in (75 mm) in diameter, every 36 in (900 mm). Bottom panel should be supported. On the top row of protection board, apply a continuous bead of adhesive 1 in (25mm) wide to the top leading edge of the panels to be adhered. This bead will protect the adhesive spots during initial cure by limiting the flow of moisture behind the board in case of rain.

C. BACKFILLING
1. Backfilling should commence immediately after installation of protection boards.

3.14 CLEAN-UP

A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION 071326

SECTION 07 13 52 - MODIFIED BITUMINOUS SHEET WATERPROOFING
(BLINDSIDE WATERPROOFING)

PART 1 GENERAL

1.01 SUMMARY

A. Work shall include, but is not limited to, the following:
   1. Preparation of all field and flashing substrates.
   2. SBS-modified bitumen vertical field membrane.
   3. SBS-modified bitumen horizontal field membrane.
   4. Protection sheet, self-adhered.
   5. Liquid-applied, reinforced flashings.
   6. All related materials and labor required to complete specified waterproofing necessary to receive specified manufacturer's warranty.

1.02 RELATED SECTIONS

A. Division 01 00 00 General Requirements

1.03 DEFINITIONS

A. ASTM D 1079 - Definitions of Term Relating to Roofing and Waterproofing.
B. The National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual, Fifth Edition Glossary.

1.04 REFERENCES

A. AMERICAN STANDARD OF TESTING METHODS (ASTM):
   1. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
   2. ASTM D 903 – Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
   3. ASTM D 1970 – Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
   4. ASTM D 412 - Standard Test Method for Tensile Strength and Ultimate Elongation
   5. ASTM D 5385 – Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
   6. ASTM D 5385 (modified)– Standard Test Method for Lateral Water Migration
   7. ASTM D 5601 – Standard Test Method for Tearing Resistance of Roofing and Waterproofing Materials and Membranes.
   8. ASTM E 96 – Standard Test Methods for Water Vapor Transmission of Materials.
   9. ASTM E 154 – Standard Test Method for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
   10. ASTM D 1876 – Standard Test Method for Lap Peel Adhesion
   11. ASTM D 570 – Standard Test Method for Water Absorption
   12. ASTM D 1434 – Standard Test Method for Methane Gas Permeability
   13. ASTM D 1894 – Standard Test Method for Coefficient of Friction

1.05 ACTION SUBMITTALS

A. Product Data Sheets: Submit manufacturer's product data sheets, installation instructions and/or general requirements for each component.

B. Safety Data Sheets: Submit manufacturer's Safety Data Sheets (SDS) for each component.
C. Sample/Specimen Warranty from the manufacturer and contractor.
D. Shop Drawings: Provide roof plan and applicable roof system detail drawings.

1.06 INFORMATIONAL SUBMITTALS

A. Contractor Certification: Submit written certification from waterproofing manufacturer certifying that the applicator is authorized by the manufacturer to install the specified materials and system.

1.07 CLOSEOUT SUBMITTALS

A. Warranty: Provide manufacturer's and contractor's warranties upon substantial completion of the waterproofing.

1.08 QUALITY ASSURANCE

A. MANUFACTURER QUALIFICATIONS:
1. Manufacture shall have 20 years of experience manufacturing SBS-modified bitumen waterproofing materials.
2. Provide specified warranty upon satisfactory project completion.

B. CONTRACTOR QUALIFICATIONS:
1. Contractor shall be authorized by the manufacturer to install specified materials prior to the bidding period through satisfactory project completion.
2. Contractor shall provide full time, on-site superintendent or foreman experienced with the specified waterproofing through satisfactory project completion.
3. Applicators shall be skilled in the application methods for all materials.
4. Contractor shall maintain a daily record, on-site, documenting material installation and related project conditions.
5. Contractor shall maintain a copy of all submittal documents, on-site, available at all times for reference.

1.09 DELIVERY, STORAGE AND HANDLING

A. Refer to each product data sheet or other published literature for specific requirements.
B. Deliver materials and store them in their unopened, original packaging, bearing the manufacturer's name, related standards, and any other specification or reference accepted as standard.
C. Protect and store materials in a dry, well-vented, and weatherproof location. Only materials to be used the same day shall be removed from this location. During cold weather, store materials in a heated location, removed only as needed for immediate use.
D. When materials are to be stored outdoors, store away from standing water, stacked on raised pallets or dunnage, at least 4 in or more above ground level. Carefully cover storage with "breathable" tarpaulins to protect materials from precipitation and to prevent exposure to condensation.
E. Carefully store waterproofing membrane materials delivered in rolls on-end with selvage edges up. Store and protect roll storage to prevent damage.
F. Properly dispose of all product wrappers, pallets, cardboard tubes, scrap, waste, and debris. All damaged materials shall be removed from job site and replaced with new, suitable materials.

1.10 SITE CONDITIONS

A. SAFETY:
1. The contractor shall be responsible for complying with all project-related safety and environmental requirements.
2. Heat-welding shall include heating the specified membrane ply using propane roof torches or electric hot-air welding equipment. The contractor shall determine when and where conditions are appropriate to utilize heat-welding equipment. When conditions are determined by the contractor to be unsafe to proceed, equivalent SBS-modified bitumen materials and methods shall be utilized to accommodate requirements and conditions.
3. Refer to NRCA CERTA recommendations, local codes and building owner's requirements for hot work operations.
4. The contractor shall review project conditions and determine when and where conditions are appropriate to utilize the specified liquid-applied, or semi-solid waterproofing materials. When conditions are determined by the contractor to be unsafe or undesirable to proceed, measures shall be taken to prevent or eliminate the unsafe or undesirable exposures and conditions, or equivalent approved materials and methods shall be utilized to accommodate requirements and conditions.
5. The contractor shall refer to product Safety Data Sheets (SDS) for health, safety, and environment related hazards, and take all necessary measures and precautions to comply with exposure requirements.

B. ENVIRONMENTAL CONDITIONS:
1. Monitor substrate temperature and material temperature, as well as all environmental conditions such as ambient temperature, moisture, sun, cloud cover, wind, humidity, and shade. Ensure conditions are satisfactory to begin work and ensure conditions remain satisfactory during the installation of specified materials. Materials and methods shall be adjusted as necessary to accommodate varying project conditions. Materials shall not be installed when conditions are unacceptable to achieve the specified results.
2. Precipitation and dew point: Monitor weather to ensure the project environment is dry before, and will remain dry, during the application of waterproofing materials. Ensure all waterproofing materials and substrates remain above the dew point temperature as required to prevent condensation and maintain dry conditions.
3. Self-adhered membrane application: During cold weather, store the specified self-adhered membrane and primer materials in heated storage areas to ensure materials remain no less than 70°F (21°C) during application. Ensure conditions allow primer to remain tacky, but not wet so that primer will transfer to finger when touched. Self-adhered primer should not fully dry and lose tack before applying the self-adhered membrane. Ensure conditions remain satisfactory to achieve membrane adhesion as specified.
4. Heat-Welding Application: Take all necessary precautions and measures to monitor conditions to ensure all environmental conditions are safe to proceed with the use of torches and hot-air welding equipment. Combustibles, flammable liquids and solvent vapors that represent a hazard shall be eliminated and primers shall be fully dry before proceeding with heat-welding operations. Refer to NRCA CERTA recommendations.

1.11 WARRANTY

A. Manufacturer's Warranty. The manufacturer shall provide the owner with the manufacturer's warranty providing labor and materials to for 10 years from the date the warranty is issued.

B. The contractor shall guarantee the workmanship and shall provide the owner with the contractor's warranty covering workmanship for a period of 2 years from completion date.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. SINGLE SOURCE MANUFACTURER: All products shall be provided by a single supplier with 20 years or more waterproofing manufacturing history in the US.
   1. Comply with the Manufacturer's requirements as necessary to provide the specified warranty.

B. PRODUCT QUALITY ASSURANCE PROGRAM: Manufacturer shall be an ISO 9001 registered company.

C. BASIS OF DESIGN:
   1. SOPREMA, located at: 310 Quadral Dr.; Wadsworth, OH 44281
      a. Contact: Maciej Tobolewski; Cell: (908) 400-1369
      b. Website: www.soprema.us
   2. Or Architect Approved Equal

2.02 WATERPROOFING SYSTEM

A. WATERPROOFING SYSTEM BASIS OF DESIGN:
   1. SOPREMA

2.03 BLINDSIDE WATERPROOFING

A. VERTICAL FIELD MEMBRANE:
   1. SBS-MODIFIED BITUMEN:
      a. SOPREMA COLPHENE BSW V: SBS-modified bitumen, self-adhesive membrane with release film on the bottom surface and a sanded top surface used for vertical blindside waterproofing applications. Composite reinforcement. DUO SELVEDGE side laps.
         i. Thickness: 120 mils (3.0 mm)
         ii. Width: 39.4 in (1 m)
         iii. Length: 32.8 ft (10 m)
         iv. Adhesion of Poured Concrete (ASTM D 903 modified): 24.2 lbf/in (4235 N/m)
         v. Puncture Resistance (ASTM E154): 350 lb (1557 N)
         vi. Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
         vii. Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
         viii. Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
         ix. Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
         x. Low Temperature Flexibility (ASTM D 1970): Unaffected at -4ºF (-20°C)
         xi. Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
         xii. Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9ºF (-23°C)
         xiii. Lap Peel Adhesion (ASTM D 1876): 7.7 lbf/in (1360 N/m)
         xiv. Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 ng/Pa·s·m^2)
         xv. Water Absorption (maximum) (ASTM D 570): 0.5 %
         xvi. Methane Gas Permeability (ASTM D 1434): 1.6*10^{-6}ft²/hr at 14.7 psia (4.12*10^{-7} cm²/sec at 1 atm)

xvii. Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.03 static 0.76 kinetic
xviii. Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.84 static 0.67 kinetic

b. SOPREMA COLPHENE BSW H: SBS-modified bitumen membrane with plastic burn-off film on the bottom surface and a sanded top surface used for vertical blindside waterproofing applications. Polyester reinforcement.
i. Thickness: 140 mils (3.5 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 32.8 ft (10 m)
iv. Adhesion of Poured Concrete (ASTM D 903 modified): 19.6 lbf/in (3430 N/m)
v. Puncture Resistance (ASTM E154): 311 lb (1383N)
vi. Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
vii. Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
viii. Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)
ix. Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
x. Low Temperature Flexibility (ASTM D 1970): Unaffected at -4ºF (-20°C)
xi. Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
xii. Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9ºF (-23°C)
xiii. Lap Peel Adhesion (ASTM D 1786): 7.7 lbf/in (1360 N/m)
xiv. Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 ng/Pa·s·m^2)
xv. Water Absorption (maximum) (ASTM D 570): 0.5 %
xvi. Methane Gas Permeability (ASTM D 1434): 1.6*10^{-6}ft²/hr at 14.7 psia (4.12*10^{-7} cm²/sec at 1 atm)
xvii. Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static 0.71 kinetic
xviii. Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63 kinetic

B. HORIZONTAL FIELD MEMBRANE:
1. SBS-MODIFIED BITUMEN:
a. SOPREMA COLPHENE BSW H: SBS-modified bitumen membrane with plastic burn-off film on the bottom surface and a sanded top surface used for horizontal blindside waterproofing applications. Polyester reinforcement.
i. Thickness: 140 mils (3.5 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 32.8 ft (10 m)
iv. Adhesion of Poured Concrete (ASTM D 903 modified): 19.6 lbf/in (3430 N/m)
v. Puncture Resistance (ASTM E154): 311 lb (1383N)
vi. Resistance to Hydrostatic Head (ASTM D 5385 modified): >360 ft (110 m)
vii. Resistance to Lateral Migration (ASTM D 5385 modified): >360 ft (110 m)
viii. Tensile Strength, MD/XD (ASTM D 412): 3437/2638 psi (23.7/18.1 MPa)

ix. Ultimate Elongation, MD/XD (ASTM D 412): 67/74 %
x. Low Temperature Flexibility (ASTM D 1970): Unaffected at -4ºF (-20°C)
xi. Tear Resistance (ASTM D 5601): 28.1 lbf (125 N)
xii. Low Temperature Crack Bridging (ASTM C 836 (C1305)): Unaffected at -9ºF (-23°C)
xiii. Lap Peel Adhesion (ASTM D 1786): 7.7 lbf/in (1360 N/m)
xiv. Water Vapor Transmission (ASTM E 96 Procedure B): <0.037 perms (2.1 ng/Pa·s·m^2)
xv. Water Absorption (maximum) (ASTM D 570): 0.5 %
xvi. Methane Gas Permeability (ASTM D 1434): 1.6*10^{-6}ft²/hr at 14.7 psia (4.12*10^{-7} cm²/sec at 1 atm)
xvii. Coefficient of Friction (ASTM D 1894): sanded side on sanded side, 1.04 static 0.71 kinetic
xviii. Coefficient of Friction (ASTM D 1894): sanded side on concrete, 0.75 static 0.63 kinetic

C. FLASHING MEMBRANE:
1. POLYMETHACRYLATE LIQUID-APPLIED FLASHING (PMA):
a. SOPREMA ALSAN RS 260 LO FLASH System: Liquid-applied, catalyzed flashing membrane with an embedded polyester reinforcement fabric used for monolithic waterproofing flashing membranes.
i. SOPREMA ALSAN RS 260 LO FLASH: Low odor, rapid curing, polymethacrylate (PMA) liquid resin
a) VOC Content: 0.5 g/L
b) Color: Grey
ii. SOPREMA ALSAN RS CATALYST POWDER: Reactive agent used to induce curing of PMA resin products.
iii. SOPREMA ALSAN RS FLEECE: Woven polyester reinforcement used in PMA liquid membrane applications.
a) Thickness: 30-40 mils (0.8-1 mm)
b) Weights: 110 g/m^2
c) Width: 13 in (35 cm), 21 in (53 cm), 41 in (105 cm). Size as required.
d) Length: 164 ft (50 m)

2. POLYMETHYL METHACRYLATE (PMMA) DETAILING FLASHING:
a. SOPREMA ALSAN RS DETAILER Flashing System: Rapid curing, catalyzed polymethyl methacrylate (PMMA) liquid resin with microfibers used as the waterproofing paste where it is difficult to install a conventional reinforced waterproofing membrane.
i. SOPREMA ALSAN RS DETAILER: Polymethyl methacrylate (PMMA) liquid resin with microfibers used as the waterproofing paste where it is difficult to install a conventional reinforced waterproofing membrane.
ii. SOPREMA ALSAN RS CATALYST POWDER: Reactive agent used to induce curing of PMMA resin products.

3. ELASTOMERIC LIQUID-APPLIED FLASHING:
a. SOPREMA COLPHENE LIQUID MEMBRANE Flashing System: Two-component elastomeric, solvent free liquid membrane reinforced with self-adhesive modified bitumen membrane.
i. SOPREMA COLPHENE LIQUID MEMBRANE: Two component, elastomeric, solvent free liquid used to flash blindside waterproofing penetrations.

ii. SOPREMA COLPHENE 3000: SBS-modified bitumen, self-adhesive membrane with release film on the bottom surface and a polyethylene woven composite facer used to reinforce SOPREMA COLPHENE LIQUID MEMBRANE.
a) Thickness: 60 mils (1.5 mm)
b) Width: 36 in (0.9 m)
c) Length: 61 ft (18.6 m)

D. DRAINAGE MAT:
1. SOPREMA SOPRADRAIN ECO-2: Entangled polypropylene filament drainage mat with a geo-composite fabric on both sides used to drain vertical and horizontal blindside waterproofing applications.
a. Width: 39 in (1 m)
b. Length: 100 ft (30 m)
c. Compressive Strength: 1436 kPa (>30,000 PSF)

E. PROTECTION BOARD:
1. SOPREMA SOPRABOARD: Mineral fortified, asphaltic roof substrate board with glass fiber facers. For use as a protection board on vertical and horizontal substrates in blindside waterproofing applications. ASPHALTIC PROTECTION BOARD shall be manufactured by the membrane supplier.
a. Thickness: 1/8 in and 1/4 in
b. Dimensions: 4 x 4 ft, 4 x 5 ft and 4 x 8 ft

F. SECONDARY WATERPROOFING / PROTECTION SHEET:
1. SOPREMA COLPHENE BSW PROTECT'R: SBS-modified bitumen, self-adhesive membrane with release film on the bottom surface and a sanded top surface used as a secondary protection on horizontal blindside waterproofing applications. Composite reinforcement.
i. Thickness: 80 mils (2.0 mm)
ii. Width: 39.4 in (1 m)
iii. Length: 49.2 ft (15 m)

2.04 ACCESSORIES

A. SELF-ADHERED SBS MEMBRANE PRIMERS:
1. SOPREMA ELASTOCOL STICK: Self-Adhered membrane primer. SBS polymer, resin and, solvent-based primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhered SBS flashing applications.
2. SOPREMA ELASTOCOL STICK ZERO: Zero VOC, self-adhesive membrane primer. Low VOC solvent-based primer for the preparation of membrane substrates for self-adhered SBS membrane and self-adhered SBS flashing applications.

B. LIQUID APPLIED PMA FLASHING PRIMERS:
1. SOPREMA ALSAN RS 222 PRIMER: Rapid curing, polymethyl methacrylate (PMMA) liquid resin used to promote adhesion of PMMA/PMA membranes over asphaltic substrates, wood, concrete and approved waterproofing board substrates.
a. VOC content: 2.5 g/L
b. Color: Clear
2. SOPREMA ALSAN RS METAL PRIMER: Solvent-based primer used to improve the adhesion of PMMA/PMA membranes to metal substrates.
a. VOC content: 50 g/L
b. Color: Off White

C. FASTENERS AND PLATES:
1. SOPREMA #12 DP Fastener and 3 in stress plate: Fastener and plate used to secure drainage mat to wood lagging.
2. SOPREMA #12 DP Fastener and 2 in stress plate: Fastener and plate used to secure vertical field membrane to wood lagging.

D. TERMINATION BAR & FASTENERS
1. Termination Bar: Extruded aluminum, 1 in (25 mm) wide by .098 in (2.5 mm) thick with sealant edge and fastener holes at maximum 12 in (300 mm) centers anchored using appropriate and acceptable fasteners.

E. LIQUID APPLIED FLASHING MEMBRANE CLEANER:
1. SOPREMA ALSAN RS CLEANER: Clear, blended solvent used to clean and prepare plastic and metal surfaces or used to clean existing ALSAN RS surfaces prior to the application of PMMA/PMA liquid applied membrane and flashings.
a. VOC content: <5 g/L
b. Color: Clear

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination includes visual observations, qualitative analysis, and quantitative testing measures as necessary to ensure conditions remain satisfactory throughout the project.
B. The contractor shall examine all waterproofing substrates.
C. The applicator shall not begin installation until conditions have been properly examined and determined to be clean, dry and, otherwise satisfactory to receive specified waterproofing materials.
D. During the application of specified materials, the applicator shall continue to examine all project conditions to ensure conditions remain satisfactory to complete the specified waterproofing system.
E. No waterproofing membranes will be installed during rain or snowfall. Use of salt or calcium is prohibited to remove ice or snow.
F. Verify the compatibility of all membrane components with curing compounds, coatings or other materials which are already or will be installed on the surfaces to be treated.

3.02 PREPARATION

A. Before commencing work each day, the contractor shall prepare all waterproofing substrates to ensure conditions are satisfactory to proceed with the installation of specified waterproofing materials. Preparation of substrates includes, but is not limited to, substrate repairs, securement of substrates, eliminating all incompatible materials, and cleaning.
B. Where conditions are found to be unsatisfactory, work shall not begin until conditions are made satisfactory to begin work. Commencing of work shall indicate contractor's acceptance of conditions.

3.03 DRAINAGE MAT APPLICATION

A. Drainage board must be supported and follow the shapes of the substrate.
B. Drainage board can bridge cracks and/or holes in the substrate from 1 to 2 in wide and deep. Cracks and/or holes in the substrate exceeding 2 in shall be prepared using mortar, shotcrete, plywood, SOPRABOARD (mechanically attached to substrate) or other approved method prior to the placement of the drainage board.
C. Install drainage mat in accordance with membrane manufacturer's published instructions.

D. Place and secure drainage mat with the filter fabric facing the positive side of the waterproofing. Overlap the edges of the geotextile fabric to maintain continuity.
E. For vertical applications, fasten drainage mat to substrate using appropriate fasteners and plates.
F. Ensure drainage panels are not damaged during subsequent construction.

3.04 PRE-APPLIED PROTECTION BOARD APPLICATION

A. Install protection board in accordance with manufacturer's published instructions.
B. Place and secure all boards fitted against adjoining boards to form tight joints.
C. For vertical applications, fasten and secure protection board to substrate using appropriate fasteners for the substrate.
D. Ensure protection board is not damaged during subsequent construction.

3.05 SUBSTRATE PRIMER APPLICATION

A. Examine all substrates and conduct adhesion peel tests as necessary to ensure satisfactory adhesion is achieved.
B. Apply the specified self-adhesive primer to dry, compatible substrates where determined primer is necessary to enhance adhesion.
C. For the self-adhesive waterproofing applied during cold temperatures (below 50ºF) the specified self-adhesive primer shall be applied.
D. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet.
E. Ensure self-adhered membrane primer is tacky to-the-touch, but not wet. Primer should not transfer to the fingertips when touched.
F. As project conditions vary throughout the day, applicator shall monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.

3.06 VERTICAL MEMBRANE APPLICATION – BASE PLY (COLPHENE BSW V)

A. Follow material product data sheets and published general requirements for installation instructions.
B. Temporarily fasten the top leading edge of the waterproofing ply in place using specified fasteners and plates. Upon completion, remove and seal fastener holes using specified heat welded waterproofing membrane or specified liquid-applied flashing.
C. Vertical blind side waterproofing membrane shall be applied in lengths not exceeding 16 ft (4.9m) or as necessary to accommodate project conditions.
D. Once in place, remove the release film on the underside of the sheet.
E. As the release film is peeled away, use an approved membrane roller to roll-in vertical membrane to firmly set the sheet in place. Ensure full contact is made between the ply and the substrate for full adhesion.
F. Ensure a minimum 4 in (100 mm) side-lap is achieved.
G. The 4 in (100 mm) duo-selvage side-lap consists of 2 in (50 mm) of self-adhesive on the inside edge of the lap and 2 in (50 mm) of heat welded membrane along the outside edge of the side-lap.
H. Using a roller, seal the self-adhesive portion of the side-lap, and use an approved roofing torch or hot-air welder to seal the 2 in (50 mm) heat welded portion of the side lap.
I. All waterproofing end-laps shall be overlapped 6 in (150 mm) and fully adhered by heat welding.
J. All end lap joints shall be aligned and overlapped a minimum of 6 in (150 mm) beyond all fastener penetrations and holes where fasteners were removed.
K. Ensure all membrane T-joints are heat welded and fully sealed.
L. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in (300 mm) reinforcing ply of membrane over the cold joint, fully heat-welded or self-adhered

over primed surface. The waterproofing reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.

M. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.

N. If a negative/back-water lap is created on the positive side of the waterproofing, heat weld or self-adhere a reinforcing ply to strip-in the end-lap joint. The reinforcing ply shall extend a minimum of 4 in (100 mm) beyond the joint in both directions.

O. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully sealed watertight.

P. Inspect the installation each day to ensure the plies are secure and adhered.

Q. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs, prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged membrane.

3.07 VERTICAL PROTECTION SHEET APPLICATION – TOP PLY (COLPHENE BSW PROTECT'R)

A. Follow material product data sheets and published general requirements for installation instructions.

B. Ensure environmental conditions are satisfactory, and will remain satisfactory, during the application of the primer and self-adhesive membrane.

C. Ensure base-ply membrane is prepared, clean, dry and acceptable to receive primer and self-adhesive membrane.

D. Apply the specified self-adhesive primer to dry base-ply membrane to enhance adhesion.

E. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet.

F. Ensure self-adhered membrane primer is tacky to-the-touch, but not wet. Primer should not transfer to the fingertips when touched.

G. As project conditions vary throughout the day, applicator shall monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.

H. Unroll the protection sheet and loose lay in place

I. Ensure minimum 1 in (25 mm) side and end-laps.

J. Adhere the protection sheet in a continuous longitudinal strip over the vertical waterproofing membrane by removing the silicone release film.

K. As the release film is peeled away, use a stiff push broom or roller to firmly set the sheet in place. Ensure full contact is made between the ply and the substrate for full adhesion.

L. Each day physically inspect all side and end-laps, and ensure the membrane is sealed watertight.

M. Inspect the installation each day to ensure the plies are fully adhered. Repair all un-adhered voids, wrinkles, open laps and all other deficiencies.

N. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs, prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in beyond the damaged membrane.

3.08 HORIZONTAL FIELD MEMBRANE APPLICATION – BASE PLY (COLPHENE BSW H)

A. Follow material product data sheets and published general requirements for installation instructions.

B. Unroll horizontal blind side waterproofing membrane loose laid onto the prepared substrate, or onto specified drainage mat/protection board where applicable per design requirements.

C. The 4 in (100 mm) duo-selvage side-lap consists of 2 in (50 mm) of self-adhesive on the inside edge of the lap and 2 in (50 mm) of heat welded membrane along the outside edge of the side-lap.

D. Remove the side-lap release film and use a roller to seal the self-adhesive portion of the side-lap. Use an approved roofing torch or hot-air welder to seal the 2 in heat welded portion of the side lap.

E. All end lap joints shall be overlapped a minimum of 6 in (150 mm).
F. End-laps shall be staggered 12 in (300 mm) or more. Where T-joints are formed at the end-laps, cut away a 4 in (100 mm) corner at a 45º angle from the overlying end-lap.
G. Waterproofing over concrete cold joints shall be reinforced by installing an additional 12 in (300 mm) reinforcing ply of membrane over the cold joint, fully heat-welded or self-adhered over primed surface. The waterproofing reinforcing ply shall be centered in the angle of the cold joint or over the cold joint.
H. All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
I. Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully sealed watertight.
J. Inspect the installation each day to ensure the plies are secure and adhered.
K. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs, prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in (150 mm) beyond the damaged membrane.

3.09 HORIZONTAL PROTECTION SHEET APPLICATION – TOP PLY (COLPHENE BSW PROTECT'R)

A. Follow material product data sheets and published general requirements for installation instructions.
B. Ensure environmental conditions are satisfactory, and will remain satisfactory, during the application of the primer and self-adhesive membrane.
C. Ensure base-ply membrane is prepared, clean, dry and acceptable to receive primer and self-adhesive membrane.
D. Apply the specified self-adhesive primer to dry base-ply membrane to enhance adhesion.
E. Apply primer using brush, roller, or sprayer at the rate published on the product data sheet.
F. Ensure self-adhered membrane primer is tacky to-the-touch, but not wet. Primer should not transfer to the fingertips when touched.
G. As project conditions vary throughout the day, applicator shall monitor changing conditions, monitor the drying time of primers, and monitor the adhesion of the membrane plies. Adjust primer and membrane application methods as necessary to achieve the desired results.
H. Unroll the protection sheet and loose lay in place
I. Ensure minimum 1 in (25 mm) side and end-laps.
J. Adhere the protection sheet in a continuous longitudinal strip over the horizontal waterproofing membrane by removing the silicone release film.
K. As the release film is peeled away, use a stiff push broom or roller to firmly set the sheet in place. Ensure full contact is made between the ply and the substrate for full adhesion.
L. Each day physically inspect all side and end-laps, and ensure the membrane is sealed watertight.
M. Inspect the installation each day to ensure the plies are fully adhered. Repair all un-adhered voids, wrinkles, open laps and all other deficiencies.
N. Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs, prime surfaces using specified self-adhesive primer. Repairs shall extend 6 in (150 mm) beyond the damaged membrane.

3.10 PENETRATION FLASHINGS STAGING & INSTALLATION (GENERAL)

A. Refer to manufacturer's details drawings, product data sheets and published general requirements for specific flashing installation instructions.
B. Flashings should be applied to prepared and primed substrates overlapping the base-ply membrane 8 in (200 mm) minimum. After flashing has fully cured, apply a secondary overlapping ply of applicable COLPHENE BSW membrane set in COLPHENE LIQUID MEMBRANE.
C. Install protection sheet membrane following installation of flashings.

3.12 PMMA PRIMER APPLICATION (SOPREMA ALSAN RS 222)

A. Refer to manufacturer's detail drawings, product data sheets and published general requirements for application rates and specific installation instructions.
B. Examine all substrates and conduct adhesion peel tests as necessary to ensure satisfactory adhesion is achieved.
C. Mix primer resin and catalyst approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of primer that can be used within the application time.
D. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.
E. Apply primer using brush or roller at the rate published on the product data sheet. Do not allow primer to pond or collect in low areas.
F. Project conditions vary throughout the day. Monitor changing conditions, and the curing time of primers.
G. Allow primer to fully cure before membrane application.

3.13 METAL PRIMER APPLICATION (SOPREMA ALSAN RS METAL PRIMER)

A. Mix primer resin approximately 2 minutes using a clean spiral agitator on slow speed or stir stick until evenly mixed. Do not aerate. Mix only the amount of primer that can be used within the application time.
B. Apply the appropriate specified primer to dry, compatible substrates as required to enhance adhesion of new specified waterproofing materials.
C. Apply primer using brush or roller at the rate published on the product data sheet. Do not allow primer to pond or collect in low areas.
D. Project conditions vary throughout the day. Monitor changing conditions, and the curing time of primers.
E. Allow primer to fully cure before membrane application.

3.14 LIQUID-APPLIED FLASHING, (PMA MEMBRANE APPLICATION) (ALSAN RS 260 LO FLASH)

A. Refer to manufacturer's details drawings, product data sheets and published general requirements for application rates and specific installation instructions.
B. Pre-cut polyester reinforcing fleece to conform to roof terminations, transitions and penetrations being flashed. Ensure a minimum 2 in (50 mm) overlap of fleece at side and end-laps. Ensure the completed liquid-applied flashing membrane is fully reinforced.
C. Apply the base coat of catalyzed liquid resin onto the substrate using a brush or roller, working the material into the surface for complete coverage and full adhesion.
D. Immediately apply the reinforcing fleece into the wet base coat of resin. Using a brush or roller, work the reinforcing fabric into the wet resin while applying the second coat of catalyzed liquid resin to completely encapsulate the fleece.
E. Refer to reinforced, polymethacrylate (PMA) specification section and application instructions, details drawings, product data sheets and published general requirements for installation instructions.

3.15 CLEAN-UP

A. Clean-up and properly dispose of waste and debris resulting from these operations each day as required to prevent damages and disruptions to operations.

END OF SECTION 071352

SECTION 072100 – BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Concealed building insulation.

2. Sound Attenuation.

3. Spray Polyurethane Foam Insulation.

4. Vapor retarders.

B. Related Sections include the following:

1. Section 072113 “Continuous Insulation”.

2. Division 7 Section "Fire Resistant, Fluid Applied Membrane Air Barriers".

3. Division 9 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by reference to this Section.

1.3 SUBMITTALS

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

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source.

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: ASTM E 84.

2. Fire-Resistance Ratings: ASTM E 119.

3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:

1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.

3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Extruded-Polystyrene Board Insulation:

a. Dow / Styrofoam. Cavity Mate SE.
b. Owens Corning.
c. Plymouth Form Incorporated – Gold Wall Insulating System

2. Glass-Fiber Insulation:

a. CertainTeed Corporation.
b. Johns Manville Corporation.
c. Knauf Fiber Glass.
d. Owens Corning.

3. Slag-Wool-/Rock-Wool-Fiber Insulation:

a. Fibrex Insulations Inc.
b. Owens Corning.
c. Thermafiber.

4. Sound Attenuations Fire Batts Insulation / MW:

a. Owens Corning.
b. Fibrex Insulations Inc.
c. Thermafiber.

5. Spray Polyurethane Foam Insulation

a. Dow/Styrofoam MX Series.
b. Owens Corning.
c. Johns Manville Corporation.

6. Vapor Retarders

a. Raven Industries, Inc.
b. Reef Industries, Inc.
Architect Approved Equal.

2.2 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. Preformed Units: Sizes to fit applications indicated; selected from manufacturer's standard thicknesses, widths, and lengths.

B. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indices of 75 and 450, respectively:

1. Type X – 15 psi.

C. Unfaced Mineral-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from glass; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

D. Faced Mineral-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass.

E. Sound Attenuation Fire Batts Insulation/MW:

1. ASTM C 665, Type I This material is considered non combustible per ASTM C 136. Surface burning characteristics per ASTM E84 Flame spread of 5.

F. Spray Polyurethane Foam Insulation: Two-component spray polyurethane cellular plastic foam. Complying with the following methods and meeting the following physical properties:

1. Core Density (ASTM D1622): Min. Z pcf
2. Thermal Resistance (ASTM C518): 140 degree F/90 day aged R-value, measured at 75 F mean Temp: min R6.0/inch
3. Flame Spread (ASTM E84, Class A): 25 or less
4. Smoked Developed (ASTM E84, Class A): 450 or less
5. Compressive Strength Minimum (ASTM D1621, 10% parallel to rise): (20 psi) (182 kPa)
6. Closed Cell Content (ASTM D2856): minimum 95 percent
7. Water Absorption by Volume Maximum (ASTMD2842): 2.5 percent
8. Water Vapor Permeability maximum (ASTME96): 2.5 perm – inch

2.3 VAPOR RETARDERS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Reinforced-Polyethylene Vapor Retarders:

a. Raven Industries, Inc.; DURA-SKRIM 2 - 6 MIL.
b. Reef Industries, Inc.; Griffolyn TX 1200 - 6 MIL.

B. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of high-strength polyethylene film laminated to an inner reinforcing layer consisting of polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating per ASTM E96 procedure B.

C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.4 AUXILIARY INSULATING MATERIALS

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

B. Protection Board: Premolded, semirigid asphalt/fiber composition board, 1/4 inch thick, formed under heat and pressure, of standard sizes.

C. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

2.5 INSULATION FASTENERS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Adhesively Attached, Spindle-Type Anchors:

a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
b. Eckel Industries of Canada Limited; Stic-Klip Type N Fasteners.
c. Gemco; Spindle Type.

2. Insulation-Retaining Washers:

a. AGM Industries, Inc.; RC150.
b. AGM Industries, Inc.; SC150.
c. Gemco; Dome-Cap.
d. Gemco; R-150.
e. Gemco; S-150.

3. Insulation Standoff:

a. Gemco; Clutch Clip.

4. Anchor Adhesives:

a. AGM Industries, Inc.; TACTOO Adhesive.
b. Eckel Industries of Canada Limited; Stic-Klip Type S Adhesive.
c. Gemco; Tuff Bond Hanger Adhesive.

B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches (50 mm) square.

2. Spindle: Copper-coated, low carbon steel, fully annealed, 0.105 inch in diameter, length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.

1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:

a. Ceiling plenums.
b. Attic spaces.
c. Where indicated.

D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of dimension indicated between face of insulation and substrate to which anchor is attached.

1. Air Space: 1 inch (25 mm).

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 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 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 on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF BLANKET 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. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.

1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.

C. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

1. Use blanket 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 blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

3.5 INSTALLATION OF INSULATION FOR SOUND ATTENUATION:

A. Install 3 ½" unfaced Sound Attenuation Fire Batts / MW blanket insulation in stud wall cavities. Use blanket 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 provide a snug fit between ends.

3.6 INSTALLATION OF SPRAY POLYURETHANE FOAM INSULATION

A. Must be applied by manufacturer approved applicator.

B. Apply SPF in accordance with ASTM C1029 and manufacturers installation guidelines.

C. Apply spray foam in consecutive layers of not less than (1/2 inches) and not more than (2 inches) thick each to achieve total thickness required. For light-gauge steel and polystyrene board first layer should be a skim coat of 1/2" before adding extra layers.

3.7 INSTALLATION OF VAPOR RETARDERS

A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.

C. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.

D. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.

E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

F. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

3.8 PROTECTION

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

END OF SECTION 072100

SECTION 072113 – CONTINUOUS INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Continuous Insulation XCI Foil wall panels.

B. Continuous Insulation XCI Foil (Class A).

1.2 RELATED SECTIONS

A. Section 033000 – Cast-In-Place Concrete: Concrete base wall.

B. Section 042113 - Brick Masonry: Brick facing

C. Section 042200 - Concrete Unit Masonry

D. Section 047200 - Cast Stone Masonry

E. Section 072726 - Air Barriers: Air seal materials over insulation to adjacent insulation.

1.3 REFERENCES

A. ASTM C 209 – Methods of Testing Insulating Board, Structural and Decorative.

B. ASTM C 518 – Steady State Thermal Transmission by Means of the Heat Flow Meter Apparatus (R Value)

C. ASTM C 1289 – Specifications for Faced Rigid Cellular Polyisocyanurate Thermal Insulating Board.

D. ASTM D 1621 – Test Methods for Compressive Properties of Rigid Cellular Plastics.

E. ASTM D 2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

F. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

G. ASTM E 84 (UL 723) - Standard Test Method for Surface Burning Characteristics of Building Materials

H. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.

I. ASHRAE 90.1-2010 - Energy Standard for Buildings Except Low-Rise Residential Buildings.

J. IBC Chapter 26 – Foam Plastic Insulation.

K. Miami-Dade County FL NOA No: 14-0501.01.

L. ICC-ES Evaluation Report - ICC-ESR-3174

M. DRJ Technical Evaluation Report #1402-02

N. NFPA 285 - Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

O. UL 723 - Test for Surface Burning Characteristics of Building Materials

P. ASTM D 1037 - Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials

Q. ASTM E 283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Window, Curtain Walls and Doors Under Specific Pressure Differences Across the Specimen

R. ASTM E 330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

S. ASTM E 331 – Standard Test Method for Water Penetration of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference

T. ASTM E 2178 – Standard Test Method for Air Permeance of Building Materials

U. ASTM E 2357 – Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

V. California Bureau of Furnishings and Home Insulation

W. IBC Chapter 26 – Foam Plastic Insulation

1.4 SYSTEM DESCRIPTION

A. NFPA 285 Exterior Wall Assembly – Concrete Masonry Construction:

1. Base Wall System:
   a. Cast in Place Concrete
   b. CMU Wall.
2. Approved Exterior Finish:
   a. Masonry: Brick veneer anchors, standard types, installed maximum 24 inches o.c. vertically. Maximum 2 inch air gap between exterior insulation and brick. Standard nominal 4 inches thick or greater, clay brick.
   b. Cast Artificial Stone Veneer. Any standard installation technique can be used.
3. Panel Thickness:
   a. 3.5 inches maximum, NFPA 285 approved.
   b. 3.6 to 4.0 inches, contact Hunter Panels Xci for NFPA 285 approvals.
4. Floorline Firestopping: 4 lb/cu ft mineral fiber based safing insulation at each floor line, attached with Z Clips or equivalent.
5. Weather Resistive Membrane Applied to Base Wall: Acceptable products are:
   a. Carlisle:
      1) Fire Resist Barritech VP or equal

B. NFPA 285 Exterior Wall Assembly – Cast-in-Place:

1. Base Wall System: Concrete Masonry Wall.
2. Approved Exterior Finish:
   a. Masonry: Brick veneer anchors, standard types, installed maximum 24 inches o.c. vertically. Maximum 2 inch air gap between exterior insulation and brick. Standard nominal 4 inch thick or greater, clay brick.
   b. Cast Artificial Stone Veneer. Any standard installation technique, including shiplap can be used.
3. Panel Thickness: 3.5 inches maximum.
4. Floorline Firestopping: 4 lb/cu ft mineral fiber based safing insulation at each floor line, attached with Z Clips or equivalent.
5. Weather Resistive Membrane Applied to Base Wall: Acceptable products are:
   a. Carlisle:
      1) Fire Resist Barritech VP or equal

1.5 DESIGN REQUIREMENTS

A. Perform work in accordance with all federal, state and local codes.

B. Physical properties (Foam Core):

1. Water Absorption: ASTM C 209, less than 0.05 percent by volume.
2. Compressive Strength: ASTM D 1621; Type I; Grade 1. 16 psi (110 kPa) minimum; Grade 2, 20 psi (138 kPa) minimum and Grade 3, 25 psi (172 kPa).
3. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
4. Moisture Vapor Permeance: ASTM E 96, less than 0.05 perm (2.875ng/(Pa•s•m2)).
5. Service Temperature: Minus 100 degrees to 250 degrees F (Minus 73 degrees C to 122 degrees C).

C. Physical properties (Foam Core) (Class A):

1. Flame Spread Index: ASTM E 84, less than 25.
2. Smoke Developed: ASTM E 84, less than 250.
3. Compressive Strength: ASTM D 1621; Type I, Grade 3 - 25 psi (172 kPa).
4. Dimensional Stability: ASTM D 2126, 2 percent linear change (7 days).
5. Moisture Vapor Permeance: ASTM E 96, less than 0.04 perm (2.875ng/(Pa•s•m2)).
6. Water Absorption: ASTM C 209, less than 0.05 percent by volume.
7. Service Temperature: Minus 100 degrees to 250 degrees F (Minus 73 degrees C to 122 degrees C).
8. Air Permeance of Building Material: ASTM E 2178, less than 0.001 L(s.m2) at 75 Pa
9. Air Leakage of Air Barrier Assemblies: ASTM E 2357, no leakage
10. Rate of Air Leakage: ASTM E 283, less than 0.04 cfm/ft2
11. Structural Performance by Uniform Static Air Pressure Difference: ASTM E 330, less than 0.04 cfm/ft2
12. Water Penetration by Static Air Pressure Difference: ASTM E 331, pass, no leakage
13. Resistance to Mold: ASTM D 3273 Passed (10).
14. Impact Resistance: ASTM D 1037, 40 Janka Ball Test.

D. Continuous Insulation XCI Foil wall panels shall meet the continuous insulation standards of ASHRAE 90.1-2010, IECC 2012 and IBC Chapter 26

E. Continuous insulation Xci Foil (Class A) wall panels shall meet the continuous insulation standards of ASHRAE 90.1-2010, ICB Chapter 26 and IECC 2012.

F. Hunter Panels XCI Foil evaluated and listed under ESR-3174. Tests includes the following:

1. Foam core flame spread index of 75 or less and smoke developed of 450 or less when tested in accordance with ASTM E 84 or UL 723.
2. Classified as Type I in accordance with ASTM C 1289.
3. DRJ Technical Evaluation Report #1402-02.

G. Hunter Panels XCI Foil evaluated and listed under Miami Dade Product Control – Notice of Acceptance NOA No. 14-0501.01

H. Xci Foil (Class A) wall panels shall be listed by the California Bureau of Furnishings and Home Insulation.

1.6 SUBMITTALS

A. Submit under provisions of Section 013000.

B. Product Data: Manufacturer's data sheets on wall panels and fasteners to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Manufacturer's Certificate: Certify panels will conform to specified performance requirements.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures and assembles specified insulation in house with no outside fabrication operations.

B. Pre-Installation Meeting: Convene minimum one week prior to commencing Work of this section. Review installation procedures and coordination required with Related Work and include the following:

1. Participants: Authorized representatives of the Contractor, Architect, Installer, and Manufacturer.
2. Review wall assemblies for potential interference and conflicts and coordinate layout and support provisions for interfacing work.
3. Review continuous insulation wall panels installation methods and procedures related to application, including manufacturer’s installation guidelines.
4. Review firestopping requirements and weather resistive membrane requirements and placement locations.
5. Review field quality control procedures.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Good construction practice dictates that all insulations should be protected from moisture and direct sunlight during job-site storage. Pallets of Hunter Panels Xci CG are double packaged in a UV resistant polyethylene bag. This moisture resistant package is designed for protection from the elements during flatbed shipment from our factories to

the job-site. Outdoor storage for extended periods of time requires waterproof tarpaulins and elevated storage above ground level a minimum of 2". Additionally, we recommend slitting the bundle packaging vertically down the center of the two short sides to prevent moisture accumulation within the package.

1.9 SEQUENCING

A. Coordinate with the installation of air barrier specified in Section 072726.

B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.10 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Insulating panels shall be XCI products produced by Hunter Panels, 15 Franklin Street, Portland, Maine 04101. Phone: (207) 761-5678 or (888) 746-1114. Fax: (717) 960-1611. E-mail: info@hpanels.com.

B. Requests for substitutions will be considered in accordance with provisions of Section 012500

2.2 BOARD INSULATION

A. Board Insulation with Foil Facer: Hunter Panels XCI Foil complies with ASTM C 1289. Panels are a high thermal resistive rigid insulation panel composed of a closed cell polyisocyanurate foam core bonded to an impermeable foil facer.

1. Type: ASTM C 1289, Type I
   a. Grade 1 (16 psi).
   b. Grade 2 (20 psi).
   c. Grade 3 (25 psi).
2. Panel Size:
   a. 4 feet by 8 feet.
3. Thickness / R Value: ASTM C 518 at 75 degrees F (23.9 degrees C).
   a. 1.0 inches / R Value 6.5
   b. 1.5 inches / R Value 10.0
   c. 2.0 inches / R Value 13.3
   d. 2.5 inches / R Value 17.0
   e. 3.0 inches / R Value 20.3
   f. 3.5 inches / R Value 24.0
   g. Provide to the thickness indicated on the Drawings.

B. Board Insulation with Foil Facers: Hunter Panels Xci Foil (Class A) complies with ASTM C 1289 and ASTM E 84 Class A. Panels are a high thermal resistive rigid insulation panel

composed of a closed cell polyisocyanurate foam core bonded on both sides to reinforced foil facers.

1. Type: ASTM C 1289, Type I
   a. Grade 3 (25 psi).
2. Panel Size:
   a. 4 feet by 8 feet.
3. Thickness / R Value: ASTM C 518 at 75 degrees F (23.9 degrees C).
   a. 1.0 inches / R Value 6.3
   b. 1.5 inches / R Value 9.5
   c. 1.6 inches / R Value 10.1
   d. 2.0 inches / R Value 13.0
   e. 2.5 inches / R Value 16.0
   f. 3.0 inches / R Value 19
   g. 3.5 inches / R Value 22
   h. 4.0 inches / R Value 25.2
   i. Provide to the thickness indicated on the Drawings.

2.3 PANEL FASTENERS

A. Panel fasteners shall be corrosion resistant type as approved Hunter Panel fasteners. Length of fasteners shall be as recommended by the panel manufacturer

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until exterior walls have been properly prepared.

B. Verify that all exterior wall assembly construction has been completed to the point where the insulation may correctly be installed.

C. Verify that mechanical and electrical services in walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.

D. If wall assembly preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in exterior spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.

E. Exposed insulation must be protected from open flame and stored in accordance with manufacturer's instructions.

F. Fasten insulation to the structural base wall. Coordinate with the cladding or wall finish manufacturer for the attachment requirements over insulation panels. Contact Hunter Panels for guidance when determining fastening pattern.

G. Install air barriers as specified in Section 072726.

H. Exterior wall insulation is not intended to be left exposed for extended periods of time in excess of 45-60 days without adequate protection. If extended exposure is anticipated all exposed foam surfaces including corners, window and door openings, should be taped with a compatible waterproof tape.

I. Install exterior cladding as recommended by the cladding manufacturer and as specified in other sections of this specification.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.

C. Do not leave panels exposed to moisture. Wet panels shall be removed or allowed to completely dry prior to application of vapor barrier and/or roof covering.

D. Wet panels shall be allowed to completely dry prior to application of vapor barrier and/or cladding.

E. Repair or replace damaged products before Substantial Completion.

END OF SECTION 072113

SECTION 072726 – AIR BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. A 40-mil thickness fluid-applied vapor-permeable membrane of synthetic polymer, fire retardant composition for use as an air and water resistive barrier in exterior walls.

B. Monolithic, fully-adhered membrane and accessory products installed as a continuous air and water resistive barrier assembly over substrates of the Project's opaque walls as indicated on Drawings

C. Air and water resistive barrier assembly providing air and water tight coverage over these conditions
   1. Joints between building materials such as sheathing joints, mortar joints and dissimilar materials.
   2. Joints around windows, curtain walls, louvers, door frames and other service openings
   3. Junctions between walls and floors, between walls at building corners and between walls, roofs and ceilings.
   4. Mechanical and electrical penetrations
   5. Structural penetrations for canopies, decks, walkways and similar horizontal projections or junctions to the exterior walls
   6. Fastener and hardware penetrations used to attach insulation, cladding, trim or other overburden
   7. Termination at footing, roof deck and existing construction
   8. Junction to air & water barrier in roof, below grade or other adjacent systems

D. Air and water resistive barrier assembly providing air and water tight coverage while accommodating designed movement at expansion and control joints.

E. Air and water resistive barrier assembly performing as a liquid water drainage plane flashed to discharge to the exterior any incidental condensation or water penetration

1.02 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete

B. Section 042000 - Unit Masonry

C. Section 079000 - Joint Protection: Joint sealant materials and installation.

D. Section 092900 - Gypsum Sheathing: Gypsum sheathing over metal studs.

1.03 REFERENCES

A. American Association of Textile Chemists and Colorists (AATCC) Test Method 127. "Water Resistance – Hydrostatic Pressure Test"

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2010 "Energy Standard for Buildings Except Low-Rise Residential Buildings"

C. ASTM C 920 Standard Specification for Elastomeric Joint Sealants

D. ASTM C 1305 Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane

E. ASTM C 1522 Standard Test Method for Extensibility after Heat Aging of Cold, Liquid-Applied Elastomeric Waterproofing Membrane

F. ASTM D 1970 Standard Specification for Self-Adhering Polymer Modifed Bituminous Sheet Materials Used as Steep slope roofing Underlayment for Ice Dam Protection.

G. ASTM D 4541 Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers

H. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials

I. ASTM E 96 Standard Test Methods for Water Vapor Transmission of Materials.

J. ASTM E 783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

K. ASTM E 1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference

L. ASTM E 1354 Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

M. ASTM E 2178 Standard Test Method for Air Permeance of Building Materials

N. ASTM E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

O. Canadian General Standards Board (CGSB) 71-GP-24M Standard for: Adhesive, Flexible, for Bonding Cellular Polystyrene Insulation

P. International Code Council Evaluation Services (ICC-ES) Acceptance Criteria for Water Resistive Coatings used as Water Resistive Barriers over Exterior Sheathing AC-212, Approved February 2015

Q. National Fire Protection Association (NFPA) 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

1.04 PERFORMANCE REQUIREMENTS

A. Installed product and accessories shall exhibit an air leakage rate, infiltration and exfiltration modes, measured after pressure cycling, not to exceed 0.2 L/s*m^2 at 75 Pa [0.040 CFM/ft^2 at 1.57 PSF] according to ASTM E 2357.

B. Product shall meet the water vapor transmission requirement water resistive coatings used as water resistive barriers: minimum 35 g/m^2/24h (5 Perms), tested to ASTM E 96 water method (B), ICC-ES AC-212, Section 4.4

C. For Type I, II, III and IV construction: Installed product and accessories shall be tested to NFPA 285 and pass in wall assemblies of the Project or shall pass by engineering judgement.

D. Installed product and accessories shall be recommended by manufacturer for at least 180 days of outdoor exposure.

E. Installed product and accessories shall have an upper service temperature limit of 180°F or higher.

F. Manufacturer shall provide product and accessories which have a minimum installation temperature of 25°F or lower.

G. Product shall be of fire-retardant, non-asphalt synthetic polymer composition.

H. Product shall be minimum 0.040 inch (40 mils) dry thickness membrane. Dry membrane thickness shall be calculated based on field-measured wet mil thickness using a comb gauge and volume % solids of the product. [Example 66% solids membrane applied at minimum 60 wet mils yields a minimum 40 mil thickness membrane].

I. Product shall meet the following requirements:

REQUIREMENT	RESULT	TEST METHOD
Air Permeance – on Porous Substrate	Not more than 0.02 L/s*m^2 at 75 Pa (0.004 CFM/ft^2 at 1.57 PSF)	ASTM E-2178, mod sprayed on CMU
Air Permeance – Free Film	Not more than 0.02 L/s*m^2 at 75 Pa (0.004 CFM/ft^2 at 1.57 PSF)	ASTM E-2178
Low Temperature Flexibility	No cracking at minus 20 degrees F, 180 degree bend over 1 inch mandrel	ASTM D 1970
Low-Temperature Crack Bridging	No cracking after 10 cycles at minus 15 deg F	ASTM C 1305, mod 40 mil membrane thickness
Long-Term Aging/ Flexibility	No cracking or tearing after aging	ASTM C 1522, mod 40 mil membrane thickness OR CGSB 71-GP-24M
Fastener Sealability	No water leaking through nail penetration after 24 h.	ASTM D 1970
Water Resistance	Product spray-applied to CMU and gypsum sheathing with joint shall resist a 55 cm (22 inch) column of water for 5 hours, no leaking or wet through.	AATCC-127 - mod, static head generated with 5”diameter PVC pipe sealed to specimen
Pull Adhesion	Not less than 16 lb_f per square inch (or report value at substrate failure) on glass-faced gypsum sheathing and concrete masonry unit (CMU)	ASTM D 4541, modified 4 inch wood puck
Water Vapor Permeance	Not less than 5 Perms	ASTM E-96, Water Method (B)
Surface Burning Characteristics.	Flame Spread Index: Not more than 25	ASTM E 84, sample tested at full

	Smoke Generation Index: Not more than 450	coverage, 40 mil dry film, cement board substrate
Measurement of Heat Release Rate by Cone Calorimeter	Effective Heat of Combustion: Not more than 12.3 MJ/kg Total Heat Released: not more than 14.7 MJ/m^2 Peak Heat Release: Not more than 167 kW/m^2	ASTM E 1354, horizontal orientation, 50 kW/m^2 heat flux

1.05 SUBMITTALS

A. Provide submittals in accordance with Section 013300.

B. At bid submission, provide evidence to the Architect of installer qualification by the air barrier manufacturer.

C. Shop drawings showing locations and extent of air barrier and details of all typical conditions.

D. Vertical and lateral fire propagation evaluation of the Project's exterior wall assemblies containing the product, submit documentation of one of the following:
1. NFPA 285 test and pass
2. NFPA 285 pass through engineering judgement
3. Exemption from the NFPA 285 requirement.

E. Manufacturer's technical data sheets and safety data sheets for product and accessories.

F. Manufacturer's installation instructions.

G. Certification of compatibility by manufacturer, listing all materials on the project with which the product and accessories may come into contact.

H. Free film sample of product at representative cured thickness, minimum 2 inch by 3 inch size.

I. Sample of sheet detail flashing and transition membrane, minimum 2 inch by 3 inch size.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: Shall be experienced in applying the same or similar materials and shall be specifically approved in writing by Manufacturer.

B. Single-Source Responsibility: Obtain product and accessories from single manufacturer.

C. Product and Accessories shall comply with all state and local regulations controlling use of volatile organic compounds (VOCs).

D. Pre-Installation Meeting: Convene one (1) week prior to commencing work.

E. Field-Constructed Mock-Ups: Prior to installation on Project, apply product and accessories on mock-up to verify details under shop drawing submittals, to demonstrate tie-ins with adjoining construction and other termination conditions and to become familiar with properties of materials in application:

1. Construct typical exterior wall panel, 8 feet long by 8 feet wide, incorporating back-up wall, cladding, window and doorframe and sill, insulation, flashing, building corner condition, junction with roof system foundation wall and typical penetrations and gaps; illustrating interface of materials and seals

F. Allow full cure of product and test mock-up in accordance with Section 014000 – Quality Requirements and test in accordance with ASTM E 783 and ASTM E1105 for air and water infiltration

G. Cooperate and coordinate with the Owner's inspection and testing agency. Do not cover any installed product unless it has been inspected, tested and approved.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, lot number and directions for storage.

B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by manufacturer.

C. During cold weather, protect product in containers and spray equipment from freezing. Maintain product temperature within acceptable range for spray application, as required by air barrier manufacturer.

D. Avoid spillage. Immediately notify Owner, Consultant if spillage occurs and start cleanup procedures. Clean spills and leave area as it was prior to spill.

1.08 WASTE MANAGEMENT AND DISPOSAL

A. Separate and recycle waste materials in accordance with Section 017419 – Construction Waste Management and Disposal, and with the Waste Reduction Work Plan.

B. Place materials defined as hazardous or toxic waste in designated containers.

C. Ensure emptied containers are stored safely for disposal away from children.

1.09 PROJECT CONDITIONS

A. Do not apply product or accessories during rain or accumulating snowfall.

B. Apply product and accessories within approved ambient and substrate temperature range stated in manufacturer’s literature.

C. Do not apply product or accessories over incompatible materials.

D. Observe safety and environmental measures indicated in manufacturer’s SDS, and mandated by federal, state and local regulations.

1.10 WARRANTIES: Provide the manufacturer’s minimum five (5) year material warranty.

PART 2 PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS :

A. Carlisle Coatings & Waterproofing, Incorporated. 900 Hensley Lane, Wylie, TX 75098. Phone 1-800-527-7092. Website http://www.carlisleccw.com
1. Fire Resist Barritech VP, for installation at 40 degrees F and above
2. Fire Resist Barritech VP LT, for installation at 15 degrees F and above

B. [Other manufacturers and products, as approved by Architect]

2.02 ACCESSORIES: Provide from same manufacturer as air barrier membrane.

A. Sheet Detail Flashing: Foil composite faced rubberized asphalt flashing, minimum 0.040 inch (40 mils) thickness.
1. Fire-Resist 705 FR-A or Fire-Resist 705 FR-A LT low temperature application formula by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

B. Contact Adhesive:
1. Carlisle Coatings & Waterproofing, Incorporated: CCW-702 Solvent-Based, CCW-702 LV VOC Compliant Solvent-Based, CCW-702 WB Water-Based, CAV-GRIP™ Aerosol Spray or Travel-Tack portable aerosol spray cans
2. Others as approved by air barrier membrane manufacturer

C. Liquid Detail Flashing. Silane-terminated polyether, minimum 90% solids. ASTM C 920 Type S, Grade NS, Class 25, Use NT. 0.040 inch (40 mil) thickness application
1. Barribond
2. Others as approved by air barrier membrane manufacture

D. Detail Sealant:
1. Barribond by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

E. Transition Membrane:
1. CCW SURE-SEAL Pressure-Sensitive Elastoform by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

F. Transition Membrane Primer:
1. Carlisle Coatings & Waterproofing, Incorporated: SURE-SEAL HP-250 Primer, SURE-SEAL EP-95 Splicing Cement or SURE-SEAL Low VOC EPDM Primer
2. Others as approved by air barrier membrane manufacturer

G. Reinforcing Fabric: Woven, synthetic polymer fabric
1. DCH Reinforcing Fabric by Carlisle Coatings & Waterproofing, Incorporated
2. Others as approved by air barrier membrane manufacturer

H. Glass Mat: Randomly-oriented glass strands held in binder soluble in wet air barrier membrane. Offered in rolls of various widths
1. LiquiFiber
2. Others as approved by air barrier membrane manufacturer

I. Fill Compound: 2-part, non-sag polyurethane sealant
1. Carlisle Coatings & Waterproofing, Incorporated: CCW-703 V or CCW-201
2. Others as approved by air barrier membrane manufacturer

2.03 RELATED MATERIALS BY OTHERS

A. Silicone Sealant, select any:
   1. Dow 758, 790, 791, 795
   2. Pecora AVB Silicone, 890, 891, 895
   3. GE Silpruf, Silpruf LM
   4. Other product approved by air barrier membrane manufacturer

B. Polyurethane Foam Sealant, select any:
   1. TVM Fireblock Foam
   2. Fomo Handifoam Fireblock
   3. Great Stuff PRO or Froth Pack by Dow Chemical Company
   4. Other product approved by air barrier membrane manufacturer

C. Insulation Adhesive, select any
   1. Barribond
   2. LM 800 XL
   3. QB-300 Multi-Purpose Construction Adhesive by OSI
   4. PL-300 VOC Foamboard Adhesive by Loctite
   5. Other product approved by air barrier membrane and board foam insulation manufacturer

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions affecting installation of the air & vapor barrier and accessory products for compliance with requirements. Verify that surfaces and conditions are suitable prior to commencing Work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Verify that wall assemblies are dried in, such that water intrusion will not occur from above, behind or around the air barrier installation.

C. Concrete shall be cured for a minimum of seven days. It shall be smooth, with sharp protrusions such as form joints or fins removed and ground flush. Honeycomb and holes/cracks shall be filled with grout or mortar.

D. Surfaces shall be sound, dry and free of oil, grease, dirt, excess mortar or other contaminants.

E. Surfaces shall be supported and flush at joints without large voids or sharp protrusions.

F. Mortar joints shall be struck flush and shall be free of voids. Mortar droppings shall be removed from brick ties and all other surfaces accepting air barrier.

G. Sheathing boards shall be flush at joints, with gaps between boards according to building code and sheathing manufacturer's requirements. Sheathing boards shall also be securely fastened to the structure with proper fastener type, technique and spacing according to building code and sheathing manufacturer's requirements. Sheathing boards shall be repaired or replaced if inspection reveals moisture damage, mechanical damage or if sheathing boards have exceeded the exposure duration or exposure conditions as required by the sheathing manufacturer.

H. Plywood, OSB, lumber or pressure-treated wood moisture content, measured with a wood moisture meter in the core of the substrate, shall be below 20%.

I. Inform Architect [Consultant] [Owner] in writing of
1. Unsatisfactory substrates
2. Cracks in concrete and masonry.
3. Gaps or obstructions such as steel beams, angles, plates and projections which cannot be spanned or covered by Product or Accessories.
4. Anticipated problems applying product and accessories over substrate.

3.02 SURFACE PREPARATION

A. Note to Mason: This project will have fluid-applied Membrane Air Barrier material applied to the cavity side of the CMU. Special attention and care must be taken to provide a smooth, filled surface to receive the membrane. The care is necessary to insure the design performance of the selected materials. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air & vapor barrier:
1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane
2. The CMU surfaces shall be free from projections.
3. Strike all mortar joints flush to the face of the concrete block.
4. Fill all voids and holes with mortar, sealant or other approved fill material.
5. Surface irregularities shall be ground flush or made smooth.
6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
7. If the surfaces cannot be made smooth to the satisfaction of the Architect, it will be the responsibility of the trade to alternatively apply a parge coat (typically one part cement to three parts sand) over the entire surface to receive Air Barrier Membrane
8. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.

B. Fill cracks, gaps and joints with fill compound, detail sealant or other material approved by air barrier manufacturer.

C. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.

D. Apply a ¾ inch cant of fill compound or detail sealant at the intersection of the base of the wall and the footing.

3.03 DETAILING

A. Additional materials and installation are required at joints, transitions, openings, terminations, penetrations and similar surface irregularities. Perform detailing before or after product installation.

B. Install product and accessories in details as directed in manufacturer's literature.

C. Sheathing joints, use one of the following methods:
1. 4 inch reinforcing fabric imbedded in product and centered over joint.
2. 2" width liquid flashing centered over joint.

D. Sheathing inside and outside corners. Flashing or reinforcement shall bear 3 inches minimum onto either side of angle change. Use any of the following methods:

1. Sheet detail flashing
2. Liquid detail flashing centered over angle change
3. Reinforcing fabric centered over angle change and imbedded in product
4. Glass mat centered over angle change and imbedded in product

E. Window openings. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall return into window opening according to Project drawings. Use any of the following materials:
1. Sheet detail flashing
2. Liquid detail flashing
3. Glass mat imbedded in product

F. Pipe or duct penetrations. Flashing or reinforcement shall bear onto wall 3 inches minimum and shall bear onto pipe or duct 3 inches, or according to Project drawings. Select any:
1. Sheet detail flashing
2. Liquid detail flashing
3. Glass mat imbedded in product

G. Expansion or deflection joints. Flashing shall bear 3 inches minimum onto either side of joint. Select any:
1. Sheet detail flashing bellows or expansion bulb
2. Transition membrane expansion bulb

H. Interface of dissimilar substrates: Flashing or reinforcement shall bear 3 inches minimum onto either side of joint. Select any:
1. Sheet detail flashing
2. Liquid detail flashing
3. Reinforcing fabric imbedded in product
4. Glass mat imbedded in product

I. Seal all terminations of sheet detail flashing with a 1 inch width X 0.040 inch (40 mils) thick ribbon of detail sealant, centered over termination.

3.04 INSTALLATION

A. Apply product and accessories over opaque wall surfaces as indicated in Project drawings.

B. Use the manufacturer’s standard or low temperature formula product as required by the project conditions.

C. Apply product by spray, roller, brush or other method as recommended by air barrier manufacturer. Apply product at specified wet mil thickness in accordance with air barrier manufacturer’s requirements.

D. Verify compliance with air barrier manufacturer’s minimum required thickness by documenting product use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.

E. Installation shall produce complete coverage of opaque substrates as indicated in Drawings.

F. Product and accessories shall be fully-adhered to substrates. Defects such as holes, fishmouths, blistering, de-lamination, bridging or thin spots shall be repaired according to air barrier manufacturer's instructions.

3.05 SCHEDULE

A. Wall substrates and roof or temporary roof shall be in place, effectively enclosing interior space, before proceeding with air barrier installation.

B. Seal penetrations made through installed product according to manufacturer's instructions and drawings.

C. Seal fenestration to product with detail membrane, transition membrane, detail sealant, silicone sealant or polyurethane foam sealant according to Project drawings

D. Through-wall flashing may be installed before or after product. Seal termination of through-wall flashing to product according product manufacturer's instructions.

E. Exterior cladding shall be installed after product.

F. Rigid or semi-rigid insulation installed over product shall be attached with mechanical fastening, insulation adhesive or a combination of these techniques, according to insulation manufacturer and air barrier manufacturer's instructions.

G. Sequence Work to enable air barrier continuity at wall-to-foundation, shelf angle, wall-to-roof, fenestration, different wall assemblies and other conditions as indicated in Project drawings.

3.06 REPAIR AND PROTECTION

A. Protect from damage during application and remainder of construction period.

B. Inspect and make necessary repairs before covering. Repair or replace damaged material according to manufacturer's literature.

C. Product and accessories are not designed for permanent exposure. Cover with insulation or exterior cladding as soon as schedule allows.

D. Outdoor exposure of installed product and accessories shall not exceed 180 days.

END OF SECTION 072726

SECTION 075600 – FLUID-APPLIED ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   a. New Construction:
      1) Glass ply mechanically fastened to light weight deck over metal pan.
      2) Polyisocyanurate insulation R-30 adhered in low rise foam insulation adhesive.
      3) ¼" tapered insulation adhered in low rise foam adhesive.
      4) 1/2" reinforced gypsum cover board adhered over polyisocyanurate insulation in low rise foam insulation adhesive.
      5) One trilaminate base ply adhered in dual component cold process adhesive.
      6) Dual component 100% solids reinforced fluid-applied roofing and flashing system, cold applied.
      7) Slip-resistant walkway areas.
      8) Metal perimeter flashings, counter flashings, components and miscellaneous accessories as required.

1.3 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

C. Flashings and Fastening: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Roof Specialties." Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:
   1. FMG 1-49: Loss Prevention Data Sheet for Perimeter Flashings.
   2. FMG 1-29 (rev. 1-06): Loss Prevention Data Sheet for Above Deck Roof Components.
   3. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.
   4. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
   5. The metal edge securement, except gutter, shall be installed as tested in accordance with the most current version of the ANSI\SPRI ES-1, American National Standard for Edge Systems Used with Low-Slope Roofing Systems.

1.5 ACTION SUBMITTALS

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

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
   1. Tapered insulation layout, including thicknesses and slopes.
   2. Base flashings and membrane terminations.
   3. Crickets, saddles, and tapered edge strips, including slopes.

C. Samples for Verification: For the following products:
   1. 8-by-10 inch sample of trilaminate base ply.
   2. 4-by-4-inch of roof insulation and cover board.
   3. Six insulation fasteners of each type and length.
   4. Six base sheet fasteners of each type and length.
   5. 1-by-3-inch sample of cured fluid-applied system (base coat/reinforcement/top coat).

1.6 INFORMATIONAL SUBMITTALS

A. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that fluid-applied roofing complies with requirements specified in "Performance Requirements" Article.
   1. Provide copies of FM RoofNav approval assemblies and/or UL TGFU & TGIK wind uplift and fire rating assemblies showing approved substitutions.

C. Qualification Data: For manufacturer’s technical representative.

D. Warranties: Sample of warranties as specified in this Section.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform Work of this Section who has specialized in installing cold process roofing systems; who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer’s product; and who is eligible to receive and issue the roofing manufacturer’s warranty.
   1. Applicators to include a list of projects, completed within the last three (3) years of, similar size, and within 50 miles of project site using the submitted manufacturer's cold applied roofing products. Include names and addresses of Architects and Owners, and other information with bid.

B. Installing contractor shall not own the roofing materials manufacturer, shall not be owned by the roofing materials manufacturer, and shall not be a subsidiary of or with the roofing materials manufacturer.

C. Manufacturer Qualifications: Manufacturer shall demonstrate a minimum (10) ten-year track record of successful production and application of cold process roofing systems. Include names and addresses of architects and owners, and other information as needed.

D. Source Limitations: Roofing membrane plies, base flashings and insulation adhesive materials to be supplied by a single manufacturer with said products branded by the single manufacturer issuing the roofing warranty. Auxiliary materials to be approved by roofing system manufacturer.

E. Inspection Reports: Provide copies of the roofing system manufacturer's inspection reports noted during and at the completion of the new roof installation. Manufacturer's Technical (non-sales) Representative must inspect roof installation every other day and report progress to Owner's representative. Provide progress photos for application of each operation of roofing system. In addition to regular inspections, Manufacturer's Technical (non-sales) Representative shall be present for roof work starts at each section. Manufacturer's Technical Representative shall provide proof of no less than 10 years experience in the Roofing Industry.

F. Roofing Inspections: Arrange for roofing inspections by roofing system manufacturer's technical personnel as required in Part 3 Article "Field Quality Control."

G. Roofing Inspector Qualifications: A full time technical representative of manufacturer (non-sales) experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification.
   1. The Roofing Inspector shall be one of the following:
      a. An authorized full-time technical employee of the manufacturer with 10 years experience in commercial roofing.
      b. If manufacturer does not employ full time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

H. Provide installer's field supervision. Installer must maintain full-time supervisor/foreman on job-site during times that roofing work is in progress. Supervisor must have a minimum of 5 years experience in roofing work similar to nature and scope of specified roofing.

I. Source Limitations: Obtain roofing system components from or approved in writing by roofing system manufacturer.

J. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
   1. Exterior Fire Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
   2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

K. Pre-Bid Roofing Conference: Conduct conference at Project site.

L. Pre-installation Roofing Conference: Conduct conference at Project site. Combine with preliminary roofing conference specified in Division 07 Section "Preparation for Reroofing".
   1. Meet with Owner, Architect, inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
   2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review status of required submittals.
   5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
   6. Review structural loading limitations of roof deck during and after roofing.

7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
8. Review governing regulations and requirements for insurance and certificates if applicable.
9. Review temporary protection requirements for roofing system during and after installation.
10. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 50 deg F.

E. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

F. Contractor is responsible for the safekeeping of materials stored onsite.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

B. Prevent dust, vapors, gases, and odors from entering into the building during roof installation. When shutting down or blocking air intakes, provide makeup air or additional intake air from sources away from the work area. Coordinate these procedures with owner’s Representative.

1.10 WARRANTY

A. Manufacturer’s Roofing Warranty: Submit a written warranty, signed by the roofing system manufacturer agreeing to promptly repair any leaks in the roof membrane system resulting from defects in materials or workmanship including, but not limited to, roof plies and adhesive, base flashings, roof insulations and adhesives, wood components, fasteners, and all roof system metal components for the indicated warranty period.
1. Manufacturer’s 25-Year Systems Warranty.
2. Indicate a wind speed warranty of 74 M.P.H., as reported by the certified weather reporting station nearest to the site for the Mamaroneck, N.Y. region. Provide a sample copy of standard roofing manufacturer’s warranty, stating obligations, remedies, limitations, and exclusions of warranty.

3. Bidders to provide copy of the manufacturer's sample warranty, written as specified, with bid.
4. Inspections required by the manufacturer to provide this warranty shall be performed at no additional cost to the Owner.
5. Warranty shall run for a continuous 25 years.
6. Warranty will not be accepted that contains any requirement(s) for Owner to renew the warranty at any time during the 25 year period.
7. In year(s) number 2, 5, 10, 15 and 20 of this warranty, manufacturer shall provide roof inspections, and limited housekeeping services, at no additional charge.
8. Upon successful completion of the work and prior to receipt of final payment, the manufacturer's warranty as stated above shall be issued to the Owner.

B. Applicator/Roofing Contractor Warranty: Submit roofing installer's written warranty, signed by the installer, covering work of this section, including but not limited to, roof plies and adhesive, insulation layers, base flashings, roof insulations, wood components, fasteners, and all roof system metal components for two years from the date of substantial completion. The warranty shall guarantee material and workmanship for watertightness, weathertightness, and against all leaks. During the two-year period, the contractor shall respond and fix all reported leaks within 24 hours from time of notification, and fix all leaks without any cost to the Owner.
1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer/Product: The roof system specified in this Section is based upon Tremco, Inc. products named in other Part 2 articles. Subject to compliance with requirements, provide the named product by one the following:
1. Tremco, Alphaguard Bio Inc. (Basis of Design System)
2. Kemper 2KPUR
3. Pacific Polymers.
4. Architect-approved equal.

B. Approved Manufacturer's trilaminate base sheet and solvent free adhesive:
1. Manufacturer / VB Trilaminate Base Sheet / Adhesive
a. Tremco Inc. / BURmastic Composite Ply HT / Powerply Endure

C. Approved Manufacturer's Fluid-Applied Roofing Products:
1. Manufacturer / Base Coat / Reinforcement / Top Coat
a. Tremco Inc. / AlphaGuard Bio Base Coat / AlphaGuard Permafab / AlphaGuard Bio Top Coat

D. Reinforced fluid-applied roofing systems shall be dual component system employing aromatic 100% solids polyurethane base coat, full reinforcement and an 100% solids aliphatic polyurethane top coat. Moisture-cured, polymethyl-methacrylate (PMMA), MMA and aromatic polyurethanes are not permitted.

2.2 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.

B. Base Ply Sheet: Non-perforated, asphalt-coated, fiberglass/fiberglass/polyester, or polyester/fiberglass/polyester trilaminate-reinforced sheet dusted with fine mineral surfacing on

both sides which meets the requirements of ASTM D 4601, Type II, and the following properties per ASTM D5147:

1. Tensile Strength, minimum, ASTM D 5147: machine direction, 140 lbf/in; cross machine direction, 130 lbf/in.
2. Tear Strength, minimum, ASTM D 5147: machine direction, 220 lbf; cross machine direction, 185 lbf.
3. Thickness, minimum, ASTM D 5147: 55 mils.

C. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with specified roofing system.

D. Polyurethane sealant suitable for sealing at penetrations, cracks and providing a suitable transition between walls and roof prior to the installation of the membrane system.
   1. Tremco, TremSeal D Sealant, or equal as approved by roofing manufacturer.

E. Metal & PVC Pipe Surface Primer: M-Prime, single-component, water based primer to promote adhesion of base coat to metal and PVC pipe surfaces.

F. Surfaces Re-Primer: Geogard Primer, Single-component, multi-substrate primer to promote adhesion of base coat to aged coated surfaces.

G. Masonry Primer: C-Prime, dual-component, masonry primer to promote adhesion of base coat to masonry surfaces.

H. Asphalt Primer: Manufacturer's water based asphalt primer.

I. Solvent-Free Elastomeric Mastic: One-part, asbestos-free, elastomeric roof mastic specially formulated for compatibility and use with specified roofing membranes and flashings, with the following properties:
   1. Asbestos Content, EPA 600/R13/116: None.
   2. Elongation at 77 deg. F, minimum, ASTM D 412: 220 percent.
   3. Tensile Strength, 270 psi.

J. Drain Flashings: 4lb lead sheet.

K. Slip-Resistant Walkway Additive: Silica/Quartz Sand.

L. Miscellaneous accessories as required by manufacturer.

2.3 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses required.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, HCFC-free, with felt or glass-fiber mat facer on both major surfaces.
   a. R-Value minimum continuous R-30.
   b. Tapered slopes as indicated on drawings.

2.4 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Insulation Adhesive: Two-component, solvent-free, low odor, elastomeric urethane adhesive formulated to adhere roof insulation to substrate, with the following physical properties:
   1. Flame Spread Index, ASTM E 84: 10.
   2. Smoke Developed Index, ASTM E 84: 30.
   3. Asbestos Content, EPA 600/R13/116: None.
   4. Volatile Organic Compounds (VOC), maximum, ASTM D 3960: 0 g/L.
   5. Tensile Strength, minimum, ASTM D 412: 250 psi.
   6. Peel Adhesion, minimum, ASTM D 903: 17 lbf/in.
   7. Flexibility, 70 deg. F, ASTM D 816: Pass.

C. Wood Nailers and Cants: Comply with recommendations in FMG Loss Prevention Data Sheet 1-49, including requirements for wood nailers and cants. Fibrous cants are not permitted.

D. Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

E. Provide preformed crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain.
   1. Crickets and saddles to have a minimum of double the slope of the insulation.
   2. Adhered crickets to be installed between all drains.

F. Cover Board: Reinforced gypsum cover board to be:
   1. USG Corporation; Securock: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 1/2 inch thick.

2.5 METAL FLASHING MATERIALS

A. See Division 07 Section “Sheet Metal Flashing and Trim” for custom metal roof penetration flashings, counter flashings and perimeter flashings.

B. Other Metal Flashings:
   1. Metal flashings, counter flashings, pitch pans, scuppers, and like applications shall be in accordance with:
      a. National Roofing Contractors Association Manual (NRCA).

C. Pitch pans and hoods:
   1. 16 ounce copper, mill finish. Soldered joints.

D. Lead Flashings: Plumbing Stacks and Drain Bowls: 4 lb. sheets ASTM B29-79

E. Termination Bar: Extruded aluminum bar x 2” wide x 10’ lengths. Fastener spacing 8” o.c.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
   1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
   2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
   3. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane relative to adjoining deck.
   4. Verify that substrate is visibly dry and free of moisture.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. All roof top curbs, units, projections and wall flashings must be raised to allow finish roof system flashing height of eight inches.

B. Remove all existing roofing, insulations, flashings and perimeter metal flashings down to roof deck.

C. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

D. 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.

E. Prevent dust, vapors, gases, and odors from entering into the building during roof installation. When shutting down or blocking air intakes, provide makeup air or additional intake air from sources away from the work area. Coordinate these procedures with owner’s Representative.

3.3 INSTALLATION, GENERAL

A. Install roofing system in accordance with manufacturer’s recommendations.

B. Begin the built up roof membrane system installation in the presence of roofing manufacturer technical (non-sales) personnel.

C. Coordinate installation of roofing system components so insulation and roofing plies are not exposed to moisture or remain exposed at the end of the workday or when rain is forecast.

D. Provide water cutoffs at the end of each day’s work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed.

E. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system.

F. Roofing system and building shall be water-tight at the end of each working day.

G. Remove and discard temporary seals before beginning work on adjoining.

H. Shingling Plies: Install base sheet and roofing plies with ply sheets shingled uniformly to achieve required number of membrane plies throughout. Shingle in direction to shed water.

I. Cooperate with inspecting and testing agencies engaged or required to perform services for installing modified bitumen membrane roofing system.

J. Asphalt Primer Application: Prime all surfaces and substrates to which cold adhesive or asphalt mastic or membrane will come in contact. Apply at the rate of 200 square feet per gallon. Coat all metal flashings and fascia with primer that will come in contact with membrane materials.

K. Install roofing system in accordance with NRCA Manual Plates and NRCA recommendations; modify as required to comply with requirements of FMG references above.

L. Contractor shall erect all required roof barriers and safety lines as required by OSHA and comply with OSHA regulations for safety.

3.4 ROOF DRAINS

A. General:
1. Inspect roof drains at time of existing roof tear-off to ascertain requirements for repair and/or replacement of broken or missing parts.
2. Provide temporary means of protecting roof drains from clogging of foreign material during construction. (E.g. inclement weather, weekends, holidays, etc.)

B. Preparation:
1. For all existing roof drain locations, remove all foreign material from body of drain, tailpiece, connecting piping, and roof leader.
2. Flush through roof leaders to building drainage system to remove sediment and to test drain capacity.
3. Verify that all roof drains are clear and free flowing and attain Owner's site representative approval prior to commencement of work.

C. Rework Roof Drains:
1. Clean drain body of all bitumen and other contaminants.
2. Set drain bowl to required height to allow for proper drainage and meet manufacturer's insulation requirements at drain.
3. Fasteners: Coat all bolt threads with manufacturer's recommended permanent type lubricant to prevent freeze-up.
4. Set membrane under new clamping ring in full bead of water stop mastic.
5. Use bronze, brass or stainless steel machine bolts.
6. Do not seal the new dome strainer to the drain body or clamping ring. It must be removable for future cleaning of the drain bowl or roof leader.
7. Install new cast iron drain strainers. Plastic strainers are not permitted.

3.5 BASE SHEET INSTALLATION ON LIGHT WEIGHT DECK

A. Install one lapped base sheet course and mechanically fasten to light weight substrate to meet wind uplift requirements, according to built-up roofing manufacturer's written instructions.

3.6 INSULATION INSTALLATION

A. Comply with roofing manufacturer's written instructions for installing roof insulation.

B. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

C. Do not permit water to enter into or under existing membrane roofing system components that are to remain.

D. Install tapered insulation and crickets, as indicated on drawings, to provide positive drainage.

E. Install insulation with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

F. Install wood nailers to match insulation and cover board thicknesses. Attach to deck per FM 1-49.

G. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/8 inch with insulation.
   1. Cut and fit insulation within 1/8 inch of nailers, projections, and penetrations.

H. Trim surface of insulation where necessary at roof drains so completed surface is flush with ring and does not restrict flow of water.

I. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

J. Taper insulation to provide 1/8” with a 48” square sump at roof drains.

K. Provide adhered crickets between drain locations and adhered saddles along walls between drains to ensure positive drainage.

L. Adhered insulation: Set all insulation layers in ribbons/beads of specified insulation adhesive at the rate required by the manufacturer to meet the minimum field wind uplift pressures. Firmly press boards into place following manufacturer's written instructions.
   a. Increase adhesive application rate by 50% in roof perimeters and 75% in roof corners.

3.7 COVER BOARD INSTALLATION

A. Install cover boards over all insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together. Prime all non-factory-primed gypsum cover boards with asphalt primer and allow primer to dry.
   1. Set cover board in ribbons of the specified cold-applied insulation adhesive the rate required by the manufacturer to meet required wind uplift pressures. Firmly press boards into place following manufacturer's written instructions.
      a. Increase adhesive application rate by 50% in roof perimeters and 75% in roof corners to meet specified wind uplift.

B. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

3.8 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in NRCA's "Quality Control Guidelines for the Application of Fluid Applied Roofing".

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.

C. Cooperate with inspecting agencies engaged or required to perform services for installing roofing system.

D. Coordinate installation of roofing so insulation and other components of built-up roofing not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
   1. Provide tie-offs at end of each day's work to cover exposed built-up roofing sheets and insulation with a course of coated felt set in roofing cement with joints and edges sealed.

2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
3. Remove and discard temporary seals before beginning work on adjoining roofing.

E. Substrate-Joint Penetrations: Prevent roofing adhesives from penetrating substrate joints, entering building, or damaging built-up roofing components or adjacent building construction.

3.9 BASE PLY INSTALLATION

A. Install trilaminate base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align base-ply sheets without stretching. Extend sheets over and terminate.
1. Shingle 4 inch minimum side laps of trilaminate base-ply sheets uniformly. Shingle in direction to shed water.
2. Embed trilaminate ply sheet in cold-applied dual component adhesive applied at a minimum rate of 2.00 gallons per 100 square feet.
3. Completely bond and seal all laps, leaving no voids, fish-mouths or mole-runs.
4. Broom ply into adhesive to ensure a positive bond.
5. Extend adhered base ply down over face of perimeter wood blocking and fasten base ply 12 inches on center.
6. At walls and penetrations, seal with a three-course application of elastomeric mastic and mesh where base ply meets a vertical transition or penetration.

B. Allow solvent-free adhesive bleed-out at laps, and sealant/mastic at walls and penetrations, to skin over before beginning fluid-applied base coat installation.

3.10 REINFORCED FLUID APPLIED FLASHING INSTALLATION

A. Reinforced fluid-applied flashings are to be installed before field-of-roof installation occurs.

B. Fluid-applied material thicknesses listed herein are minimum application rates and may be required to be increased depending on the manufacturer's requirements to meet the specified warranty period.

C. Install flashings a minimum of eight inches up vertical surfaces, or as shown on details, and extend four inches onto horizontal surfaces.

D. Install painters tape where flashings end on walls or other termination points. Ensure removal of tape immediately after each coating application. If coating cures while tape is still installed, removal may be impossible.

E. Prime flashing substrates with appropriate primer according to manufacturer's written instructions.
1. Apply using short nap roller, squeegee, brush or airless spray. Ensure primer does not puddle and substrate has complete coverage.
2. Base coat may be applied once primer is dry and tack free.

F. Install three course of elastomeric mastic and mesh at roof-to-penetration intersections. Allow mastic to skin over before proceeding with polyurethane flashings.

G. Prime all surfaces with appropriate primer before applying base coat.

H. Reinforced Flashing Base Coat: properly mix and pour base coat at a rate of three (3.0) gallons per 100 square feet.

1. Back roll base coat evenly to vertical and horizontal primed areas, brush apply on small round vertical applications, to achieve a wet film thickness of 48 mils minimum.
2. Apply base coat to flashings extending base coating up vertical surfaces and out onto horizontal surfaces four inches.
3. Embed fabric into wet base coat. At pipe and post penetrations install a wagon wheel of fabric and embed into wet base coat, then install square target sheet of mesh over wagon wheel. Ensure all mesh is fully encapsulated in the base coat material.
4. Cure times are extended at temperatures below 60 degrees F.

I. A thorough inspection by manufacturer's technical inspector must take place before the top coat is applied. There shall be no bare spots, no holidays, no skips, no exposed mesh, and no pinholes prior to application of the top coat. If there is no written record of this inspection, no warranty will be issued.

J. Flashing Top Coat: Apply top coat after base coat cures, but within 72 hours of the initial base coat application.
1. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended re-primer.
2. Pour finish coat directly onto roof surface after mixing and spread top coat over reinforced base coat, evenly, at a rate of three (3.0) gallons per 100 square feet minimum.
3. Back roll to achieve a minimum wet film thickness of 48 mils.
   a. Surface temperature and condition may affect the actual coverage. Cure times are extended at temperatures below 60º Fahrenheit.
4. Apply top coat to flashings extending top coating up vertical surfaces and out onto horizontal surfaces 6 inches.
5. Do not allow weather conditions to ruin the quality or uniformity of the coating.
6. Avoid foot traffic on new coating for a minimum of 24 hours.

K. Install new counter flashings to cover base flashing terminations and fasten 12" o.c.
1. End lap flashings minimum of 3 inches.
2. Fold corners and hem all exposed edges to ensure no sharp edges are exposed.
3. Break counter flashing to return snugly against the fluid-applied wall flashings.

L. Roof Drains: Install primed four pound lead flange in bed of base coat over installed base ply. Cover primed lead flashing with reinforced base coat stripping extending a minimum of 6 inches beyond edge of metal flashing onto base ply. Install reinforced base coat and top coat down one inch into primed drain bowl. Clamp roof membrane, metal flashing, and stripping into roof-drain clamping ring.

3.11 REINFORCED FLUID-APPLIED FIELD MEMBRANE APPLICATION

A. Fluid-applied material thicknesses listed herein are minimum application rates and may be required to be increased depending on the manufacturer's requirements to meet the specified warranty period.

B. Reinforced Membrane Base Coat: properly mix and pour base coat at a rate of three (3.0) gallons per 100 square feet in accordance with manufacturer's written instructions. Back roll to achieve minimum wet mil coating thickness of 48 mils, or more as required by manufacturer; verify thickness of base coat as work progresses with a wet film gauge.
1. Apply base coat on prepared and primed surfaces and spread coating evenly.
2. Embed fabric reinforcement into wet base coat. Lap adjacent flashing pieces of fabric minimum three inches along edges and four inches at end laps.
3. Roll surface of fabric reinforcing to completely embed and saturate fabric. Leave finished base coat with fabric free of pin holes, voids, or openings.

4. Cure times are extended at temperatures below 60 degrees F. Moisture-triggered polyurethanes, as specified, use moisture in the air to kick off the curing process. Cold, dry air will slow this process, resulting in extended cure times. It may be necessary to allow an additional day between applying the base and top coats.
5. Allow base coat to cure prior to application of top coat.

C. A thorough inspection by manufacturer's technical inspector must take place before the top coat is applied. There shall be no bare spots, no holidays, no skips, no exposed fabric, and no pinholes prior to application of the top coat. If there is no written record of this inspection, no warranty will be issued.

D. Membrane Top Coat: Apply top coat uniformly to provide a neat and completely covered installation over field of roof and flashings.
1. Prime base coat prior to application of top coat if top coat is not applied within 72 hours of the base coat application, using manufacturer's recommended re-primer.
2. Pour top coat at a rate of three (3.0) gallons per 100 square feet after properly mixing, or more in accordance with manufacturer's written instructions.
3. Back roll to achieve minimum wet mil coating thickness of 48 mils, or more as required by manufacturer; verify thickness of base coat as work progresses with a wet film gauge.
4. Avoid foot traffic on new fluid-applied membrane for a minimum of 72 hours in weather below 60 degrees.

3.12 ROOF WALKWAY AREAS

A. After initial fluid-applied top coat has cured, at indicated areas:
1. Install second application of top coat at a rate of 1.0 gallons (16 wet mils) per 100 square feet.
2. Broadcast mesh silica sand or quartz at the rate of 15-20 lbs per 100 square feet into wet top coat.
3. Immediately back roll sand and top coat, creating an even dispersal of sand.
4. Remove tape outlining walkway area immediately while coating is still wet.
5. Remove any loose sand from cured roofing surface.
6. Avoid foot traffic on walkway areas for a minimum of 72 hours.

3.13 FIELD QUALITY CONTROL

A. Manufacturer's Technical Representative must inspect roof installation every other day, on days where roofing work is taking place, and report progress to Owner's representative.

B. To ensure roofing inspections are not missed or overlooked, the installing contractor shall notify the roofing manufacturer's technical inspector by phone, each and every morning, before work begins on the project. Technical inspector shall make his/her cell phone number available to the installing contractor at the beginning of the project.

C. Inspection Reports: Provide progress photos for application of each operation of roofing system. In addition to regular inspections, Manufacturer's Technical (non-sales) Representative shall be present for roof work starts at each section. Manufacturer's Technical Representative shall provide proof of no less than 10 years experience in the Roofing Industry.

D. Roofing Inspector Qualifications: A full time technical representative of manufacturer (non-sales) experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification.
1. The Roofing Inspector shall be one of the following:

a. An authorized full-time technical employee of the manufacturer with 10 years experience in commercial roofing.
b. If manufacturer does not employ full time technical personnel, inspection personnel shall be certified as a Registered Roof Observer by the Roof Consultants Institute and shall be experienced in the installation and maintenance of the specified roofing system and qualified to determine Installer's compliance with the requirements of this Project.

E. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
1. Manufacture shall verify watertightness of roof system by performing a nondestructive infrared or Tramex dielectric moisture survey.
2. Notify Architect or Owner 48 hours in advance of date and time of inspection.
3. Results will be made available to owner's representative in written form. Any defects or entrapped moisture found within the new roofing system installation will be removed and replaced at the installing contractor's expense.

F. Installing contractor to repair or remove and replace components of roofing system, at the sole expense of the installing contractor, where test results or inspections indicate that they do not comply with specified requirements.

G. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.14 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Sequence operations to avoid excessive or concentrated foot traffic and storage over roof areas while they cure.

D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075600

SECTION 075713 – SPRAY POLYURETHANE FOAM ROOFING

PART 1 GENERAL

1.00 This guide specification is for renewing previously installed polyurethane foam roofing system and recoating. Roofs with the following three coating coverage's are eligible. Any others must be approved individually by a representative of the manufacturer.

A. SCM 3400 Series Silicone Roof Coating

B. Other Silicone Roof Coatings

C. Other Elastomeric Coatings and Approved Polyurethane Coatings

Regardless of the type of coating used, a representative from the manufacturer shall review each application and have the right to approve or reject any application. To be eligible for a Recoating Limited Warranty, the roof must meet the requirements in the "LIMITATIONS" section of this guide specification.

1.01 SECTION INCLUDES

A. Preparation of Substrate.

B. Sprayed in-place Polyurethane Foam Insulation.

C. Silicone Roof Coating.

D. Roofing Granules.

1.02 RELATED SECTIONS

A. Section 079200 - Joint Sealants.

1.03 REFERENCES

A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

B. ASTM D 93 - Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.

C. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers -Tension.

D. ASTM D 562 - Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer.

E. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.

F. ASTM D 471 - Standard Test Method for Rubber Property, Effect of Liquids

G. ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.

H. ASTM D 903 - Standard Test Method for Peel or Stripping Strength of Adhesive

Bonds, adhesive bonding, peel strength, stripping strength.

I. ASTM D 1353 - Standard Test Method for Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products.

J. ASTM D 1549 - Test Method for Determination of Solar Reflectance

K. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

L. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.

M. ASTM D 1644 - Standard Test Methods for Nonvolatile Content of Varnishes.

N. ASTM D 1653A - Standard Test Methods for Water Vapor Transmission of Organic Coating Films.

O. ASTM D 2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.

P. ASTM D 2240 - Standard Test Method for Rubber Property, Durometer Hardness.

Q. ASTM D 2370 - Standard Practice for Calculating Viscosity Index from Kinematic Viscosity at 40 and 100 degrees C.

R. ASTM D 2697 - Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.

S. ASTM D 2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

T. ASTM D 2856 - Standard Test Method for Open-Cell Content of Rigid Cellular Plastics by the Air Pycnometer.

U. ASTM D 6083 - Standard Specification for Liquid Applied Acrylic Coating Used in Roofing.

V. ASTM D 6694 - Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing.

W. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials, flame spread, flame spread index, smoke developed, smoke developed.

X. American Wood Preserve Bureau (AWPB) Standard LP-2

Y. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.

Z. SPFA (Spray Foam Alliance) A-Y Documents

1.04 DESIGN / PERFORMANCE REQUIREMENTS

A. Underwriters Laboratories, Inc. UL 790: Class A Fire Hazard Classification as applied to the deck types and inclines listed.

B. Factory Mutual Approval for Bayseal Polyurethane Foam and Bayblock II, Bayblock HT, SCM 3400 coatings for use in Class 1 roof construction as described in the current edition of the FM Approval Guide. Windstorm rated 1-60 to 1-180 (depending on construction).

C. Miami Dade NOA No. 03-0820.01 for Bayer MaterialScience LLC' single component Silicone coating system SCM 3400 Series membrane applied over foam roofs and complying with the Florida Building Code including High Velocity Hurricane Zone.

1.05 SUBMITTALS

A. Submit under provisions of General Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors.

1. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product and color.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing urethane foam products and systems of this section with minimum ten years documented experience.

B. Installer Qualifications: A current Bayer MaterialScience LLC Qualified Applicator specializing in performing Work of this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging, clearly marked with the manufacturer's name, brand name, product identification, type of material, safety information, manufacture date, and lot numbers until ready for installation.

B. Store silicone coating materials between 50 degrees F (18 degrees C) and 90 degrees F (29 degrees C) with careful handling to prevent damage to products. If conditions exceed these ranges, special consideration in storage must be taken. Do not store at high temperatures in direct sunlight.

C. Protect all materials from exposure to moisture, freezing and other damage during transit, handling, storage, and installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 PRE-INSTALLATION MEETINGS

A. Convene pre-installation meeting prior to commencing work of this section.

B. Attendance: Architect, Contractor, Manufacturer Representative, and roof system applicator.

C. Agenda: Review installation sequence and scheduling.

1.09 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results and document with daily log. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not apply polyurethane foam or roof coating during periods of rain, snow, fog, and mist.

C. Do not apply the polyurethane foam when substrate or ambient air temperatures are below 50 degrees F (10 degrees C) or above 120 degrees F (49 degrees C), or when wind velocities exceed 15 mph. Do not apply polyurethane foam when the substrate surface temperature is less than 5 degrees F (minus 15 degrees C) above the dew point.

D. Do not apply silicone roof coatings when temperatures are below 40 degrees F (4.4 degrees C).

E. Use windscreens during the application of the polyurethane foam and roof coating to prevent overspray onto surfaces not intended to receive foam and coating. Under no circumstances shall the polyurethane foam be applied when wind speeds exceed 15 miles per hour.

1.10 WARRANTY

A. Provide 10-year Full labor and Material Warranty upon completion, inspection and acceptance of the project. Warranty shall cover repair of leaks caused by deterioration of any component of the installed System, improper workmanship in the roof installation, and defects in the coating.

B. WARRANTY LIMITATIONS

1. Systems Warranty Administration will review all potential applications. Only those applications approved by manufacturer prior to the start of the application shall be candidates for a warranty.
2. The repair history and data on all previous inspections shall be considered by manufacturer in determining if the roof is acceptable for renewing/recoating and obtaining a warranty.

    a. Only approved substrates are eligible for a renewable warranty.
    b. The renewed roof may be inspected by the Bayer MaterialScience LLC representative or an independent inspection firm, and any deviations from specifications will require repair.
    c. An infrared moisture survey is required on all system renewables.

C. PRE-JOB REQUIREMENTS AND APPROVAL

1. The form “POTENTIAL CANDIDATE FOR WARRANTY” must be submitted to the Warranty Department prior to job start-up.
2. A Pre-job Inspection should be performed by the applicator, to determine all deviations, paying particular attention to areas of wet foam, if any.

3. MANUFACTURER REQUIRES THAT AN INFRARED MOISTURE SURVEY BE PERFORMED ON ALL ROOFS FOR RENEWABLE SYSTEM WARRANTY, WHICH IS AT THE OWNER OR APPLICATOR'S COST. THE COST MAY BE PAID BY THE OWNER OR APPLICATOR THROUGH A SET UPWARD ADJUSTMENT IN THE WARRANTY FEE.
4. IT IS THE APPLICATOR'S RESPONSIBILITY TO CORRECT ALL DEVIATIONS. ANY DEVIATIONS FOUND DURING THE INITIAL INSPECTION MUST BE CORRECTED PRIOR TO WARRANTY ISSUANCE, AT THE APPLICATOR'S COST.
5. BAYER MATERIALSCIENCE LLC RETAINS THE RIGHT TO PERFORM A POST-JOB MOISTURE SURVEY. IF WET FOAM IS FOUND, THE APPLICATOR IS RESPONSIBILITY TO REMOVE AND REPLACE, PRIOR TO WARRANTY ISSUANCE.
6. NO RENEWAL/RECOAT APPLICATIONS ARE TO BE STARTED BY THE QA WITHOUT BAYER MATERIALSCIENCE LLC ROOFING SYSTEMS' APPROVAL.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer (Basis of Design): Bayer MaterialScience LLC, 2400 Spring Stuebner Rd., Spring, TX 77389. ASD. Phone Toll Free: (800) 221-3626. Phone: (281) 350-9000. Fax: (281) 288-6450. Web Site: www.spf.bayermaterialscience.com. E-mail: joe.gizoni@bayer.com.

B. Substitutions: As approved by Architect.

2.02 POLYURETHANE FOAM

A. General: Spray, two-component monolithic polyurethane foam shall be Bayer MaterialScience LLC Bayseal, two- component, foam designed for use as a self- adhering, seamless, high insulating, spray applied rigid polyurethane foam roof system, as manufactured by Bayer MaterialScience LLC. Polyurethane foam may be required to replace a portion of the previously applied polyurethane foam, for example the existing foam is fond to be wet. The Type of replacement foam shall be detemined by the application and service conditions, in accordance with the recommendation of the polyurethane foam supplier. The installation to be applied should be a two component system made by Bayer MaterialScience LLC and combining an isocyanate component (Component A) and poyoy component (Component B). The cured sprayed-in-place polyurethane foam shall have the components as listed below in Bayseal 2.7.

B. Bayseal 2.7 is designed for spray application and shall have the following minimum physical properties when cured:

1. Minimum in-place Density: Minimum 2.7 lb/cf when tested in accordance with ASTM D 1622.
2. Compressive strength: Minimum 45 psi when tested in accordance with ASTM D 1621.
3. Closed cell content: Minimum 90 percent when tested in accordance with ASTM D 2856.
4. R-Value aged: 6.4 hr/sf/degrees F/Btu minimum at 1 inch thick when tested in accordance with ASTM C 518.
5. Dimensional Stability, 7 days, 158 degrees F, 100 percent R.H: Percent volume change, less than 1 percent when tested in accordance with ASTM D 2126.
6. Flame spread: Class II, less than 75 when tested in accordance with ASTM E 84.

2.03 SILICONE COATING

A. Silicone coating system shall be Bayer MaterialScience LLC' SCM 3400 Series single component silicone coating designed for use in as a weather seal coating over spray applied urethane foam roofing systems. Silicone coating shall have the following minimum properties:

1. Solids Content By Weight: 80 percent when tested in accordance with ASTM D 2697
2. Solids Content By Volume: 65 percent when tested in accordance with ASTM D 2697
3. Flash Point: Minimum 100 degrees F, Tagg closed cup.
4. Durometer Hardness, Shore A, 32 points when tested in accordance with ASTM D 2240.
5. Tensile Strength, 200 psi when tested in accordance with ASTM D 412.
6. Elongation, 400 percent when tested in accordance with ASTM D 570.
7. Water Absorption: 0.5 percent when tested in accordance with ASTM 526.
8. Weatherometer: Carbon-Arc, 4,000 hours. No observable degradation.

B. Silicone coating system shall be Bayer MaterialScience LLC' Baytec SiL 100 single component high solids, silicone coating designed to provide protection for architectural surfaces such as vertical walls, masonry, concrete, metal, single ply membranes and sprayed-in-place urethane foam systems. Silicone coating shall have the following minimum properties:

1. Tensile Strength, 225 psi when tested in accordance with ASTM D 412.
2. Elongation, 180 percent when tested in accordance with ASTM D 412.
3. Reflectivity, White: 84 percent when tested in accordance with ASTM C 1549.
4. Water Absorption: 0.5 percent when tested in accordance with ASTM D 471.
5. Permeably: Greater than 4 when tested in accordance with ASTM E 96 Procedure B.
6. Durometer Hardness, Shore A, 50 plus or minus 5 when tested in accordance with ASTM D 2240.
7. Solids Content By Weight: 95 percent when tested in accordance with ASTM D 1353.
8. Solids Content By Volume: 95 percent when tested in accordance with ASTM D 2697
9. Weatherometer: Carbon-Arc, 4,000 hours. No observable degradation.
10. Flash Point: Greater than 150 degrees F.
11. Color Topcoat:
    a. White.

C. Baytec Sil 70

1. Tensile Strength, 486 psi when tested in accordance with ASTM D 412.
2. Elongation, 267 percent when tested in accordance with ASTM D 412.
3. Reflectivity, White: 84 percent when tested in accordance with ASTM C 1549.
4. Peel (wet) Strength greater than 2.0 lbs/inch when tested per WPSTM C 628
5. Durometer Hardness, Shore A, 50 plus or minus when tested per ASTM C 2240.
6. Solids Content By Weight: 80 percent when tested in accordance with ASTM D 1353.
7. Slides Content by Volume: 69 percent when tested in accordance with ASTM D 2697.
8. Viscosity: 9000 centipoise when tested per WPSTM C 560.
9. Color: White (also available in gray, tan, and dark gray).

D. Non-Slip Granules:

1. No. 11 screen size, ceramic-coated roofing granules as manufactured by the Industrial Products Division of 3M Company, color to best match topcoat or approved equal.
2. Low dust roofing granules as supplied by Specified Equipment Systems, Co., “SESCO GRANULES” or approved equal.

E. Walkways: Yellow Spaghetti, as manufactured by Greenstreak Plastic Products, Inc. or other approved by Bayer MaterialScience LLC.

F. Silicone Sealant or caulking: If Silicone Sealant or caulking is required for detail work or to seal the surface after samples are taken, one of the following GE Sealants & Adhesive sealants must be used: Silpruf Sealant SCS2008 or SCS2009; Construction 1200 Silicone Sealant SCS 1208 or SCS 1209.

2.04 PRIMER COATING

A. Bayblock Prime EW: A two component, water based rust inhibitive primer for the preparation of ferrous and non-ferrous metal surfaces for the application of elastomeric coatings and spray polyurethane foam.

B. Bayblock Prep, is a water based blend of surfactants formulated for the preparation of fully adhered EPDM roof surfaces.

C. Bayblock Prime NS: A single component, water-based, general purpose primer to for the preparation of most non-metallic surfaces for the application of elastomeric coatings and spray polyurethane foam. Suitable for built-up roofing, wood, concrete, spray polyurethane foam, aged asphaltic and other substrates.

2.05 ACCESSORIES

A. Wood nailers, sleepers or other wood blocking to be No. 2 Common Douglas fir or yellow pine, pressure treated in accordance with the current American Wood Preserve Bureau (AWPB) Standard LP-2.

B. Fasteners:

1. Fasteners for securing to wood substrates: Hot dipped galvanized steel nails, domestically produced; 3-1/2 inches (6.4 mm) long 16D spiral shank wire nail.
2. Fastener for nailing sheet metal flanges to wood substrate: Hot dipped galvanized steel roofing nails, No. 11 or 12 gauge, barbed shank, minimum 3/8 inch (9.5 mm) diameter and head 1-1/2 inches (38 mm) long.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that all surfaces to receive polyurethane foam insulation are clean, dry and free of dust, dirt, debris, oil, solvents and all materials that may adversely affect the adhesion of the polyurethane foam.

C. Verify that all roof penetrations and flashings are properly installed and secured. Verify that metal roof opening covers designated to receive polyurethane foam insulation are

permanently secured.

D. Inspect roof for area of exposed foam or areas where thin coating has allowed foam to be burned beneath the coating.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Surface Preparation – SPF Roof

1. Power wash existing SPF roof.
2. Remove all coating that is loose or poorly adhered.
3. Cut out all areas that are wet, punctures and soft spots in an industry acceptable manner.
4. All severely burned SPF areas must be dug out and refoamed.
5. All burnt foam areas, blisters and coatings shall be removed and repaired to insure adhesion of the new material.
6. The entire area to be coated will be clean, dry, and free of any contaminants, which would cause poor adhesion.
7. All burnt areas, cracks, holes, and other imperfections shall be cut and filled using a suitable caulk/sealant.
8. All areas that appear wet must be allowed to dry or removed and re-foamed.
9. All new foam must receive an additional 2 coats of coating.
10. Repair any pinholes.

3.03 SAFETY REQUIREMENTS

A. Exercise care not to allow fumes from the polyurethane foam and coating materials to enter the building, using the following minimum precautions:

1. Turn off all HVAC equipment and cover all intake vents and other potential sources of air entry into the building.
2. Provide CO2 or other dry chemical fire extinguishers to be available at the jobsite.
3. Provide adequate ventilation for all areas being worked.

B. Proper safety precautions shall be followed throughout the entire roofing operation. Conform to safety precautions of Spray Polyurethane Foam Alliance of the American Plastics Council's Recommendations for the Safe Handling and Use of Sprayed Urethane Foam and Coating Materials.

C. Provide fire extinguishers available on the roof and at all work sites at all times during roofing operations.

3.04 SPRAY POLYURETHANE FOAM APPLICATION

A. Apply polyurethane foam in strict accordance with the manufacturer's specifications and application instructions.

B. Apply in a minimum of 1⁄2 inch (12.5 mm) thick passes and 1-1/2 inch (38 mm) maximum thick passes. Total thickness of the polyurethane foam shall be a minimum of 1-1/2 inches (38 mm), except where tapering is required to facilitate drainage.

C. Apply the full thickness of polyurethane foam in any area on the same day.

D. Applied to ensure proper drainage, resulting in no ponding water. Ponding water is generally defined as "an area of 100 square feet or more, which holds in excess of 1⁄2 inch (12.5 mm) of water as measured 24 hours after rainfall.

E. Terminate polyurethane foam neatly a minimum of 4 inches (102 mm) above the finished roof surface at roof penetrations. Foamed-in-place cants shall be applied to allow a smooth transition from the horizontal to vertical surface and shall be applied prior to the application of additional foam lifts to achieve specified thickness. Mask building surfaces to terminate the foam and coating in a neat, straight line.

F. Finished polyurethane foam surface texture shall be "smooth to orange-peel", free of voids, pinholes and depressions. "Verge of popcorn" texture is acceptable if it can be thoroughly and completely coated. Popcorn and tree bark textures are not acceptable. Unacceptable foam textures must be removed and re-foamed prior to coating application.

3.05 SILICONE ROOF COATING APPLICATION

A. Polyurethane foam surface shall be free of moisture, dust, dirt, debris and other contaminants that would impair the adhesion of the silicone coating.

B. If more than 24 hours elapse between the polyurethane foam application and the start of the silicone coating application, thoroughly inspect the polyurethane foam surface for UV degradation and oxidation. Contact a Bayer MaterialScience LLC representative for guidance.

C. Sprays apply coating in accordance with the manufacturer's application instructions and precautions in the technical datasheet. For new foam areas:

1. Apply silicone basecoat on the same day as the polyurethane foam application, and after the polyurethane foam has been allowed to cure a minimum of one hour. If the basecoat is not applied within 24 hours of polyurethane foam, remove and repair all signs of oxidation, or other damages as required by manufacturer.
2. Apply the basecoat in a uniform application to achieve a finished dry film thickness of approximately 12 to 15 mils.
3. Basecoat shall not be subjected to foot traffic or otherwise disturbed until it is tack-free.
4. Coating shall not be applied to the exposed leading edge of the foam at unfinished areas. Sandwiching of coating between foam passes is not permitted.
5. After the basecoat has cured, inspect the coating for pinholes, cracks, thin areas or other deviations. All deviations observed shall be caulked with sealant and/or roller coated with additional basecoat prior to applying subsequent coats of silicone.
6. Basecoat must be cured, clean and free of all moisture prior to application of intermediate coat and topcoat.
7. Silicone coating should be applied in one coat of approximately ¼ gallon per square.

D. Nominal thickness of additional the final dry film protective silicone coating system shall be an average 15 mils with a minimum of 25 mils including existing coating.

E. Coating shall be applied a minimum of 2 inches beyond all the terminated edges of the polyurethane foam. Mask terminations to provide a straight edge, neat, finished appearance.

F. Silicone coating shall be applied to the exterior of the vent coverings. Surfaces of the vent coverings shall be properly prepared as with any other substrate as outlined within this guide specification.

G. Allow the topcoat to cure and inspect the finished coating surface for pinholes, cracks, thin areas, or other deviations. Repair any deviations observed with silicone sealant and/or additional silicone coating material.

H. Granule Application (use this section if granule application is part of scope of work):

1. Apply roofing granules immediately (within 3 minutes) after application of the finish coat of silicone coating. Immediate application is important to obtain maximum wet-out and embedment.
2. Apply the roofing granules, using suitable compressed air equipment, uniformly at a rate of approximately 40 lbs per 100 square feet of roof area.
3. After the coating has fully cured, all loose granules shall be removed using a soft-bristled broom to prevent blocking gutters and clogging drains.
4. Bare spots in the granulated surface shall be filled in by applying additional coating and granules in these areas.

I. Walkways: (use this section if walkway application is part of scope of work) Yellow Spaghetti, factory-formed walkway pads may be used as walkways, around access scuttles, around rooftop equipment to provide a working surface, and wherever specified. Spot adhere the pads or rolls to the finished surface with generous buttons of silicone sealant.

J. Set splash blocks (if included as part of scope of work) on Yellow Spaghetti adhered with buttons of silicone sealant on completed foam and coated roof where indicated on Drawings.

K. Patch all holes 3 inches (76 mm) diameter or smaller, with silicone sealant, to same level as adjacent surfaces and apply coating.

L. Where larger holes occur, fill the opening with spray polyurethane foam to match the adjacent surfaces prior to applying the specified roof coating.

M. Set the strainer dome in dabs of silicone sealant.

N. Equipment Walkway Coatings: (if included as part of scope of work) Roofing granules or a reinforced polyester mesh shall be installed around all mechanical equipment as indicated on the Drawings. Install at least six feet around the perimeter as follows:

1. Apply an additional coat of acrylic coating at the rate of 1-1/2 gallons per 100 square feet.
2. Broadcast grade 11 roofing granules at a rate of 50 pounds per 100 square feet or lay down the reinforced polyester mesh while the coating is in a fluid condition.
3. Seal granules or polyester mesh in by applying additional coating at the rate of 3/4 gallon per 100 square feet.

3.06 FIELD QUALITY CONTROL

A. Roof system manufacturer shall provide independent inspection firm, to perform periodic follow-up inspections on the roof, through a standard warranty inspection program.

B. Any areas that do not meet the minimum standards for application as specified herein shall be corrected by the applicator. Manufacturer's inspection or verification shall not constitute acceptance of responsibility for any improper application of material.

3.07 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 075713

SECTION 076200 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1.

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:

1. Manufactured reglets.
2. Formed low-slope roof flashing and trim.
3. Formed wall flashing and trim.
4. Formed equipment support flashing.

B. Related Sections include the following:

1. Division 6 Section 061053 "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
2. Division 7 Section 075216 “SBS Modified Bituminous Membrane Roofing” for installing sheet metal flashing and trim integrated with roofing membrane.
3. Division 7 Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Division 7 Section 079200 "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft.: 60-lbf/sq. ft. perimeter uplift force, 90-lbf/sq. ft. corner uplift force, and 30-lbf/sq. ft. outward force.

C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

E. ANSI/SPRI ES-1: All manufactured roof edge shall meet or exceed ANSI/SPRI ES-1 design standards. Submit test reports for review.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:

1. Identify material, thickness, weight, and finish for each item and location in Project.
2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
4. Details of expansion-joint covers, including showing direction of expansion and contraction.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: Full-size Sample.

1.5 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.

1. Copper Standard: Comply with CDA's "Copper in Architecture Handbook."

B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.

B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 SHEET METALS

A. Copper Sheet: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet.

B. Lead-Coated Copper Sheet: ASTM B 101, Temper H00 and H01, cold-rolled copper sheet, of weight indicated below, coated both sides with lead weighing not less than 12 lb/100 sq. ft. nor more than 15 lb/100 sq. ft. of copper sheet (total weight of lead applied equally to both sides).

C. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:

1. Mill Finish: Standard one-side bright.

2. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil.
3. Anodized Finish: Apply the following coil-anodized finish:

    a. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
    b. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

1. Finish: No. 2D (dull, cold rolled).

E. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).

1. Product: Subject to compliance with requirements, provide "TCS II" by Follansbee Steel.

F. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality, mill phosphatized for field painting where indicated.

G. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality with manufacturer's standard clear acrylic coating both sides.

H. 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. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
3. Exposed Finishes: Apply the following coil coating:

    a. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil.

I. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.3 UNDERLAYMENT MATERIALS

A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.

B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized paper, minimum 5 lb/100 sq. ft.

2.4 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. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

1. Nails for Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel, 0.109 inch minimum and not less than 7/8 inch long, barbed with large head.
2. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
3. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
4. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
5. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

C. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

D. Solder for Lead-Coated Copper: ASTM B 32, Grade Sn60, 60 percent tin and 40 percent lead.

E. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.

F. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.

G. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.

H. Burning Rod for Lead: Same composition as lead sheet.

I. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

J. Elastomeric Sealant: Generic type recommended by sheet metal manufacturers and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section 07920 “Joint Sealants”.

K. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

L. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

M. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

N. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

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.

1. Available Manufacturers:

   a. Fry Reglet Corporation.
   b. Hickman, W. P. Company.
   c. Keystone Flashing Company, Inc.

2. Material: Stainless steel, 0.0187 inch thick Copper, 16 oz./sq. ft. Lead-coated copper, 17.2 oz./sq. ft. Aluminum, 0.032 inch thick Galvanized steel, 0.0217 inch thick.
3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
4. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
5. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.6 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 in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

C. 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 Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.

E. 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 deep, filled with butyl sealant concealed within joints.

F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.

G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing and Fascia Caps: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Furnish with 6-inch- wide joint cover plates.

1. Joint Style: Lap, 4 inches.
2. Fabricate with scuppers as indicated on drawings of dimensions required with 4-inch-wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
3. Fabricate scuppers from the following material:
   a. Aluminum: 0.050 inch thick.
   b. Galvanized Steel: 0.0276 inch thick.
   c. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
   d. Prepainted, Metallic-Coated Steel: 0.0276 inch thick.

B. Copings: Fabricate in minimum 96-inch- long, but not exceeding 10-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight.

1. Joint Style: Butt, with 12-inch- wide concealed backup plate and 6-inch- wide exposed cover plates.
2. Fabricate copings from the following material:

   a. Aluminum: 0.050 inch thick.
   b. Galvanized Steel: 0.0396 inch thick.
   c. Prepainted, Metallic-Coated Steel: 0.0396 inch thick.

C. Roof to Wall Transition Expansion-Joint Cover: Fabricate from the following material:

1. Aluminum: 0.050 inch thick.
2. Galvanized Steel: 0.0336 inch thick.
3. Aluminum-Zinc Alloy-Coated Steel: 0.0336 inch thick.
4. Prepainted, Metallic-Coated Steel: 0.0336 inch thick.

D. Base Flashing: Fabricate from the following material:

1. Galvanized Steel: 0.0276 inch thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
3. Prepainted, Metallic-Coated Steel: 0.0276 inch thick.

E. Counterflashing: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.
2. Galvanized Steel: 0.0217 inch thick.
3. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
4. Prepainted, Metallic-Coated Steel: 0.0217 inch thick.

F. Flashing Receivers: Fabricate from the following material:

1. Aluminum: 0.0320 inch thick.
2. Galvanized Steel: 0.0217 inch thick.
3. Aluminum-Zinc Alloy-Coated Steel: 0.0217 inch thick.
4. Prepainted, Metallic-Coated Steel: 0.0217 inch thick.

G. Roof-Penetration Flashing: Fabricate from the following material:

1. Lead: 4.0 lb/sq. ft. hard tempered.
2. Galvanized Steel: 0.0276 inch thick.
3. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.

H. Roof-Drain Flashing: Fabricate from the following material:

1. Lead: 4.0 lb/sq. ft., hard tempered.
2. Copper: 13.2 oz./sq. ft.
3. Lead-Coated Copper: 12 oz./sq. ft.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

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

1. Galvanized Steel: 0.0276 inch thick.
2. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.
3. Prepainted, Metallic-Coated Steel: 0.0276 inch thick.

2.9 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.

1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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.

1. Coat side of uncoated aluminum and lead sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

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 butyl 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 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 with no joints allowed within 24 inches 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 deep, filled with butyl sealant concealed within joints.

G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
2. Aluminum: Use aluminum or stainless-steel fasteners.
3. Copper: Use copper, hardware bronze, or stainless-steel fasteners.
4. Stainless Steel: Use stainless-steel fasteners.

H. Seal joints with butyl sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.

1. Do not solder prepainted, metallic-coated steel and aluminum sheet.
2. Pretinning is not required for lead-coated copper zinc-tin alloy-coated stainless steel and lead.
3. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
4. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
5. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
6. Lead-Coated Copper Soldering: Wire brush edges of sheets before soldering.
7. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 16-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.

1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 16-inch centers.
2. Anchor interior leg of coping with screw fasteners and washers at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for butyl sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant.

1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and 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 butyl sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.4 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Reglets:

1. Extend at least 1” into wall with hemmed inner edge to receive ribbed flashing and form a hook seam. Form hem on upper surface of metal so that completed will shed water.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with butyl sealant to equipment support member.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077100 – MANUFACTURED ROOF SPECIALTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:
   1. Copings.
   2. Reglets.
   3. Counterflashing.

B. Related Sections include the following:

   1. Division 7 Section "Sheet Metal Flashing and Trim" for shop- and field-fabricated metal flashing and counterflashing, scuppers, gutters and downspouts, trim and fascia units, roof expansion-joint covers, and miscellaneous sheet metal accessories.
   2. Division 7 Section "Roof Expansion Assemblies" for roof expansion-joint covers.
   3. Division 7 Section "Roof Accessories" for manufactured curbs, roof hatches, gravity ventilators, penthouse ventilators, ridge vents, and smoke vents. Roof accessories installed integrally with roofing membrane are specified in roofing system Sections as roofing work.

1.03 SUBMITTALS

A. Product Data: For each type of product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop Drawings: Indicate layout, joining, profiles, accessories, anchorage, flashing connections, and relationship to supporting structure and to adjoining roof and wall construction.

C. Samples for Initial Selection: Manufacturer's sample finishes showing the full range of colors and textures available for units with factory-applied color finishes.

D. Samples for Verification: Of the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material to be used for the Work. Furnish straight Samples in lengths specified below or where corner pieces are required for Project; furnish corner Samples with each leg in lengths specified below:

   1. Copings: 8 inches long.
   2. Fascia: 8-inch long sections of each distinctly different fascia component, including scuppers and extenders (if any), exposed as finish work.
   3. Reglets and Counterflashing: 8 inches (200 mm) long.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide manufactured roof specialties capable of withstanding wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

B. Provide manufactured roofing specialties, incorporating roof edge treatment that complies with recommendations of FM Loss Prevention Data Sheet 1-49 for the following Wind Zone:

1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft.: 60-lbf/sq. ft. perimeter uplift force, 90-lbf/sq. ft. corner uplift force, and 30-lbf/sq. ft. outward force.

C. FMG Listing: Provide roofing specialties that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

A. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1.

B. Flashings and Fastening: Comply with requirements of Division 07 Sections “Sheet Metal Flashing and Trim” and “Roof Specialties.” Provide base flashings, perimeter flashings, detail flashings and component materials and installation techniques that comply with requirements and recommendations of the following:
1. FMG 1-49: Loss Prevention Data Sheet for Perimeter Flashings.
2. NRCA Roofing and Waterproofing Manual (Fifth Edition) for construction details and recommendations.
3. SMACNA Architectural Sheet Metal Manual (Fifth Edition) for construction details.
4. The metal edge securement, except gutter, shall be installed as tested in accordance with the most current version of the ANSI\SPRI ES-1, American National Standard for Edge Systems Used with Low-Slope Roofing Systems.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of manufactured roof specialty from one source and by a single manufacturer.

1.06 PROJECT CONDITIONS

A. Coordinate work of this Section with adjoining work for proper sequencing of each installation to ensure best-possible weather resistance and protection of materials and finishes against damage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Formed-Aluminum Copings:
    a. ABC Seamless, Inc.
    b. Architectural Products Co.
    c. ATAS International, Inc.
    d. Cheney Flashing Company.
    e. Hickman: W.P. Hickman Co.
    f. Merchant and Evans, Inc.
    g. Metal-Era, Inc.
    h. MM Systems Corp.
    i. Petersen Aluminum Corp.
    j. Southern Aluminum Finishing Co.

2. Aluminum Reglets:

    a. Fry Reglet Corporation.
    b. Hickman: W.P. Hickman Co.
    c. Keystone Flashing Company.
    d. MM Systems Corp.

2.02 METALS

A. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for use intended and finish indicated, and with not less than the strength and durability of alloy and temper designated below:

1. Alloy 3003-H14, with a minimum thickness of 0.040 inch (1.0 mm), unless otherwise indicated, for aluminum sheet with mill finish.
2. Alloy 5005-H14, with a minimum thickness of 0.050 inch (1.2 mm), for aluminum sheet with other than mill finish.

B. Galvanized Steel Sheets: ASTM A 653, G90 (ASTM A 653M, Z275) coating designation; commercial quality; at least 0.034 inch (0.85 mm) thick, unless otherwise indicated.

2.03 COPINGS

A. Provide copings in shapes and sizes indicated, with shop-fabricated corners. Include anchor plates formed from at least 0.028-inch- (0.7-mm-) thick, galvanized steel sheet; cleats or other attachment devices; concealed splice plates; and trim and other accessories indicated or required for complete installation, with no exposed fasteners.

B. Provide exposed coping components fabricated from the following metal:

1. Formed-aluminum sheet in thickness indicated, but not less than the following:
    a. Thickness: 0.050 inch (1.3 mm).

2.04 REGLETS

A. General: Provide reglets of type, material, and profile indicated, compatible with flashing. Form to securely interlock with counterflashing.

B. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.

C. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.

D. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of the counterflashing's lower edge.

E. Material: Fabricate reglets from the following metal in thickness indicated:

1. Aluminum Sheet: 0.024 inch (0.6 mm) thick.

2.05 COUNTERFLASHING

A. Provide counterflashing fabricated from the same metal as reglets and compatible with reglet system installed.

2.06 ACCESSORIES

A. General: Provide manufacturer's standard accessories designed and manufactured to match and fit roof edge treatment system indicated.

B. Exposed Fasteners: Stainless steel, nonmagnetic, of manufacturer's standard type and size for product and application indicated. Match finish of exposed heads with material being fastened.

C. Concealed Fasteners: Same metal as item fastened or other noncorrosive metal as recommended by manufacturer.

D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

E. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil (0.4-mm) dry film thickness per coat.

F. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

G. Foam-Rubber Seal: Manufacturer's standard foam.

H. Adhesives: Type recommended by manufacturer for substrate and project conditions, and formulated to withstand minimum 60-lbf/sq. ft. (2.9-kPa) wind-uplift force.

2.07 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

C. Finish manufactured roof specialties after fabrication and assembly if products are not fabricated from prefinished metals.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.08 ALUMINUM FINISHES

A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

B. Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 606.1 or AAMA 608.1.
   1. Color: As selected by Architect from the full range of industry colors and color densities.

2.09 GALVANIZED STEEL SHEET FINISHES

A. Surface Preparation: Clean galvanized surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. Remove pretreatment from galvanized steel sheet fabricated from coil stock by mechanical methods.

B. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating of type compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified to comply with ASTM A 780.

C. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply the air-dried primer specified below immediately after cleaning and pretreating.

   1. Shop Primer: Zinc-rich primers complying with performance requirements of SSPC-Paint 20.

D. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).
   1. Color and Gloss: As selected by Architect from manufacturer's full range of colors and glosses.\

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine walls, roof edges, and parapets for suitable conditions for roof edge system installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Promptly remove protective film, if any, from exposed surfaces of finished metals. Strip with care to avoid damage to finish.

B. Prepare concrete, concrete masonry block, cement plaster, and similar surfaces to receive roof edge system specified. Install blocking, cleats, water dams, and other anchoring and attachment accessories and devices required.

3.03 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Coordinate with installation of roof deck and other substrates to receive work of this Section and with vapor retarders, roofing insulation, roofing membrane, flashing, and wall construction, as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor products securely to structural substrates to withstand lateral and thermal stresses and inward and outward loading pressures.

B. Isolation: Where metal surfaces of units contact dissimilar metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces or provide other permanent separation as recommended by aluminum producer.

C. Expansion Provisions: Install running lengths to allow controlled expansion for movement of metal components in relation not only to one another but also to adjoining dissimilar materials, including flashing and roofing membrane materials, in a manner sufficient to prevent water leakage, deformation, or damage.

3.04 CLEANING AND PROTECTING

A. Clean exposed metal surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

B. Protection: Provide protective measures as required to ensure work of this Section will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION 077100

SECTION 078100 – APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes sprayed fire-resistive materials.

B. Related Requirements:

1. Section 078123 "Intumescent Fireproofing" for mastic and intumescent fire-resistive coatings.

1.3 DEFINITIONS

A. SFRM: Sprayed fire-resistive materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Framing plans or schedules, or both, indicating the following:

1. Extent of fireproofing for each construction and fire-resistance rating.
2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
4. Treatment of fireproofing after application.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Product Certificates: For each type of fireproofing.

C. Evaluation Reports: For fireproofing, from ICC-ES.

D. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 40 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 ; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.
2. UL design listings must state that the loading was determined by Allowable Stress Design Method or Load and Resistance Factor Design Method. UL design listings requiring a load restriction factor are not allowed.

D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

A. Standard Durability SFRM, [Interior Locations, Concealed Conditions for Low Rise Buildings]: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated

fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application. Dry mix inorganic spray-applied fire resistive material containing mineral slag wool and Portland-cement are not permitted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies_; Monokote MK-6
2. Bond Strength: Minimum 200-lbf/sq. ft. (9.57-kPa) cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than density specified in the approved fire-resistance design, according to ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 10 or less.
    b. Smoke-Developed Index: 10 or less.

6. Compressive Strength: Minimum 10 lbf/sq. in. (68.9 kPa) according to ASTM E 761.
7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
10. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E 859.
11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in [no growth on specimens per ASTM G 21] [or] [rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273].
12. Sound Absorption: [NRC] [or] [SAA] of [0.50 to 0.75] [0.60 to 0.70] [0.65 to 0.75] [not less than 0.60] <Insert range or single value> according to ASTM C 423 for Type A mounting according to ASTM E 795.
13. Finish: [Spray-textured finish] [Rolled, spray-textured finish] <Insert requirement>.[Apply separate, colored topcoat after finishing.]

B. Intermediate Durability SFRM, [Interior Locations, Exposed to View Only or for Buildings Between 75 and 420 Feet Tall]: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application. Dry mix inorganic spray-applied fire resistive material containing mineral slag wool and Portland-cement are not permitted.
    1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies; Monokote MK-10/HB
    2. Bond Strength: Minimum 600-lbf/sq. ft. (28.4-kPa) cohesive and adhesive strength based on field testing according to ASTM E 736.
    3. Density: Not less than density specified in the approved fire-resistance design, according to ASTM E 605.
    4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
    5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

        a. Flame-Spread Index: 10 or less.
        b. Smoke-Developed Index: 10 or less.

    6. Compressive Strength: Minimum 30 lbf/sq. in. (206 kPa) according to ASTM E 761.
    7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.

8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
10. Air Erosion: Maximum weight loss of [0.025 g/sq. ft. (0.270 g/sq. m)] <Insert value> in 24 hours according to ASTM E 859.
11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in [no growth on specimens per ASTM G 21] [or] [rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273].
12. Sound Absorption: [NRC] [or] [SAA] of [0.50 to 0.75] [0.60 to 0.70] [0.65 to 0.75] [not less than 0.60] <Insert range or single value> according to ASTM C 423 for Type A mounting according to ASTM E 795.
13. Finish: [Spray-textured finish] [Rolled, spray-textured finish] <Insert requirement>.[Apply separate, colored topcoat after finishing.]

C. Super High Rise Durability SFRM, [Interior Locations, for Buildings Over 420 Feet Tall]: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application. Dry mix inorganic spray-applied fire resistive material containing mineral slag wool and Portland-cement are not permitted.
1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies; Monokote MK-1000/HB
2. Bond Strength: Minimum 1000-lbf/sq. ft. (47.2-kPa) cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than 18 pcf density as tested in accordance with ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: [10] <Insert number> or less.
    b. Smoke-Developed Index: [10] <Insert number> or less.

6. Compressive Strength: Minimum 50 lbf/sq. in. (345 kPa) according to ASTM E 761.
7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
10. Air Erosion: Maximum weight loss of [0.025 g/sq. ft. (0.270 g/sq. m)] <Insert value> in 24 hours according to ASTM E 859.
11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in [no growth on specimens per ASTM G 21] [or] [rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273].
12. Sound Absorption: [NRC] [or] [SAA] of [0.50 to 0.75] [0.60 to 0.70] [0.65 to 0.75] [not less than 0.60] <Insert range or single value> according to ASTM C 423 for Type A mounting according to ASTM E 795.
13. Finish: [Spray-textured finish] [Rolled, spray-textured finish] <Insert requirement>.[Apply separate, colored topcoat after finishing.]

D. Medium Durability SFRM, [Interior Locations, Exposed Conditions to Abrasion/Moisture]: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application. Dry mix inorganic spray-applied fire resistive material containing mineral slag wool and Portland-cement are not permitted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies; Monokote Z-106/HY
2. Bond Strength: Minimum 2000-lbf/sq. ft. (94.5-kPa) cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than 22 pcf density as tested in accordance with ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 10 or less.
    b. Smoke-Developed Index: 10 or less.

6. Compressive Strength: Minimum 100 lbf/sq. in. (680 kPa) according to ASTM E 761.
7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
10. Air Erosion: Maximum weight loss of [0.025 g/sq. ft. (0.270 g/sq. m)] <Insert value> in 24 hours according to ASTM E 859.
11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in [no growth on specimens per ASTM G 21] [or] [rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273].
12. Sound Absorption: [NRC] [or] [SAA] of [0.50 to 0.75] [0.60 to 0.70] [0.65 to 0.75] [not less than 0.60] <Insert range or single value> according to ASTM C 423 for Type A mounting according to ASTM E 795.
13. Finish: [Spray-textured finish] [Rolled, spray-textured finish] [Skip-troweled finish] <Insert requirement>.[Apply separate, colored topcoat after finishing.]

E. High Durability SFRM, [Interior or Exterior Locations, Exposed Conditions Subject to Impact or Direct Moisture]: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies; Monokote Z-146
2. Bond Strength: Minimum 10000-lbf/sq. ft. (478-kPa) cohesive and adhesive strength based on field testing according to ASTM E 736.
3. Density: Not less than 40 pcf density as tested in accordance with ASTM E 605.
4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker, but not less than 0.375 inch (9 mm).
5. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 10 or less.
    b. Smoke-Developed Index: 10 or less.

6. Compressive Strength: Minimum 500 lbf/sq. in. (3450 kPa) according to ASTM E 761.
7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
10. Air Erosion: Maximum weight loss of [0.025 g/sq. ft. (0.270 g/sq. m)] <Insert value> in 24 hours according to ASTM E 859.

11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in [no growth on specimens per ASTM G 21] [or] [rating of 10 according to ASTM D 3274 when tested according to ASTM D 3273].
12. Sound Absorption: [NRC] [or] [SAA] of [0.50 to 0.75] [0.60 to 0.70] [0.65 to 0.75] [not less than 0.60] <Insert range or single value> according to ASTM C 423 for Type A mounting according to ASTM E 795.

13. Finish: [Spray-textured finish] [Rolled, spray-textured finish] [Skip-troweled finish] [Skip-trowel finish with corner beads] <Insert requirement>.[Apply separate, colored topcoat after finishing.]

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:

1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.

C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.

D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.

E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

G. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Verify that concrete work on steel deck is complete before beginning fireproofing work.

C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning fireproofing work.

D. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.

1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.

2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

D. Metal Decks:

1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, is completed.
2. Do not apply fireproofing to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fireproofing.

E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

F. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

G. Extend fireproofing in full thickness over entire area of each substrate to be protected.

H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fireproofing that differs in color from that of encapsulant over which it is applied.

J. Where sealers are used, apply products that are tinted to differentiate them from fireproofing over which they are applied.

K. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

L. Cure fireproofing according to fireproofing manufacturer's written instructions.

M. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

N. Finishes: Where indicated, apply fireproofing to produce the following finishes:

1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
2. Spray-Textured Finish: Finish left as spray applied with no further treatment.
3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.
4. Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth out the texture and neaten edges.
5. Skip-Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray-applied finish to smooth out the texture, eliminate surface markings, and square off edges.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by Chapter 17 of the applicable building code.

2. Shop drawings showing the minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly must be obtained from the architect.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078100

SECTION 078123 – INTUMESCENT FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes mastic and intumescent fire-resistive coatings (MIFRC).

B. Related Requirements:

1. Section 078100 "Applied Fireproofing" for sprayed fire-resistive materials (SFRM).

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review products, design ratings, restrained and unrestrained conditions, thicknesses, and other performance requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Structural framing plans indicating the following:

1. Extent of fireproofing for each construction and fire-resistance rating.

2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.

3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.

4. Treatment of fireproofing after application.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions in size.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of fireproofing.

C. Evaluation Reports: For fireproofing, from ICC-ES.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of each type of fireproofing and different substrate and each required finish as shown on Drawings.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.

B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.

C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Steel members are to be considered unrestrained unless specifically noted otherwise.

D. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction.

1. Flat Paints and Coatings: 50 g/L.

2. Nonflat Paints and Coatings: 150 g/L.
3. Primers, Sealers, and Undercoaters: 200 g/L.
4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
5. Fireproofing Exterior Coatings: 350 g/L.

E. Low-Emitting Materials: Fireproofing used within the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Asbestos: Provide products containing no detectable asbestos.

2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

A. MIFRC: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.

1. Application: Designated for interior general purpose and conditioned interior space purpose use by a qualified testing agency acceptable to authorities having jurisdiction.

2. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.

3. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less.
b. Smoke-Developed Index: 50 or less.

4. Hardness: Not less than 65, Type D durometer, according to ASTM D 2240.

5. Finish: As selected by Architect from manufacturer's standard finishes.

a. Color and Gloss: As selected by Architect from manufacturer's full range.

2.3 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.

B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.

D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.

E. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify compliance with the following:

1. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.

2. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.

3. Substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.

B. Conduct tests according to fireproofing manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

B. Clean substrates of substances that could impair bond of fireproofing.

C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.

B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.

1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.

2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.

D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written recommendations for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.

E. Spray apply fireproofing to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.

F. Extend fireproofing in full thickness over entire area of each substrate to be protected.

G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.

H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.

I. Cure fireproofing according to fireproofing manufacturer's written recommendations.

J. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

K. Finishes: Where indicated, apply fireproofing to produce the following finishes:

1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.

2. Spray-Textured Finish: Finish left as spray applied with no further treatment.

3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.

4. Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth out the texture and neaten edges.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Test and inspect as required by the IBC, 1704.11.

B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.

C. Fireproofing will be considered defective if it does not pass tests and inspections.

1. Remove and replace fireproofing that does not pass tests and inspections, and retest.

2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing will be without damage or deterioration at time of Substantial Completion.

C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.

D. Repair fireproofing damaged by other work before concealing it with other construction.

E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 078123

SECTION 078443 – FIRESTOPPING

PART 1 - GENERAL

1.1 Applicable provisions of the Conditions of the Contract and Division #1, General Requirements, govern work in this Section.

1.2 DESCRIPTION OF WORK

A. The work of this Section consists of the provision of all materials, labor and equipment and the like necessary and/or required for the complete execution of all firestopping and smoke seal work for this project as required by the schedules, keynotes and drawings, including, but not limited to the following:

NOTE: Firestopping is defined as a material, or combination of materials, to restore the integrity of fire rated walls and floors by maintaining an effective barrier against the spread of flame, smoke and toxic gases and further defined in 1.4 below.

1. Provide firestopping and smoke seals as indicated on the drawings and/or required to maintain full and continuous smoke and fire barrier between zones including:

    a. Through penetration firestops and smoke-stops for all fire-rated bearing and non-bearing wall and floor assemblies, both blank (empty) and those accommodating penetrating items such as cables, conduits, pipes, ducts, etc.

NOTE: A preinstallation conference shall be scheduled by the Contractor with this Specialty Contractor and all other Specialty Contractors, Subcontractors and the like to establish procedures to maintain optimum working conditions and to coordinate the work of this Section with related and adjacent work.

1.3 RELATED WORK SPECIFIED ELSEWHERE – Entire Project Specification

NOTE: Proper execution of this work will maintain the hourly ratings of the walls and floors and ensure progress of work in other Sections as listed below.

1.4 QUALITY ASSURANCE

A. Firestopping systems (materials and design):

1. Shall conform to both Flame (F)P and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479 fire tests in a configuration that is representative of field conditions.

2. The F rating must be a minimum of 1 hour but not less than the fire resistance rating of the assembly being penetrated.

3. T rating when required by code authority shall be based on measurement of the temperature rise on penetrating item(s).

4. The fire test shall be conducted with a minimum positive pressure differential of 0.03 inches of water column.

5. For joints, must be tested to UL 2079 or E 1399 and E 1966 with movement capabilities equal to those of the anticipated conditions.

6. Where there is no specific third party tested and classified firestop system available for a particular firestop configuration, the firestopping contractor shall obtain from the firestop manufacturer an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) for submittal.

B. Firestopping materials and systems must be capable of closing or filling through-openings created by 1) the burning or melting of combustible pipes, cable jacketing, or pipe insulation materials, or 2) deflection of sheet metal due to thermal expansion (electrical and mechanical duct work).

C. Firestopping sealants must be flexible, allowing for normal pipe movement.

D. Firestopping materials shall not shrink upon drying as evidenced by cracking or pulling back from contact surfaces.

E. Firestopping materials shall be moisture resistant, and may not dissolve in water after curing.

F. For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.

G. All firestopping materials shall be manufactured by one manufacturer (to the maximum extent possible).

H. Material used shall be in accordance with the manufacturer's written installation instructions.

I. Firestopping shall be performed by a Specialty Contractor trained or approved, in writing, by firestop material manufacturer. Said specialist shall be as defined in the Conditions. Equipment used shall be in accordance with firestop material manufacturer's written installation instructions.

J. Materials shall conform to all applicable governing codes.

K. All materials used in the work shall be certified "asbestos free" and shall be free from any and all solvents or components that require hazardous waste disposal or, that after curing, dissolve in water.

L. All materials shall comply with the interior finish flame spread and smoke developed requirements for the area in which they are installed./ Coordinate with governing codes.

M. DEFINITIONS

1. FIRESTOPPING: The use of a material or combination of materials in a fire-rated structure (wall or floor) where it has been breached, so as to restore the integrity of the fire rating on the wall or floor.

2. SYSTEM: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s), constitutes a "system".

3. BARRIER: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.

4. THROUGH-PENETRATION: Any penetration of a fire-rated wall or floor that completely breaches the barrier.

5. MEMBRANE-PENETRATION: Any penetration in a fire-rated wall that breaches only one side of the barrier.

6. CONSTRUCTION GAPS: Any gap, joint, or opening, whether static or dynamic, where the top of a wall may meet a floor; wall to wall applications; edge to edge floor configurations; floor to exterior wall; or any linear breach in a rated barrier. Where movement is required, the firestopping system must comply with UL2079 for dynamic joints.

1.5 SUBMITTALS

NOTE: A “Certificate of Conformance”, from the manufacturer listed in Part 2, is required with the “Submittal Package” to ensure that the material selected meets all of the criteria of this specification as set forth in Paragraph 1.4 of this Section.

A. Submit manufacturer’s product literature for each type of firestop material to be installed. Literature shall indicate project characteristics, typical uses, performance and limitation criteria, and test data. Submittal should be in compliance with Section 013300.

B. UL Tested Systems: Submit drawings showing typical installation details for the methods of installation. Indicate which firestop materials will be used and thickness for different hourly ratings.

C. Engineering Judgments: Submit manufacturer’s drawings for all non-standard applications where no UL tested system exists. All drawings must indicate the “Tested” UL system upon which the judgment is based so as to assess the relevance of the judgment to some known performance.

D. Submit manufacturer’s installation procedures for each type of product.

E. Approved Applicator: Submit document from manufacturer where in manufacturer recognizes the installer as a qualified or submit a list of past projects to demonstrate capability to perform intended work.

F. Upon completion, installer shall provide written certification that materials were installed in accordance with the manufacturer’s installation instructions and details.

G. Mockups:

1. Prepare job mockup of the material proposed for use in the project as directed by Architect. Approved mockups shall be left in place as part of the finished project and will constitute the standard for remaining work, including aesthetics.

H. Manufacturers Material Safety Data Sheet (MSDS) must be submitted for each manufactured product.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver all materials to be used in the work of this section to the project site in original sealed containers with manufacturer's brand and name, lot numbers, UL labeling, mixing and installation instructions clearly identified thereon.

B. Store all materials in accordance with manufacturer's directions from the project site at the contractors expense if date is expired.

1.7 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. E 814 – Standard Method of Fire Tests of Through Penetration Fire Stops.

2. E 119 – Methods of Fire Tests of Building Construction and Materials.

3. E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

4. E 136 – Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F.

5. E 1399 – Cyclic Movement and Measuring Minimum and Maximum Joint Widths.

6. E 1966 – Test Method for Resistance of Building Joint.

7. E 2174 – Standard Practice for On-Site Inspection of Installed Fire Stops.

8. E 05.11.14 – Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA); ASTM permanent number assignment pending approval of Draft.

B. Underwriters Laboratories, Inc. (UL)

1. UL 1479 – Fire Tests of Through Penetration Fire Stops.

2. UL 263 – Fire Tests of Building Construction and Materials.

3. UL 723 – Surface Burning Characteristics of Building Materials.

4. UL 2079 – Tests for Fire Resistance of Building Joint Systems.

5. UL "Fire Resistance Directory", current year, including but not limited to the following:

a. For penetrations by uninsulated, non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT) – UL System: CAJ1235, CAJ1404, WL1152.

b. For penetrations by insulated, non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EAMT) – UL System: CAJ5222, CAJ5250, CAJ5251, WL5171.

c. For penetrations by PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems) – UL System: CAJU2401, CAJ3185, CAJ3199, CAJ3234, WL3118, WL3179, WL3199.

d. For penetrations by combustible plastic pipe (open piping systems) – UL System: CAJ2174, CAJ2339, CAJ2351, CAJ2432, WL2168, WL2170, WL2185, WL2259.

e. For penetrations by multiple combustible and/or non-combustible items – UL System: CAJ8101, CAJ8133, WL8007.

f. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways – UL System: CAJ1406, CAJ1502, CAJ4053, CAJ6027, WJ6004, WL1207, WL1343, WL4030, WL6018.

g. For penetrations by steel ducts – UL System: CAJ7075, CAJ7082, WJ7045, WL7046, WL7006, WL7046, WL7081, WL7082.

h. For fire-rated construction joints and other gaps – OPL System: CEJ296P, CEJ302P.

6. For openings between structurally separate sections of wall and floors. At the top of walls – UL System: HWD0107, HWD0110, HWD0257, HWD0267, HWD0299, HWD0327, HWD0266, HWD 0333, HWD0334.

C. Factory Mutual (FM) Approval Guide, current year.

1. FM Approval Standard of Firestop Contractors – Class 4991.

D. Building code of the jurisdiction of the Work.

E. National Fire Protection Association

1. NFPA 101 – Life Safety Code.

2. NFPA 70 – National Electrical Code.

3. NFPA 221 – Fire Walls and Fire Barriers (preliminary to be released).

4. NFPA 251 – Fire Tests of Building Construction and Materials

F. FICA “Manual of Practice”.

G. Certification of “DRI” employee(s).

H. International Firestop Council (IFC):

1. Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments (April 2001)

2. Ref. 2 Inspectors Field Pocket Guide

1.8 PROJECT CONDITIONS

A. Conform to manufacturer's printed instructions for installation and when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.

B. Coordinate work required with work of other trades; firestopping shall, **where practical**, precede gypsum board or other applied sheet finishing operations.

C. Where firestopping is installed at locations which will remain exposed in the finished work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as required against damage from other construction operations.

1.9 SEQUENCING

A. Schedule firestopping after installation of penetrants but prior to concealing the openings.

1.10 PROTECTION

A. Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

PART 2 - PRODUCTS

2.1 GENERAL

A. Firestopping materials and systems shall meet the requirements specified herein.

B. Architect must approve in writing any alternates to the materials and systems specified herein.

C. All firestop products and systems shall be designed and installed so that the basic sealing system will allow the full restoration of the thermal and fire resistance properties of the barrier being penetrated with minimal repair if penetrants are subsequently removed.

D. For applications where combustible penetrants are involved, i.e., insulated and plastic pipe, a suitable intumescent material must be used.

2.2 SPECIFIED STANDARD: For purposes of establishing standards of quality and levels of performance and not for the purposes of limiting competition, the basis of this specification is upon units as manufactured by one of the following and their respective model suitable for the intended application.

A. Hilti, Inc.

B. Specified Technologies, Inc.

C. Grace / IPC Corp.

D. Nelson Firestop Products

E. Tremco, Inc.

F. U.S. Gypsum Company

G. Johns Manville

2.3 PRODUCTS SHALL GENERALLY INCLUDE:

A. Cast-In-Sleeves (3M CID).

B. Mortar seals.

C. Fire stop design sealant compounds, caulk and foam systems.

D. Putty and putty pads.

E. Firestop kits including collars, plugs, etc.

F. Seal bags.

G. Tapes and blankets.

H. Intumescent design wrap strips.

I. Mineral type unfaced safing insulation with third party wrap, 3.5 pcf density, UL R-10905 label.

2.4 ACCESSORY ELEMENTS

A. Forming, damming materials shall be mineral fiber board or other suitable material recommended by nominated system manufacturer.

B. Primers, sealant and solvent cleaners shall be as recommended by the nominated system manufacturer.

C. Metal Systems – 20 gauge phosphatized, electro-galvanized steel plate and/or galvanized steel clips.

2.5 Balance of materials shall be as specified elsewhere in this Section.

PART 3 – EXECUTION

3.1 INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

B. Verify the environmental conditions are safe and suitable for installation of firestop products./

C. Verify that all pipe, conduit, cable, and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.

3.2 PREPARATION

A. The surface shall be dry, clean, and free of all foreign matter. Do not apply firestopping to surfaces previously painted or treated with a sealer, curing compound, water repellant or other coatings unless tests have been performed to ensure compatibility of materials.

B. Provide primers as required which conform to manufacturer's recommendations for various substrates and conditions.

C. Mask where necessary to protect adjoining surfaces.

D. Remove excess material and stains on surfaces as required.

3.3 INSTALLATION – GENERAL SYSTEMS

A. Install in strict accordance with manufacturer's printed instructions as well as UL guidelines and state and local fire codes.

B. Ensure that anchoring devices, backup materials, clips, sleeves, supports and other materials used in the actual fire test are installed.

C. Install firestopping with sufficient pressure to properly fill and seal openings to ensure an effective smoke seal.

D. Tool or trowel exposed surfaces. Remove excess firestop material promptly as work progresses and upon completion.

E. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance ratings. Combustible damming materials must be removed after appropriate curing. Incombustible damming materials may be left as a permanent component of the firestopping system.

3.4 PENETRATION SEALS

A. Penetrations are defined as conduits, cables, wires, piping, ducts or other elements passing through one or both outer surfaces of fire rated walls, floors or partitions and shall be firestopped on both sides of penetration in accordance with requirements set forth in Paragraph 1.4 of this Section.

B. Where sleeves are used, same shall be as specified in Part 2 herein; in event that sleeves are not used, core openings and caulk or wrap penetrating items with intumescent system the full length of penetration and seal on both sides with intumescent caulk. Residual openings within square or rectangular holes shall be filled with compounds applicable for substrate encountered and all penetrations sealed on both sides with caulk.

3.5 FIELD QUALITY CONTROL

A. Contractor shall immediately notify the Architect if the firestopping systems herein specified cannot meet the requirements of the specification.

B. Contractor shall examine firestops to ensure proper installation and full compliance with this specification.

C. All areas of work must be accessible until inspection by the applicable Code authorities.

D. Correct unacceptable firestops and provide additional inspection to verify compliance with this specification at no additional cost.

3.6 IDENTIFICATION

A. Identify firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words: “Warning—Firestop System—Do Not Disturb. Notify Building Management of Any Damage.”

2. Contractor’s name, address, and phone number.

3. Firestop system designation of applicable testing and inspecting agency.

4. Date of installation.

5. Firestop system manufacturer’s name.

6. Installer’s name.

3.7 CLEANING

A. When finished work will be visible, clean adjacent surfaces in accordance with manufacturer’s printed instructions.

B. If visible in the finished work, remove temporary dams after initial cure of firestops.

C. Correct staining and discoloring on adjacent surfaces.

D. Remove all debris and excess materials entirely from site and leave work in a neat and clean condition.

3.8 FIRESTOP SYSTEM SCHEDULE

A. The following schedules shall be completed by the Contractor and reviewed prior to submission to the Architect. The untitled table included shall be completed with each of the following categories of penetrating items.

1. Single uninsulated metallic piping and conduit.

2. Multiple uninsulated metallic piping and conduit.

3. Uninsulated plastic piping and conduit.

4. Insulated metallic piping.

5. Electrical cable.

6. Bus duct.

7. Miscellaneous penetrations.

B. Complete the additional tables for the following using the format provided.

1. Blanks, voids, holes.

2. Engineering judgments.

3. Ductwork engineering judgments.

3.09 WASTE MANAGEMENT

A. Separate and recycle materials and material packaging in accordance with Waste Management Plan and to the maximum extent economically feasible and place in designated areas for recycling.

B. Set aside and protect materials suitable for reuse and/or remanufacturing.

C. Separate and fold up metal banding; flatten and place along with other metal scrap for recycling in designated area.

PENETRATING ITEM:

Manufacturer/Product Name:
Color:
Accessories:

Floor/Wall Construction	Item Size/ Description	Sleeve	F Rating	T Rating	Annular Space	Firestop Thickness	Tested Ass'y No.

BLANKS, VOIDS, HOLES:

Manufacturer/Product Name:
Color:
Accessories:

Floor/Wall Construction	Size/ Description	F Rating	T Rating	Firestop Thickness	Tested Ass'y No.

ENGINEERING JUDGMENTS (Submit Actual Installation Drawing and Letter of Certification)

Manufacturer/Product Name:
Color:
Accessories:

Floor/Wall Construction	Item/Size Description	F Rating	T Rating	Annular Space	Firestop Thickness	Packing Thickness

DUCTWORK ENGINEERING JUDGMENTS (Submit Actual Installation Drawing and Letter of Certification

Manufacturer/Product Name:
Color:
Accessories:

Wall/Fl Construction	Size	Fire Damper	F	T	Annular Space Range	Firestop Thickness	Packing Thickness

END SECTION 078443

SPECIFICATION – 079000 PRE-COMPRESSED EXPANSION JOINTS

PART 1 – GENERAL

1.01 Work Included

A. The work shall consist of furnishing and installing waterproof expansion joints in accordance with the details shown on the plans and the requirements of the specifications. Preformed sealant shall be silicone pre-coated, preformed, pre-compressed, self-expanding, sealant system.

B. Related Work
- Division 4 - Masonry
- Division 7 - Thermal & Moisture Protection
- Division 7 - Sealants, Caulking and Waterproofing

1.02 Submittals

A. General – Submit the following according to Division 1 Specification Section.

B. Standard Submittal Package – Submit typical expansion joint drawing(s) indicating pertinent dimensions, general construction, expansion joint opening dimensions and product information.

C. Sample of material is required at time of submittal.

D. All products must be certified by independent laboratory test report to exceed the requirements of curtain wall performance tests ASTM E330, E283-04, and E331. Product must meet or exceed hurricane-force wind loading with no deflection at both positive and negative pressures up to 4954 Pascals—equal to 200 mph winds (ASTM E330-02-procedure A).

E. All products must be certified by independent laboratory test report to ASTM E90-09 and to meet or exceed an STC 52 in STC 56 wall and OITC 38 rating in an OITC 38 wall.

F. All products must be certified by independent laboratory test report to be free in composition of any waxes or wax compounds using FTIR and DSC testing.

G. All products shall be certified in writing to be: a) capable of withstanding 150°F (65°C) for 3 hours while compressed down to the minimum of movement capability dimension of the basis of design product (-50% of nominal material size) without evidence of any bleeding of impregnation medium from the material; and b) that the same material after the heat stability test and after first being cooled to room temperature will subsequently self-expand to the maximum of movement capability dimension of the basis-of-design product (+50% of nominal material size) within 24 hours at room temperature 68°F (20°C).

H. Quality and Environmental control: Manufacturer shall be certified to both ISO-9001:2015 (quality management) and ISO-14001:2015 (environmental management) and shall provide written confirmation that formal Quality and Environmental management systems and processes have been adopted.

1.03 Product Delivery, Storage and Handling

A. Deliver products to site in Manufacturer's original, intact, labeled containers. Handle and protect as necessary to prevent damage or deterioration during shipment, handling and storage. Store in accordance with manufacturer's installation instructions.

1.04 Basis of Design

A. All joints shall be designed to meet the specified performance criteria of the SEISMIC COLORSEAL product as manufactured by: (USA & International) EMSEAL JOINT SYSTEMS, LTD 25 Bridle Lane, Westborough, MA 01581-2603, Toll Free: 800-526-8365.
(Canada) EMSEAL, LLC 120 Carrier Drive, Toronto, Ontario, Canada M9W 5R1 Toll Free: 800-526-8365. www.emseal.com

B. Alternate manufacturers must demonstrate that their products meet or exceed the design criteria and must submit certified performance test reports performed by nationally recognized independent laboratories as called for in section 1.02 Submittals. Submittal of alternates must be made three weeks prior to bid opening to allow proper evaluation time.

1.05 Quality Assurance

A. The General Contractor will conduct a pre-construction meeting with all parties and trades involved in the treatment of work at and around expansion joints including, but not limited to, concrete, mechanical, electrical, HVAC, landscaping, masonry, curtain wall, waterproofing, fire-stopping, caulking, flooring and other finish trade subcontractors. All superintendents and foremen with responsibility for oversight and setting of the joint gap must attend this meeting. The General Contractor is responsible to coordinate and schedule all trades and ensure that all subcontractors understand their responsibilities in relation to expansion joints and that their work cannot impede anticipated structural movement at the expansion joints, or compromise the achievement of watertighness or life safety at expansion joints in any way.

B. Warranty – Manufacturer's standard warranty shall apply.

C. LEED Building Performance Requirements:

1) The VOC of the silicone must not exceed 40 grams/liter
2) All substitute products must be proved to be certified by independent test report to exceed the requirements of curtain wall performance tests ASTM E330, E283-04, and E331. Product must meet or exceed hurricane-force wind loading with no deflection at both positive and negative pressures up to 4954 Pascals—equal to 200 mph winds (ASTM E330-02-procedure A).
3) Products must be proved to have been certified by independent test report in accordance with ASTM C518-04 and demonstrate an R-Value per 1-inch (25mm) of depth of not less than 2.15 at as-installed nominal joint size compression.
4) Products must be proved to have been certified by independent test report to ASTM E-90-09 and to meet or exceed a STC rating of 52 and OITC rating of 38.
5) Product must be proved by independent test report to have air permeability not to exceed 0.02 L/(s.m2) at 75 Pascals as required by the Air Barrier Association of America (ABAA) and conform to ASTM E283-04.

PART 2 – PRODUCT

2.01 General

A. Provide watertight, energy-efficient exterior joints in vertical-plane walls (above-grade). Typical locations include, but are not limited to the following: applications in window perimeters, other façade penetrations such as doors, store fronts, vents, HVAC units, panel to panel joints, curtain walls, control joints, between dissimilar materials, high-movement and seismic structural expansion joints, acoustic partition barriers, and new-to-existing connections.

B. Provide SEISMIC COLORSEAL as manufactured by EMSEAL JOINT SYSTEMS LTD and as indicated on drawings for vertical expansion joint locations.

C. Preformed sealant shall be silicone pre-coated, preformed, pre-compressed, self-expanding, sealant system. Expanding foam to be cellular foam impregnated with a water-based, non-drying, 100% acrylic dispersion. Seal shall combine factory-applied, low-modulus silicone and a backing of acrylic-impregnated expanding foam into a unified hybrid sealant system.

D. Material shall be capable of movements of +50%, -50% (100% total) of nominal material size

E. Silicone external color facing to be factory-applied to the foam while it is partially pre-compressed to a width greater than maximum joint extension and cured before final compression. When compressed to final supplied dimension, a bellow(s) to handle movement must be created in the silicone coating. Silicone coating to be available in a range of not less than 26 standard colors for coordination with typical building materials.

F. Select the sealant system model appropriate to the movement and design requirements at each joint location that meet the project specification or as defined by the structural engineer of record.

G. Manufacturer's Checklist must be completed by expansion joint subcontractor and returned to manufacturer at time of ordering material.

2.02 Fabrication

A. SEISMIC COLORSEAL by EMSEAL JOINT SYTEMS LTD must be supplied precompressed to less than the joint size, packaged in shrink-wrapped lengths (sticks) with a mounting adhesive on one face.

B. Directional changes and terminations into horizontal plane surfaces to be provided by factory-manufactured universal-90-degree single units containing minimum 12-inch long leg and 6-inch long leg or custom leg on each side of the direction change or through field fabrication in strict accordance with installation instructions.

PART 3 – EXECUTION

3.01 Installation

A. Preparation of the Work Area

1. The contractor shall provide a properly formed and prepared expansion joint openings constructed to the exact dimensions and elevations shown on manufacturer's standard system drawings or as shown on the contract drawings. Deviations from these dimensions will not be allowed without the written consent of the engineer of record.

2. The contractor shall clean the joint opening of all contaminants immediately prior to installation of expansion joint system. Repair spalled, irregular or unsound joint surfaces using accepted industry practices for repair of the substrates in question. Remove protruding roughness to ensure joint sides are smooth. Ensure that there is sufficient depth to receive the full depth of the size of the SEISMIC COLORSEAL being installed plus at least ¼-inch (6mm) for the application of corner beads. Refer to Manufacturers Installation Guide for detailed step-by-step instructions.

3. No drilling, or screwing, or fasteners of any type are permitted to anchor the sealant system into the substrate.

3.02 Clean and Protect

A. Protect the system and its components during construction. Subsequent damage to the expansion joint system will be repaired at the general contractor's expense. After work is complete, clean exposed surfaces with a suitable cleaner that will not harm or attack the finish.

END OF SECTION 079000

SECTION 079200 – JOINT SEALERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. The sealing of joints indicated on schedule at the end of this section.

2. The sealing of exterior joints, including:

a. Coping joints
b. Joints around perimeter of frames

3. The sealing of interior joints, including:

a. Wall joints
b. Joints around perimeter of frames
c. Joints between countertops and walls

4. The sealing of concealed joints in sound-retardant assemblies, including:

a. Around all electric outlet boxes, between top and bottom stud runners and structure, and where indicated

5. The sealing of joints in floors and pedestrian paving

6. The sealing of penetrations through exterior walls and roofs by pipes, ducts and conduit

7. The sealing of other joints indicated on drawings

B. Joints of a nature similar to that of joints indicated on the schedule shall be sealed with same sealer, whether indicated on drawings to be sealed or not.

C. Related Sections:

1. Firestopping/smokestopping sealers: Elsewhere in Division 7
2. Joint sealers in roofing work: Elsewhere in Division 7
3. Joint sealers in plumbing work: Division 22
3. Joint sealers in mechanical work: Division 23
4. Joint sealers in electrical work: Division 26

1.02 REFERENCES

A. AAMA 800-92 -- Voluntary Specifications and Test Methods for Sealants; American Architectural Manufacturers Association; 1992.

B. ASTM C 719-93 -- Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle); 1993.

C. ASTM C 834-95 -- Standard Specification for Latex Sealants; 1995.

D. ASTM C 919-84(88) -- Standard Practice for Use of Sealants in Acoustical Applications; 1984 (Reapproved 1988).

E. ASTM C 920-95 -- Standard Specification for Elastomeric Joint Sealants; 1995.

F. ASTM C 1193-91 -- Standard Guide for Use of Joint Sealants; 1991.

G. ASTM D 2628-91 -- Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements; 1991.

H. FS A-A-272 -- Caulking Compounds; 1980.

1.03 SUBMITTALS

A. Product Data: Manufacturer's data on each joint sealer, with instructions for substrate preparation and installation.

B. Samples for Color Selection: Cured samples of actual products showing manufacturer's full range of colors (Products exposed to view only.)

C. Samples for Color Verification: Cured samples of each color of each product used, prepared to simulate actual joints minimum 6 inches long; use substrates similar appearance to actual substrates. (Products exposed to view only.)

D. Substrate Test Report for Each Sealer.

E. Certified Product Test Reports: Independent testing agency reports showing compliance with all specified requirements.

1. Reports may be on tests conducted up to 24 months before submission, provided the products tested were aged specimens of the same formulation as that to be used.

F. Field Installation Test Reports.

G. Certificates: For each sealer, provide manufacturer's certificate stating that the product complies with the specifications and is appropriate for the use it is being put to.

H. Installer's Preconstruction Inspection Report: List all conditions detrimental to performance of joint sealer work.

1.04 QUALITY ASSURANCE

A. Installer Qualifications:

1. Execution of at least 50 sealer installations of similar size and scope.
2. Similar installations completed within 5 years before start of this project.
3. Lead mechanic assigned from among those experienced on previous similar projects.

B. Substrate Tests: Have samples of actual substrate materials tested by manufacturer(s) of sealer products.

1. Test to determine what preparation procedures (if any are necessary to make sealers adhere properly under environmental conditions that may occur during installation.
2. Test to determine compatibility with substrates backers, and secondary seals, if any.
3. Use manufacturer's standard test methods.

4. Report the sealer manufacturer's recommendations for substrate preparation and sealer installation and identify specific primer(s) required.
5. The requirement for testing for this project will be waived if test reports based on previous testing of the products and substrates to be used are acceptable to the architect.

C. Field Installation Tests: Before installation, test the adhesion of all sealers to actual substrates.

1. Seal at least 5-foot lengths of joints and cure properly. Try to pull sealer out of joint by hand, by method recommended by sealer manufacturer.
2. Select test joints representative of joints to be sealed by the product to be tested.
3. Perform tests for each type of sealer.
4. Do tests in the presence of the architect.
5. Report acceptable results only.

D. Mock-ups: Before beginning installation, install sealers in joints in actual construction as directed by the architect, to show color, materials, and installation. Keep mock-ups intact as the standard for evaluating the completed work.

E. Preinstallation Meeting: Have the installer, sealer manufacturers' representatives, and other affected installers meet to review sealer installation and protection procedures and sequencing with other work.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original containers or bundles with labels showing manufacturer, product name or designation, color, shelf life, and installation instructions.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Do not install sealers if any of the following conditions exist:

1. Air or substrate temperatures exceed the range recommended by sealer manufacturer or is below 40 degrees F (4.4 degrees C).

2. Substrate is wet, damp, or covered with snow, ice, or frost.

B. Dimensional Limitations: Do not install sealers if joint dimensions are less than or greater than that recommended by sealer manufacturer; notify the architect and get sealer manufacturer's recommendations for alternative procedures.

C. Coordination Data: Compression gasket manufacturer's requirements for joint dimensional tolerances; provide to installers of joints to be sealed with compression gaskets.

1.07 WARRANTY

A. Submit written warranty signed by contractor and installer guaranteeing to correct failures in sealer work that occur within 5 years after substantial completion, without reducing or otherwise limiting any other rights to correction which the owner may have under the contract documents. Failure is defined as failure to remain weathertight due to faulty materials or workmanship. Correction is limited to replacement of sealers.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

A. General: Provide only products which are recommended and approved by their manufacturer for the specific use to which they are put and which comply with all requirements of the contract documents.

1. For each generic product, use only materials from one manufacturer.
2. Provide only materials, which are compatible with each other and with joint substrates.
3. Colors of exposed sealers: As selected by the architect from manufacturer's standard colors.

B. Manufacturers: Products of the manufacturers listed, provided they comply with requirements of the contract documents will be among those considered acceptable.

1. Polysulfide sealants:

a. A. C. Horn, Inc.
b. W. R. Meadows, Inc.
c. Pecora Corporation
d. Products Research & Chemical Corporation

2. Silicone sealants:

a. Bostik Inc.
b. Dow Corning Corporation
c. Pecora Corporation
d. Tremco, Inc.
e. GE Silicones
f. Rhone-Poulenc, Inc.

3. Urethane sealants:

a. Bostik Inc.
b. Mameco International, Inc.
c. Pecora Corporation.
d. Products Research & Chemical Corporation.
e. Sika Corporation.
f. Sonneborn Building Products Division/ChemRex, Inc.
g. Tremco, Inc.
h. W. R. Meadows, Inc.

4. Acrylic solvent-release sealants:

a. Pecora Corporation
b. Koch Protective Treatments, Inc.
c. Tremco, Inc.

5. Butyl sealants:

a. Pecora Corporation
b. Koch Protective Treatments, Inc.
c. Tremco, Inc.

6. Acrylic-latex emulsion sealant:

a. Bostik Inc.

b. Pecora Corporation
c. Sonneborn Building Products Division/ChemRex, Inc.

2.02 ELASTOMERIC SEALANTS

A. Elastomeric Sealants - General: Chemically curing elastomeric sealants of types indicated, complying with ASTM C 920, including specific Type, Grade, Class, and Uses indicated, as well as all other requirements specified.

1. Where movement capability exceeding that measured by ASTM C 920 is specified, sealant shall withstand the total movement indicated while remaining in compliance with the other requirements specified, when tested in accordance with ASTM C 719, with base joint width measured at the time of application.
2. For M-type substrates: Comply with requirements for Use M.
3. For G-type substrates: Comply with requirements for Use G.
4. For A-type substrates: Comply with requirements for Use A.
5. For O-type substrates: Comply with requirements Use M (minimum) and Use O for the particular substrate.

B. Two-Part Pourable Polysulfide Sealant: Type M, Grade P, Class 12-1/2, Use T.

C. Polysulfide Sealant for Water Immersion: Type M, Grade NS, Class 12-1/2, Use T, specifically recommended by the manufacturer for sealing joints immersed continuously in water.

D. One-Part Non-sag Polysulfide Sealant: Type S, Grade NS, Class 12-1/2, Use NT.

E. High Movement Silicone Sealant: One- or two-part non-acid-curing, Grade NS, Class 25, Use NT, plus movement capability of at least 50 percent in both extension and compression.

F. Medium Movement Silicone Sealant: One- or two-part non-acid-curing, Grade NS, Class 25, Use NT, plus movement capability of more than 25 percent but less than 50 percent in both extension and compression.

G. High Strength Silicone Sealant: One-part, acid- or non-acid-curing, Type S, Grade NS, Class 25, Use NT; with not over plus or minus 30 percent movement capability.

H. Mildew-Resistant Silicone Sealant: One-part, Type S, Grade NS, Class 25, Use NT, formulated with fungicide, for interior use on nonporous substrates.

I. Silicone Sealant for Use T: One-part, non-acid curing, Type S, Grade NS, Class 25, Use T, Use M, plus movement capability of 50 percent in both extension and compression.

J. All-Purpose Urethane Sealant: Multipart, non-sag, Type M, Grade NS, Class 25, Uses NT, M, G and A.

K. Multipart Pourable Urethane Sealant: Type M, Grade P, Class 25, Use T.

L. Non-sag Urethane Sealant for Use T: Type S or M, Grade NS, Class 25, Use T.

M. One-Part Pourable Urethane Sealant: Type S, Grade P, Class 25, Use T.

N. Urethane Sealant for Water Immersion: One- or two-part urethane, Grade NS, Class 25, Use NT, specifically recommended by the manufacturer for sealing joints immersed continuously in water.

2.03 SOLVENT-RELEASE-CURING SEALANTS

A. Acrylic Sealant: Non-sag, one-part, solvent-release-curing; complying with ASTM C 920, Type S Grade NS, Use NT, with the following exceptions:

1. Weight loss: 15 percent, maximum.
2. Movement capability: 12-1/2 percent in both extension and compression, minimum.

B. Butyl Sealant: Non-sag, one part, solvent-release-curing; complying with FS A-A-272, Type III; non-staining; paintable.

2.04 LATEX SEALANTS

A. Acrylic-Latex Emulsion Sealant: One-part, non-sag, mildew-resistant, paintable; complying with ASTM C 834.

2.05 NON-CURING SEALERS

A. Non-curing Butyl Sealant: Nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant.

B. Butyl Polyisobutylene Sealant: Non-curing, nondrying, solvent-release; complying with 809.2, as described in AAMA 800.

2.06 COMPRESSION SEALS

A. Compression Gaskets: Neoprene (polychloroprene) hollow gasket; complying with ASTM D 2628; sizes and shapes as indicated.

1. Accordion Type
2. Manufacturers:

a. The D. S. Brown Company.
b. Watson Bowman Acme Corp.

2.07 SEALANT BACKERS

A. Backers - General: Non-staining; recommended or approved by sealant manufacturer for specific use.

B. Backer Rods: Flexible, nonabsorbent, compressible polyurethane foam, either open-cell or non-gassing closed-cell, unless otherwise restricted by sealant manufacturer; preformed to appropriate size and shape.

2.08 MISCELLANEOUS MATERIALS

A. Primers: Use primers determined to be required by substrate tests.

B. Cleaners: As recommended by sealer manufacturer and not damaging to substrates.

C. Masking Tape: Nonabsorbent, non-staining.

D. Tooling Agents: Approved by sealant manufacturer; non-staining to sealant and substrate.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine joints for characteristics that may affect sealer performance, including configuration and dimensions.

B. For compression gaskets, joints should have straight, parallel sides within proper tolerances, free of spalls.

C. Do not begin joint sealer work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Cleaning: Just before starting sealer installation, clean out joints in accord with recommendations of sealer manufacturers and as follows:

1. Remove all material that could impair adhesion, including dust, dirt, coatings, paint, oil, and grease. Exception: Materials tested to show acceptable adhesion and compatibility.
2. Dry out damp and wet substrates thoroughly.
3. Clean M-type and O-type substrates by suitable mechanical or chemical methods.
4. Remove loose particles by vacuuming or by blowing with oil-free compressed air.
5. Concrete: Remove laitance and form-release coatings.
6. Clean A-type and G-type substrates by chemical or other methods, which will not damage the substrate.
7. Use methods, which will not leave residues that will impair adhesion.

B. Priming: Prime substrates as recommended by sealer manufacturer.

C. Masking Tape: Use masking tape to keep primers and sealers off of adjacent surfaces, which would be damaged by contact or by cleanup. Remove tape as soon as practical.

D. Install fillers where needed to provide proper joint depth or support for sealant backers.

3.03 INSTALLATION

A. Comply with sealer manufacturers' instructions and recommendations, except where more restrictive requirements are specified.

B. Gunnable and Pourable Sealants: Comply with recommendations of ASTM C 1193.

C. Sealants in Acoustical Assemblies: Comply with recommendations of ASTM C 919.

D. Backers:

1. Install backers at depth required to result in shape and depth of installed sealant, which allows the most joint movement without failure.

a. Make backers continuous, without gaps, tears, or punctures.
b. Do not stretch or twist backers.

2. If backers become wet or damp before installation of sealant, dry out thoroughly before proceeding.

E. Sealants: Use methods recommended by manufacturer completely fill the joint; make full contact with bond surfaces; tool non-sag sealants to smooth surface eliminating air pockets.

1. Use concave joint shape shown in Figure 5A in ASTM C 1193, where not otherwise indicated.

F. Compression Gaskets: Use methods recommended by manufacturer; use as few end joints as possible; apply adhesive just before installing gaskets; make adhesively sealed joints at ends, corners, and intersections; install with top face approximately 1/8 to 1/4 inch below adjoining surfaces.

3.04 PROTECTION AND CLEANING

A. Clean surfaces adjacent to joints as work progresses and before sealants set using methods and materials approved by manufacturers of sealers and of surfaces to be cleaned.

B. Protect joint sealers from contamination and damage.

C. Remove and replace damaged sealers.

3.05 SCHEDULE OF JOINT SEALERS

A. General: Unless otherwise indicated, joints around perimeter of frames, where indicated to be sealed, are to be sealed using sealer specified for the substrate adjacent to the frame.

B. Exterior Joints for Which No Other Sealer Is Indicated:

1. Use one of the following sealants:

a. High movement silicone sealant
b. Medium movement silicone sealant

2. Backer: Backer rod
3. Joint shape: Concave joint configuration

C. Interior Joints for Which No Other Sealer Is Indicated:

1. Use one of the following sealants:

a. Acrylic-emulsion latex sealant

2. Backer: Backer rod
3. Joint shape: Concave joint configuration

D. Below-Grade Joints:

1. Use one of the following sealants:

a. Polysulfide sealant for water immersion
b. Urethane sealant for water immersion

2. Backer: Backer rod
3. Joint shape: Concave joint configuration

E. Exterior Joints Well Protected from Weather and Not Subject to Movement:

1. Use one of the following sealants:

    a. Acrylic sealant
    b. Butyl sealant

2. Backer: Backer rod

F. Interior Floor Joints and Pedestrian Paving Joints, Less than 1-1/2 Percent Slope:

1. Use one of the following sealants:

    a. Compression gasket
    b. Two-part pourable polysulfide sealant
    c. Silicone sealant for Use T
    d. Two-part pourable urethane sealant
    e. Two-part nonsag urethane sealant for Use T
    f. One-part pourable urethane sealant

2. Backer: Backer rod

3. Joint shape: Concave joint configuration

G. Joints around Pipes, Ducts, and Conduit Penetrating Exterior Walls and Roofs:

1. Use one of the following sealants:

    a. Same as used for adjacent substrates

H. Joints in Interior Wet Areas:

1. Use one of the following sealants:

    a. Mildew-resistant silicone sealant

2. Backer: Backer rod
3. Joint shape: Concave joint configuration

I. Concealed Joints in Acoustical Assemblies:

1. Use one of the following sealants:

    a. Acrylic-emulsion latex sealant
    b. Non-curing butyl sealant
    c. Butyl polyisobutylene sealant

END OF SECTION 079200

SECTION 079513 – EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Conform to sections of Division 1 as applicable.

1.2 RELATED WORK

A. Section 033000 – Cast – in – place concrete

B. Section 079000 – Pre-Compressed Expansion Joints

C. Section 079200 – Joint Sealants

1.3 SUBMITTALS

A. Submit manufacturer's product technical data showing relevant performance criteria.

B. Submit manufacturer's installation instructions.

C. Submit shop drawings showing profile dimensions, splicing details, joinery details with other systems, special end conditions, fasteners, adhesives and relationships to adjoining work prior to shipment of materials to the site.

D. Samples of profiles, colors and materials for each joint cover assembly for approval before used on site.

E. Submit manufacturers warranty letters as per general requirements of the contract.

1.4 QUALITY ASSURANCE

A. Obtain expansion joint cover assemblies from one source (from a single manufacturer) whenever possible to avoid any compatibility issues.

B. In addition to requirements of project specifications, comply with manufacturer's instructions and recommendations for all phases of work, including preparation of substrate, applying materials, and protection of installed units.

C. Obtain a letter from the manufacturer certifying that product selection, preparation and placement of the expansion joint system is in accordance with manufacturer's requirements.

D. Defects or deficiencies include adhesive and cohesive failures, system's inability to accommodate specified movements, moisture penetration in case of watertight applications, inability to withstand loading and traffic requirements, cracking of nosing/ filler materials due to aggregate loading, not conforming to specified geometries, and improper workmanship.

E. Defects and deficiencies are to be corrected by the expansion joint installer at no cost to the owner during the period of manufacturer's warranty.

F. Products shall be installed either by manufacturers licensed applicators, approved installers or after installation training from the manufacturer.

G. Materials and work should conform to all applicable codes and requirements of local authorities having jurisdiction.

H. Where indicated, install fire barriers, before the installation of expansion joints.

I. Install fire assemblies if required from one source (from a single manufacturer) and not necessarily from the expansion joint manufacturer to avoid compatibility issues in areas requiring fire barriers only and no expansion joint assemblies.

1.5 ENVIRONMENTAL CONDITIONS

A. Do not install products at temperatures less or more than published in manufacturer's product data.

B. Do not install products without prior approval in damp or wet substrates.

C. Do not install products without prior approval that might come in contact with aggressive media during the construction process.

1.6 REFERENCES

A. Reserved.

B. ASTM – D2240 – 97, Durometer hardness in rubbers.

C. Reserved

D. Reserved

E. ASTM – D3574, Flexible Cellular Materials - Slab, Bonded, and Molded Urethane Foams - Compression Force Deflection

F. Reserved

1.7 DELIVERY, STORAGE AND HANDLING

A. Exercise proper care in handling of all work so as not to harm the finished surface, and take proper precautions to protect the work from damage after it is in place.

B. Store materials under cover in a dry and clean location off the ground.

C. Store adhesives, epoxies and resins at room temperature.

D. Remove materials that are damaged or otherwise not suitable for installation and replace with acceptable materials before handing over the completed work to the site authorities.

E. Installed assemblies should be identical to submitted and reviewed shop drawings, samples and certificates.

PART 2 - MATERIALS AND PRODUCTS

2.1 MATERIALS

A. Aluminum and steel alloys and extrusions should be treated and finished to suit project requirements.

B. Rubber inserts should be ADA compliant and capable of withstanding design temperatures, design loads and design movements. Rubber inserts should be heat weldable when necessary to create watertight transitions.

C. Nosing materials should conform to required elastomeric properties maintaining 1:2 resins to aggregate ratio.

D. Preformed sealants and rubber products required to accommodate movements and maintain memory should not experience compression set beyond desirable limits as mentioned in ASTM standards given in 1.6 - section references.

E. Profile design and shape should be ADA compliant and capable of withstanding design loads and provide structural separation and movement without disturbing the integrity of adjacent substrates.

F. Fasteners or adhesive materials should not contaminate the substrate, create undue stresses at joint edges or compromise the functionality of adjacent materials and substrates.

G. Reserved

2.2 FABRICATION

A. Fabricate expansion joint covers, square, true, straight and accurate to required joint sizes and profile dimensions.

B. Fabricate lengths in continuous runs of at least 2.00LM for precompressed sealants, at least 3.00LM for metal parts and at least 20.00LM for rubber parts.

C. Assemble systems in shops wherever practicable.

D. Make available to the installer all necessary tools, mixing equipment and welding equipment to ensure proper installation.

E. Fabricate and supply all necessary accessories to suit the application and to deliver required performance.

F. Provide isolation coatings, rust inhibitive paints or dielectric separators where aluminum components will be in contact with concrete, masonry or dissimilar materials.

G. Fabricate and make available all profiles for flat and corner installations.

H. Reserved

2.3 PRODUCTS

A. Expansion joint assemblies installed in interior spaces should be able to accommodate a total movement of 33% of the specified joint width. Assemblies should be able to accommodate movement sin three directions under specified loading.

B. Interior floors with retrofit conditions or surface mounted assemblies:
Basis of Design: EMSEAL Migua FN series.
Expansion joint assemblies to bridge XXmm wide joint gaps comprising of metallic anchorage units (rails) installed on both sides of the gap and a flexible rubber insert bridging the gap. The anchorage units are fastened on top of the finished floor. Profile should be capable of withstanding loads from occasional vehicular traffic.

PART 3 - EXECUTION

A. SURFACE CONDITION

1. Joint surfaces to receive seal shall be sound, smooth, straight, parallel, clean, dry and free of all visible contaminants. Applications of non-visible coatings or contaminants to surfaces of joint interface area prior to installation of seal shall be controlled by the Architect/Engineer in consultation with the expansion joint manufacturer.

B. INSTALLATION

1. The following is a general summary of installation requirements. In all cases the manufacturer's standard written instructions or specific instructions of a manufacturer's technician are to be followed.
2. Set work plumb, square, level and free from distortion.
3. Use anchoring devices and fasteners for securing expansion joint cover assemblies to in-place construction. Provide chemical fasteners wherever possible and as recommended or supplied by expansion joint manufacturer.
4. System to be leveled into and embedded in 2-part hi-mod epoxy-gel setting-bed as supplied by expansion joint manufacturer in blockout mounted horizontal applications. Ensure that no rattling or movement occurs between the substrate and the profile.
5. System to be leveled into and fastened to the studs behind the wall finishes in blockout mounted vertical applications.
6. Perform all cutting, assembling and fitting required for installation of expansion joint covers.
7. If being installed in blockouts on each side of the joint-gap, the blockout depth shall equal the system leg height plus ¼-inch (6mm). The blockout width on each side of the joint-gap will vary with model being installed and with size of joint-gap (consult with manufacturer before casting or cutting blockouts).
8. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels. Securely attach in place with all required accessories. Locate anchors at recommended intervals, and not less than 3 inches from each end.
9. Maintain continuity of expansion joint cover assemblies with end joints held to a minimum. Lengths of profiles with one-piece anchorage unit are connected with the help of slide-in connecting pins. Lengths of profiles with two-piece anchorage units are connected by staggering the aluminum profiles.
10. The blockouts in case of recessed profiles are to be filled flush to the floor or top surface of the expansion joint with a low-modulus elastomeric concrete capable of handling expected loads. If installing into floor where special floor covering is specified, joint system must be installed higher than the sub-floor level by an amount which will allow the flooring material to be installed flush to the finished surface of the joint system.
11. Reserved

3.3 CLEANING AND PROTECTION

A. Do not remove protective materials until finish work in adjacent areas is complete.

B. When protective material is removed, clean exposed metal surfaces to comply with manufacturer's instructions.

C. Remove all waste materials from the site.

D. Seal shall be cleaned of all foreign matter as recommended by the seal manufacturer.

E. Leave work in a condition satisfactory to the Architect/Engineer.

END OF SECTION 079513